

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS
LIMITED



Registered Office: BHEL House, Siri Fort, New Delhi – 110 049, India
Website: www.bhel.com

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CONTENTS

Sl. No	DESCRIPTION	Chapter
Volume-IA	Part-I: Contract specific details	
1	Project Information	Chapter-I
2	Scope of Works and Technical Specifications	Chapter-II
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V
6	Time Schedule	Chapter-VI
7	Terms of Payment	Chapter-VII
8	Taxes and other Duties	Chapter-VIII
9	Estimated Weight for various systems in scope of work (BOQ)	Chapter-IX
10	General	Chapter-X
11	Welding Schedule	Chapter-XI
12	Foundation & Grouting	Chapter-XII
13	Material Handling, Transportation and Site Storage	Chapter-XIII
14	Erection	Chapter-XIV
15	Welding, Heat treatment & Radiography and Non-destructive testing	Chapter-XV
16	Hydraulic test	Chapter-XVI
17	Testing, Pre – Commissioning & Commissioning And Post Commissioning	Chapter-XVII
18	Painting	Chapter-XVIII
19	Lining & Insulation	Chapter-XIX
20	Preservation & Protection Of Components	Chapter-XX
21	Special Features	Chapter-XXI
22	Specific Exclusion	Chapter-XXII
23	Bill of Quantities and % Weightage of Individual Items	Chapter-XXIII
24	Technical Annexure	Chapter-XXIV

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I: Project Information

1.0 Project Information:

Sl. No.	Description	Details
1	Project Title	2X800MW Lara Super Thermal Power Station, Stage-II
2	Customer	National Thermal Power Corporation Limited (NTPC Limited)
3	Location	Lara STPP Stage-I units are in operation near Lara village in Raigarh Distt. of Chhattisgarh. The Present tender is for the scope to be executed in Lara STPP, Stage-II (2x800 MW) as extension of existing Stage-I. The project is located in Raigarh district of Chhattisgarh State. The project is located south-east of Raigarh town near village Lara, bounded by villages Lara, Chhapora & Lhakhang and on the western side of Odisha State boundary. The project site is approachable from NH-200 (Raigarh–Sarangarh) via Kondatarai through State PWD Road.
4	Nearest Airport	The nearest commercial airport, Jarsuguda is about 90 kms from the project site. Raipur is about 250 kms from the project site.
5	Nearest Railway link	The nearest rail head Raigarh Railway Station (on South East Central Railway, Howrah-Bilaspur Broad Gauge), is approximately 30 kms from the project site.
6	Access By Road/Major Cities	The project site is approachable from NH-200 (Raigarh–Sarangarh) via Kondatarai through State PWD Road..
7	Temperature	Mean of daily minimum temperature = 13.2°C Mean of daily maximum temperature = 41.8°C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I: Project Information

8	Seismic Zone	The project site lies in zone III as defined in IS: 1893.
9	Wind Speed	Design wind speed is 39 m/sec as per IS: 875 Part III

	INSTRUCTIONS TO BIDDERS	
1.1	The Bidder shall visit project site and acquire full knowledge and information about conditions prevailing at site and in & around the plant premises, together with site conditions, transportation routes, various distances, all the statutory, obligatory, mandatory requirements of various authorities and all information that may be necessary for preparing the bid and entering into the Contract. All costs for and associated with site visits shall be borne by the bidder.	
1.2	Other contractors would be working in this area and their structures are to be protected. The material brought and stacked for construction should not make hindrance to other contractors.	
1.3	The information given herein is for general guidance and shall not be contractually binding on BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.	
1.4	The contractor, in the event of this work awarded to him, shall establish an office at site and keep posted an authorized, responsible officer with valid Power of Attorney for the purpose of the contract. Any order or instructions of the 'Engineer' or his duly authorized representative, communicated to the contractor's representative at site office will be deemed to have been communicated to the contractor at his legal address.	
1.5	No claim will be entertained by BHEL on ground of lack of knowledge and the contractor's rates shall be deemed to have taken this into account.	
1.6	Bidders may fix up their site visit in consultation with below mentioned contact person:	
	Name:	Mr. Shailesh Kumar Chitti Mr. Mihir Sarkar
	Designation:	Sr DGM Manager
	Location:	2X800 Lara Project PSER Kolkata
	Email:	shaileshc@bhel.in mihir.sarkar@bhel.in

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I: Project Information

	Ph. No.	(+91) 888 973 3376	(+91) 833 101 5820
--	----------------	--------------------	--------------------

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.0	Scope of Works:
2.1	Erection, commissioning & Trial Operation including application of lining, Insulation, supply & touch-up painting as and where required including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site, and handing over of Boiler and its auxiliaries, Boiler integral piping, Structure for bunker, Pressure Part, Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, Mills, Power Cycle Piping (incl. MS, HRH, CRH etc.), HP Piping, LP Piping (in and around SG area), Deaerator, Refractory, Erection of Bunker & allied works, including supply & installation of items as per BOQ of following Packages at 2X800 MW NTPC LARA Stage II Project, Dist. Raigarh, CG: Package-A: Unit # 3 Boiler and Common System of 2X800 MW NTPC Lara Project. Package-B: Unit # 4 Boiler of 2X800 MW NTPC Lara Project. Note: Ordering of Package A & B as above shall be governed as per modality of award described in TCC. All the clauses shall be applicable on both the agencies separately (until otherwise explicitly mentintion). Before commencement of any work, the bidders have to check with Civil/Mechanical/Electrical drawings jointly with concerned BHEL Engineers.
2.2	The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of handling, loading and transporting of materials from project stores sheds / storage yards to site of erection or preassembly yard and unloading at pre-assembly area/erection site, checking, cleaning chipping and levelling of foundations, providing packers and shims/pre-assembling of equipment at the preassembly yard, inspection, minor rectification, preservation, erection, levelling, and other adjustments, cutting, edge / surface preparation, welding, grinding, radiography, LPI/MPI/UT/PAUT/CRT testing wherever needed, heat treatment, carrying out air tightness test by soap solution / kerosene, Vacuum test, hydraulic test, steam / air blowing, light up, chemical cleaning, passivation, steam blowing and safety valve floating including inter connection of all the termination points, erection and dismantling of all temporary piping, valves, pumps, tanks etc., and all other tests as per Latest FQP and commissioning procedures,required for the above operations, all pre-commissioning tests and trial runs of Boiler & its Auxiliaries including Bunker & Bunker structures, Power Cycle Piping and LP Piping (aroung SG area) etc.
2.3	BHEL at its discretion may include works in other area on silimar nature limited to 15% of awarded contract value, which are not mentioned in above scope of works. Contractor shall execute such works as desired and as directed by BHEL Engineer. The item rates & contract conditions shall remain unchanged for such works.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.4	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.
2.5	GENERAL
2.5.1	Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
2.5.2	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.
2.5.3	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.
2.5.4	Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and fro the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handing over the works in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.
2.5.5	Manpower hired/deployed by contractor for this project shall be monitored through online project monitoring system. All Personnel entering in to NTPC site premises for carrying out any work shall be tracked. Tracking devices shall be provided by BHEL on chargeable basis to contractor. BHEL will provide tags free of cost at first instance. In case of damage or missing of issued worker tag, Rs. 1000/- per tag will be charged for issuing new worker tag.
2.5.6	The area of work shall be cleared of all vegetation, rubbish and other objectionable matter and materials by contractor. No separate payment for these operations shall be made for such works.
2.5.7	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.
2.5.8	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.
2.5.9	All necessary arrangement for safety like Hard Barricading with scaffolding pipes and providing of safety net is in bidder's scope.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.5.10	The Customer may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works at no extra cost to BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.
2.5.11	Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works shall be in the scope of contractor.
2.5.12	Carrying out establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars 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.
2.5.13	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.
2.5.14	Medical/First aid center/medicine purchased for emergency/Doctor purpose along with ambulance services with fuel and operator (round the clock) shall be arranged by BHEL for handling medical emergencies. Cost against these facilities shall be distributed / shared among the vendors working in Lara Project site proportionately based on contract value.
2.5.15	The complete works shall be carried out as per BOQ cum Rate schedule. If any work covered in the scope of contract cannot be executed using items available in BOQ, additional / extra items shall be made and rates for such items shall be worked out as per GCC clause 2.15.7. However, contractor shall be bound to execute all the works under the scope of the contract and decision whether an extra item is applicable or not, shall be taken by BHEL Engineer which will be binding on the contractor.
2.5.16	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	Tentative Technical Staff Requirement:

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.6.1	• Project Manager – 01 Head with 15 Years' relevant experience in Industrial Building & Power Plant (Boiler & Piping) Works etc. • Asst. Project Managers – 01 Heads with 12 Years' relevant experience in Industrial Building & Power Plant (Boiler & Piping) Works etc. • Experienced Engineers – 04 heads, 01 PP+TP, Structure-1, NPP+Ducts-1, Piping-1 and on later stage 01 no. dedicated head for Insulation and cladding) • Experienced Foreman / Supervisors – 08 heads • Planning & Billing Engineers – 02 head • Stores, Gate Pass – 01 head • Accounts & Administration – 01 head • Human Resource officers – 01 head • Quality Control Engineer – ○ Sr. Quality Control Engineer– 01 Head with minimum 10 Years' relevant experience in quality control of Boiler / piping ○ Quality Control Engineer – 02 heads with minimum 03 years' relevant experience in NDT (Level-2 in RT, UT, LPI/MPI) ○ QA/QC Documentation Engineer with minimum 03 years' relevant experience in QA/QC of boiler & piping – 01 no. • Safety Engineer – As per HSE Plan • Operator, Licensed Electrician, Mechanic - As per requirement • Experienced Helpers – lot for similar nature of work • Security Guards (Round The Clock) – As per requirement. Note: Above manpower requirement is tentative only. Contractor shall augment manpower to meet the project schedule/ milestones. Deployment of manpower shall be progressive to meet the project schedule.
2.6.2	Deputation of above man-power shall be jointly decided at site in line with construction Schedule.
2.6.3	Engineer/ supervisor for other functions like store & purchase, material management, planning, finance, administration etc. are to be provided as per site requirement and not considered in above list.
2.6.4	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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.6.5	In addition to above, a well experienced qualified engineer to be designated, as 'Project Co-coordinator', shall be deployed by the contractor. Such engineer shall have adequate exposure on the job and shall remain fully involved in all planning activities, guidance etc. to contractor's own team during the complete execution period of contract.
2.6.6	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 organization shall be reinforced from time 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.
2.7	Supervisors / Engineer and Computer for exclusive use of BHEL:
2.7.1	The Contractor will have to provide 02 nos. of supervisors / Engineers , acceptable to BHEL Site with sufficient computer knowledge (knowledge of MS office) to whom works will be assigned in consultation and acceptance of BHEL for original contract and extended period. BHEL may utilize this manpower in any area of work with in plant premises as per requirement. All statutory compliances, gate passes, food and accommodation of these manpower shall be arranged by contractor.
2.7.2	In case, the contractor fails to provide supervisors / Engineers as decided by BHEL for a continuous period of fifteen days or more, BHEL shall have the right to depute it on behalf of contractor, all statutory compliances, gate passes, food and accommodation of these manpower shall be arranged by contractor. In such case cost (if any) incurred by BHEL, the same shall be recovered from contractor's bill along with overhead of 5%.
2.7.3	The bidder will have to provide Two (02) No. of Laptops (X-86 Architecture Based, 64-Bit Supported, Microprocessor with minimum 8 cores, On-board Graphics feature compatible with supplied OS, Minimum 8 GB RAM 2666 MHZ SDRAM upgradeable to 16 GB, 512 GB SSD M.2 Hard Drive or higher, 13" - 14" (both included) high definition anti-glare LED back lit Screen, OEM USB Optical Travel Mouse, Integrated High definition audio with integrated speakers and volume control (Hardware/Software). Single audio jack (single pin) for connecting ear phones and mic, Built-In HD Webcam with Built-In Microphone, integrated 100/1000 Mbps port, Integrated Wi-Fi 6, supporting industry standard IEEE 802.11ax + Bluetooth 5.0 or higher, Minimum 2xUSB 3.1 Ports, 1xType C, Stereo headphone/ microphone combo jack, 1 x HDMI Port. 1 x RJ – 45, Minimum 3-cell battery capable of providing 6 hours or more backup in standard business environment, ACPI Compliant, OEM AC Adaptor suitable for 230V supply, Should come pre-installed with Windows 11 Professional Edition or latest version with 64bit latest service pack, OEM carry bag to be supplied with OS Certification from Microsoft and required software like MS Office 2010 Professional, AutoCAD 2011, ADOBE PDF CREATOR (version 8.0) with one laser jet printer compatible for A4 and A3 size printing with power backup at places, as per instruction of BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.7.4	These laptops/ printers shall remain contractor's property/ownership for all legal/technical purposes. However, contractor will be allowed to take out the same after completion of the site works. The computer/printer shall remain at BHEL offices during the contract period/ extended period (if any).
2.7.5	This facility has to be provided as directed by BHEL till completion of site works or as decided by BHEL. If contractor fails to provide computer/ printer as per requirement, for a continuous period of fifteen days or more, BHEL shall have the right to purchase it on behalf of contractor and recover the expenses incurred from the dues payable to contractor. Recoveries shall be actual expenses incurred plus 5% overheads.
2.8	Field Quality Assurance:
2.8.1	The contractor shall be responsible for day-to-day quality checks for works and other building materials in line with approved Field Quality Plan (FQP) and Manufacturing Quality Plan (MQP) during the progress of work. All quality records and log sheets shall be maintained as per the requirement of BHEL/CUSTOMER and as per FQP/MQP approved by BHEL/CUSTOMER.
2.9	Erection Clause:
2.9.1	The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of handling, loading and transporting of materials from project stores sheds / storage yards to site of erection or preassembly yard and unloading at pre-assembly area/erection site, checking, cleaning chipping and levelling of foundations, providing packers and shims/pre-assembling of equipment at the preassembly yard, inspection, minor rectification, preservation, erection, levelling, and other adjustments, cutting, edge / surface preparation, welding, grinding, wherever needed, application of touch up Painting (as and where required).
2.9.2	The works to be performed under this contract consist of providing all labour, supervision, material, scaffolding, construction equipment's, tools and plants, temporary works, supplies including POL, 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 structural erection drawings. 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.
2.9.3	The bidder should fully apprise himself of the prevailing conditions at the proposed site, climatic conditions including monsoon pattern, local conditions, 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

2.9.4	The quantities indicated in the tender specification are approximate and are liable for variation at the 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.
2.9.5	All transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc, except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.
2.9.6	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.
2.9.7	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 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 equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where 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, with in the quoted rate.
2.9.8	The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.
2.9.9	Considering the area constrain in the subject project, Contractor has to work in close co-ordination with other 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 etc., are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.
2.9.10	No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

	engineer. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / Customer without any additional cost.
2.9.11	The storage yard is located within the plant boundary and outside plant boundary of the plant premises in multiple locations. All other materials have to be transported from storage yard to construction area by the contractor at his own cost, using own Pick & Carry Crane (Farrana) , crane and trailer.
2.9.12	Painting: Touch-up Painting: All structures/ components shall be supplied from BHEL units/ workshops with finish coats of paint. Therefore, final painting is not applicable in the scope of contractor for Unit supplied items (until specifically mentioned in the tender). However, touch up painting (wherever required), incidental to the work, shall be in the scope of the contractor, including supply of the required paints and primers and associated consumables.
2.9.13	During the course of erection, certain rework / modification / rectification / repairs / fabrication etc will be necessary on account of feedback/revision from various relevant sources, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repairs etc promptly and expeditiously.
2.9.14	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 his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works. <u>(Refer HSE Manual)</u> 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 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.
2.9.15	Contractor has to deploy following manpower at site/BHEL PSER HQ Kolkata office, in addition to requirement mention else where in this contract, within 15 days from the date on which the requirement is mentioned in Contractor performance review (F-14) format. 2 nos. Computer Operator (Experience in computer) 2 nos. Service staffs.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

	c. 4 nos. Engineer/Supervisor (Minimum Qualification Engineering/Diploma) d. 2 nos. Safety Engineer. The qualification is as per HSE plan. e. 2 nos. Quality (QA/QC) Engineer (Minimum Graduate Experience in QA/QC) The deployed manpower shall report to BHEL and may be deployed at any location. BHEL shall make payment on pro rata monthly basis on actual deployment as per BOQ(considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per person per service day, for such delay.
2.9.16	Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and fro the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.
2.9.17	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.
2.9.18	Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.
2.9.19	Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works.
2.9.20	Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.
2.9.21	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.
2.9.22	Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
2.9.23	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.
2.9.24	Contractor shall set up suitable storage facilities. Contractor shall ensure the Storage of only those material at site which will be erected/Pre-assembled within 10 days

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

	OR as directed by BHEL Engineer. Any wastage due to lapse of storing shall be debited to contractor.
2.9.25	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. 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.
2.9.26	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.
2.9.27	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.
2.9.28	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.
2.9.29	Adequate water less/Bio urinals (at least 1 no. per 100 nos of manpower, in alternate levels/locations) shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas with proper disposal arrangement.
2.9.30	Vendors have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, NTPC Safety requirement, State/Central statutory requirement.
2.9.31	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.
2.9.32	Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.
2.10	Consumables
2.10.1	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.
2.10.2	The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes (including alloy steel and stainless steel), all gases (inert, welding, and cutting), soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

	provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding 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. are to be arranged by agency.
2.10.3	All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.
2.10.4	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.
2.10.5	The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
2.10.6	The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.
2.10.7	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.
2.10.8	Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the contractor.
2.10.9	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 and portable drying ovens shall be provided by contractor at his cost.
2.10.10	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.
2.10.11	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.
2.10.12	Sealing compounds and GI wires for insulation mattress binding and Self drilling screws / Self tapping screws for sheeting works shall be provided by the agency within the quoted price/rates.
2.11	BHEL is entitled to engage a separate Contractor for NDT & PWHT / SR for the welding works executed in this contract, without assigning any reason to the contractor. In this regard, Contractor shall not be entitled for corresponding payment against as mentioned in Terms of payment Chapter VII of TCC. However, Contractor has to provide all possible support to NDT & PWHT / SR agency such as Scaffolding, area illumination, approach, wrench/sky climber with operator etc. Item no. 7.1.5.2 of Terms of payment Chapter VII of TCC shall be payable for such support. In case, any defect is identified, repair work shall be done by contractor (Boiler agency) at no extra cost to BHEL. Extra NDT & PWHT / SR arise due to defect, shall

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II: Scope of Work

	be debited to contractor (Boiler agency) at prevailing rate with 5% overhead. Engagement of NDT & PWHT / SR agency by BHEL, shall not vacate contractor from their responsibility of workmanship till trial run/PG Test/warranty period. Repair in weld joints, as and when required, shall be attended by the contractor."
2.11	HEIRARCHY:
2.11.1	In case of any conflict/deviations amongst various documents, the order of precedence shall be as follows: 1. Items Description in BOQ Cum Rate Schedule. 2. Technical Conditions of Contract (TCC). 3. Technical Specifications for Customer (Section-C). 4. IS Standard. 5. BHEL's Standard Specification (Section-D). 6. SCC/GCC

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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 (for details refer relevant clause of tender document)
		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	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipment, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	
f	Firefighting equipment like buckets, extinguishers etc.		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	For living purpose of the 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:			

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Sl. No	Description PART I	Scope		Remarks (for details refer relevant clause of tender document)
		BHEL	Bidder	
3.2.1	Electricity for construction purposes (for Site/Project works only) 3 Phase 415/440 V within project premises			
a	Single point source	Yes		Chargeable at prevailing tariff on project site at one point near the site at a distance of approx. 500 meter.
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 (Chargeable) within project premises			
a	Single point source (Chargeable)	Yes		Chargeable at prevailing tariff on project site at one point near the site at a distance of approx. 500 meter.
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:			

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

Sl. No	Description PART I	Scope		Remarks (for details refer relevant clause of tender document)
		BHEL	Bidder	
3.3.1	For construction purposes:			
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	
3.3.2	Water supply for bidder's office, stores, canteen etc			
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	
3.3.3	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 bidders construction site/ storage yard/pre-assembly yard/ material handling location, etc. shall be in scope of contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Sl. No	Description PART I	Scope		Remarks (for details refer relevant clause of tender document)
		BHEL	Bidder	
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		Yes	
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		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	<i>Communication facilities for site operations of the bidder</i>			
a	Téléphone, 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	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Sl. No	Description PART I	Scope		Remarks (for details refer relevant clause of tender document)
		BHEL	Bidder	
3.7.3	Erection Facilities			
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 where ever 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 site erection schedules and other input requirements as per Form-14.		Yes	In consultation with BHEL
f	Review of performance and revision of site 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 (for details refer relevant clause of tender document)
		BHEL	Bidder	
j	Preparation of preassembly bay		Yes	Materials required for preassembly 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 racks for gantry crane if provided by BHEL or brought by the contractor /bidder himself.		Yes	

3.8	Land/Open Space:
3.8.1	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 erections 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, establish batching plant, 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.
3.9	Labour and Staff Colony: Following are in the Bidder's scope of work for labour & staff colony:
3.9.1	Labour colony is to be developed by bidder for all the labours required to be deployed for the works. All labour colony set-up is to be developed as per attached drawing and in compliance of statutory requirements. Contractor shall construct/arrange Labour Hutment as per minimum specifications mentioned in the attached drawing, for which no separate payment shall be made by BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	Ownership of the labour hutment shall be of the contractor and contractor shall keep BHEL indemnified from any statutory obligations/ legal compliances w.r.t. labour hutment establishment during as well as after the completion of contract.
3.9.2	In case labour hutment is not completed as per the drawings and specification and any penalty is imposed by Customer, same shall be recovered from contract's 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 non-compliance of the instructions, same shall be recovered from his RA Bills along with 5% overheads.
3.9.3	Land for labor colony shall be arranged by Contractor at their own cost as per availability outside project area within 5Km, 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.
3.9.4	Development of Bidder's temporary staff colony and labour colony having adequate no. of rest rooms along with toilets & fencing etc. (drawing enclosed for ready reference) .
3.9.5	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.
3.9.6	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.
3.9.7	Development and maintenance of above facilities for construction workers deployed by the Contractor shall solely rest with the Contractor.
3.10	Installation of necessary amenities- and temporary infrastructure for construction activities 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: i. Canteen facility creation. ii. Drinking water facility. iii. Labour Bio toilets near work spot in sufficient nos. with regular cleaning & maintenance arrangement. iv. Labour colony should have all hygienic condition, dining hall, toilets, proper sewerage system, good drinking water arrangements. v. Regular fogging in the work place and labour colony to avoid mosquitoes.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	vi. Royalty challan (if applicable) and statutory documents shall be submitted along with RA Bills for processing of Bills.
3.11	Construction Power:
3.11.1	Construction power (three phase, 415 V/ 440 V) will be provided near the site at a distance of approx. 500M. Further, distribution shall be arranged by the contractor at his own cost and services. If any other voltage level (other than normally available) is required, the same shall be arranged by the contractor from power supply as above. Contractor shall be responsible for fulfilment of all requirements including statutory requirements in this regard. The charges for the actual energy consumed by the bidder (Energy Charges Only) shall be recovered by the BHEL based on prevalent rate of DISCOM and type of connection used.
3.11.2	Contractor shall deploy and install required energy meter, cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act. 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. Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal. Contractor shall also obtain approvals of appropriate authority and pay necessary fees, levies etc. towards the clearance of such installations, prior to use.
3.11.3	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.
3.11.4	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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

3.11.5	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.
3.11.6	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.
3.11.7	Contractor to note that till construction power is made available by BHEL (approx. within 5 months from start of work); contractor shall make his own arrangement like DG set etc. The contractor shall also take the approval/ permission of statutory authorities for his DG set installation. The Contractor has to make his own arrangement for the same as required to carry out the job under the scope of work within the quoted rate. Nothing extra shall be paid on this account of DG set up and running for construction and office maintenance etc.
3.11.8	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.
3.11.9	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.
3.11.10	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, portable lighting towers with DG back-up, within the quoted price. The illumination should be such that minimum illumination requirement as specified by Indian standards for general illumination is maintained.
3.11.11	Contractor is advised to maintain the calibrated energy measuring instruments and use their system as efficiently as possible to maintain the HT side input energy meter reading and LT side outgoing energy meter reading to sub-contractors as equal.
3.11.12	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.

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

3.12	Construction water:
3.12.1	Construction water shall be arranged by bidder. Bidder has to make arrangement of further distribution of water at his own cost. No extra payment shall be made under this account.
3.12.2	The Contractor should make arrangements for storage of sufficient quantity of water required for work. The agency should also construct sumps (if required) of suitable size for storage of construction water as per their requirement for use in batching plant and construction purposes.
3.12.3	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 for execution of work as per Technical Conditions of Contract of this tender within the quoted rate.

For Package A:

S.N.	DESCRIPTION OF MAJOR T&Ps	CAPACITY	QUANTIT Y	REMARKS
1.	Crawler Crane	150 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge
2.	Crawler/Tyre mounted crane	75 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative schedule: from Start of Boiler Erection till Synchronisation.
3.	Tyre mounted crane	75 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative schedule: from Start of Boiler Erection till Major Completion of work.
4.	Crawler/Tyre mounted crane	75 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative requirement: for pre-assembly work.
5.	Induction heating M/c	Minimum 10 KHz frequency and Heating upto Temp. 770 Degree Celsius, along with all accessories. IIOT enabled.	06 Nos.	To be made available as per instruction from BHEL Site in-charge. For welding of P-91, P-92, P-22, P-23, & pipes as applicable.
6.	Passenger Cum Goods Elevator	Temporary lift, 1.5 MT capacity	01 No.	Till installation of permanent Lift
7.	Acid/Chemical cleaning pump Along with Motor and starter	Capacity of each pump Head 200 Mtr and Flow/ Discharge 250 M3/Hr to 300 M3/Hr.	03 Nos.	One month before the scheduled Acid cleaning activity till completion of activity

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

S.N.	DESCRIPTION OF MAJOR T&Ps	CAPACITY	QUANTIT Y	REMARKS
8.	Acid Unloading pump for handling 31% concentration Hcl or 40% EDTA concentration ph 5.5 to 6.0/ 25% CONCENTRATED AMMONIA Along with Motor and starter	(Head 50 Mtr and Flow/ Discharge 20 M3/Hr)	02 Nos.	One month before the scheduled Acid cleaning activity till completion of activity

For Package B:

S.N.	DESCRIPTION OF MAJOR T&Ps	CAPACITY	QUANTIT Y	REMARKS
1.	Crawler Crane	150 MT	01 No.	Crane to be made available as per instruction from BHEL Site in-charge
2.	Crawler/Tyre mounted crane	75 MT	01 Nos.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative schedule: from Start of Boiler Erection till Synchronisation.
3.	Tyre mounted crane	75 MT	01 Nos.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative schedule: from Start of Boiler Erection till Major Completion of work.
4.	Crawler/Tyre mounted crane	75 MT	01 Nos.	Crane to be made available as per instruction from BHEL Site in-charge. Tentative requirement: for pre-assembly work.
5.	Induction heating M/c	Minimum 10 KHz frequency and Heating upto Temp. 770 Degree Celsius, along with all accessories. IIOT enabled.	06 Nos.	To be made available as per instruction from BHEL Site in-charge For welding of P-91, P-92, P-22, P-23, & pipes as applicable.
6.	Passenger Cum Goods Elevator	Temporary lift, 1.5 MT capacity	01 Nos.	Till installation of permanent Lift

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

S.N.	DESCRIPTION OF MAJOR T&Ps	CAPACITY	QUANTIT Y	REMARKS
7.	Acid/Chemical cleaning pump Along with Motor and starter	Capacity of each pump Head 200 Mtr and Flow/ Discharge 250 M3/Hr to 300 M3/Hr.	03 Nos	One month before the scheduled Acid cleaning activity till completion of activity
8.	Acid Unloading pump for handling 31% concentration Hcl or 40% EDTA concentration ph 5.5 to 6.0/ 25% CONCENTRATED AMMONIA Along with Motor and starter	(Head 50 Mtr and Flow/ Discharge 20 M3/Hr)	02 Nos.	One month before the scheduled Acid cleaning activity till completion of activity

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 under **Package A & B** as per Technical Conditions of Contract of this tender within the quoted rate. Below given Quantities are tentative for planning purposes by the bidder.

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
1	Tyre mounted mobile crane	35/40/50 MT	As per requirement	As per requirement
2	Tyre mounted mobile crane	18/20/23 MT	As per requirement	As per requirement
3	Tyre mounted mobile crane	10/12/14 MT	As per requirement	As per requirement
4	Trailer with prime mover	20 MT	As per requirement	As per requirement
5	Trailer with prime mover	40 MT	As per requirement	As per requirement
6	Low bed trailer Low bed trailer with min 70-100 feet span	60 MT	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)	MINIMUM QUANTITY	REMARKS
7	Backhoe Loader/JCB	As per Requirement	01 no.	As per requirement
8	Man lifter	min. 40mtr height capacity	01 no.	As per requirement
9	Calibrated Power driven HSFG bolt tightening machines	As per Requirement	15 Nos	As per requirement
10	Power Driven Torque tightening machine	As per Requirement	06 Nos	Incl. 02 nos. of capacity of 30 Dia. HSFG bolt tightening.
11	Torque calibrator	As per Requirement	As per requirement	As per requirement
12	Bolt Tension Calibrator	As per Requirement	As per requirement	As per requirement
13	Pre-heating, post-heating and post-weld stress relieving equipment with automatic recording devices and chartless recorder / IIOT sensors duly password protected with a connectivity to remote server /Cloud 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
14	Electrical torque wrench	As per Requirement	As per requirement	As per requirement
15	Impact wrench	As per Requirement	As per requirement	As per requirement
16	Torque wrench	As per Requirement	As per requirement	As per requirement
17	Steel tape	As per Requirement	As per requirement	As per requirement
18	Steel ruler	As per Requirement	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)	MINIMUM QUANTITY	REMARKS
19	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.)
20	DG SET – 250 KVA	As per Requirement	02 set	For continuous/uninterrupted back up power during welding & post weld heat treatment of Girders and HP joints.
21	Air compressor/blower (electric/diesel operated)	210 CFM, 7 KG/CM2	01 no.	As per requirement
22	Air Leak Test equipment with all auxiliaries.	As per Requirement	02 Set	For leakage test
23	Tig welding set	As per Requirement	As per requirement	As per requirement
24	Oxy Acetylene Gas cutting Machine	As per Requirement	As per requirement	As per requirement
25	GTAW Machine: HF Welding Machine & SMAW machine: Inverter based welding machine	As per Requirement	As per requirement	As per requirement
26	DC arc welding machine & Submerged ARC welding M/C	As per Requirement	As per requirement	As per requirement
27	3-phase distribution board with complete set up for drawl of construction power	As per Requirement	As per requirement	As per requirement
28	Power cable for drawl of construction power	As per Requirement	As per requirement	As per requirement
29	Self-drilling cum tapping machine for screws	As per Requirement	As per requirement	Prior to start of sheeting works.
30	Radiography arrangement with radioactive isotope source	As per Requirement	As per requirement	As per requirement
31	Theodolite of required accuracy	To ensure verticality of structural columns.	02 Nos.	Required Since start of work
32	Arrangement for UT of higher thickness joints with recording	Type USN 50 or equivalent/ up graded type	As per requirement	During Pre-assembly & erection

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
	facility & required calibration blocks.			
33	Welding rectifiers / MIG Welding (electrical)	As per requirement	As per requirement	As per requirement
34	Welding generator (diesel operated)	As per requirement	As per requirement	As per requirement
35	Radiography film viewer	As per Requirement	As per requirement	As per requirement
36	Pipe/Tube cutting/ beveling /chamfering machine	As per Requirement	As per requirement	During Pre-assembly & erection
37	Electro/hydraulic pipe bending machine	Up to 2" nb and 12 mm thick pipes	As per requirement	During Trim piping erection work.
38	Baking oven with thermostat and temperature gauge for welding electrodes	As per Requirement	As per requirement	Required Since start of work
39	Holding oven with thermostat and temperature gauge for welding electrodes	As per Requirement	As per requirement	Required Since start of work
40	Portable oven for welding electrodes	As per Requirement	As per requirement	Required Since start of work
41	Pug Cutting machines	As per Requirement	As per requirement	As per requirement
42	Chain pulley blocks	As per Requirement	As per requirement	As per requirement
43	Electric winch	2/3/5/10/15 MT capacity	As per requirement	As per requirement
44	Hand winch	0.5 ton/1.0 MT capacity	As per requirement	As per requirement
45	Battery Driven emergency light	As per Requirement	As per requirement	As per requirement
46	Scaffolding materials with clamps for insulation, painting etc works	As per Requirement	Min 15000 pipes and matching clamps	As per requirement
47	Profile making m/c	For aluminium sheet cladding work	As per requirement	As per requirement
48	Nibbling m/c	As per Requirement	As per requirement	As per requirement
49	Shearing m/c	As per Requirement	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)	MINIMUM QUANTITY	REMARKS
50	Portable grinding m/c	As per Requirement	As per requirement	As per requirement
51	Portable drilling m/c	As per Requirement	As per requirement	As per requirement
52	Hoisting and pulley devices/pulleys	As per Requirement	As per requirement	As per requirement
53	SPANNERS / EYE BOLTS (OF ALL SIZES)	As per Requirement	As per requirement	As per requirement
54	Magnetic particle testing equipment – DRY &WET Type	As per Requirement	As per requirement	As per requirement
55	Hydraulic Jacks	10/20/50/100 MT	As per requirement	As per requirement
56	Dewatering pumps(Electrical & Diesel engine operated)	As per Requirement	As per requirement	As per requirement
57	Various sizes of clamps/ fixtures for assembling	As per Requirement	As per requirement	As per requirement
58	Portable hardness tester (UCI Hardness Tester M/C)	As per Requirement	As per requirement	As per requirement
59	Hand Operated Megger 500 / 1000 V	As per Requirement	As per requirement	As per requirement
60	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy	As per Requirement	As per requirement	As per requirement
61	Digital and Analogue Multimetres	As per Requirement	As per requirement	As per requirement
62	U Tube Manometer 0-2000 mm Water Column	As per Requirement	As per requirement	As per requirement
63	Inclined Manometer 0-50 mm Water Column	As per Requirement	As per requirement	As per requirement
64	Special Slings for Erection of Ceiling Girders & other heavy components	As per Requirement	As per requirement	As per requirement
65	Concrete Blocks	As per Requirement	As per requirement	For making bed of steel structure for checking dimensional accuracy, configuration and minor rectification.
66	Wooden/Concrete sleeper 1.5-2.0 Mtr length	As per Requirement	As per requirement	As per requirement
67	PORTABLE MAGNETIC STRUCTURESCOPE	As per Requirement	01 no.	As per requirement
68	PMI (Positive Material Identification)	As per Requirement	01 no.	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)	MINIMUM QUANTITY	REMARKS
69	Equipment for carrying out NDT test like LPI/MPI etc along with consumables.	As per Requirement	As per requirement	As per requirement
70	Painting equipment sets complete with compressor, hopper, screen, blasting hose pipe, nozzle airless / conventional spray (within CGI temporary cover shed)	As per Requirement	As per requirement	As per requirement
71	Digital Elcometer for paint thickness checking	As per Requirement	As per requirement	As per requirement
72	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	As per requirement
73	Suspended working platform Size :7mX1mX0.5m, Rated load 800 kg to 1000 Kg,	As per Requirement	02 Nos.	Prior to start of sheeting works.
74	Shot blasting equipment required capacity	As per Requirement	As per requirement	As per requirement
75	PAUT + TOFD Machine	As per BHEL "Guidelines for Selection of NDE & Heat Treatment Agencies" (PP-QLYAA-DC-106/01-20)	01	As per requirement
76	Tools for Reaming and Honing	As per Requirement	As per requirement	As per requirement
77	PVC Caps to cover Pipe/tube ends.	As per Requirement	As per requirement	As per requirement
78	Hydraulic test/ pressurizing pump (Alongwith Suitable/ different ranges of calibrated Pr. gauges- Minimum 06 Nos.)	Upto 600 kg per cm2	As per requirement	For Piping and other areas Incl. installation, electrical connection, Erection and dismantling, temporary pipelines, fittings, etc. shall be carried out by the contractor as part of this work.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

SN	DESCRIPTION OF OTHER T&Ps	CAPACITY (MINIMUM)	MINIMUM QUANTITY	REMARKS
79	Furnace maintenance platform (sky climber)	As per Requirement	02 Nos.	to cover one length and one width of furnace including corners
80	Spot Welding M/c	As per Requirement	As per requirement	As per requirement

B.	List of suggestive safety Equipments /PPEs to be included in List of minimum T&P:		
1.	Safety Net (Conforming IS 11057:1984) Safety Net (Net Size: 10m x 5m, Mesh Size: 25 mm, Mesh Rope: 2mm double cord, Border/Tie Cord: 12mm diameter polypropylene rope (tested as per IS: 5175). Two meters length shall be provided at all four corners.	Min-300 Nos/unit (Fire resistant)	
2.	Fall Arrestor 'Rope grab fall arrestor' & anchorage line. Anchorage Line: 14mm- 16 mm diameter, three strand twisted Polyamide rope. Rope Grab fall arrestor: Openable & Guided type Fall Arrestor (on flexible line) conforming EN 353-2 & works on 14-16 mm diameter polyamide rope. Material: Nickel Chrome plated Steel. Connector: Karbiner conforming to EN 362 (Minimum Strength 22 KN), material: Steel Retractable Fall arrestor Block (Range 6 Mtr to 15 Mtr)	Min. 200 nos. of Rope Grab Fall arrestor' and Karbiner each, Min. 90 nos. anchorage line, 30 metre long each, 30 nos. anchorage line, 40 metre long each, Min. 200 Nos.	
3.	Horizontal life line Stainless Steel Wire rope of 8mm diameter. Minimum six nos. of steel U-bolt clips are required for clamping each wire rope to a rigid support (03 nos. of U-bolt clips at each end).	Min 40 nos. of wire rope, each 40 metre long Min 90 nos. of wire rope, each 25 metre long.	
4.	Ladders on column The minimum design live load on metallic ladder shall be a single concentrated load of 100 kilo grams. All rungs shall have a minimum diameter of 16mm to 25 mm, and minimum clear length of rungs shall be 40.6 centimeters. The distance between rungs shall not exceed 30.5 centimeters. Each ladder shall have maximum height of 9.0 metre. The ladder shall have proper fastenings for attaching it to a column using positive means such as bolt, weld or other type of fasteners.	Cumulative length of ladders is 1200 metres	
5.	Height Rescue Kit and Confined space rescue kit	1 No each	
6.	Lux Meter & Breathe Analyser	2 Nos each	
7.	Multi Gas Meter	1 No	
8.	ELCB & RCCB Tester	1 No	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

9.	Earth Resistance meter	1 No
10.	Scaffolding materials as per EN 74 for hard barricading	As per requirement
11.	Axial Fan with exhaust hood for confined space working and DC Light Unit	Min 2 Nos each
12.	Oxygen Meter	1 No
13.	Fire Blanket	Min 500 Mtr
14.	Fire resistant tarpaulins	100 Nos
15.	Safety Posters as per BHEL Guidelines	As per requirement and instruction of BHEL
16.	Fire Extinguishers: ABC – 6 Kg: 50 Nos, Co2 – 4.5 Kg: 20 Nos, Foam – 9 Kg: 5 Nos Fire Bucket (set of ¾ buckets) with stand – 10 Nos	
17.	Rubber Mat as per IS 15652	Min 200 Sqm
18.	Electrical rubber gloves	As per requirement
19.	Water Sprinkling tanker for dust suppression	1 No

4.3	Measuring and Monitoring Equipment (MMEs): To be finalized as per site requirement.
4.3.1	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.
4.3.2	Heavy Equipments (cranes, winch etc.) manufactured less than 15 Yrs. from the current Year shall be only allowed to be used at project Site.
4.3.3	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.
4.3.4	Tendum operation towards material handling is also not permitted in the project premises.
4.3.5	Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor's account.
4.3.6	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.
4.3.7	All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the NABL accredited agencies that are approved by BHEL or calibration tractability is established upto National Test House/Laboratory. Details of all MMDs mobilised to site necessarily be entred into BHELs 'Field Calibration Monitoring System' (FCMS).
4.3.8	Contractor has to arrange slings of all sizes for completing the works covered under these specifications.
4.3.9	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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	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.
4.3.10	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.
4.3.11	Crane operators deployed by the contractor shall be offered for testing by BHEL before they are allowed to operate the cranes.
4.3.12	The above list as mentioned in S.No. 4.2 (Other that 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.
4.3.13	APR (As per Requirement)- Contractor has to deploy T&P, MMD, IMTE as per requirement of site and as decided by BHEL Engineer.
4.3.14	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 within two weeks from the written instruction from BHEL.
4.3.15	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.
4.3.16	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 1-BHEL T&P Hire Charges ". (Please note that these charges are as valid up to Aug, 2025 and may get revised further). 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.
4.3.17	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.
4.3.18	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.
4.3.19	All operators (for crane, winch etc.) deployed by contractor shall have valid licence from applicable authority (which ever applicable).
4.3.20	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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

4.4.1	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.
4.4.2	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.
4.5	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.
4.6	Heavy equipment will be tracked with real-time position location for fleet management. Deployment vs planned reports shall be generated. Equipment condition monitoring data like service meter reading, operation maps, loading, fuel levels, operating information, idle time etc. shall be captured. This data shall be captured through integrated online project monitoring system. All T&Ps and Equipment deployed by contractor will also be covered/monitored through this system. Accordingly, minimum 5 signals per equipment should be made available to provide the input to integrated online project monitoring system. Necessary software/ hardware for aforesaid system shall be provided by BHEL.
4.7	4.7.1 FACILITY TO BE PROVIDED BY THE CONTRACTOR FOR P91/P92 WELDING a. Required no. of operators/ Technicians/ Electrician for installation, commissioning & operating continuously. b. Gas Burners arrangement with required gas for maintaining temperature in the event of power failure. c. Ultrasonic Flaw detector with recording device & complete accessories (Digital Type – Krautkramer Model USN 50 or equivalent) capable of storing calibration data. All recordable indications will be stored in memory of digital flaw detector and in PC (to be provided by the contractor) for review at later period. d. EQUOTIP or MICRODUR make or equivalent portable hardness tester. e. MPI/LPI Kits with required consumables. Note

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	1) The induction heating equipment and other equipment 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) The contractor shall provide electrical cables & switches required for extending power supply to the induction heating equipment (either provided by agency or BHEL). All the equipment shall be protected by providing covers or sheds at site by the contractor with in the quoted rate. 3) Adequate no of DG Set of required rating not less than 500KVA, operator and fuel for P-91 welding is in Bidders scope. Diesel Generator for P 91/92 welding (Refer SI No 16), along with required cables, switches, fuel and operator, has to be arranged by the contractor within the quoted rates. Contractor to follow and ensure the following related to DG set deployment at site: • All rules & regulations pertaining in the state of Chhattisgarh to run DG sets are to be strictly followed. • Statutory permission is to be obtained from Inspection authority. • Separate earth pits for Body and neutral are to be made. • All safety precautions and protections are to be installed before starting of the DG sets. • Installation inspection is to be done by the authority. • Payment of electricity duty and generation duty is to be paid by the contractor. 4.7.2 Consumables - Glass fibre cloth – 1mm x 1000mm – Temp rating – 1260 °C. - Glass fibre cord – Dia 3mm (twisted) Temp rating – 1260 oC. - Ceramic fibre Blanket – RT Grade, density 96Kg/M3 – Temp rating – 1260 oC. - Ceramic fibre rope – Fibre Glass braided, Dia 12mm – Temp rating – 1260 oC. - K Type Thermocouple – 0.5mm Dia Single Strand individual fiber glass insulated - Heavy duty TC connectors for – K Type Thermocouple – 0.5mm Dia Single Strand individual fibre glass insulated. - All other consumables/ equipment required to carry out the work.
4.8	PASSENGER CUM GOODS ELEVATOR “The contractor has to Supply, install, operate and maintain passenger cum goods lift (temporary lift ,1.5 MT capacity each with operators) in boiler to facilitate access to various platform elevations upto top floor. Civil Foundation shall be provided by BHEL as per drawing submitted by the agency. Necessary grouting including supply of grout materials shall be in the scope of the bidder. The dismantling of the erected lift, Transport / removal from site is also covered in this scope of work. The contractor has to arrange operators, technicians for round the clock operation and maintenance is to be carried out by the contractor at his cost. The operation and maintenance shall be carried out till the end of contract period, or the date, on which

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	the lift is dismantled as per the directives of BHEL, whichever is earlier” Foundation drawing for the proposed passenger lifts shall be submitted by the agency. The elevator shall conform to the national standard and industrial safety code as applicable. These shall be deployed at the time of start of pressure parts work in consultation with BHEL site engineer. Laying of sleepers and rails and routine maintenance of the dip trolley system including assembly and dismantling are in Contractor's scope.
4.9	Acid/Chemical Pump required for chemical cleaning process including supply, and installation of pumps - Installation including structure work & operation of Acid/Chemical pumps is in scope of Contractor. Pumps, motor, Starter panel & structural material (if required) shall be supplied by Agency. Note: For chemical cleaning process, compressor will be in the scope of agency. Civil foundations work for pump installation, if required, shall be in BHEL scope.
4.10	Filling pump, for hydro test shall be arranged by the contractor, if required. For testing LP lines, necessary hydraulic test pumps/ hand pumps are to be arranged by the contractor.
4.11	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 consumables like electrodes, all gases, and other materials for this scope of work are to be arranged by the contractor at their cost.
4.12	Only TIG welding wires for CS, AS & SS welding will be supplied by BHEL free of cost for Boiler for applicable Pressure Parts as provided by manufacturing units. Imported electrodes / TIG welding wires released under XX992 will be given by BHEL. All other electrodes / TIG welding wires including stainless steel electrodes required for shall be arranged by the contractor at his cost. However, BHEL will provide imported electrodes as provided by manufacturing units. The bidder shall use the Customer approved quality welding electrodes only. The utilization of the TIG welding wires issued by BHEL shall be duly accounted for exercising maximum care and ensuring economical usage for minimum wastage. If during erection, it is found that the consumption of filler wire is more than the actual requirement due to improper usage, the cost for the additional quantity so consumed shall be recovered from the contractor.
4.13	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 him.
4.14	Penalty due to non availability of T&Ps: 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. 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)'. Case 1: Contractor fails to mobilise the same within the mobilisation period of 30 days from the date of intimation. OR Case 2: After mobilisation of T&P at site, the work is getting hampered due to non-availability of T&P for more than 5 days from the date of such intimation,

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	Penal rate for Major T&Ps is mentioned hereunder: a. 150 MT Crane – Rs. 3000/day b. 75 MT Crane – Rs. 1000/day c. Induction heating M/c – Rs. 1000/day d. Passenger Cum Goods Elevator – Rs. 500/day e. Acid/Chemical cleaning pump – Rs. 500/day f. Acid Unloading pump – Rs. 250/day
--	---

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

SL NO	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
1	Cranes	As decided by BHEL	All cranes (except Contractor scope), if required for mentioned work, will be arranged by BHEL as per requirement.
2	Boiler Hydraulic Pressure Testing Pump with accessories.	As required	Above 600 Kg/cm ²
3	Induction heating Machine	As decided by BHEL	Induction heating M/c (except Contractor scope), if required for mentioned work, will be arranged by BHEL as per requirement.

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.
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 Sr 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	HLHR crane is to be used for erection of boiler ceiling structures and equipment/ components above boiler ceiling structure, heavy structures of bunker 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

5.11	Hydraulic pump: Hydraulic testing pumps for HP lines (for pressure beyond 600Kg/cm²) shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.
5.12	The consumables such as electrodes and filler wire (except as specified in shipping list), thermocouple, ceramic pads, annealing cable and insulation, induction coil etc. required for Induction Heating Machine (Provided by BHEL) has to be arranged by the contractor.
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 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.
	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 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 done by the contractor, at his cost. Necessary plates required for marching operation shall be provided by the BHEL only for BHEL owned cranes.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

6. TIME SCHEDULE & MOBILIZATION

6.1	Time Schedule and Mobilization:		
6.1.1	Initial Mobilization and Time Schedule:		
	After issue of LOA (though Fax/courier/email) the contractor shall report to the Construction Manager/Site In-Charge of BHEL at site within Two weeks (14 days) from date of LOA and make a Kick of meeting (KOM) for mobilization of manpower, T&Ps and date of start of work and detailed completion program etc. Contractor shall submit detailed mobilization plan to start work within 15 days from date of LOA; unless instructed otherwise by BHEL in writing. The activities for Erection etc. shall be started as per directions of Construction Manager of BHEL. 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.		
6.1.2	COMMENCEMENT OF CONTRACT PERIOD		
	Erection/placement on its designated foundation / location, of the first major permanent equipment / component / column covered in the scope of these specifications, (whichever is earlier as decided by BHEL) shall be recognized as "Start of contract period" for Each Package. Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period. 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 engineer is final. 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. 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. 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.		
6.2	Schedule of Completion:		
	The contract period for completion of entire work under scope shall be as mentioned hereunder, from the "START OF CONTRACT PERIOD" as specified earlier for completion of the entire work in respective Package.		
	S.No.	Package	Contractual Schedule (Month)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

1.	Package-A: Unit # 3 Boiler and Common System of 2X800 MW NTPC Lara Project.	32 nd Month
2.	Package-B: Unit # 4 Boiler of 2X800 MW NTPC Lara Project.	32 nd Month

6.3 The schedule of important milestones is as follows:

6.3.1 Boiler & Its Auxiliaries ,PCP & Bunker For Package A		
SL No.	Milestones	Tentative Schedule w.r.t date of start of work
1.	Boiler Erection Start (BES)	1 st Month
2.	Completion of Ceiling Girder erection	8 th Month
3.	Boiler Hydro Test- drainable	20 th Month
4.	Boiler Hydro Test- nondrainable	24 th Month
5.	Boiler Light Up (BLU) & Chemical cleaning	25 th Month
6.	Steam Blowing	26 th – 27 th Month
7.	Safety Valve Floating	28 th month
8.	Synchronization on coal	29 th Month
9.	Full Load Operation	30 th Month
10.	Completion of Trial Run Operations	31 st Month
11.	Completion of Facilities	32 nd Month

6.3.2 Boiler & Its Auxiliaries ,PCP & Bunker For Package B		
SL No.	Milestones	Tentative Schedule w.r.t date of start of work
1.	Boiler Erection Start (BES)	1 st Month
2.	Completion of Ceiling Girder erection	8 th Month
3.	Boiler Hydro Test- drainable	20 th Month
4.	Boiler Hydro Test- nondrainable	24 th Month
5.	Boiler Light Up (BLU) & Chemical cleaning	25 th Month
6.	Steam Blowing	26 th – 27 th Month
7.	Safety Valve Floating	28 th month
8.	Synchronization on coal	29 th Month

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

9.	Full Load Operation	30 th Month
10.	Completion of Trial Run Operations	31 st Month
11.	Completion of Facilities	32 nd Month

6.4.1	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.	
6.4.2	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).	
6.5	Intermediate milestones:	
6.5.1	Two Major Intermediate Milestones are identified as M1 and M2 above.	
	Milestones for Package A	Tentative Schedule
M1	Boiler Hydro Test- drainable	20 th Month
M2	Full Load Operation	30 th Month
	Milestones for Package B	Tentative Schedule
M1	Boiler Hydro Test- drainable	20 th Month
M2	Full Load Operation	30 th Month
6.6	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.	
6.6.1	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.	
6.6.2	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.	
6.6.3	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.	
6.6.4	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.	
6.6.5	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.	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

6.6.6	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.
6.6.7	Contractor shall make all possible efforts to expedite the activities, in case of delay of any intermediate milestone, to maintain over all project completion schedule.
6.7	COMPLETION OF WORK AND COMMENCEMENT OF GUARANTEE PERIOD
6.7.1	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, labor 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.
6.7.2	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.
6.7.3	The 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.
6.8	The contractor shall submit and a detailed area/structure wise L3 schedule within 15 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.
6.9	The under mentioned Records/ Log-books/ Registers applicable to be maintained.
	I. Hindrance Register.
	II. Site Order Book.
	III. Test Check of measurements.
	IV. Records of Test reports of Field tests.
	V. Records of manufacture's test certificates.
	VI. Records of disposal of scraps generated during and after the work completion.
6.10	Control and monitoring of progress of work
6.10.1	Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume - I BCD. Plan and review will be done as per the formats.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

6.10.2	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.
6.10.3	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.
6.10.4	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.
6.10.5	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.
6.10.6	The contractor shall submit daily, weekly and monthly 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.
6.10.7	The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
6.10.8	The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.
6.10.9	The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
6.11	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, 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 Boiler (pressure parts, structures), Auxiliary boiler, Rotating machines, Electro static precipitator, Bunker structure etc.
e	Consumables report giving consumption of all types of gases and electrodes during the previous month.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI: Time Schedule

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.
6.12	Site Data Digitalisation: Daily Activity Log, M-Book and Subcontracting Billing Module: -
a	Refer Vendor Portal System with links: for ref. https://pshq.bhel.in/sddvp/
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.
f	Contractor shall raise their RA Bills along with supporting documents (such as Quality and HR Document – Vetted by Customer Etc.) and checklist through SDD portal only.
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.
6.13	Agency shall extend all support towards inputs for IPMS system for project monitoring and control.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

7. 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 both the Packages: Payment shall be regulated progressively as mentioned in Table 7.1 & 7.2 below:

7.1 Progressive Payment 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 7.1.20.8 of the following table.

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure	Rotating machines		Piping		Insulation
	Rate schedule Identifier --->	1A	1B	1C	2A - APH (PG52)	2A - Fans,	5A, 5B, 5C, 5D	5E	3A, 3B, 3C, 3D
	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%	--	15%	15%	15%	--
7.1.2	Placement in position	15%	10%	10%	--	20%	20%	25%	50%
7.1.3	Alignment	20%	15%	15%	--	20%	15%	15%	15%
7.1.4	Welding/bolting/fixing/Torque check/tightness check of bolts	20%	20%	20%	--	20%	15%	30%	15%
7.1.5.1	Completion of non-destructive examination – Radiography/ PAUT/TOFD as per approved FQP/EWS (if not applicable, then this portion to be paid along with S.No. 7.1.4)	2%	4%	--	--	--	4%	--	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure	Rotating machines	Piping	Insulation
7.1.5.2	Making support viz. safe access / approach, platform, doing necessary gridding / buffing, arranging LT power point, proving illumination, providing unskilled manpower, etc. to the satisfaction of BHEL engineer for conducting NDT / Stress relieving/ heat treatment. (if not applicable, then this portion to be paid along with S.No. 7.1.4)	1%	1%	--	--	1%	--
7.1.5.3	Completion of non-destructive examination – Hardness treatment as per approved FQP / EWS (if not applicable, then this portion to be paid along with S.No. 7.1.4)	1%	1%	--	--	0.5 %	--
7.1.5.4	Completion of Stress relieving/ heat treatment as per approved FQP / EWS (if not applicable, then this portion to be paid along S.No. 7.1.4)	2%	4%	--	--	2%	--
7.1.6	VOID						
7.1.7	VOID						
7.1.8	VOID						
7.1.9	Completion of attachment welding, fin welding, supports	--	5%	--	--	--	--
7.1.10	Completion of roof skin casing & al cladding works	--	4%	--	--	--	5%
7.1.11	VOID	--	--	--	--	--	--
7.1.12	VOID	--	--	--	--	--	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure	Rotating machines		Piping		Insulation
7.1.1 3	Hangers & supports etc wherever necessary as per drg	--	1%	15%	--	--	5%	--	--
7.1.1 4	completion of furnace alignment and fire ball checking	2%	--	--	--	--	--	--	--
7.1.1 5	completion of back pass alignment	2%	--	--	--	--	--	--	--
7.1.1 6	completion of vibration snubbers, mechanical spacers, cassette baffles, steam cooled spacers	--	--	--	--	--	--	--	--
7.1.1 7	equipment trial operation	--	--	--	--	10%	--	--	--
7.1.1 8	hydraulic test/pneumatic test	--	--	--	--	--	5%	--	--
7.1.1 9	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)	--	--	--	--	--	2.5 %	--	--
7.1.2 0	Air pre heaters (PG 52)from the total amount payable for the PGMA weight at tonnage rates, payment will be regulated as under:	--	--	--	--	--	--	--	--
7.1.2 0.1	completion of support steel squareness and levelling, expansion arrangement, housing panel erection and alignment, erection, alignment and welding of pedestals	--	--	--	11%	--	--	--	--
7.1.2 0.2	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%	--	--	--	--
7.1.2 0.3	completion of erection and alignment of modules	--	--	--	15%	--	--	--	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure	Rotating machines		Piping		Insulation
7.1.2 0.4	completion of erection, alignment and welding of pin rack assembly and drive assembly	--	--	--	12%	--	--	--	--
7.1.2 0.5	completion of seals setting	--	--	--	17%	--	--	--	--
7.1.2 0.6	erection, alignment and welding of lube oil systems, cleaning device, fire sensing device, deluge and water wash lines, observation port and lighting assemblies and other accessories	--	--	--	13%	--	--	--	--
7.1.2 0.7	completion of PGMA	--	--	--	1%	--	--	--	--
7.1.2 0.8	air preheater trial run	--	--	--	2%	--	--	--	--
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	85 %	85 %	85 %	85%	85 %	85 %	85%	85%

7.2 Further 15 % payment on pro-rata basis common to all PGs of Boiler, its Aux shall be released on achievement of the following stage / milestones events (as per Cl no 7.2.1 to 7.2.30 of the following table) for the tonnage erected.

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

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure Parts	Rotating machines		Piping		Insulation
	Rate schedule Identifier --->	1A	1B	1C	2A – APH (PG52)	2A - Fans, Mills	5A, 5B, 5C, 5D	5E	3A, 3B, 3C, 3D
II	STAGE/MILESTONE PAYMENTS (15%)								
7.2.1	Air & gas tightness test	--	--	5%	--	--	--	--	--
7.2.2	VOID								
7.2.3	VOID								
7.2.4	Completion of air & gas tightness test for furnace	--	2%	--	--	--	--	--	--
7.2.5	Boiler hydraulic test (drainable)	--	2%	--	--	--	--	--	--
7.2.6	Boiler Hydraulic test (non Drainable)	--	1%	--	--	--	--	--	--
7.2.7	Reheater coils hydraulic test	--	2%	--	--	--	--	--	--
7.2.8	Clean air flow test	--	--	--	--	1%	--	--	--
7.2.9	Boiler light up	1%	1%	--	2%	1%	1%	1%	2%
7.2.10	ABO/chemical cleaning	--	1%	1%	2%	1%	--	--	1%
7.2.11	Steam blowing	--	--	2%	2%	1%	2%	2%	1%
7.2.12	Safety valve floating	--	2%	--	2%	--	--	--	1%
7.2.13	Rolling and synchronization	--	--	--	--	--	2%	2%	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure Parts	Rotating machines		Piping		Insulation
7.2.14	Readiness for coal feeding	--	--	--	--	--	--	--	--
7.2.15	Coal firing	2%	--	2%	2%	2%	--	--	1%
7.2.16	Full load	1%	--	--	--	2%	2%	2%	2%
7.2.17	Trial operation of unit	1%	--	--	--	2%	1%	2%	2%
7.2.18	VOID								
7.2.19	VOID								
7.2.20	VOID								
7.2.21	VOID								
7.2.22	VOID								
7.2.23	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3%	--	--	--	--	--	--	--
7.2.24	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing	--	--	--	--	--	1%	--	--
7.2.25	Completion of Painting works	2%	--	1%	1%	1%	1%	1%	--
7.2.26	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	1%	1%	2%	2%
7.2.27	Punch List points/pending points liquidation	2%	1%	1%	1%	1%	1%	1%	1%
7.2.28	Submission of 'As Built Drawings'	--	--	--	--	--	1%	--	--
7.2.29	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%	1%
7.2.30	Completion of Contractual Obligation	1%	1%	1%	1%	1%	1%	1%	1%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

Sl No.	Sub Packages ----->	Structures	Pressure Parts	Non Pressure Parts	Rotating machines		Piping		Insulation
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	15%	15%	15%	15%	15%	15%	15%	15%
	TOTAL I + II	100%	100%	100%	100%	100%	100%	100%	100%

7.3 Mill bunker including coal bunkers, Conveyor galleries, trestles etc., (Other than PG 34): This is split into two types as below:

- 1) BHEL supplied items.
- 2) Contractor supplied items that goes as permanent part of the system.

7.3.1 BHEL supplied items

7.3.1.1: Progressive Payment against monthly running bills will be made up-to 85 % of the value of the erected tonnage Pro-rata as per following table.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

Sr no	Description	Percentage
7.3.1.1.1	On pre-assembly wherever applicable (if not applicable, this portion shall be clubbed with placement in position)	15%
7.3.1.1.2	Placement in position	20%
7.3.1.1.3	Alignment	20%
7.3.1.1.4	Welding / bolting / fixing	15%
7.3.1.1.5	Completion of non-destructive examination - Radiography (if not applicable, then this portion to be paid along with welding/bolting/fixing)	4%
7.3.1.1.6	Completion of non-destructive examination – ultrasonic testing UT (if not applicable, then this portion to be paid along with welding/bolting/fixing)	1%
7.3.1.1.7	Completion of non-destructive examination - Hardness (if not applicable, then this portion to be paid along with welding/bolting/fixing)	1%
7.3.1.1.8	Completion of Stress relieving/ heat treatment (if not applicable, then this portion to be paid along with welding/bolting/fixing)	4%
7.3.1.1.9	Hangers & supports etc., Readiness of floors for concrete pouring as applicable	5%
		85%

7.3.1.2 Further 15 % payment on pro-rata basis shall be released on achievement of the following stage / milestones events (as per SL no 7.3.1.2.1 to 7.3.1.2.8 of the following table) for the tonnage erected.

Sr no	Description	Percentage
7.3.1.2.1	READINESS FOR COAL FEEDING (1% for each Mill) & completion of side cladding	7%
7.3.1.2.2	COAL FIRING	3%
7.3.1.2.3	TRIAL OPERATION OF UNIT	1%
7.3.1.2.5	Area cleaning, temporary structures cutting/removal and return of scrap	1%
7.3.1.2.6	Punch List points/pending points liquidation	1%
7.3.1.2.7	Material Reconciliation	1%
7.3.1.2.8	Completion of Contractual Obligation	1%
		15%
	Total of 7.3.1.1 and 7.3.1.2	100%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

7.3.2 Contractor supplied items that goes as permanent part of the system: Progressive payment:

7.3.2.1 Interim Payment (95%) Interim bills in the form of monthly running bills prepared by the contractor shall be based on the quantities executed and measured.

7.3.2.2 5% of the item rate shall be released after submission of the quality check formats / documents as per the quality plan for the quantum of work billed and duly certified by engineer.

7.4	Progressive Payment/ Final Payment: The payments for works under the scope of this contract for both the packages shall be as per clause no 2.6; 2.22; 2.23 of General Conditions of Contract and Volume-IB, Chapter-X of SCC.
7.4.1	<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.
	Power of Attorney before submission of Bill.
	Validity of Bank Guarantees as applicable under the contract.
	Monthly HSE Compliance Certificate certified by BHEL- Safety
	Monthly Material reconciliation statement alongwith RA Bill.
	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.
	<u>Documents required for Final Bill:</u>
7.4.2	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:
	☐ Final Bill in WAM-7 Format.
	☐ 'No claim' certificate from the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

	☐ 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.
7.4.3	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).
	Few points of consideration are as below:
	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.
7.5	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.
	SECURED RECOVERABLE ADVANCES: 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: 1. For Mobilization of <u>01 no. of Crane of 75 MT capacity, 2 no. of Tyre mounted mobile crane</u> - <u>2.0%</u> of Contract value of each package.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: TERMS OF PAYMENT

2. For Mobilization of balance required T&Ps and resources at site to start the work - 1.5% of Contract value of each package.

3. For Installation and Erection of Site Infrastructure by contractor i.e. site office stores, labour hutment etc. - [1.5%](#) of Contract value of each package.

Note:

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

8.0	TAXES & DUTIES
8.1	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. However, provisions regarding GST on output supply (goods/service) and TDS/TCS as per Income Tax Act shall be as per following clauses.
8.2	GST (Goods and Services Tax)
8.2.1	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.
8.2.2	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.
8.2.3	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.
8.2.4	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.
8.2.5	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.
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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

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	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: - 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.
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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

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	<u>Variation in Taxes & Duties:</u> 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. 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. 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:

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

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 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

	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.	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: 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.
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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Duties

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.
-----	---

TECHNICAL CONDITIONS OF CONTRACT (TCC)
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: -

Sr. No	Descriptions	Package A Tentative Weight (in MT)	Package B Tentative Weight (in MT)
1A	Structure	25763.36	25763.36
1B	Pressure parts	9908.79	9874.24
1C	Non Pressure Parts	5720.81	5445.85
1D	Trim Piping	897.51	897.51
2A	Rotary machines	2014.90	2014.90
3A	Insulations Wool Matress	1889.00	1889.00
3B	Insulation -pourable and castable	270.00	270.00
3C	Insulation-iron parts	159.15	159.15
3D	Insulation -Al cladding sheets	373.10	373.10
5A	Power Cycle Piping P-91/92	1254.00	1255.00
5B	HP Piping Including P-11,P-12,P-22	1515.90	1229.40
5C	LP Piping (incl CW Piping)	1549.35	1549.35
5E	Hangers/Pumps & Tanks	1054.69	1054.74
5D	SS Piping	41.16	41.16
	TOTAL	52411.72	51816.76

Note to weight schedule:

1	The weights/Quantities/dimentions 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 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 Boiler etc. and its aux. The quoted rate shall be applicable for such product groups also. There may be variation or addition of PGMAs, 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

4	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.
5	The erection & dismantling of temporary piping, pumps, tanks, 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, steam blowing etc. are covered in this contract and shall be carried out as a part of work. Payment will be made at the rate applicable. 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. Except contractor scope materials/Pump. Payment terms for temporary piping: 50% on completion of installation of temporary piping. 25% on dismantling. 15% on return of BHEL Stores. 10% on Material reconciliation. 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. 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.
6	Fixing components for insulation: The scope of works covers welding of all attachment on the pressure parts for fixing insulation & refractory.
7	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.
8	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.
9	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 material is installed. i.e. P91, P92, HP Piping, LP Piping & SS piping.
10	Extra work rates for welding: The quantum of welding joints indicated in Welding schedule shall be tentative and liable for variation in PG, description, size, materials, NDT requirements etc. The joints will be grouped into category of carbon steel (inclusive of SA106GrC or equivalent) and Alloy steel (inclusive of T91/T92/P91/P92) and convert them in to equivated joints (Dia 63.5x6.3mm) as per the formula below: No. of equivated Joints = $\text{Dia} \times \text{Thickness} / (63.5 \times 6.3)$

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

	= Dia X Thickness / 400.05 If the total no of equivalent joints in each category exceeds 25% of the total equivalent joints in that category contractor will be paid extra as per the rate indicated below: a) One extra Equivalent joints of Carbon Steel (CS) = Rs 254/- b) One extra Equivalent Joints of Alloy Steel (AS) = Rs 561/-
--	--

9.1 Detailed (PGMA wise) weight of BOQ for Boiler, Mill bunker structure, Coal bunkers, ID- Ducts, Structure, PCP, LP Piping in SG area, Gates & dampers, Rot. M/c, Insulation: -

Package A: Unit # 3

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
04-147	Supprts for Collectr & Separatr Vessel	20,000.00	Try	PP	1B
04-321	VERTICAL SEPARATOR	36,800.00	Try	PP	1B
04-323	STORAGE TANK	60,000.00	Try	PP	1B
04-347	Seperator/Collecting Vessel Supp DD	200.00	Try	PP	1B
04-547	Seperator/Collecting Vessel Supp Shop	2,000.00	Try	PP	1B
05-137	EVAPORATOR INLET HDR - FRNT	15,000.00	Try	PP	1B
05-147	FUR LWR REAR INLET HDR	15,000.00	Try	PP	1B
05-155	FUR LWR SIDE INLET HDRS	14,000.00	Try	PP	1B
05-227	FUR UPPER REAR OUTLET HDR	13,000.00	Try	PP	1B
05-231	FUR UPPER FRNT OUTLET HDR	12,000.00	Try	PP	1B
05-251	FUR UPPER SIDE OUTLET HDRS	25,000.00	Try	PP	1B
05-327	FUR INTERMEDIATE REAR HDR	11,500.00	Try	PP	1B
05-330	FUR INTERMEDIATE FRNT HDR	11,500.00	Try	PP	1B
05-350	FUR INTERMEDIATE SIDE HDRS	23,000.00	Try	PP	1B
06-400	FUR BURNER PANELS	49,500.00	Try	PP	1B
06-401	Burner Panel- OS	250.00	Try	PP	1B
06-431	Front Upper Ww Panel Attachment	50.00	Try	PP	1B
06-434	Front Intermediate WW Panel -OS	50,500.00	Try	PP	1B
06-437	Front WW Lower Panel-OS	39,000.00	Try	PP	1B
06-441	Rear Upper WW Panel -OS	3,900.00	Try	PP	1B
06-444	Rear Intermediate WW Panel -OS	50,500.00	Try	PP	1B
06-447	Rear Lower WW Panel -OS	40,200.00	Try	PP	1B
06-451	Side Upper Ww Panel Attachment	150.00	Try	PP	1B
06-453	Side Intermediate WW Panel -OS	70,000.00	Try	PP	1B
06-455	Side Lower WW Panel -OS	21,000.00	Try	PP	1B
06-500	FUR SOFA PANELS	11,000.00	Try	PP	1B
06-501	Sofa Panels -OS	200.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
06-515	H&S FOR START-UP SYSTEM - BOI ITEMS	16,000.00	Try	PP	1B
06-731	FUR VERTICAL WALL PANELS - FRNT	42,000.00	Try	PP	1B
06-732	FRONT WW PNL + ATT	54,500.00	Try	PP	1B
06-734	FUR UPPER FRNT SPIRAL PANEL	90,000.00	Try	PP	1B
06-735	FUR FRNT SPIRAL TO VERTICAL TRANS. PANEL	12,500.00	Try	PP	1B
06-737	FUR LWR FRNT SPRL PNL WITH I/T TERM TUBE	62,000.00	Try	PP	1B
06-741	FUR REAR ARCH PANELS	41,600.00	Try	PP	1B
06-744	FUR UPPER REAR SPIRAL PANEL	90,000.00	Try	PP	1B
06-745	FUR REAR SPIRAL TO vert TRANSITION PANEL	12,150.00	Try	PP	1B
06-747	FUR LWR RR SPRL PNL WITH I/T TERM TUBES	75,600.00	Try	PP	1B
06-751	FUR VERTICAL WALL PANELS - SIDE	86,200.00	Try	PP	1B
06-752	FUR LWR VERTICAL WALL PANELS - SIDE	123,000.00	Try	PP	1B
06-753	FUR UPPER SIDE SPIRAL PANELS	180,000.00	Try	PP	1B
06-755	FUR LWR SIDE SPIRAL PANELS	74,200.00	Try	PP	1B
06-759	FUR SIDE SPIRAL TO VERT TRANSITION PANEL	24,000.00	Try	PP	1B
07-102	LINKS FROM SEPARATOR TO STORAGE TANK	48,000.00	Try	PP	1B
07-110	DOWNCOMER TO CONNECTING SPHERE	15,000.00	Try	PP	1B
07-125	Connecting Sphere	5,000.00	Try	PP	1B
07-217	SCREEN RELIFE TUBES	1,000.00	Try	PP	1B
07-223	FUR SCREEN AND HANGER ASSEMBLY	95,000.00	Try	PP	1B
07-231	FUR SPIRAL WALL OUTLET TERM TUBES	3,000.00	Try	PP	1B
07-232	FUR VERTICAL WALL INLET TERM TUBES	7,000.00	Try	PP	1B
07-309	Furnace Wall Supports Front-DD	1,500.00	Try	PP	1B
07-315	FUR SIDE RISERS	52,000.00	Try	PP	1B
07-316	FUR REAR RISERS	32,000.00	Try	PP	1B
07-318	FUR FRNT RISERS	18,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
07-331	Riser Tube Support DD Item	100.00	Try	PP	1B
07-360	Furnace Spiral Wall Support DD Item	100.00	Try	PP	1B
07-361	Furnace Wall Support Rear DD Item	300.00	Try	PP	1B
07-362	Furnace Wall Support Side L&R DD Item	600.00	Try	PP	1B
07-393	Consumables & Erection Materials-DD	100.00	Try	PP	1B
07-402	WW FRT HDR SUSPN	5,200.00	Try	PP	1B
07-403	WW SIDE HDR SUSPN	3,000.00	Try	PP	1B
07-405	WW SCR.HDR SUSPN.	12,000.00	Try	PP	1B
07-409	Furnace wall Supports front	42,000.00	Try	PP	1B
07-423	Furnace Screen Tubes Attachment	5,600.00	Try	PP	1B
07-431	RISER TUBE SUPPORT	8,000.00	Try	PP	1B
07-460	Furnace Spiral Wall supports Misc items	28,000.00	Try	PP	1B
07-461	Furnace wall Supports rear	32,000.00	Try	PP	1B
07-462	Furnace wall Supports Sides L & R	32,000.00	Try	PP	1B
07-502	Ww Front Header Suspn Shop Item	1,000.00	Try	PP	1B
07-503	Ww Side Header Suspension Shop Item	1,500.00	Try	PP	1B
07-509	MISC PR.PART COMPNTS	1,400.00	Try	PP	1B
07-531	Riser Tube Support Shop Item	6,500.00	Try	PP	1B
07-560	Furnace Spiral Wall Support Shop Item	5,600.00	Try	PP	1B
07-991	Welding Electrodes-Part-1	600.00	Try	NB	
07-992	Welding Electrodes	300.00	Try	NB	
07-993	EREC MATLS, CONSUMES	1,600.00	Try	NB	
08-001	FURN UPR BKSTYS-F&R	99,000.00	Try	STR	1A
08-003	FURN UPR BKSTYS-SIDE	250,000.00	Try	STR	1A
08-006	FURN INT BKSTYS	410,000.00	Try	STR	1A
08-007	FURN LWR BKSTYS	60,000.00	Try	STR	1A
08-111	FURN REAR ARCH BKSTYS	75,000.00	Try	STR	1A
08-380	FURN BOT SUPRTS	482,000.00	Try	STR	1A
08-501	FURN B P BKSTYS-F&R	240,000.00	Try	STR	1A
08-503	FURN B P BKSTYS-SIDE	300,000.00	Try	STR	1A
08-901	FURN KEY BKSTYS-UPR	13,000.00	Try	STR	1A
08-910	EX.MOVT MEAS COMP	1,250.00	Try	STR	1A
08-911	Bulk Bps Items-Upper	250.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
08-912	Bulk Bps Items-Inter	2,000.00	Try	STR	1A
08-913	Bulk Bps Items-Lower	2,500.00	Try	STR	1A
09-003	MATL FOR INST TAPPG	1,000.00	Try	NPP	1C
09-004	SEAL BOX FURN OPENG	17,000.00	Try	NPP	1C
09-005	SEAL BOX INST OPENG	3,500.00	Try	NPP	1C
09-304	Seal Boxes For Furnace Openings-DD	500.00	Try	NPP	1C
10-135	FUR ARCH SUPPPORT INLET HDR	15,500.00	Try	PP	1B
10-174	FINISH SH INLET HDR	17,500.00	Try	PP	1B
10-176	SH PLATEN FRONT INLET HEADER(S-26)	21,000.00	Try	PP	1B
10-178	SH PLATEN INLET HDR	17,500.00	Try	PP	1B
10-182	BP LWR REAR HDR	16,000.00	Try	PP	1B
10-183	BP UPPER SIDE INLET HDR	25,000.00	Try	PP	1B
10-184	BP EXTENDED SIDE INLET HDR	13,000.00	Try	PP	1B
10-185	BP LWR FRNT HDR	16,000.00	Try	PP	1B
10-191	SH FUR ROOF INLET HDR	16,000.00	Try	PP	1B
10-235	FUR ARCH SUPPPORT OUTLET HDR	15,000.00	Try	PP	1B
10-274	FINISH SH OUTLET HDR	55,500.00	Try	PP	1B
10-276	SH PLATEN FRONT OUTLET HEADER(S-28)	20,000.00	Try	PP	1B
10-278	SH PLATEN OUTLET HDR	23,000.00	Try	PP	1B
10-283	BP LWR SIDE HDRS	27,000.00	Try	PP	1B
10-284	BP EXT FLOOR OUTLET HDR WITH TERM TUBES	11,000.00	Try	PP	1B
10-285	BP FRNT OUTLET HDR	21,500.00	Try	PP	1B
10-291	SH FUR ROOF OUTLET HDR	27,500.00	Try	PP	1B
11-074	FINISH SH FRNT ASSY WITH I/T TERM & COT	371,000.00	Try	PP	1B
11-078	SH PLATEN ASSY WITH TERM TUBES - LEFT	251,000.00	Try	PP	1B
11-374	FINISH SH REAR ASSY WITH O/T TERM & COT	378,000.00	Try	PP	1B
11-378	SH PLATEN ASSY WITH TERM TUBES - RIGHT	262,000.00	Try	PP	1B
11-406	SH Frnt Upper Pnl Attachment	700.00	Try	PP	1B
11-467	SH Sc Side Pnl Upper Left Attachment	100.00	Try	PP	1B
11-469	SH Sw Panels Lower Front (L&R)-OS	100.00	Try	PP	1B
11-474	SH Vertical Spaced Coil Attachment	1,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
11-487	BP LTRH Hanger Tube Attchment	800.00	Try	PP	1B
11-491	SH Radiant Roof Tubes (Left)-OS	100.00	Try	PP	1B
11-494	SH Extended Bottom Panels-OS	100.00	Try	PP	1B
11-606	BP FRNT WALL PANELS	29,300.00	Try	PP	1B
11-608	BP FRNT WALL PANEL - LWR	55,300.00	Try	PP	1B
11-684	BP EXTENDED SIDE FIN WELDED PANEL	35,500.00	Try	PP	1B
11-694	BP EXTENDED SIDE FLOOR FIN WELDED PANEL	20,100.00	Try	PP	1B
11-716	BP UPPER REAR PANEL	24,500.00	Try	PP	1B
11-717	SH REAR WALL PANEL INTER(LEFT)	25,800.00	Try	PP	1B
11-718	BP LWR REAR PANEL	28,500.00	Try	PP	1B
11-767	BP UPPER SIDE PANEL-LEFT	37,800.00	Try	PP	1B
11-768	SH SIDE WALL PANELS INTER (FRONT)	33,300.00	Try	PP	1B
11-769	BP LWR SIDE PANEL - LEFT	38,400.00	Try	PP	1B
11-787	BP REAR ROOF PANELS	29,800.00	Try	PP	1B
11-791	SH FUR ROOF FIN WELDED PANEL	42,400.00	Try	PP	1B
11-916	SH REAR WALL PANELS UPPER (RIGHT)	24,500.00	Try	PP	1B
11-917	SH REAR WALL PANEL INTER (RIGHT)	25,900.00	Try	PP	1B
11-918	SHSC RR WL PNL LR RT	28,500.00	Try	PP	1B
11-967	BP UPPER SIDE PANEL-RIGHT	37,900.00	Try	PP	1B
11-968	SH SIDE WALL PANELS INTER (REAR)	33,300.00	Try	PP	1B
11-969	BP LWR SIDE PANEL - RIGHT	38,900.00	Try	PP	1B
11-987	SHSC RR ROOF PNL RT	30,300.00	Try	PP	1B
11-991	SH FUR ROOF TUBES	65,100.00	Try	PP	1B
12-178	LINK TO SH DESUPERHEATER	36,000.00	Try	PP	1B
12-179	LINK TO FINISH SH INLET HDR	38,000.00	Try	PP	1B
12-181	FUR ARCH SUPPORT LINKS	15,000.00	Try	PP	1B
12-184	BP EXTENDED SIDE CONNECTION LINK	33,500.00	Try	PP	1B
12-187	SH BYPASS PIPES	14,000.00	Try	PP	1B
12-306	SH Spprt For Lines And Links DD Item	100.00	Try	PP	1B
12-314	Suspns of SH R.Roof Headers DD Item	500.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
12-317	Suspns of R.Roof Headers DD Item	100.00	Try	PP	1B
12-324	Suspension of SH Rear Wall DD Items	100.00	Try	PP	1B
12-327	Suspension of SH Rear Wall DD Items	600.00	Try	PP	1B
12-328	Suspension of SH Rear Wall DD Items	600.00	Try	PP	1B
12-344	Suspns of Vert. Spaced Assy DD Item	50.00	Try	PP	1B
12-348	Suspns of Vert. Spaced Assy DD Item	1,700.00	Try	PP	1B
12-354	Suspns of Vert. Spaced Assy DD Item	50.00	Try	PP	1B
12-368	RH Vert Platen Frnt Coil Left DD Item	100.00	Try	PP	1B
12-393	SH Misc Components DD Item	300.00	Try	PP	1B
12-405	SH Hanger Tube Attachment	4,800.00	Try	PP	1B
12-506	SH Spprt For Lines And Links Shop Item	1,100.00	Try	PP	1B
12-514	Suspns of SH R.Roof Hdrs Shop Item	3,500.00	Try	PP	1B
12-517	Suspns of R.Roof Headers Shop Item	9,200.00	Try	PP	1B
12-524	Suspension of SH Rear Wall Shop Item	2,100.00	Try	PP	1B
12-528	Suspension of SH Rear Wall Shop Item	2,900.00	Try	PP	1B
12-544	Suspns of Vert. Spaced Assy Shop Item	4,000.00	Try	PP	1B
12-554	Suspns of Vert. Spaced Assy Shop Item	5,000.00	Try	PP	1B
12-600	Sh Desuperheater (S-01B)	6,500.00	Try	PP	1B
12-800	SH DESUP-STAGE II	6,400.00	Try	PP	1B
12-803	SH STEAM COOLED SPACER TUBES	4,500.00	Try	PP	1B
12-805	BP FRNT WALL SCREEN TUBES	54,000.00	Try	PP	1B
12-850	SH CONNECTING PIPE	30,000.00	Try	PP	1B
12-852	LINKS TO SH PLATEN INLET HDR	36,000.00	Try	PP	1B
12-862	Desh M/F(S-01A) Roof I/T Hdr Conn(S-01C)	42,000.00	Try	PP	1B
12-900	SH DESUPERHEATER	7,100.00	Try	PP	1B
12-903	SH MISCL COMPONENTS	13,000.00	Try	PP	1B
12-906	SH LINK SUPPORTS	1,000.00	Try	PP	1B
12-907	RAD&RR ROOF SUPPORTS	9,200.00	Try	PP	1B
12-914	EXPNSH RAD ROOF HDR	1,900.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
12-917	SUSPN OF RADINT ROOF	28,000.00	Try	PP	1B
12-924	SUSPN-SH BAKPASS HDR	14,000.00	Try	PP	1B
12-927	SUSPN OF REAR ROOF	28,000.00	Try	PP	1B
12-928	SUSPN - SH REAR WALL	33,500.00	Try	PP	1B
12-944	SUSPN-SH PLATEN HDRS	3,500.00	Try	PP	1B
12-948	SUSP-VERT SPACD ASSY	49,000.00	Try	PP	1B
12-954	SUSP-VERT SPACD HDRS	5,700.00	Try	PP	1B
12-968	SUSPN OF PLATEN ASSY	33,000.00	Try	PP	1B
12-991	Welding Electrodes-Part-1	500.00	Try	NB	
12-992	Welding Electrodes	3,800.00	Try	NB	
12-993	EREC MATLS, CONSUMES	6,000.00	Try	NB	
12-994	PORT IN FOR THK MSMT	100.00	Try	PP	1B
15-136	LTRH INLET HDR	13,500.00	Try	PP	1B
15-178	FINISH RH INLET HDR	26,500.00	Try	PP	1B
15-236	LTRH OUTLET HDR	20,000.00	Try	PP	1B
15-278	FINISH RH OUTLET HDR	33,000.00	Try	PP	1B
16-201	LTRH UPPER ASSEMBLY	182,000.00	Try	PP	1B
16-202	LTRH INTERMEDIATE ASSEMBLY	502,000.00	Try	PP	1B
16-203	LTRH LWR ASSEMBLY WITH INLET TERM TUBES	507,000.00	Try	PP	1B
16-270	LTRH PENDANT ASSY WITH O/T TERM TUBES	147,000.00	Try	PP	1B
16-278	FINISH RH ASSEMBLY WITH TERMINAL TUBES	185,000.00	Try	PP	1B
16-379	RH VERPLN FR COIL RT	12,000.00	Try	PP	1B
17-174	LINK TO RH DESUPERHEATER	110,000.00	Try	PP	1B
17-304	RH Spprts For Lines And Links DD Item	100.00	Try	PP	1B
17-306	RH Suprt For Lines And Links DD Item	100.00	Try	PP	1B
17-319	RH Frnt Suspension DD Item	100.00	Try	PP	1B
17-407	RH Sc Spacer Tube Attchment	100.00	Try	PP	1B
17-476	RH V.S. CENTRE CROSS OVER TUBE ATTCHMT	6,000.00	Try	PP	1B
17-504	RH Suprts For Lines And Links Shop Item	9,000.00	Try	PP	1B
17-506	RH Suprt For Lines And Links Shop Item	3,000.00	Try	PP	1B
17-807	RH STM COOL SPACERS	300.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
17-900	RH DESUPERHEATER	7,000.00	Try	PP	1B
17-903	RH MISCL COMPONENTS	90,000.00	Try	PP	1B
17-904	RH HDR SUPRT AB ROOF	10,000.00	Try	PP	1B
17-906	RH SUPRT LINES & LIN	3,000.00	Try	PP	1B
17-919	RH FRONT SUSPENSION	24,000.00	Try	PP	1B
17-991	Welding Electrodes-Part-1	1,100.00	Try	NB	
17-992	Welding Electrodes	1,200.00	Try	NB	
18-001	FUR ROOF SKIN CASING	21,000.00	Try	NPP	1C
18-002	1 PASS ROOF SKINCASG	3,000.00	Try	NPP	1C
18-010	PR PARTS ATTACH-CASG	900.00	Try	NPP	1C
18-701	Furnace Roof Skin Casing BOI Item	100.00	Try	NPP	1C
19-092	ECO OUTLET TERM TUBES	22,000.00	Try	PP	1B
19-306	Eco Supports For Line & Links DD Item	100.00	Try	PP	1B
19-307	Eco Feed Pipe Suspnn DD Item	100.00	Try	PP	1B
19-402	Eco Hanger Tube Attachment	1,000.00	Try	PP	1B
19-506	Eco Supports For Line & Links Shop Item	45,000.00	Try	PP	1B
19-507	Eco Feed Pipe Suspnn Shop Item	28,000.00	Try	PP	1B
19-701	ECO INLET HDR	25,000.00	Try	PP	1B
19-702	ECO OUTLET HDR	29,000.00	Try	PP	1B
19-704	ECO II INLET HEADER	8,800.00	Try	PP	1B
19-753	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-763	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-783	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-793	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-802	ECO LWR HANGER TUBES	315,000.00	Try	PP	1B
19-804	ECO UPPER HANGER TERMINAL TUBES	32,000.00	Try	PP	1B
19-814	ECO UPPER ASSY - LEFT	110,000.00	Try	PP	1B
19-824	ECO LWR ASSY -LEFT	342,900.00	Try	PP	1B
19-850	ECO INLET LINKS	120,000.00	Try	PP	1B
19-851	LINKS FROM ECO OUT. HDR TO ECO MIX LINE	165,000.00	Try	PP	1B
19-852	ECO MIXING LINE	28,000.00	Try	PP	1B
19-853	LINKS FROM ECO MIX LINE TO FURN I/T HDRS	63,000.00	Try	PP	1B
19-884	ECO INTER ASSY - LEFT	342,900.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
19-903	ECO.MISCL COMP	115,000.00	Try	PP	1B
19-904	ECO HDR SUPT AB ROOF	135,000.00	Try	PP	1B
19-905	ECO HDR SUPT BL ROOF	1,000.00	Try	PP	1B
19-906	ECO LINE&LINK SUPORT	26,000.00	Try	PP	1B
19-907	ECO,FEEDPIPE SUPPORT	8,000.00	Try	PP	1B
19-914	ECO UPPER ASSY - RIGHT	110,000.00	Try	PP	1B
19-924	ECO LWR ASSY-RIGHT	342,900.00	Try	PP	1B
19-984	ECO INTER ASSY - RIGHT	342,900.00	Try	PP	1B
19-991	Welding Electrodes-Part-1	100.00	Try	NB	
19-992	Welding Electrodes	100.00	Try	NB	
20-051	LONG RETRACTABLE SOO	97.00	Try	PP	1B
20-054	WALL BOX NON PRESSUR	2.00	Try	PP	1B
20-201	WALL DESLAGGER RW5E	30.00	Try	PP	1B
20-204	WALL BOX NON PRESSUR	4.00	Try	PP	1B
20-511	DA HEAD VALVE ASSY	-	Try	PP	1B
20-794	WALL BOX NON 7RESSUR	-	Try	PP	1B
20-962	TEMP PROBE DUPLEX WI	2.00	Try	PP	1B
20-988	SOOT BLOWER COMMISSIONING SPARES	-	Try	NB	
20-998	SPECIAL TOOLS FOR SO	-	Try	NB	
21-600	S.B. PPG & FITTINGS	40,000.00	Try	TP	1D
21-601	S.B PIPING SUPPORTS	2,000.00	Try	TP	1D
21-602	Sb Piping - DD Items	3,600.00	Try	TP	1D
21-603	Sb Piping - BOI Items	60.00	Try	TP	1D
21-604	SB Piping Supports - OS items	10,000.00	Try	TP	1D
21-605	SB Piping Supports - DD Items	10.00	Try	TP	1D
21-606	SB Piping Supports - BOI Items	2.00	Try	TP	1D
21-700	BULKED BPS COMP	600.00	Try	TP	1D
21-800	SB VALVES (BHEL)	4,700.00	Try	TP	1D
21-825	SB VALVES (SUBDELY)	1,300.00	Try	TP	1D
21-850	SB SAFETY VALVE BHEL	60.00	Try	TP	1D
21-992	Welding Electrodes	250.00	Try	NB	
24-350	BLR FILLING PIPING	3,500.00	Try	TP	1D
24-351	H&S BLR FILLING PPG	300.00	Try	TP	1D
24-352	Boiler Fill Piping - DD Items	250.00	Try	TP	1D
24-353	H&S For Boiler Fill Piping - OS Items	1,000.00	Try	TP	1D
24-354	BOI Items for Blr Trim Piping	2.00	Try	TP	1D
24-700	BULKED BPS COMP	500.00	Try	TP	1D

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
24-800	BOILER TRIM PIPING	51,000.00	Try	TP	1D
24-801	SUPPORTS-TRIM PIPING	6,000.00	Try	TP	1D
24-803	Boiler Trim Piping - DD Items	600.00	Try	TP	1D
24-804	Supports - Blr Trim Piping - OS Items	44,000.00	Try	TP	1D
24-805	LINK TO BOILER RECIRCU SYSTEM	38,000.00	Try	TP	1D
24-806	MIXING VESSEL	6,500.00	Try	TP	1D
24-807	RECIRCU PUMP SUCTION LINE	38,000.00	Try	TP	1D
24-808	RECIRCU PUMP DISCHARGE LINE	14,000.00	Try	TP	1D
24-809	BOILR RECIR LINK FROM BF LINE	18,000.00	Try	TP	1D
24-810	H and S FOR STARTUP SYSTEM	28,000.00	Try	TP	1D
24-811	Fur Link to Flash tank HWL1&2	94,000.00	Try	TP	1D
24-813	Supports - Blr Trim Piping - DD Items	15.00	Try	TP	1D
24-814	BOI ITEMS FOR BOILER TRIM PPG	21,000.00	Try	TP	1D
24-815	SPRAY WATER SYSTEM	60,000.00	Try	TP	1D
24-817	H&S For Start-Up System - OS Items	16,500.00	Try	TP	1D
24-818	H&S For Start-Up System - DD Items	300.00	Try	TP	1D
24-820	EXHAUS PIPE SAFETY VLV	60,000.00	Try	TP	1D
24-822	De-Superheater Pipes - OS Items	1,000.00	Try	TP	1D
24-823	De-Superheater Pipes - DD Items	1,000.00	Try	TP	1D
24-824	Exhaust Pipe For Sv - OS Items	21,000.00	Try	TP	1D
24-825	SILENCER SUPPORTS	150.00	Try	TP	1D
24-826	Silencer Supp - OS Items	45,000.00	Try	TP	1D
24-827	Exhaust Pipe For Sv - DD Items	1,500.00	Try	TP	1D
24-828	Exhaust Pipe For Sv - BOI Items	50.00	Try	TP	1D
24-835	STARTUP VENT DIFFUSER SILEN SUP	2,000.00	Try	TP	1D
24-836	Start-Up Vent, Diffuser, Sil Supp-OS	10,000.00	Try	TP	1D
24-837	Start-Up Vent, Diffuser, Sil Supp-DD	20.00	Try	TP	1D
24-840	SAMPLE COOLER AND SUPPORTS	900.00	Try	TP	1D
24-841	Sample Cooler & Supports - OS Items	180.00	Try	TP	1D
24-842	Sample Cooler and Suprts-DD items	15.00	Try	TP	1D
24-855	RECIRCULATING PUMB COMP	19,700.00	Try	TP	1D
24-860	VALVES (BHEL)	95,000.00	Try	TP	1D
24-865	CTL VALVES FOR SPRAY PIPING SD	15,000.00	Try	TP	1D
24-867	CTL VAL FOR STARTUP RECIRCU SYS	15,000.00	Try	TP	1D
24-880	SAFETY VALVES	5,800.00	Try	TP	1D

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
24-881	SAFETY VALVES AND ERV(BHEL) SD	2,000.00	Try	TP	1D
24-883	Safety Valves (Bhel) - Non HT	5,500.00	Try	TP	1D
24-885	SILENCERS(BHEL)	87,000.00	Try	TP	1D
24-950	SPECIAL TOOLS	200.00	Try	NB	
24-955	LAP TOOL SV&ERV	60.00	Try	NB	
24-960	LAP TOOL-CON VAL(BHEL)	30.00	Try	NB	
24-966	NITROGEN BLANKETING SYSTEM PIPING	2,000.00	Try	TP	1D
24-967	NITROGEN BLANKETING SYSTEM PIPING OS	1,600.00	Try	TP	1D
24-968	NITROGEN BLANKETING SYSTEM PIPING DD	200.00	Try	TP	1D
24-969	NITROGEN BLANKETING SYSTEM PIPING SD	1,800.00	Try	TP	1D
24-992	WELDING ELECTRODES-TRIM PPG	2,000.00	Try	NB	
24-993	CONSUME & EREC MATLS	200.00	Try	NB	
24-994	NAME PLATES	300.00	Try	TP	1D
28-220	DOORS	14,700.00	Try	NPP	1C
28-700	BPS FASTENERS	6,000.00	Try	NPP	1C
30-103	SEAL PLATE ASSY	4,300.00	Try	NPP	1C
30-105	FUR BOTTOM ENCL FRAM	59,350.00	Try	NPP	1C
30-212	FURNACE EXTD SIDE BOTTOM ENCLOSURE FRA	24,100.00	Try	NPP	1C
30-215	MAIN BOILER ENCL	46,350.00	Try	NPP	1C
30-219	VERT ROOF ENCL	134,900.00	Try	NPP	1C
30-223	GAS DIST BAFFLES	450.00	Try	NPP	1C
30-224	Antivibration Baffles	46,250.00	Try	NPP	1C
30-233	IST PASS DECK SPRT	55,650.00	Try	NPP	1C
30-234	2ND PASS DECK SPRT	53,850.00	Try	NPP	1C
30-235	ENCL SUPPORT STEEL	81,750.00	Try	NPP	1C
31-010	COMPS WELDED TO PR	1,000.00	Try	NPP	1C
31-104	FUR REAR ARCH SKIN	2,700.00	Try	NPP	1C
32-010	FICOM BLR PP INSUL	7,550.00	Try	Insl.	3C
32-210	FIX COMP-DUCT INSULN	69,550.00	Try	Insl.	3C
32-700	BULKED DD COMPONENT	71,300.00	Try	Insl.	3D
32-810	EQUIPMENT OUTER CASING	212,050.00	Try	Insl.	3D
33-021	BLR PP MINRL WOOL	1,035,000.00	Try	Insl.	3A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
33-210	MAIN BLR CAST REF GR	180,000.00	Try	Insl.	3B
33-221	DUCT MINERAL WOOL	804,000.00	Try	Insl.	3A
33-230	MAIN BLR POUR INSUL	90,000.00	Try	Insl.	3B
33-924	MISC EQPTS PCK MATLS	350.00	Try	Insl.	3C
33-970	MISC EQPTS EXP METAL	19,550.00	Try	Insl.	3C
33-971	MISC EQPTS WW CLOTH	1,350.00	Try	Insl.	3C
33-975	MISC EQPTS SEAL COMP	800.00	Try	Insl.	3C
35-010	FOUNDATION MATERIALS	105,000.00	Try	STR	1A
35-131	Middle Columns RHS 1st Tier	161,000.00	Try	STR	1A
35-132	Middle Columns RHS 2nd Tier	176,000.00	Try	STR	1A
35-133	Middle Columns RHS 3rd Tier	74,000.00	Try	STR	1A
35-134	Middle Columns RHS 4th Tier	58,000.00	Try	STR	1A
35-135	Middle Columns RHS 5th Tier	78,000.00	Try	STR	1A
35-136	Middle Columns RHS 6th Tier	61,000.00	Try	STR	1A
35-137	Middle Columns RHS 7th Tier	52,000.00	Try	STR	1A
35-138	MIDDLE COLUMNS 8TH TIER	51,000.00	Try	STR	1A
35-141	Auxiliary Columns LHS 1st Tier	134,000.00	Try	STR	1A
35-142	Auxiliary Columns LHS 2nd Tier	134,000.00	Try	STR	1A
35-143	Auxiliary Columns LHS 3rd Tier	76,000.00	Try	STR	1A
35-144	Auxiliary Columns LHS 4th Tier	43,000.00	Try	STR	1A
35-145	Auxiliary Columns LHS 5th Tier	65,000.00	Try	STR	1A
35-146	Auxiliary Columns LHS 6th Tier	55,000.00	Try	STR	1A
35-147	Auxiliary Columns LHS 7th Tier	56,000.00	Try	STR	1A
35-148	AUXILIARY COLUMNS LHS 8TH TIER	50,000.00	Try	STR	1A
35-151	AUXCOL LHSLWR 1&2PAS	136,000.00	Try	STR	1A
35-152	AUXCOL RHSMID 1&2PAS	133,000.00	Try	STR	1A
35-153	AUXCOL RHSUPR 1&2PAS	78,000.00	Try	STR	1A
35-154	Auxiliary Columns RHS 4th Tier	44,000.00	Try	STR	1A
35-155	Auxiliary Columns LHS 7th Tier	66,000.00	Try	STR	1A
35-156	Auxiliary Columns RHS 6th Tier	56,000.00	Try	STR	1A
35-157	Auxiliary Columns RHS 7th Tier	57,000.00	Try	STR	1A
35-158	AUXILIARY COLUMNS RHS 8TH TIER	50,000.00	Try	STR	1A
35-181	Main Columns 1st Tier	498,000.00	Try	STR	1A
35-182	Main Columns 2nd Tier	455,000.00	Try	STR	1A
35-183	Main Columns 3rd Tier	292,000.00	Try	STR	1A
35-184	Main Columns 4th Tier	192,000.00	Try	STR	1A
35-185	Main Columns 5th Tier	260,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
35-186	Main Columns 6th Tier	243,000.00	Try	STR	1A
35-187	Main Columns 7th Tier	234,000.00	Try	STR	1A
35-188	MAIN COLUMNS 8TH TIER	250,000.00	Try	STR	1A
35-190	GIRDER PIN CONNECTIO	30,000.00	Try	STR	1A
35-211	CEILING STRUCTUREMAI	723,000.00	Try	STR	1A
35-212	CEILING STRUCTUREMAI	676,000.00	Try	STR	1A
35-213	CEIL STRUCT -CROSS W	182,000.00	Try	STR	1A
35-214	CEIL STRUCT -CROSS W	137,000.00	Try	STR	1A
35-221	CEILING STRUCTURE RO	83,000.00	Try	STR	1A
35-222	CEILING STRUCTURE RO	50,000.00	Try	STR	1A
35-231	CEILING STRUCTURE HO	105,000.00	Try	STR	1A
35-232	CEILING STRUCTURE HO	60,000.00	Try	STR	1A
35-311	HORIZONTAL BRACING I	37,000.00	Try	STR	1A
35-312	HORIZ BRACING II PAS	22,000.00	Try	STR	1A
35-321	HORIZ BRACING I PASS	36,000.00	Try	STR	1A
35-322	HORIZ BRACING II PAS	41,000.00	Try	STR	1A
35-331	HORIZ BRACING I PASS	33,000.00	Try	STR	1A
35-332	HORIZ BRACING II PAS	41,000.00	Try	STR	1A
35-341	HORIZ BRACING I PASS	51,000.00	Try	STR	1A
35-342	HORIZ BRACING II PAS	46,000.00	Try	STR	1A
35-351	HORIZ BRACING I PASS	55,000.00	Try	STR	1A
35-352	HORIZ BRACING II PAS	29,000.00	Try	STR	1A
35-361	HORIZ BRACING I PASS	35,000.00	Try	STR	1A
35-362	HORIZ BRACING II PAS	41,000.00	Try	STR	1A
35-371	Horizontal Bracing@79100 (MBL-7)1st Pass	55,000.00	Try	STR	1A
35-372	Horizontal Bracing @79100(MBL-7)2nd Pass	47,000.00	Try	STR	1A
35-374	Horizontal Bracing@87500(MBL-8) 1st Pass	38,000.00	Try	STR	1A
35-375	Horizontal Bracing@87500(MBL-8) 2nd Pass	54,000.00	Try	STR	1A
35-381	Landing & Connecting Platforms Tier-1	80,000.00	Try	STR	1A
35-382	Landing & Connecting Platforms Tier-2	61,000.00	Try	STR	1A
35-383	Landing & Connecting Platforms Tier-3	111,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
35-384	Landing & Connecting Platforms Tier-4	54,000.00	Try	STR	1A
35-385	Landing & Connecting Platforms Tier-5	65,000.00	Try	STR	1A
35-386	Landing & Connecting Platforms Tier-6	90,000.00	Try	STR	1A
35-387	Landing & Connecting Platforms Tier-7	77,000.00	Try	STR	1A
35-388	Landing & Connecting Platforms Tier-8	80,000.00	Try	STR	1A
35-390	MISC STRUCTURES	72,000.00	Try	STR	1A
35-441	Horil Beams First Pass-Tier-1	124,000.00	Try	STR	1A
35-442	Horil Beams First Pass-Tier-2	135,000.00	Try	STR	1A
35-443	Horil Beams First Pass-Tier-3	86,000.00	Try	STR	1A
35-444	Horil Beams First Pass-Tier-4	111,000.00	Try	STR	1A
35-445	Horil Beams First Pass-Tier-5	118,000.00	Try	STR	1A
35-446	Horil Beams First Pass-Tier-6	84,000.00	Try	STR	1A
35-447	Horil Beams First Pass-Tier-7	105,000.00	Try	STR	1A
35-448	Horil Beams First Pass-Tier-8	75,000.00	Try	STR	1A
35-451	Hor Beam-Second Pass- Tier-1	68,000.00	Try	STR	1A
35-452	Hor Beam-Second Pass- Tier-2	119,000.00	Try	STR	1A
35-453	Hor Beam-Second Pass- Tier-3	53,000.00	Try	STR	1A
35-454	Hor Beam-Second Pass- Tier-4	41,000.00	Try	STR	1A
35-455	Hor Beam-Second Pass- Tier-5	42,000.00	Try	STR	1A
35-456	Hor Beam-Second Pass- Tier-6	40,000.00	Try	STR	1A
35-457	Hor Beam-Second Pass- Tier-7	49,000.00	Try	STR	1A
35-458	Hor Beam-Second Pass- Tier-8	34,000.00	Try	STR	1A
35-511	Front Bracing-Tier-1	44,000.00	Try	STR	1A
35-512	Front Bracing-Tier-2	51,000.00	Try	STR	1A
35-513	Front Bracing-Tier-3	38,000.00	Try	STR	1A
35-514	Front Bracing-Tier-4	23,000.00	Try	STR	1A
35-515	Front Bracing-Tier-5	31,000.00	Try	STR	1A
35-516	Front Bracing-Tier-6	30,000.00	Try	STR	1A
35-517	Front Bracing-Tier-7	26,000.00	Try	STR	1A
35-518	Front Bracing-Tier-8	23,000.00	Try	STR	1A
35-521	Side Bracing-Tier-1	101,000.00	Try	STR	1A
35-522	Side Bracing-Tier-2	90,000.00	Try	STR	1A
35-523	Side Bracing-Tier-3	61,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
35-524	Side Bracing-Tier-4	32,000.00	Try	STR	1A
35-525	Side Bracing-Tier-5	36,000.00	Try	STR	1A
35-526	Side Bracing-Tier-6	40,000.00	Try	STR	1A
35-527	Side Bracing-Tier-7	45,000.00	Try	STR	1A
35-528	Side Bracing-Tier-8	39,000.00	Try	STR	1A
35-531	Rear Bracing-Tier-1	75,000.00	Try	STR	1A
35-532	Rear Bracing-Tier-2	55,000.00	Try	STR	1A
35-533	Rear Bracing-Tier-3	18,000.00	Try	STR	1A
35-534	Rear Bracing-Tier-4	19,000.00	Try	STR	1A
35-535	Rear Bracing-Tier-5	32,000.00	Try	STR	1A
35-536	Rear Bracing-Tier-6	25,000.00	Try	STR	1A
35-537	Rear Bracing-Tier-7	23,000.00	Try	STR	1A
35-538	Rear Bracing-Tier-8	25,000.00	Try	STR	1A
35-701	HSFG FASTENERS	16,000.00	Try	STR	1A
35-721	HSFG FASTENERS FOR 35PG - TIER 1	17,000.00	Try	STR	1A
35-722	HSFG FASTENERS FOR 35PG - TIER 2	24,000.00	Try	STR	1A
35-723	HSFG FASTENERS FOR 35PG - TIER 3	16,000.00	Try	STR	1A
35-724	HSFG FASTENERS FOR 35PG - TIER 4	15,000.00	Try	STR	1A
35-725	HSFG FASTENERS FOR 35PG - TIER 5	16,000.00	Try	STR	1A
35-726	HSFG FASTENERS FOR 35PG - TIER 6	14,000.00	Try	STR	1A
35-727	HSFG FASTENERS FOR 35PG - TIER 7	15,000.00	Try	STR	1A
35-728	HSFG FASTENERS FOR 35PG - TIER 8	15,000.00	Try	STR	1A
35-730	HSFG FASTENERS - CEILING	28,000.00	Try	STR	1A
35-811	FLOOR GRILLS AND GUARD PLATE	110,000.00	Try	STR	1A
35-812	Edge Strip And Guard Plate	16,000.00	Try	STR	1A
35-821	STAIRS - LOWER	18,000.00	Try	STR	1A
35-822	STAIRS - MIDDLE	12,000.00	Try	STR	1A
35-823	STAIRS - UPPER	14,000.00	Try	STR	1A
35-851	HAND RAILS AND POSTS	33,000.00	Try	STR	1A
35-993	CONSUMABLES AND RECTI	42,000.00	Try	NB	
35-995	CHUTE PIPE AND LADDE	43,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
36-111	COLUMNS NEAR APH Tier 1	400,000.00	Try	STR	1A
36-112	COLUMNS NEAR APH Tier 2	400,000.00	Try	STR	1A
36-113	COLUMNS NEAR APH Tier 3	220,000.00	Try	STR	1A
36-151	BEAMS AND BRACINGS NEAR APH Tier 1	400,000.00	Try	STR	1A
36-152	BEAMS AND BRACINGS NEAR APH Tier 2	400,000.00	Try	STR	1A
36-153	BEAMS AND BRACINGS NEAR APH Tier 3	205,000.00	Try	STR	1A
36-311	MAIN FLOOR I MBL 1ST	18,000.00	Try	STR	1A
36-312	MAIN FLOOR I MBL 2ND	18,000.00	Try	STR	1A
36-313	NON-MBL FLOOR BETWEE	230,000.00	Try	STR	1A
36-314	NON-MBL FLOOR BETWEE	353,000.00	Try	STR	1A
36-315	NON-MBL FLOOR BETWEE	73,000.00	Try	STR	1A
36-316	NON-MBL FLOOR BETWEE	43,000.00	Try	STR	1A
36-321	MAIN FLOOR II MBL 1ST	6,000.00	Try	STR	1A
36-322	MAIN FLOOR II MBL 2ND	36,000.00	Try	STR	1A
36-323	NON-MBL FLOOR BETWEE	82,000.00	Try	STR	1A
36-324	NON-MBL FLOOR BETWEE	97,000.00	Try	STR	1A
36-325	NON-MBL FLOOR BETWEE	8,000.00	Try	STR	1A
36-326	NON-MBL FLOOR BETWEE	6,000.00	Try	STR	1A
36-331	MAIN FLOOR III MBL 1	38,000.00	Try	STR	1A
36-332	MAIN FLOOR III MBL 2	66,000.00	Try	STR	1A
36-333	NON-MBL FLOOR BETWEE	87,000.00	Try	STR	1A
36-334	NON-MBL FLOOR BETWEE	46,000.00	Try	STR	1A
36-335	NON-MBL FLOOR BETWEE	136,000.00	Try	STR	1A
36-336	NON-MBL FLOOR BETWEE	52,000.00	Try	STR	1A
36-337	NON-MBL FLOOR BETWEE	129,000.00	Try	STR	1A
36-338	NON-MBL FLOOR BETWEE	4,000.00	Try	STR	1A
36-341	MAIN FLOOR IV MBL 1ST	44,000.00	Try	STR	1A
36-342	MAIN FLOOR IV MBL 2ND	30,000.00	Try	STR	1A
36-343	NON-MBL FLOOR BETWEE	67,000.00	Try	STR	1A
36-344	NON-MBL FLOOR BETWEE	131,000.00	Try	STR	1A
36-345	NON-MBL FLOOR BETWEE	48,000.00	Try	STR	1A
36-346	NON-MBL FLOOR BETWEE	17,000.00	Try	STR	1A
36-351	MAIN FLOOR V MBL 1ST	5,000.00	Try	STR	1A
36-352	MAIN FLOOR V MBL II ND	15,000.00	Try	STR	1A
36-353	NON-MBL FLOOR BETWEE	61,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
36-354	NON-MBL FLOOR BETWEE	54,000.00	Try	STR	1A
36-355	NON-MBL FLOOR BETWEE	3,000.00	Try	STR	1A
36-356	NON-MBL FLOOR BETWEE	3,000.00	Try	STR	1A
36-361	MAIN FLOOR VI MBL 1ST	47,000.00	Try	STR	1A
36-362	MAIN FLOOR VI MBL 2ND	43,000.00	Try	STR	1A
36-363	NON_MBL FLOOR ABOVE	68,000.00	Try	STR	1A
36-364	NON MBL FLOOR ABOVE MBL VI	80,000.00	Try	STR	1A
36-365	NON MBL FLOOR ABOVE MBL VI	106,000.00	Try	STR	1A
36-366	NON MBL FLOOR ABOVE MBL VI	74,000.00	Try	STR	1A
36-371	Floor Beams @ 79100 (MBL-7) 1st Pass	19,000.00	Try	STR	1A
36-372	Floor Beams @ 79100 (MBL-7) 2nd Pass	6,000.00	Try	STR	1A
36-373	Floor Beams @ 83400 (Tier-8)	87,000.00	Try	STR	1A
36-374	Floor Beams @ 87500 (MBL-8) 1st Pass	133,000.00	Try	STR	1A
36-375	Floor Beams @ 87500 (MBL-8) 2nd Pass	14,000.00	Try	STR	1A
36-376	Floor Beams @ 90500 (Tier-8)2nd Pass	20,000.00	Try	STR	1A
36-377	Floor Beams 2nd Pass Tier-8	9,000.00	Try	STR	1A
36-381	LAND & CONN PLAT LOW	86,000.00	Try	STR	1A
36-382	LAND & CONN PLAT MID	183,000.00	Try	STR	1A
36-383	LAND & CONN PLAT UPP	41,000.00	Try	STR	1A
36-391	MISCELLANEOUS PLATFO	62,000.00	Try	STR	1A
36-392	MISCELLANEOUS PLATFO	226,000.00	Try	STR	1A
36-393	APH, SCAPH, HANDLING	346,000.00	Try	STR	1A
36-394	MISCELLANEOUS PLATFO	92,000.00	Try	STR	1A
36-395	MISCELLANEOUS PLATFO	6,000.00	Try	STR	1A
36-396	Slide Bearing Plates	1,000.00	Try	STR	1A
36-398	HEAVY SLIDE BEARING PLATES	2,000.00	Try	STR	1A
36-610	BOILER ROOF STRUCTUR	205,000.00	Try	STR	1A
36-611	BOILER ROOF SHEETING	33,000.00	Try	STR	1A
36-613	RAIN WATER PIPES and	24,000.00	Try	STR	1A
36-620	BOILER SIDE CLADDING	57,000.00	Try	STR	1A
36-621	BOILER SIDE CLADDING	16,000.00	Try	STR	1A
36-630	OTHER BOILER SIDING	225,000.00	Try	STR	1A
36-631	OTHER BOILER SIDING SHEETING	75,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
36-700	Hsfg Bolts	83,000.00	Try	STR	1A
36-701	Fasteners	2,000.00	Try	STR	1A
36-721	HSFG FASTENERS FOR 36PG - TIER 1	29,000.00	Try	STR	1A
36-722	HSFG FASTENERS FOR 36PG - TIER 2	12,000.00	Try	STR	1A
36-723	HSFG FASTENERS FOR 36PG - TIER 3	20,000.00	Try	STR	1A
36-740	POSTS AND HANGERS	25,000.00	Try	STR	1A
36-811	FLOORGRILLSANDGUARDP	420,000.00	Try	STR	1A
36-812	FLOORGRILLSANDGUARDP	222,000.00	Try	STR	1A
36-813	FLOORGRILLSANDGUARDP	170,000.00	Try	STR	1A
36-814	FLOORGRILLSANDGUARDP	84,000.00	Try	STR	1A
36-820	STAIRS AND LADDERS	88,000.00	Try	STR	1A
36-821	STAIRS AND LADDERS	62,000.00	Try	STR	1A
36-822	STAIRS AND LADDERS	10,000.00	Try	STR	1A
36-823	STAIRS AND LADDERS	6,000.00	Try	STR	1A
36-851	HANDRAILS AND POSTS	33,000.00	Try	STR	1A
36-852	HANDRAILS AND POSTS	40,000.00	Try	STR	1A
36-853	HANDRAILS AND POSTS	21,000.00	Try	STR	1A
36-993	CONSUMABLESANDERECIT	36,000.00	Try	NB	
37-010	BLR OUTER CSG COMPS	51,800.00	Try	Insl.	3C
37-810	BLR OUTER CASING	64,750.00	Try	Insl.	3D
38-210	INTER CONN PLATFORMS	25,000.00	Try	STR	1A
38-299	MILL HANDLING MONORA	260,000.00	Try	STR	1A
38-310	CONN PLATFORMS TO MI	40,000.00	Try	STR	1A
38-410	MILL MAINTANANCE PLA	180,000.00	Try	STR	1A
38-510	LIFT BEAMS AND BRACI	50,000.00	Try	STR	1A
38-610	ELEVATOR CLADDING ST	110,000.00	Try	STR	1A
38-611	ELEVATOR CLADDING SH	35,000.00	Try	STR	1A
38-710	LIFT MACHINE ROOM DE	113,000.00	Try	STR	1A
38-810	FLOORGRILLS AND GUAR	18,000.00	Try	STR	1A
38-820	STAIRS AND LADDERS	5,000.00	Try	STR	1A
38-850	HAND RAILS AND HAND	70,000.00	Try	STR	1A
38-993	CONSUMABLES AND EREC	24,000.00	Try	NB	
39-012	FOUNDATION MATERIALS	79,700.00	Try	STR	1A
39-101	COLUMNS FRAMES BEFOR	489,000.00	Try	STR	1A
39-102	COLUMNS FRAMES BEFOR	447,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
39-141	COLS FRAMES NEAR ID	185,000.00	Try	STR	1A
39-142	COLS FRAMES NEAR ID	800,000.00	Try	STR	1A
39-150	COL FRAMES BETN I.D.	93,000.00	Try	STR	1A
39-299	Platforms - Before ESP	170,000.00	Try	STR	1A
39-304	FAN HANDLING STRUCTU	24,800.00	Try	STR	1A
39-305	FAN HANDLING STRUCTU	20,000.00	Try	STR	1A
39-306	FAN HANDLING STRUCTU	97,100.00	Try	STR	1A
39-700	HSFG FASTENERS FOR P	29,000.00	Try	STR	1A
39-810	FLOOR GRILL	103,500.00	Try	STR	1A
39-820	STAIRS	25,560.00	Try	STR	1A
39-850	HAND RAIL AND HAND R	56,700.00	Try	STR	1A
39-993	CONSUMABLES AND EREC	7,000.00	Try	NB	
41-350	ACOIL GUN ASSY	700.00	Try	NPP	1C
41-390	OIL GUN VICE&RACK	1,100.00	Try	NPP	1C
41-500	HEA IGNITOR	950.00	Try	NPP	1C
41-710	Oil Gun Assembly - DD items	2.00	Try	NPP	1C
42-001	PNEUMATIC FITTINGS	50.00	Try	PP	1B
42-002	STEAM BLOW MATERIALS	2,900.00	Try	PP	1B
42-005	INSTRUMENT FITTINGS	80.00	Try	PP	1B
42-010	LFO PUMP SET	20,000.00	Try	PP	1B
42-046	DO PUMP-MOTOR ASSY	300.00	Try	PP	1B
42-065	DRAIN OIL TANK	4,800.00	Try	PP	1B
42-070	BURNER STN SKID ASLY	6,100.00	Try	PP	1B
42-120	PIPING,PH FUEL OIL	1,700.00	Try	PP	1B
42-152	PIPING,OP.FLR LFO	3,000.00	Try	PP	1B
42-154	PIPING,OP.FLR DO	500.00	Try	PP	1B
42-157	PIPING,OP.FLR AIR	20.00	Try	PP	1B
42-200	SUB.DEL FO SYSTEM	7,500.00	Try	PP	1B
42-300	BHEL VALVE F.O. SYS	1,000.00	Try	PP	1B
42-700	BULKED BPS COMPONENT	1,200.00	Try	PP	1B
42-710	Fuel Oil System - DD Items	1,700.00	Try	PP	1B
42-858	Fuel Oil System - Shop items	14,500.00	Try	PP	1B
42-992	IMPORTED ELECTRODES	25.00	Try	NB	
43-004	ASSY SCNR&GUN AIR SY	4,000.00	Try	NPP	1C
43-005	ASSY MILL AIR SYSTEM	25,000.00	Try	NPP	1C
43-104	M/C SCNR&GUN AIR SYS	19,000.00	Try	NPP	1C
43-105	M/C MILL AIR SYSTEM	82,000.00	Try	NPP	1C
43-200	SUBDEL,IGNR,SCNR AIR	16,000.00	Try	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
43-710	Seal Air & Scanner Air System - DD items	800.00	Try	NPP	1C
45-200	Windbox - Sub Delivery	4,500.00	Try	NPP	1C
45-710	Wind Box & SOFA Assembly - DD items	800.00	Try	NPP	1C
45-801	WINDBOX AND SOFA TUBE ATTACH	44,000.00	Try	NPP	1C
45-802	WINDBOX ASSEMBLY - 32" WIDTH	215,000.00	Try	NPP	1C
45-804	WINDBOX - SOFA ASSEMBLY	48,500.00	Try	NPP	1C
45-805	WINDBOX SUPPT AIR CYL MOUNTG	41,000.00	Try	NPP	1C
45-858	Wind Box & SOFA Assy - Shop items	47,000.00	Try	NPP	1C
47-200	Fuel Piping - Sub-delivery	49,000.00	Try	NPP	1C
47-281	FUEL PIPE SUPPORTS	50,000.00	Try	NPP	1C
47-283	FUEL PIPE MISC ITEMS	17,500.00	Try	NPP	1C
47-289	ST PIPE SHOP BEND REST OF MILL	390,000.00	Try	NPP	1C
47-710	Pulverised Fuel Piping - DD items	4,000.00	Try	NPP	1C
47-858	Fuel Piping - Shop items	57,000.00	Try	NPP	1C
48-012	DUCT - -FDFAN TO A.H	181,700.00	Try	NPP	1C
48-014	EXP.JT - -FDFAN TO A.H	5,155.00	Try	NPP	1C
48-015	SUPPORT-FDFAN TO A.H	36,080.00	Try	NPP	1C
48-018	MISC. DUCT&SPRT MATL	34,795.00	Try	NPP	1C
48-019	AIRDUCT SUP FDN MATL	5,155.00	Try	NPP	1C
48-022	DUCT - FDFAN INTRCON	12,890.00	Try	NPP	1C
48-112	DUCT - -PAFAN-PRI-AH	188,155.00	Try	NPP	1C
48-114	EXP.JT - -PAFAN-PRI-AH	14,175.00	Try	NPP	1C
48-115	SUPPORT-PAFAN-PRI-AH	24,485.00	Try	NPP	1C
48-116	DUCT MISC.	12,890.00	Try	NPP	1C
48-141	SEAL AIR HAG&ID GATE	9,020.00	Try	NPP	1C
48-142	DUCT - -COLDAIRBUS	173,980.00	Try	NPP	1C
48-144	EXP.JT - -COLDAIRBUS	5,155.00	Try	NPP	1C
48-145	SUPPORT-COLDAIRBUS	25,775.00	Try	NPP	1C
48-200	INS TAPPINGS ON DUCT	6,440.00	Try	NPP	1C
48-202	DUCT - AH-WIND BOX	239,705.00	Try	NPP	1C
48-204	EXPJT - AH-WIND BOX	56,705.00	Try	NPP	1C
48-205	SUPORT AH-WIND BOX	61,860.00	Try	NPP	1C
48-206	CLH/VLH -Hot Air	15,465.00	Try	NPP	1C
48-207	FLOWMTR-SEC AIRFLOW	32,215.00	Try	NPP	1C
48-208	DUCT-SEC.AIR TO WB	192,022.00	Try	NPP	1C
48-212	DUCT - WIND BOX CONN	128,875.00	Try	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
48-214	EXPJT - WIND BOX CONN	14,176.00	Try	NPP	1C
48-222	SQ DUCT AH-HOT AIR BUS	231,970.00	Try	NPP	1C
48-224	EXPN PCS AH-HOT AIR BUS	18,040.00	Try	NPP	1C
48-225	SUPPORT AH-HOT AIR BUS	38,660.00	Try	NPP	1C
48-262	Rect Duct Aihtr Toprinozzle And Seca	134,030.00	Try	NPP	1C
48-264	Expn Piece Aihtr Toprinozzle and Seca	45,105.00	Try	NPP	1C
48-265	Supports Aihtr Toprinozzle And Seca	16,750.00	Try	NPP	1C
48-267	FLOW METER- SOFA	5,155.00	Try	NPP	1C
48-372	DUCT - ECO HOPPER TO AH	37,370.00	Try	NPP	1C
48-382	DUCT - ECO-HOPPER	157,225.00	Try	NPP	1C
48-384	EXPNJT - ECO-HOPPER	50,260.00	Try	NPP	1C
48-385	SUPPORT - ECO-HOPPER	69,592.00	Try	NPP	1C
48-386	DUCT - ECO TO ECO HOPPER	341,516.00	Try	NPP	1C
48-395	CLH/VLH-FLUE GAS	20,620.00	Try	NPP	1C
48-432	DUCT - AH-BLROUTFL	132,740.00	Try	NPP	1C
48-434	EXPJT - AH-BLROUTFL	9,020.00	Try	NPP	1C
48-435	SUPORT AH-BLROUTFL	41,240.00	Try	NPP	1C
48-462	DUCT - BLROUTFL-EP	534,830.00	Try	NPP	1C
48-464	EXPJT - BLROUTFL-EP	46,395.00	Try	NPP	1C
48-465	SUPORT BLR OUTFL-EP	67,015.00	Try	NPP	1C
48-662	CIRCULAR DUCT HOT BUS MILLS	153,360.00	Try	NPP	1C
48-664	EXPN PCS HOT BUS MILLS	14,175.00	Try	NPP	1C
48-665	SUPPORTS HOT BUS MILLS	21,910.00	Try	NPP	1C
48-667	FLOW METER	21,910.00	Try	NPP	1C
48-700	BULKED BPS COMPONENT	7,735.00	Try	NPP	1C
48-911	Slide Brg Pl & Pac Bellow-Blr	5,155.00	Try	NPP	1C
48-912	Slide Brg Pl-Id Sys	1,290.00	Try	NPP	1C
48-915	Man Hole Doors (450X450)	19,330.00	Try	NPP	1C
48-993	ERECTON-MATERIALS	55,194.00	Try	NB	
65-200	Coal Feeder- Sub-Delivey	1,000.00	Try	RM	2A
65-710	Coal Feeder - DD items	200.00	Try	RM	2A
65-736	36GRAVIMETRIC FEEDER	62,600.00	Try	RM	2A
67-200	Coal Feeding System- Sub dely.	950.00	Try	RM	2A
67-204	RAW COAL GATES	4,100.00	Try	RM	2A
67-272	BUNKER OUTLET GATE -36" MOTOR	9,400.00	Try	RM	2A
67-276	FEEDER INLET GATE- 36" CHAIN	8,600.00	Try	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
67-283	FEEDER OUTLET ISOLATION GATE	12,200.00	Try	RM	2A
67-710	Coal Feeding System - DD items	500.00	Try	RM	2A
67-801	DOWN SPOUT	9,300.00	Try	RM	2A
67-802	BUNKER EMPTYINGCHUTE	32,000.00	Try	RM	2A
67-803	FEED PIPE TO MILL	24,000.00	Try	RM	2A
95-088	FSSS FLAME SCANNER	450.00	Try	PP	1B
96-588	ELECT.ACTUATOR-A&FG	600.00	Try	NPP	1C
97-282	FLOWMETERS	3,500.00	Try	PP	1B
97-284	FIELD GAUGES	400.00	Try	PP	1B
97-297	MTM CLAMPS & PADS	3,000.00	Try	PP	1B
97-599	PNEU.ACTUR A&FG SYS	3,200.00	Try	NPP	1C
99-099	MISC CHAIN PULLY BLO	100.00	Try	NPP	1C
99-100	FAN HANDLING EQUIPT	20,000.00	Try	NPP	1C
99-300	PUMP HANDLING EQUIPT	3,150.00	Try	NPP	1C
99-400	SCAPH,RAPH HANDLG EQ	2,300.00	Try	NPP	1C
PGMA	Description	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
	Flash Tank A	3850	BPL	PP	1B
	Flash Tank B	3200	BPL	PP	1B
	Unit Flash Tank	1200	BPL	PP	1B
	ID Fan Motor (2 Nos)	87400	BPL	RM	2A
	FD Fan Motor (2 Nos)	30000	BPL	RM	2A
	PA Fan Motor (2 Nos)	34000	BPL	RM	2A
	Mill Motor (9 Nos)	71100	BPL	RM	2A
52341	L AH-HP PUMP WITH MOTOR	1.500	RPT APH	RM	2A
52011	LARG AH-ROTOR POST	53.000	RPT APH	RM	2A
52010	LARG AH-ROTOR ASSY	1,330.000	RPT APH	RM	2A
52012	LARG AH-ROTORPINRACK	7.500	RPT APH	RM	2A
52030	LARG AH-ROTORHOUSING	76.000	RPT APH	RM	2A
52041	HOT END CONN PLATE	128.800	RPT APH	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
52042	COLD END CONN PLATE	246.800	RPT APH	RM	2A
52000	SPECIAL TOOLS/CONTRA	1.140	RPT APH	NB	
52261	LARG AH-GUIDE BEARNG	7.950	RPT APH	RM	2A
52262	LARG AH-SUPRT BEARNG	22.000	RPT APH	RM	2A
52013	LARG AH-ROTORSEALS	18.500	RPT APH	RM	2A
52054	LARG AH-AXIAL SEAL	1.400	RPT APH	RM	2A
52055	LARG AH-BY PASS SEAL	1.730	RPT APH	RM	2A
52100	LARGE AH ROTOR DRIVE	14.500	RPT APH	RM	2A
52101	LARG AH-AUX ROTDRIVE	10.500	RPT APH	RM	2A
52600	LARGE AH ECI COMPONENTS	1.500	RPT APH	RM	2A
50510	STEAM COIL A P H	13.000	RPT APH	RM	2A
52220	LARG AH-GENS DETAILS	3.200	RPT APH	RM	2A
52271	OIL PIPING GUIDE BRG	0.540	RPT APH	RM	2A
52272	OIL PIPING SUPRT BRG	0.520	RPT APH	RM	2A
52338	LARGE AH-MULTIMEDI CLNG DEV-CE	3.050	RPT APH	RM	2A
52339	LARGE AH-RETRACT CLNG DEV (HE)	2.500	RPT APH	RM	2A
52211	LARG AH-AIRSEAL PIPE	0.800	RPT APH	RM	2A
52274	LUB OIL CIRCULATION UNIT	1.120	RPT APH	RM	2A
52275	LARGE AIR HEATER-LUBRICANTS	1.550	RPT APH	RM	2A
52301	WASH MANIFLD GAS INL	2.450	RPT APH	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
52302	WASH MANIFLD GAS OUT	2.700	RPT APH	RM	2A
52988	LARG AH COMMISSIONING SPARE	0.500	RPT APH	NB	
55012	FD STAIR HAND RAIL	2.000	RPT FAN	RM	2A
55019	FD FAN MOTOR CANOPY	1.500	RPT FAN	RM	2A
55022	ID STAIR HAND RAIL	3.000	RPT FAN	RM	2A
55029	ID FAN MOTOR CANOPY	3.000	RPT FAN	RM	2A
55032	PA STAIR HAND RAIL	2.300	RPT FAN	RM	2A
55039	PA FAN MOTOR CANOPY	2.400	RPT FAN	RM	2A
55210	FD FAN LOS CANOPY	1.200	RPT FAN	RM	2A
55220	ID FAN LOS CANOPY	1.200	RPT FAN	RM	2A
55230	PA FAN LOS CANOPY	1.200	RPT FAN	RM	2A
55728	ID FAN SUCTION BOX	21.000	RPT FAN	RM	2A
55828	ID FAN DIFFUSER	18.800	RPT FAN	RM	2A
56072	SA STAIR HAND RAIL	1.200	RPT FAN	RM	2A
55015	FD FAN COUPLING GUARD	0.060	RPT FAN	RM	2A
55420	ID SET INDN SHAFT	0.180	RPT FAN	RM	2A
55000	FAN TOOL FIXTURE	0.500	RPT FAN	NB	
55410	FD SET INDN SHAFT	0.130	RPT FAN	RM	2A
55510	FD FAN EXPN JOINTS	1.850	RPT FAN	RM	2A
55011	FAN FIX MATERIAL	0.950	RPT FAN	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
55021	ID FAN FIX MATERIAL	2.000	RPT FAN	RM	2A
55024	ID FAN C S AIR FAN	3.000	RPT FAN	RM	2A
55031	PA FAN FIX MATERIAL	1.000	RPT FAN	RM	2A
55216	1 STG FD ROTOR	6.300	RPT FAN	RM	2A
55516	1 STG FD HOUSING	16.500	RPT FAN	RM	2A
55635	2 STG PA HOUSING	8.600	RPT FAN	RM	2A
55816	FD FAN DIFFUSER	9.000	RPT FAN	RM	2A
55920	ID FAN LUBE OIL SYS	6.600	RPT FAN	RM	2A
56077	SA FAN CI ITEMS	0.020	RPT FAN	RM	2A
55091	FIRST FILL LUBRICANT	6.720	RPT FAN	RM	2A
55328	2 STG ID ROTOR	32.500	RPT FAN	RM	2A
55335	2 STG PA ROTOR	7.500	RPT FAN	RM	2A
55430	PA SET INDN SHAFT	0.160	RPT FAN	RM	2A
55628	2 STG ID HOUSING	47.000	RPT FAN	RM	2A
55716	FD FAN SUCTION BOX	8.600	RPT FAN	RM	2A
55025	ID FAN CPLNG GUARD	0.120	RPT FAN	RM	2A
55027	ID FAN CI ITEMS	0.050	RPT FAN	RM	2A
55035	PA FAN CPLNG GUARD	0.100	RPT FAN	RM	2A
55520	ID FAN EXPN JOINTS	2.300	RPT FAN	RM	2A
55530	PA FAN EXPN JOINTS	1.250	RPT FAN	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
55820	ID FAN COUPLING	5.000	RPT FAN	RM	2A
55830	PA FAN COUPLING	1.400	RPT FAN	RM	2A
55835	PA FAN DIFFUSER	5.500	RPT FAN	RM	2A
55919	FD FAN INSUL WOOL	15.000	RPT FAN	RM	2A
55931	PA FAN SILENCER	58.100	RPT FAN	RM	2A
55939	PA FAN INSUL WOOL	10.500	RPT FAN	RM	2A
56079	SA FAN MTR CANOPY	0.350	RPT FAN	RM	2A
56670	RADIAL SEAL AIR FAN MOTOR	2.800	RPT FAN	RM	2A
55017	FD FAN CI ITEMS	0.040	RPT FAN	RM	2A
55037	PA FAN CI ITEMS	0.040	RPT FAN	RM	2A
55735	PA FAN SUCTION BOX	5.500	RPT FAN	RM	2A
55810	FD FAN COUPLING	1.380	RPT FAN	RM	2A
55910	FD FAN LUBE OIL SYS	3.000	RPT FAN	RM	2A
55911	FD FAN SILENCER	68.000	RPT FAN	RM	2A
55930	PA FAN LUBE OIL SYS	4.500	RPT FAN	RM	2A
56075	SA FAN CPLNG GUARD	0.060	RPT FAN	RM	2A
56161	PENT HOUSE FAN	1.200	RPT FAN	RM	2A
56173	SA FAN ROTOR	1.700	RPT FAN	RM	2A
56373	RADIAL SEAL AIR FAN BEARINGS	0.330	RPT FAN	RM	2A
56473	RADIAL SEAL AIR FAN STATOR	7.600	RPT FAN	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
56870	SEAL AIR FAN COUPLING(RADIAL)	0.040	RPT FAN	RM	2A
57S41	SEAL AIR PIPING-SCR	7.000	RPT GD	NPP	1C
57S77	ELECTRIC ACTUATR-SCR	6.000	RPT GD	NPP	1C
57S78	ELECTRIC ITEM-SCR GD	0.020	RPT GD	NPP	1C
57S91	BLOWER WITH MOTR-SCR	2.000	RPT GD	NPP	1C
57S97	KGV CHECK VALV-SCR	2.200	RPT GD	NPP	1C
57CX0	GATE-WITH CLADDING	35.000	RPT GD	NPP	1C
57141	SEAL AIR PIPING	30.000	RPT GD	NPP	1C
57466	PLATFORMS AND LADDERS	174.570	RPT GD	NPP	1C
57497	KGV CHECK VALVE	8.900	RPT GD	NPP	1C
57620	GATE-SCR BYPASS	98.600	RPT GD	NPP	1C
57491	BLOWER WITH MOTOR	15.800	RPT GD	NPP	1C
57010	GATE-FD FAN OUTLET	32.600	RPT GD	NPP	1C
57083	DAMPER-SA SCAPH BYPASS	24.200	RPT GD	NPP	1C
57577	ELECT ACTUATOR FOR GATEDAMPER	55.600	RPT GD	NPP	1C
57578	ELECTRICAL ITEMS FOR GATEDAMP	0.060	RPT GD	NPP	1C
57666	PLATFORMS AND LADDERS-SCR GD	13.200	RPT GD	NPP	1C
57110	GATE-PA FAN OUTLET	29.000	RPT GD	NPP	1C
57113	DAMPER-PA FAN OUTLET	16.700	RPT GD	NPP	1C
57160	GATE-COLD AIR TO MILLS	25.600	RPT GD	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
57173	DAMPER-PA APH INLET	14.800	RPT GD	NPP	1C
57270	GATE-HOT AIR TO MILLS	38.400	RPT GD	NPP	1C
57273	DAMPER-HOT AIR TO MILL	14.200	RPT GD	NPP	1C
57430	FLUE GAS AH OUT GATE	87.400	RPT GD	NPP	1C
57480	GATE-ID FAN INLET	74.500	RPT GD	NPP	1C
57490	GATE-ID FAN OUTLET	74.500	RPT GD	NPP	1C
57033	DAMPER-SA SCAPH INLET	20.300	RPT GD	NPP	1C
57063	DAMPER-SA SCAPH OUTLET	24.200	RPT GD	NPP	1C
57143	DAMPER-COLD AIR TO MILL	8.500	RPT GD	NPP	1C
57203	DAMPER-SA APH OUTLET	35.000	RPT GD	NPP	1C
57223	DAMPER-PA APH OUTLET	18.700	RPT GD	NPP	1C
PGMA	Description	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
	JOURNAL HEAD, HP 1103, MACHINED (3 Nos Per Mill)	7,800.000	Hyd Mill	RM	
	PGB ASSEMBLY (1 No Per Mill)	15,930.000	Hyd Mill	RM	
	JOURNAL HEAD LINER ASSLY. (3 Nos Per Mill)	7,653.600	Hyd Mill	RM	
	JOURNAL SKIRT ASSLY. (3 Nos Per Mill)	1,759.200	Hyd Mill	RM	
	JOURNAL SHAFT ASSLY (3 Nos Per Mill)	18,624.000	Hyd Mill	RM	
	BOWL HUB & VANE WHEEL ASSEMBLY (1 No Per Mill)	18,345.900	Hyd Mill	RM	
	MILLSIDE ASSEMBLY (1 No Per Mill)	19,636.000	Hyd Mill	RM	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
	JOURNAL SPRING ASSLY, HP 1103 (3 Nos Per Mill)	3,912.900	Hyd Mill	RM	
	DRIVE ASSEMBLY (1 No Per Mill)	2,421.400	Hyd Mill	RM	
	MULTIPLE PORT OUTLET PLATE ASSY (1 No Per Mill)	4,419.300	Hyd Mill	RM	
	250 LPM MILL LUBE OIL SYSTEM WITH TANK (1 No Per Mill)	4,300.000	Hyd Mill	RM	
	SEPARATOR TOP ASSEMBLY (1 No Per Mill)	5,157.300	Hyd Mill	RM	
	SEPARATOR BODY AND JOC ASSEMBLY (1 No Per Mill)	30,264.000	Hyd Mill	RM	
	ROTOR AND ROTOR SUPPORT ASSY HP1103 (1 No Per Mill)	2,307.600	Hyd Mill	RM	
	Mill Handling System (Main Girders & End Carriage Assembly)	33,000.000	Hyd Mill	RM	
	GEARBOX FOR DYNAMIC CLASSIFIER (1 No Per Mill)	450.000	Hyd Mill	RM	
	VFD FOR DYNAMIC CLASSIFIER (1 No Per Mill)	500.000	Hyd Mill	RM	
	MOTOR FOR DYNAMIC CLASSIFIER (1 No Per Mill)	495.000	Hyd Mill	RM	
	KGV ASSY & ACCESSORIES (HP1103) (26") (4 Nos Per Mill)	1,200.000	Hyd Mill	RM	
	MILL MOTOR COUPLING-HP1103 (DC) (1 No Per Mill)	2,400.000	Hyd Mill	RM	
	Total for 1 Mill	180,576.200			
	Total for 9 Mills	1625185.8	Hyd Mill	RM	2A
	Deaerator Header	52000	Hyd DA	PP	1B
	Deaerator Storage Tank Sec-1	55000	Hyd DA	PP	1B
	Deaerator Storage Tank Sec-2	52000	Hyd DA	PP	1B
	Deaerator Storage Tank Sec-3	55000	Hyd DA	PP	1B
34-xxx	Bunker Structure	2000000	Try	STR	1A
	Ceramic Lined items	275000	Unit	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
PGMA	Description	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	165000	Try	P91/92	5A
80-301	MS FROM BOILER STOP VALVE TO ESV	518000	Try	P91/92	5A
80-303	MS HEADER TO AUX PRDS	13000	Try	P91/92	5A
80-304	MS HEADER TO HPBP VALVE	27000	Try	P91/92	5A
80-307	HP& AND& LP BYPASS WARM UP	925	Try	P91/92	5A
80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	350000	Try	P91/92	5A
80-312	LPBP VALVE UPSTREAM& AND& DOWNSTREAM	91000	Try	P91/92	5A
80-320	CRH FROM TURBINE TO REHEATER	280000	Try	HP	5B
80-321	HPBP VALVE TO CRH PIPING	20400	Try	HP	5B
80-322	CRH HEADER TO DEAERATING HEATER	13500	Try	HP	5B
80-323	STEAM TO BFP DRIVE TURBINE	6200	Try	HP	5B
80-324	CRH HEADER TO AUX PRDS	1200	Try	HP	5B
80-326	PIPES FOR FLOW NOZZLE	500	Try	HP	5B
80-329	EXTRACTION STEAM TO BFP DRIVE TURBINE	9700	Try	HP	5B
80-331	EXTRACTION STEAM TO LP HEATER 2	8200	Try	HP	5B
80-332	EXTRACTION STEAM TO LP HEATER-3	8200	Try	HP	5B
80-335	EXTRACTION STEAM TO DEAERATING HEATER	11400	Try	HP	5B
80-336	EXTRACTION STEAM TO HP HEATER-1	9800	Try	HP	5B
80-337	EXTRACTION STEAM TO HP HEATER-2	5500	Try	HP	5B
80-338	EXTRACTION STEAM TO HP HEATER-3	6900	Try	HP	5B
80-339	AUX STEAM TO BFP DRIVE TURBINE	1550	Try	HP	5B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
80-340	AUX STEAM HEADER	9200	Try	HP	5B
80-341	AUX STEAM HEADER INTERCONNECTIONS	265000	Try	HP	5B
80-342	AUX STEAM TO SCAPH	11000	Try	HP	5B
80-343	AUX STEAM TO SOOTBLOWERS	4600	Try	HP	5B
80-345	AUX STEAM FOR OIL LINE TRACING	6800	Try	HP	5B
80-349	AUX STEAM TO GLAND SEALS & GSC-TG SCOPE	920	Try	HP	5B
80-351	AUX STEAM TO UNLISTED USERS-SG SCOPE	28800	Try	HP	5B
80-368	SCAPH DRAIN TANK VENT/SV EXHAUST TO ATM	4000	Try	LPP	5C
80-395	AUX STEAM TO FUEL OIL ATOMISING	9500	Try	HP	5B
80-399	STEAM BLOWING	64500	Try	HP	5B
80-401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE	28000	Try	LPP	5C
80-402	CD FROM LPH1/DC INLET TEE TO TG TP	12000	Try	LPP	5C
80-403	CD FROM TG TP TO DEAERATING HEATER	28800	Try	LPP	5C
80-421	BOILER FEED PUMP RECIRCULATION	16700	Try	HP	5B
80-423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	231500	Try	HP	5B
80-424	BFD BETWEEN HTRS AND GROUP PROTECTION	162000	Try	HP	5B
80-425	BFD FROM FINAL HPH TO SG TP	92500	Try	HP	5B
80-430	SPRAY WATER TO HPBP	2900	Try	HP	5B
80-433	SPRAY WATER FROM BFP INTERSTAGE	14500	Try	HP	5B
80-451	BOILER INTEGRAL PIPING DRAINS	35000	Try	HP	5B
80-452	HP PIPING DRAINS-SG SCOPE - MM	34000	Try	HP	5B
80-453	LP PIPING DRAINS-SG SCOPE - MM	4100	Try	LPP	5C
80-463	TG AUX COOLING WATER	23038	Try	LPP	5C
80-473	DEMINERALISED WATER SYSTEM	1157	Try	SS	5C
80-477	SERVICE WATER PIPING	10955	Try	LPP	5C
80-478	DRINKING WATER PIPING	3686	Try	LPP	5C
80-650	FUEL OIL SUPPLY AND RETURN PIPING	40000	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
80-935	CLH - VLH FOR MS PPG - HERP	600	Try	H&S	5E
80-936	CLH - VLH FOR SG PPG -HERP	9000	Try	H&S	5E
80-937	CLH * VLH FOR CRITICAL PPG - HERP	7500	Try	H&S	5E
80-941	VLH AND CLH FOR BFD PIPING - HERP	85000	Try	H&S	5E
80-942	VLH AND CLH FOR TG CYCLE PIPING HERP	20000	Try	H&S	5E
81-012	CLEAN DRAIN FLASH TANK - DIA 1500 MM- OS	2400	Try	H&S	5E
81-036	CW STORAGE TANK 1625 CUM OS	7600	Try	H&S	5E
81-041	IMPURE CONDENSATE TANK	24000	Try	H&S	5E
81-060	SPECIAL TANKS AND VESSELS OS	60000	Try	H&S	5E
81-100	CONDENSATE PUMP MM	3000	Try	H&S	5E
81-110	COOLING WATER PUMP MM	400	Try	H&S	5E
81-318	FIX COM FOR MISCELLANEOUS PPG INSULATION	7000	Try	Insl.	3C
81-325	MINERAL WOOL MATTRESS MM	50000	Try	Insl.	3A
81-341	SEALING COMPOUND FOR INSLÂTION	1200	Try	Insl.	3C
81-350	ALUMINIUM CLADDING FOR INSULATION	25000	Try	Insl.	3D
82-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	15000	Try	P91/92	5A
82-301	MS FROM BOILER STOP VALVE TO ESV MM	42000	Try	P91/92	5A
82-303	MS HEADER TO AUX PRDS MM	1000	Try	HP	5B
82-304	MS HEADER TO HPBP VALVE MM	2000	Try	P91/92	5A
82-307	MS AND HRH BYPASS WARM UP MM	75	Try	P91/92	5A
82-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	30000	Try	P91/92	5A
82-312	LPBP VALVE UPSTREAM&DOWNSTREAM MM	7000	Try	HP	5B
82-319	H & S BFP SUCTION LINE MM	200	Try	H&S	5E
82-320	CRH FROM TURBINE TO REHEATER MM	20000	Try	HP	5B
82-321	HPBP VALVE TO CRH HEADER MM	1600	Try	HP	5B
82-322	CRH HEADER TO DEAERATING HEATER MM	1300	Try	HP	5B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
82-323	STEAM TO BFP DRIVE TURBINE MM	500	Try	HP	5B
82-324	CRH HEADER TO AUX PRDS MM	100	Try	HP	5B
82-329	EXTRACTION STEAM TO BFP DRIVE TURBINE	900	Try	HP	5B
82-331	EXTRACTION STEAM TO LP HEATER 2 MM	800	Try	HP	5B
82-332	EXTRACTION STEAM TO LP HEATER 3 MM	800	Try	HP	5B
82-334	EXTRACTION STEAM TO LP HEATER 5 MM	2000	Try	HP	5B
82-335	EXTRACTION STEAM TO DEAERATING HEATER	1000	Try	HP	5B
82-336	EXTRACTION STEAM TO HP HEATER 1 MM	900	Try	HP	5B
82-337	EXTRACTION STEAM TO HP HEATER 2 MM	500	Try	HP	5B
82-338	EXTRACTION STEAM TO HP HEATER 3 MM	600	Try	HP	5B
82-339	AUX STEAM TO BFP DRIVE TURBINE MM	150	Try	HP	5B
82-340	AUX STEAM HEADER MM	800	Try	HP	5B
82-341	AUX STEAM HEADER INTERCONNECTIONS MM	20000	Try	HP	5B
82-342	AUX STEAM TO SCAPH MM	800	Try	HP	5B
82-343	AUX STEAM TO SOOTBLOWERS MM	400	Try	HP	5B
82-345	AUX STEAM FOR OIL LINE TRACING MM	600	Try	HP	5B
82-349	AUX STEAM TO GLAND SEALS & GSC TG SCOP	80	Try	HP	5B
82-351	AUX STEAM TO UNLISTED USERS SG SCOPE	2500	Try	HP	5B
82-363	EXHAUST STEAM FROM PRIME MOVERS TG SCO	3400	Try	LPP	5C
82-370	HP DRAIN FLASH TANK VENT TO ATMOSPHERE	8000	Try	LPP	5C
82-399	STEAM BLOWING # MM	11000	Try	HP	5B
82-418	EJECTION MATERIALS FOR INSTRUMENTS # MM	50	Try	LPP	5C
82-421	BOILER FEED PUMP RECIRCULATION # MM	1300	Try	HP	5B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
82-423	BOILER FEED PUMP TO HPH INCLUDING BYPA #	18500	Try	HP	5B
82-424	BFD BETWEEN HEATERS&GR PROTECTION VALV #	13000	Try	HP	5B
82-425	BFD FROM FINAL HPH TO SG TP # MM	7500	Try	HP	5B
82-430	SPRAY WATER TO HPBP # MM	300	Try	HP	5B
82-433	SPRAY WATER FROM BFP INTERSTAGE # MM	1100	Try	HP	5B
82-451	BOILER INTEGRAL PIPING DRAINS # MM	2800	Try	HP	5B
82-452	HP PIPING DRAINS#SG SCOPE # MM	3000	Try	HP	5B
82-453	LP PIPING DRAINS#SG SCOPE # MM	400	Try	LPP	5C
82-463	TG AUX COOLING WATER UNIT SYSTEM # MM	123038	Try	LPP	5C
82-468	MAIN CIRCULATION WATER PIPING# MM	100000	Try	LPP	5C
82-830	HANGERS & SUP FOR CRITICAL PPG,LIGHT UP	57000	Try	H&S	5E
82-901	SD VALVES&SPECIALITIES#BOILER LIGHTUP #	10000	Try	H&S	5E
82-920	H&S FOR BOILER HYDRO TEST # MM	9400	Try	H&S	5E
82-921	H&S FOR BOILER LIGHTUP#STEAM LINES # MM	25000	Try	H&S	5E
82-926	H AND S FOR TEMPORARY PIPING ACID AND AL	500	Try	H&S	5E
82-927	H AND S FOR TEMPORARY PIPING # STEAM BLO	500	Try	H&S	5E
82-928	H & S FOR BOILER LIGHT UP # TG SCOPE # M	7600	Try	H&S	5E
82-930	H&S FOR SYNCHRONISATIONN # TG SCOPE # MM	72000	Try	H&S	5E
82-933	H AND S FOR LP PIPING# MM	1797	Try	H&S	5E
82-992	IMPORTED ELECTRODES # MM	17700	Try	NB	
82-993	MISC ERECTION MATLS# MM	50	Try	NB	
83-319	PERMANENT STEAM BLOWING PIPING- OS	1800	Try	HP	5B
83-334	EXTRACTION STEAM TO LP HEATER#5# OS	18800	Try	HP	5B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
83-363	EXHAUST STEAM FROM PRIME MOVERS#TG SCOPE	30200	Try	LPP	5C
83-370	HP DRAIN FLASH TANK VENT TO ATMOSPHERE #	71000	Try	LPP	5C
83-371	TURBINE FLASH TANK VENT TO CONDENSER # O	4300	Try	LPP	5C
83-373	AUX STEAM HEADER SV EXHAUST # OS	2500	Try	LPP	5C
83-375	UNLISTED SV EXHAUSTS # TG SCOPE# OS	1900	Try	LPP	5C
83-379	HP HEATER SV EXHAUST TO FLASH TANK # OS	5600	Try	LPP	5C
83-381	HP HEATER VENTS#TG SCOPE # OS	400	Try	LPP	5C
83-382	LP HEATER VENTS # OS	2200	Try	LPP	5C
83-385	VENT FROM UNLISTED LINES/EQPT TO CONDE #	6800	Try	LPP	5C
83-388	CONDENSER AIR EVACUATION PIPING	4000	Try	LPP	5C
83-400	CONDENSATE SUCTION# OS	12800	Try	LPP	5C
83-401	CD FROM PUMP TO LPH1/DC INLETTEE&RECIR #	3100	Try	LPP	5C
83-402	CD FROM LPH1/DC INLET TEE TO TG TP # OS	2700	Try	LPP	5C
83-403	CD FROM TG TP TO DEAERATING HEATER # OS	3000	Try	LPP	5C
83-407	CONDENSATE FOR SEALING OF VACUUM # OS	3200	Try	LPP	5C
83-408	CONDENSATE DUMP FROM HEADER # OS	1600	Try	LPP	5C
83-412	CONDENSATE TRANSFER# OS	40000	Try	SS	5D
83-418	ERECTION MATERIALS FOR INSTRUMENTS# OS	450	Try	LPP	5C
83-419	DEAERATER SV EXHAUST TO ATMOSPHERE # OS	5000	Try	LPP	5C
83-420	BOILER FEED PUMP SUCTION# OS	25000	Try	LPP	5C
83-434	UNLISTED SPRAY WATER # SG SCOPE# OS	4600	Try	LPP	5C
83-435	UNLISTED SPRAY WATER # TG SCOPE# OS	2000	Try	LPP	5C
83-442	GLAND STEAM COOLER DRAINS # OS	300	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
83-443	LPH#1 DRAIN TO CONDENSER # OS	6300	Try	LPP	5C
83-444	LPH#2/3/4/5 DRAINS & DRIP PUMP INLET # O	10400	Try	LPP	5C
83-446	DEAERATING HEATER OVERFLOW AND DRAIN # O	3700	Try	LPP	5C
83-447	HP HEATER DRAINS # OS	33000	Try	LPP	5C
83-448	DRAIN FROM UNLISTED EQPT/VESSEL#TG SCOPE	13500	Try	LPP	5C
83-449	TG CYCLE PIPING DRAINS & VENTS # OS	15800	Try	LPP	5C
83-454	SCAPH DRAINS # OS	2100	Try	LPP	5C
83-455	DRAIN FROM UNLISTED EQPT/VESSEL#SG SCOPE	29400	Try	LPP	5C
83-457	MANIFOLDS FOR HP FLASH BOX AND CONDENS	1000	Try	LPP	5C
83-459	HP FLASH TANK DRAIN TO CONDENSER # OS	1200	Try	LPP	5C
83-460	SG AUX COOLING WATER UNIT SYSTEM # OS	75000	Try	LPP	5C
83-463	TG AUX COOLING WATER UNIT SYSTEM # OS	73038	Try	LPP	5C
83-468	MAIN CIRCULATION WATER PIPING# OS	400000	Try	LPP	5C
83-471	BOILER WASH WATER TO & FROM UNIT # OS	37000	Try	LPP	5C
83-473	DEMINERALISED WATER SYSTEM# OS	1157	Try	SS	5D
83-477	SERVICE WATER # OS	10955	Try	LPP	5C
83-478	DRINKING WATER PIPING# OS	3686	Try	LPP	5C
83-480	FIRE WATER#OTHER AREAS # OS	42500	Try	LPP	5C
83-493	HP FLASH TANK VENT TO CONDENSER # OS	2300	Try	LPP	5C
83-494	LP FLASH TANK VENT TO CONDENSER # OS	3100	Try	LPP	5C
83-495	LP FLASH TANK DRAIN TO CONDENSER # OS	2700	Try	LPP	5C
83-545	"LP CONDENSATE PIPING WITHIN TG HALL FOR	12600	Try	LPP	5C
83-601	LOW PRESSURE DOSING PIPING# OS	2600	Try	SS	5C
83-604	ACID CLEANING # OS	103000	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package A: Unit # 3)	Tentative Weight (in Kg)	Unit	ITEMS	Rate Sch. Identifier
83-610	SERVICE AIR SUCTION & DISH TO RECEIVER #	13000	Try	LPP	5C
83-612	SERVICE AIR FOR UNIT # OS	24600	Try	LPP	5C
83-614	INST AIR SUCTION & DISCH TO RECEIVER # O	13000	Try	LPP	5C
83-616	INST AIR FOR UNIT # OS	24800	Try	LPP	5C
83-673	LUB OIL PIPING SYSTEM # OS	5800	Try	LPP	5C
83-830	HANGERS & SUP FOR CRITICAL PPG,LIGHT UP	228000	Try	H&S	5E
83-920	H&S FOR BOILER HYDRO TEST # OS	37600	Try	H&S	5E
83-921	H&S FOR BOILER LIGHTUP#STEAM LINES # OS	100000	Try	H&S	5E
83-928	H & S FOR BOILER LIGHT UP # TG SCOPE # O	30400	Try	H&S	5E
83-930	H&S FOR SYNCHRONISATIONN # TG SCOPE # OS	48000	Try	H&S	5E
83-933	H AND S FOR LP PIPING# OS	7190	Try	H&S	5E
83-940	AUXILIARY STEEL # OS	200000	Try	H&S	5E
83-993	CONSUMABLES & ERECTION MATERIALS # OS	450	Try	NB	

Package B: Unit # 4

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
04-147	Supprts for Collectr & Separatr Vessel	20,000.00	Try	PP	1B
04-321	VERTICAL SEPARATOR	36,800.00	Try	PP	1B
04-323	STORAGE TANK	60,000.00	Try	PP	1B
04-347	Seperator/Collecting Vessel Supp DD	200.00	Try	PP	1B
04-547	Seperator/Collecting Vessel Supp Shop	2,000.00	Try	PP	1B
05-137	EVAPORATOR INLET HDR - FRNT	15,000.00	Try	PP	1B
05-147	FUR LWR REAR INLET HDR	15,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
05-155	FUR LWR SIDE INLET HDRS	14,000.00	Try	PP	1B
05-227	FUR UPPER REAR OUTLET HDR	13,000.00	Try	PP	1B
05-231	FUR UPPER FRNT OUTLET HDR	12,000.00	Try	PP	1B
05-251	FUR UPPER SIDE OUTLET HDRS	25,000.00	Try	PP	1B
05-327	FUR INTERMEDIATE REAR HDR	11,500.00	Try	PP	1B
05-330	FUR INTERMEDIATE FRNT HDR	11,500.00	Try	PP	1B
05-350	FUR INTERMEDIATE SIDE HDRS	23,000.00	Try	PP	1B
06-400	FUR BURNER PANELS	49,500.00	Try	PP	1B
06-401	Burner Panel- OS	250.00	Try	PP	1B
06-431	Front Upper Ww Panel Attachment	50.00	Try	PP	1B
06-434	Front Intermediate WW Panel -OS	50,500.00	Try	PP	1B
06-437	Front WW Lower Panel-OS	39,000.00	Try	PP	1B
06-441	Rear Upper WW Panel -OS	3,900.00	Try	PP	1B
06-444	Rear Intermediate WW Panel -OS	50,500.00	Try	PP	1B
06-447	Rear Lower WW Panel -OS	40,200.00	Try	PP	1B
06-451	Side Upper Ww Panel Attachment	150.00	Try	PP	1B
06-453	Side Intermediate WW Panel -OS	70,000.00	Try	PP	1B
06-455	Side Lower WW Panel -OS	21,000.00	Try	PP	1B
06-500	FUR SOFA PANELS	11,000.00	Try	PP	1B
06-501	Sofa Panels -OS	200.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
06-515	H&S FOR START-UP SYSTEM - BOI ITEMS	16,000.00	Try	PP	1B
06-731	FUR VERTICAL WALL PANELS - FRNT	42,000.00	Try	PP	1B
06-732	FRONT WW PNL + ATT	54,500.00	Try	PP	1B
06-734	FUR UPPER FRNT SPIRAL PANEL	90,000.00	Try	PP	1B
06-735	FUR FRNT SPIRAL TO VERTICAL TRANS. PANEL	12,500.00	Try	PP	1B
06-737	FUR LWR FRNT SPRL PNL WITH I/T TERM TUBE	62,000.00	Try	PP	1B
06-741	FUR REAR ARCH PANELS	41,600.00	Try	PP	1B
06-744	FUR UPPER REAR SPIRAL PANEL	90,000.00	Try	PP	1B
06-745	FUR REAR SPIRAL TO vert TRANSITION PANEL	12,150.00	Try	PP	1B
06-747	FUR LWR RR SPRL PNL WITH I/T TERM TUBES	75,600.00	Try	PP	1B
06-751	FUR VERTICAL WALL PANELS - SIDE	86,200.00	Try	PP	1B
06-752	FUR LWR VERTICAL WALL PANELS - SIDE	123,000.00	Try	PP	1B
06-753	FUR UPPER SIDE SPIRAL PANELS	180,000.00	Try	PP	1B
06-755	FUR LWR SIDE SPIRAL PANELS	74,200.00	Try	PP	1B
06-759	FUR SIDE SPIRAL TO VERT TRANSITION PANEL	24,000.00	Try	PP	1B
07-102	LINKS FROM SEPARATOR TO STORAGE TANK	48,000.00	Try	PP	1B
07-110	DOWNCOMER TO CONNECTING SPHERE	15,000.00	Try	PP	1B
07-125	Connecting Sphere	5,000.00	Try	PP	1B
07-217	SCREEN RELIFE TUBES	1,000.00	Try	PP	1B
07-223	FUR SCREEN AND HANGER ASSEMBLY	95,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
07-231	FUR SPIRAL WALL OUTLET TERM TUBES	3,000.00	Try	PP	1B
07-232	FUR VERTICAL WALL INLET TERM TUBES	7,000.00	Try	PP	1B
07-309	Furnace Wall Supports Front-DD	1,500.00	Try	PP	1B
07-315	FUR SIDE RISERS	52,000.00	Try	PP	1B
07-316	FUR REAR RISERS	32,000.00	Try	PP	1B
07-318	FUR FRNT RISERS	18,000.00	Try	PP	1B
07-331	Riser Tube Support DD Item	100.00	Try	PP	1B
07-360	Furnace Spiral Wall Support DD Item	100.00	Try	PP	1B
07-361	Furnace Wall Support Rear DD Item	300.00	Try	PP	1B
07-362	Furnace Wall Support Side L&R DD Item	600.00	Try	PP	1B
07-393	Consumables & Erection Materials-DD	100.00	Try	PP	1B
07-402	WW FRT HDR SUSPN	5,200.00	Try	PP	1B
07-403	WW SIDE HDR SUSPN	3,000.00	Try	PP	1B
07-405	WW SCR.HDR SUSPN.	12,000.00	Try	PP	1B
07-409	Furnace wall Supports front	42,000.00	Try	PP	1B
07-423	Furnace Screen Tubes Attachment	5,600.00	Try	PP	1B
07-431	RISER TUBE SUPPORT	8,000.00	Try	PP	1B
07-460	Furnace Spiral Wall supports Misc items	28,000.00	Try	PP	1B
07-461	Furnace wall Supports rear	32,000.00	Try	PP	1B
07-462	Furnace wall Supports Sides L & R	32,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
07-502	Ww Front Header Suspns Shop Item	1,000.00	Try	PP	1B
07-503	Ww Side Header Suspension Shop Item	1,500.00	Try	PP	1B
07-509	MISC PR.PART COMPNTS	1,400.00	Try	PP	1B
07-531	Riser Tube Support Shop Item	6,500.00	Try	PP	1B
07-560	Furnace Spiral Wall Support Shop Item	5,600.00	Try	PP	1B
07-991	Welding Electrodes-Part-1	600.00	Try	NB	0
07-992	Welding Electrodes	300.00	Try	NB	0
07-993	EREC MATLS, CONSUMES	1,600.00	Try	NB	0
08-001	FURN UPR BKSTYS-F&R	99,000.00	Try	STR	1A
08-003	FURN UPR BKSTYS-SIDE	250,000.00	Try	STR	1A
08-006	FURN INT BKSTYS	410,000.00	Try	STR	1A
08-007	FURN LWR BKSTYS	60,000.00	Try	STR	1A
08-111	FURN REAR ARCH BKSTYS	75,000.00	Try	STR	1A
08-380	FURN BOT SUPRTS	482,000.00	Try	STR	1A
08-501	FURN B P BKSTYS-F&R	240,000.00	Try	STR	1A
08-503	FURN B P BKSTYS-SIDE	300,000.00	Try	STR	1A
08-901	FURN KEY BKSTYS-UPR	13,000.00	Try	STR	1A
08-910	EX.MOVT MEAS COMP	1,250.00	Try	STR	1A
08-911	Bulk Bps Items-Upper	250.00	Try	STR	1A
08-912	Bulk Bps Items-Inter	2,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
08-913	Bulk Bps Items-Lower	2,500.00	Try	STR	1A
09-003	MATL FOR INST TAPPG	1,000.00	Try	NPP	1C
09-004	SEAL BOX FURN OPENG	17,000.00	Try	NPP	1C
09-005	SEAL BOX INST OPENG	3,500.00	Try	NPP	1C
09-304	Seal Boxes For Furnace Openings-DD	500.00	Try	NPP	1C
10-135	FUR ARCH SUPPPORT INLET HDR	15,500.00	Try	PP	1B
10-174	FINISH SH INLET HDR	17,500.00	Try	PP	1B
10-176	SH PLATEN FRONT INLET HEADER(S-26)	21,000.00	Try	PP	1B
10-178	SH PLATEN INLET HDR	17,500.00	Try	PP	1B
10-182	BP LWR REAR HDR	16,000.00	Try	PP	1B
10-183	BP UPPER SIDE INLET HDR	25,000.00	Try	PP	1B
10-184	BP EXTENDED SIDE INLET HDR	13,000.00	Try	PP	1B
10-185	BP LWR FRNT HDR	16,000.00	Try	PP	1B
10-191	SH FUR ROOF INLET HDR	16,000.00	Try	PP	1B
10-235	FUR ARCH SUPPPORT OUTLET HDR	15,000.00	Try	PP	1B
10-274	FINISH SH OUTLET HDR	55,500.00	Try	PP	1B
10-276	SH PLATEN FRONT OUTLET HEADER(S-28)	20,000.00	Try	PP	1B
10-278	SH PLATEN OUTLET HDR	23,000.00	Try	PP	1B
10-283	BP LWR SIDE HDRS	27,000.00	Try	PP	1B
10-284	BP EXT FLOOR OUTLET HDR WITH TERM TUBES	11,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
10-285	BP FRNT OUTLET HDR	21,500.00	Try	PP	1B
10-291	SH FUR ROOF OUTLET HDR	27,500.00	Try	PP	1B
11-074	FINISH SH FRNT ASSY WITH I/T TERM & COT	371,000.00	Try	PP	1B
11-078	SH PLATEN ASSY WITH TERM TUBES - LEFT	251,000.00	Try	PP	1B
11-374	FINISH SH REAR ASSY WITH O/T TERM & COT	378,000.00	Try	PP	1B
11-378	SH PLATEN ASSY WITH TERM TUBES - RIGHT	262,000.00	Try	PP	1B
11-406	SH Frnt Upper Pnl Attachment	700.00	Try	PP	1B
11-467	SH Sc Side Pnl Upper Left Attachment	100.00	Try	PP	1B
11-469	SH Sw Panels Lower Front (L&R)-OS	100.00	Try	PP	1B
11-474	SH Vertical Spaced Coil Attachment	1,000.00	Try	PP	1B
11-487	BP LTRH Hanger Tube Attchment	800.00	Try	PP	1B
11-491	SH Radient Roof Tubes (Left)-OS	100.00	Try	PP	1B
11-494	SH Extended Bottom Panels-OS	100.00	Try	PP	1B
11-606	BP FRNT WALL PANELS	29,300.00	Try	PP	1B
11-608	BP FRNT WALL PANEL - LWR	55,300.00	Try	PP	1B
11-684	BP EXTENDED SIDE FIN WELDED PANEL	35,500.00	Try	PP	1B
11-694	BP EXTENDED SIDE FLOOR FIN WELDED PANEL	20,100.00	Try	PP	1B
11-716	BP UPPER REAR PANEL	24,500.00	Try	PP	1B
11-717	SH REAR WALL PANEL INTER(LEFT)	25,800.00	Try	PP	1B
11-718	BP LWR REAR PANEL	28,500.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
11-767	BP UPPER SIDE PANEL-LEFT	37,800.00	Try	PP	1B
11-768	SH SIDE WALL PANELS INTER (FRONT)	33,300.00	Try	PP	1B
11-769	BP LWR SIDE PANEL - LEFT	38,400.00	Try	PP	1B
11-787	BP REAR ROOF PANELS	29,800.00	Try	PP	1B
11-791	SH FUR ROOF FIN WELDED PANEL	42,400.00	Try	PP	1B
11-916	SH REAR WALL PANELS UPPER (RIGHT)	24,500.00	Try	PP	1B
11-917	SH REAR WALL PANEL INTER (RIGHT)	25,900.00	Try	PP	1B
11-918	SHSC RR WL PNL LR RT	28,500.00	Try	PP	1B
11-967	BP UPPER SIDE PANEL-RIGHT	37,900.00	Try	PP	1B
11-968	SH SIDE WALL PANELS INTER (REAR)	33,300.00	Try	PP	1B
11-969	BP LWR SIDE PANEL - RIGHT	38,900.00	Try	PP	1B
11-987	SHSC RR ROOF PNL RT	30,300.00	Try	PP	1B
11-991	SH FUR ROOF TUBES	65,100.00	Try	PP	1B
12-178	LINK TO SH DESUPERHEATER	36,000.00	Try	PP	1B
12-179	LINK TO FINISH SH INLET HDR	38,000.00	Try	PP	1B
12-181	FUR ARCH SUPPORT LINKS	15,000.00	Try	PP	1B
12-184	BP EXTENDED SIDE CONNECTION LINK	33,500.00	Try	PP	1B
12-187	SH BYPASS PIPES	14,000.00	Try	PP	1B
12-306	SH Spprt For Lines And Links DD Item	100.00	Try	PP	1B
12-314	Suspns of SH R.Roof Headers DD Item	500.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
12-317	Suspns of R.Roof Headers DD Item	100.00	Try	PP	1B
12-324	Suspension of SH Rear Wall DD Items	100.00	Try	PP	1B
12-327	Suspension of SH Rear Wall DD Items	600.00	Try	PP	1B
12-328	Suspension of SH Rear Wall DD Items	600.00	Try	PP	1B
12-344	Suspns of Vert. Spaced Assy DD Item	50.00	Try	PP	1B
12-348	Suspns of Vert. Spaced Assy DD Item	1,700.00	Try	PP	1B
12-354	Suspns of Vert. Spaced Assy DD Item	50.00	Try	PP	1B
12-368	RH Vert Platen Frnt Coil Left DD Item	100.00	Try	PP	1B
12-393	SH Misc Components DD Item	300.00	Try	PP	1B
12-405	SH Hanger Tube Attachment	4,800.00	Try	PP	1B
12-506	SH Spprt For Lines And Links Shop Item	1,100.00	Try	PP	1B
12-514	Suspns of SH R.Roof Hdrs Shop Item	3,500.00	Try	PP	1B
12-517	Suspns of R.Roof Headers Shop Item	9,200.00	Try	PP	1B
12-524	Suspension of SH Rear Wall Shop Item	2,100.00	Try	PP	1B
12-528	Suspension of SH Rear Wall Shop Item	2,900.00	Try	PP	1B
12-544	Suspns of Vert. Spaced Assy Shop Item	4,000.00	Try	PP	1B
12-554	Suspns of Vert. Spaced Assy Shop Item	5,000.00	Try	PP	1B
12-600	Sh Desuperheater (S-01B)	6,500.00	Try	PP	1B
12-800	SH DESUP-STAGE II	6,400.00	Try	PP	1B
12-803	SH STEAM COOLED SPACER TUBES	4,500.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
12-805	BP FRNT WALL SCREEN TUBES	54,000.00	Try	PP	1B
12-850	SH CONNECTING PIPE	30,000.00	Try	PP	1B
12-852	LINKS TO SH PLATEN INLET HDR	36,000.00	Try	PP	1B
12-862	Desh M/F(S-01A) Roof I/T Hdr Conn(S-01C)	42,000.00	Try	PP	1B
12-900	SH DESUPERHEATER	7,100.00	Try	PP	1B
12-903	SH MISCL COMPONENTS	13,000.00	Try	PP	1B
12-906	SH LINK SUPPORTS	1,000.00	Try	PP	1B
12-907	RAD&RR ROOF SUPPORTS	9,200.00	Try	PP	1B
12-914	EXPN-SH RAD ROOF HDR	1,900.00	Try	PP	1B
12-917	SUSPN OF RADINT ROOF	28,000.00	Try	PP	1B
12-924	SUSPN-SH BAKPASS HDR	14,000.00	Try	PP	1B
12-927	SUSPN OF REAR ROOF	28,000.00	Try	PP	1B
12-928	SUSPN - SH REAR WALL	33,500.00	Try	PP	1B
12-944	SUSPN-SH PLATEN HDRS	3,500.00	Try	PP	1B
12-948	SUSP-VERT SPACD ASSY	49,000.00	Try	PP	1B
12-954	SUSP-VERT SPACD HDRS	5,700.00	Try	PP	1B
12-968	SUSPN OF PLATEN ASSY	33,000.00	Try	PP	1B
12-991	Welding Electrodes-Part-1	500.00	Try	NB	0
12-992	Welding Electrodes	3,800.00	Try	NB	0
12-993	EREC MATLS, CONSUMES	6,000.00	Try	NB	0

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
12-994	PORT IN FOR THK MSMT	100.00	Try	PP	1B
15-136	LTRH INLET HDR	13,500.00	Try	PP	1B
15-178	FINISH RH INLET HDR	26,500.00	Try	PP	1B
15-236	LTRH OUTLET HDR	20,000.00	Try	PP	1B
15-278	FINISH RH OUTLET HDR	33,000.00	Try	PP	1B
16-201	LTRH UPPER ASSEMBLY	182,000.00	Try	PP	1B
16-202	LTRH INTERMEDIATE ASSEMBLY	502,000.00	Try	PP	1B
16-203	LTRH LWR ASSEMBLY WITH INLET TERM TUBES	507,000.00	Try	PP	1B
16-270	LTRH PENDANT ASSY WITH O/T TERM TUBES	147,000.00	Try	PP	1B
16-278	FINISH RH ASSEMBLY WITH TERMINAL TUBES	185,000.00	Try	PP	1B
16-379	RH VERPLN FR COIL RT	12,000.00	Try	PP	1B
17-174	LINK TO RH DESUPERHEATER	110,000.00	Try	PP	1B
17-304	RH Spprts For Lines And Links DD Item	100.00	Try	PP	1B
17-306	RH Suprt For Lines And Links DD Item	100.00	Try	PP	1B
17-319	RH Frnt Suspension DD Item	100.00	Try	PP	1B
17-407	RH Sc Spacer Tube Attchment	100.00	Try	PP	1B
17-476	RH V.S. CENTRE CROSS OVER TUBE ATTCHMT	6,000.00	Try	PP	1B
17-504	RH Suprts For Lines And Links Shop Item	9,000.00	Try	PP	1B
17-506	RH Suprt For Lines And Links Shop Item	3,000.00	Try	PP	1B
17-807	RH STM COOL SPACERS	300.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
17-900	RH DESUPERHEATER	7,000.00	Try	PP	1B
17-903	RH MISCL COMPONENTS	90,000.00	Try	PP	1B
17-904	RH HDR SUPRT AB ROOF	10,000.00	Try	PP	1B
17-906	RH SUPRT LINES & LIN	3,000.00	Try	PP	1B
17-919	RH FRONT SUSPENSION	24,000.00	Try	PP	1B
17-991	Welding Electrodes-Part-1	1,100.00	Try	NB	0
17-992	Welding Electrodes	1,200.00	Try	NB	0
18-001	FUR ROOF SKIN CASING	21,000.00	Try	NPP	1C
18-002	1 PASS ROOF SKINCASG	3,000.00	Try	NPP	1C
18-010	PR PARTS ATTACH-CASG	900.00	Try	NPP	1C
18-701	Furnace Roof Skin Casing BOI Item	100.00	Try	NPP	1C
19-092	ECO OUTLET TERM TUBES	22,000.00	Try	PP	1B
19-306	Eco Supports For Line & Links DD Item	100.00	Try	PP	1B
19-307	Eco Feed Pipe Suspns DD Item	100.00	Try	PP	1B
19-402	Eco Hanger Tube Attachment	1,000.00	Try	PP	1B
19-506	Eco Supports For Line & Links Shop Item	45,000.00	Try	PP	1B
19-507	Eco Feed Pipe Suspns Shop Item	28,000.00	Try	PP	1B
19-701	ECO INLET HDR	25,000.00	Try	PP	1B
19-702	ECO OUTLET HDR	29,000.00	Try	PP	1B
19-704	ECO II INLET HEADER	8,800.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
19-753	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-763	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-783	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-793	ECO JUNCTION HDR	8,800.00	Try	PP	1B
19-802	ECO LWR HANGER TUBES	315,000.00	Try	PP	1B
19-804	ECO UPPER HANGER TERMINAL TUBES	32,000.00	Try	PP	1B
19-814	ECO UPPER ASSY - LEFT	110,000.00	Try	PP	1B
19-824	ECO LWR ASSY -LEFT	342,900.00	Try	PP	1B
19-850	ECO INLET LINKS	120,000.00	Try	PP	1B
19-851	LINKS FROM ECO OUT. HDR TO ECO MIX LINE	165,000.00	Try	PP	1B
19-852	ECO MIXING LINE	28,000.00	Try	PP	1B
19-853	LINKS FROM ECO MIX LINE TO FURN I/T HDRS	63,000.00	Try	PP	1B
19-884	ECO INTER ASSY - LEFT	342,900.00	Try	PP	1B
19-903	ECO.MISCL COMP	115,000.00	Try	PP	1B
19-904	ECO HDR SUPT AB ROOF	135,000.00	Try	PP	1B
19-905	ECO HDR SUPT BL ROOF	1,000.00	Try	PP	1B
19-906	ECO LINE&LINK SUPORT	26,000.00	Try	PP	1B
19-907	ECO,FEEDPIPE SUPPORT	8,000.00	Try	PP	1B
19-914	ECO UPPER ASSY - RIGHT	110,000.00	Try	PP	1B
19-924	ECO LWR ASSY-RIGHT	342,900.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
19-984	ECO INTER ASSY - RIGHT	342,900.00	Try	PP	1B
19-991	Welding Electrodes-Part-1	100.00	Try	NB	0
19-992	Welding Electrodes	100.00	Try	NB	0
20-051	LONG RETRACTABLE SOO	97.00	Try	PP	1B
20-054	WALL BOX NON PRESSUR	2.00	Try	PP	1B
20-201	WALL DESLAGGER RW5E	30.00	Try	PP	1B
20-204	WALL BOX NON PRESSUR	4.00	Try	PP	1B
20-511	DA HEAD VALVE ASSY	-	Try	PP	1B
20-794	WALL BOX NON 7RESSUR	-	Try	PP	1B
20-962	TEMP PROBE DUPLEX WI	2.00	Try	PP	1B
20-988	SOOT BLOWER COMMISSIONING SPARES	-	Try	NB	0
20-998	SPECIAL TOOLS FOR SO	-	Try	NB	0
21-600	S.B. PPG & FITTINGS	40,000.00	Try	TP	1D
21-601	S.B PIPING SUPPORTS	2,000.00	Try	TP	1D
21-602	Sb Piping - DD Items	3,600.00	Try	TP	1D
21-603	Sb Piping - BOI Items	60.00	Try	TP	1D
21-604	SB Piping Supports - OS items	10,000.00	Try	TP	1D
21-605	SB Piping Supports - DD Items	10.00	Try	TP	1D
21-606	SB Piping Supports - BOI Items	2.00	Try	TP	1D
21-700	BULKED BPS COMP	600.00	Try	TP	1D
21-800	SB VALVES (BHEL)	4,700.00	Try	TP	1D
21-825	SB VALVES (SUBDELY)	1,300.00	Try	TP	1D

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
21-850	SB SAFETY VALVE BHEL	60.00	Try	TP	1D
21-992	Welding Electrodes	250.00	Try	NB	0
24-350	BLR FILLING PIPING	3,500.00	Try	TP	1D
24-351	H&S BLR FILLING PPG	300.00	Try	TP	1D
24-352	Boiler Fill Piping - DD Items	250.00	Try	TP	1D
24-353	H&S For Boiler Fill Piping - OS Items	1,000.00	Try	TP	1D
24-354	BOI Items for Blr Trim Piping	2.00	Try	TP	1D
24-700	BULKED BPS COMP	500.00	Try	TP	1D
24-800	BOILER TRIM PIPING	51,000.00	Try	TP	1D
24-801	SUPPORTS-TRIM PIPING	6,000.00	Try	TP	1D
24-803	Boiler Trim Piping - DD Items	600.00	Try	TP	1D
24-804	Supports - Blr Trim Piping - OS Items	44,000.00	Try	TP	1D
24-805	LINK TO BOILER RECIRCU SYSTEM	38,000.00	Try	TP	1D
24-806	MIXING VESSEL	6,500.00	Try	TP	1D
24-807	RECIRCU PUMP SUCTION LINE	38,000.00	Try	TP	1D
24-808	RECIRCU PUMP DISCHARGE LINE	14,000.00	Try	TP	1D
24-809	BOILR RECIR LINK FROM BF LINE	18,000.00	Try	TP	1D
24-810	H and S FOR STARTUP SYSTEM	28,000.00	Try	TP	1D
24-811	Fur Link to Flash tank HWL1&2	94,000.00	Try	TP	1D
24-813	Supports - Blr Trim Piping - DD Items	15.00	Try	TP	1D

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
24-814	BOI ITEMS FOR BOILER TRIM PPG	21,000.00	Try	TP	1D
24-815	SPRAY WATER SYSTEM	60,000.00	Try	TP	1D
24-817	H&S For Start-Up System - OS Items	16,500.00	Try	TP	1D
24-818	H&S For Start-Up System - DD Items	300.00	Try	TP	1D
24-820	EXHAUS PIPE SAFETY VLV	60,000.00	Try	TP	1D
24-822	De-Superheater Pipes - OS Items	1,000.00	Try	TP	1D
24-823	De-Superheater Pipes - DD Items	1,000.00	Try	TP	1D
24-824	Exhaust Pipe For Sv - OS Items	21,000.00	Try	TP	1D
24-825	SILENCER SUPPORTS	150.00	Try	TP	1D
24-826	Silencer Supp - OS Items	45,000.00	Try	TP	1D
24-827	Exhaust Pipe For Sv - DD Items	1,500.00	Try	TP	1D
24-828	Exhaust Pipe For Sv - BOI Items	50.00	Try	TP	1D
24-835	STARTUP VENT DIFFUSER SILEN SUP	2,000.00	Try	TP	1D
24-836	Start-Up Vent, Diffuser, Sil Supp-OS	10,000.00	Try	TP	1D
24-837	Start-Up Vent, Diffuser, Sil Supp-DD	20.00	Try	TP	1D
24-840	SAMPLE COOLER AND SUPPORTS	900.00	Try	TP	1D
24-841	Sample Cooler & Supports - OS Items	180.00	Try	TP	1D
24-842	Sample Cooler and Suprts-DD items	15.00	Try	TP	1D
24-855	RECIRCULATING PUMB COMP	19,700.00	Try	TP	1D
24-860	VALVES (BHEL)	95,000.00	Try	TP	1D

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
24-865	CTL VALVES FOR SPRAY PIPING SD	15,000.00	Try	TP	1D
24-867	CTL VAL FOR STARTUP RECIRCU SYS	15,000.00	Try	TP	1D
24-880	SAFETY VALVES	5,800.00	Try	TP	1D
24-881	SAFETY VALVES AND ERV(BHEL) SD	2,000.00	Try	TP	1D
24-883	Safety Valves (Bhel) - Non HT	5,500.00	Try	TP	1D
24-885	SILENCERS(BHEL)	87,000.00	Try	TP	1D
24-950	SPECIAL TOOLS	200.00	Try	NB	0
24-955	LAP TOOL SV&ERV	60.00	Try	NB	0
24-960	LAP TOOL-CON VAL(BHEL)	30.00	Try	NB	0
24-966	NITROGEN BLANKETING SYSTEM PIPING	2,000.00	Try	TP	1D
24-967	NITROGEN BLANKETING SYSTEM PIPING OS	1,600.00	Try	TP	1D
24-968	NITROGEN BLANKETING SYSTEM PIPING DD	200.00	Try	TP	1D
24-969	NITROGEN BLANKETING SYSTEM PIPING SD	1,800.00	Try	TP	1D
24-992	WELDING ELECTRODES-TRIM PPG	2,000.00	Try	NB	0
24-993	CONSUME & EREC MATLS	200.00	Try	NB	0
24-994	NAME PLATES	300.00	Try	TP	1D
28-220	DOORS	14,700.00	Try	NPP	1C
28-700	BPS FASTENERS	6,000.00	Try	NPP	1C
30-103	SEAL PLATE ASSY	4,300.00	Try	NPP	1C
30-105	FUR BOTTOM ENCL FRAM	59,350.00	Try	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
30-212	FURNACE EXTD SIDE BOTTOM ENCLOSURE FRA	24,100.00	Try	NPP	1C
30-215	MAIN BOILER ENCL	46,350.00	Try	NPP	1C
30-219	VERT ROOF ENCL	134,900.00	Try	NPP	1C
30-223	GAS DIST BAFFLES	450.00	Try	NPP	1C
30-224	Antivibration Baffles	46,250.00	Try	NPP	1C
30-233	IST PASS DECK SPRT	55,650.00	Try	NPP	1C
30-234	2ND PASS DECK SPRT	53,850.00	Try	NPP	1C
30-235	ENCL SUPPORT STEEL	81,750.00	Try	NPP	1C
31-010	COMPS WELDED TO PR	1,000.00	Try	NPP	1C
31-104	FUR REAR ARCH SKIN	2,700.00	Try	NPP	1C
32-010	FICOM BLR PP INSUL	7,550.00	Try	Insl.	3C
32-210	FIX COMP-DUCT INSULN	69,550.00	Try	Insl.	3C
32-700	BULKED DD COMPONENT	71,300.00	Try	Insl.	3D
32-810	EQUIPMENT OUTER CASING	212,050.00	Try	Insl.	3D
33-021	BLR PP MINRL WOOL	1,035,000.00	Try	Insl.	3A
33-210	MAIN BLR CAST REF GR	180,000.00	Try	Insl.	3B
33-221	DUCT MINERAL WOOL	804,000.00	Try	Insl.	3A
33-230	MAIN BLR POUR INSUL	90,000.00	Try	Insl.	3B
33-924	MISC EQPTS PCK MATLS	350.00	Try	Insl.	3C
33-970	MISC EQPTS EXP METAL	19,550.00	Try	Insl.	3C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
33-971	MISC EQPTS WW CLOTH	1,350.00	Try	Insl.	3C
33-975	MISC EQPTS SEAL COMP	800.00	Try	Insl.	3C
35-010	FOUNDATION MATERIALS	105,000.00	Try	STR	1A
35-131	Middle Columns RHS 1st Tier	161,000.00	Try	STR	1A
35-132	Middle Columns RHS 2nd Tier	176,000.00	Try	STR	1A
35-133	Middle Columns RHS 3rd Tier	74,000.00	Try	STR	1A
35-134	Middle Columns RHS 4th Tier	58,000.00	Try	STR	1A
35-135	Middle Columns RHS 5th Tier	78,000.00	Try	STR	1A
35-136	Middle Columns RHS 6th Tier	61,000.00	Try	STR	1A
35-137	Middle Columns RHS 7th Tier	52,000.00	Try	STR	1A
35-138	MIDDLE COLUMNS 8TH TIER	51,000.00	Try	STR	1A
35-141	Auxiliary Columns LHS 1st Tier	134,000.00	Try	STR	1A
35-142	Auxiliary Columns LHS 2nd Tier	134,000.00	Try	STR	1A
35-143	Auxiliary Columns LHS 3rd Tier	76,000.00	Try	STR	1A
35-144	Auxiliary Columns LHS 4th Tier	43,000.00	Try	STR	1A
35-145	Auxiliary Columns LHS 5th Tier	65,000.00	Try	STR	1A
35-146	Auxiliary Columns LHS 6th Tier	55,000.00	Try	STR	1A
35-147	Auxiliary Columns LHS 7th Tier	56,000.00	Try	STR	1A
35-148	AUXILIARY COLUMNS LHS 8TH TIER	50,000.00	Try	STR	1A
35-151	AUXCOL LHSLWR 1&2PAS	136,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
35-152	AUXCOL RHSMID 1&2PAS	133,000.00	Try	STR	1A
35-153	AUXCOL RHSUPR 1&2PAS	78,000.00	Try	STR	1A
35-154	Auxiliary Columns RHS 4th Tier	44,000.00	Try	STR	1A
35-155	Auxiliary Columns LHS 7th Tier	66,000.00	Try	STR	1A
35-156	Auxiliary Columns RHS 6th Tier	56,000.00	Try	STR	1A
35-157	Auxiliary Columns RHS 7th Tier	57,000.00	Try	STR	1A
35-158	AUXILIARY COLUMNS RHS 8TH TIER	50,000.00	Try	STR	1A
35-181	Main Columns 1st Tier	498,000.00	Try	STR	1A
35-182	Main Columns 2nd Tier	455,000.00	Try	STR	1A
35-183	Main Columns 3rd Tier	292,000.00	Try	STR	1A
35-184	Main Columns 4th Tier	192,000.00	Try	STR	1A
35-185	Main Columns 5th Tier	260,000.00	Try	STR	1A
35-186	Main Columns 6th Tier	243,000.00	Try	STR	1A
35-187	Main Columns 7th Tier	234,000.00	Try	STR	1A
35-188	MAIN COLUMNS 8TH TIER	250,000.00	Try	STR	1A
35-190	GIRDER PIN CONNECTIO	30,000.00	Try	STR	1A
35-211	CEILING STRUCTUREMAI	723,000.00	Try	STR	1A
35-212	CEILING STRUCTUREMAI	676,000.00	Try	STR	1A
35-213	CEIL STRUCT -CROSS W	182,000.00	Try	STR	1A
35-214	CEIL STRUCT -CROSS W	137,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
35-221	CEILING STRUCTURE RO	83,000.00	Try	STR	1A
35-222	CEILING STRUCTURE RO	50,000.00	Try	STR	1A
35-231	CEILING STRUCTURE HO	105,000.00	Try	STR	1A
35-232	CEILING STRUCTURE HO	60,000.00	Try	STR	1A
35-311	HORIZONTAL BRACING I	37,000.00	Try	STR	1A
35-312	HORIZ BRACING II PAS	22,000.00	Try	STR	1A
35-321	HORIZ BRACING I PASS	36,000.00	Try	STR	1A
35-322	HORIZ BRACING II PAS	41,000.00	Try	STR	1A
35-331	HORIZ BRACING I PASS	33,000.00	Try	STR	1A
35-332	HORIZ BRACING II PAS	41,000.00	Try	STR	1A
35-341	HORIZ BRACING I PASS	51,000.00	Try	STR	1A
35-342	HORIZ BRACING II PAS	46,000.00	Try	STR	1A
35-351	HORIZ BRACING I PASS	55,000.00	Try	STR	1A
35-352	HORIZ BRACING II PAS	29,000.00	Try	STR	1A
35-361	HORIZ BRACING I PASS	35,000.00	Try	STR	1A
35-362	HORIZ BRACING II PAS	41,000.00	Try	STR	1A
35-371	Horizontal Bracing@79100 (MBL-7)1st Pass	55,000.00	Try	STR	1A
35-372	Horizontal Bracing @79100(MBL-7)2nd Pass	47,000.00	Try	STR	1A
35-374	Horizontal Bracing@87500(MBL-8) 1st Pass	38,000.00	Try	STR	1A
35-375	Horizontal Bracing@87500(MBL-8) 2nd Pass	54,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
35-381	Landing & Connecting Platforms Tier-1	80,000.00	Try	STR	1A
35-382	Landing & Connecting Platforms Tier-2	61,000.00	Try	STR	1A
35-383	Landing & Connecting Platforms Tier-3	111,000.00	Try	STR	1A
35-384	Landing & Connecting Platforms Tier-4	54,000.00	Try	STR	1A
35-385	Landing & Connecting Platforms Tier-5	65,000.00	Try	STR	1A
35-386	Landing & Connecting Platforms Tier-6	90,000.00	Try	STR	1A
35-387	Landing & Connecting Platforms Tier-7	77,000.00	Try	STR	1A
35-388	Landing & Connecting Platforms Tier-8	80,000.00	Try	STR	1A
35-390	MISC STRUCTURES	72,000.00	Try	STR	1A
35-441	Horil Beams First Pass-Tier-1	124,000.00	Try	STR	1A
35-442	Horil Beams First Pass-Tier-2	135,000.00	Try	STR	1A
35-443	Horil Beams First Pass-Tier-3	86,000.00	Try	STR	1A
35-444	Horil Beams First Pass-Tier-4	111,000.00	Try	STR	1A
35-445	Horil Beams First Pass-Tier-5	118,000.00	Try	STR	1A
35-446	Horil Beams First Pass-Tier-6	84,000.00	Try	STR	1A
35-447	Horil Beams First Pass-Tier-7	105,000.00	Try	STR	1A
35-448	Horil Beams First Pass-Tier-8	75,000.00	Try	STR	1A
35-451	Hor Beam-Second Pass- Tier-1	68,000.00	Try	STR	1A
35-452	Hor Beam-Second Pass- Tier-2	119,000.00	Try	STR	1A
35-453	Hor Beam-Second Pass- Tier-3	53,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
35-454	Hor Beam-Second Pass- Tier-4	41,000.00	Try	STR	1A
35-455	Hor Beam-Second Pass- Tier-5	42,000.00	Try	STR	1A
35-456	Hor Beam-Second Pass- Tier-6	40,000.00	Try	STR	1A
35-457	Hor Beam-Second Pass- Tier-7	49,000.00	Try	STR	1A
35-458	Hor Beam-Second Pass- Tier-8	34,000.00	Try	STR	1A
35-511	Front Bracing-Tier-1	44,000.00	Try	STR	1A
35-512	Front Bracing-Tier-2	51,000.00	Try	STR	1A
35-513	Front Bracing-Tier-3	38,000.00	Try	STR	1A
35-514	Front Bracing-Tier-4	23,000.00	Try	STR	1A
35-515	Front Bracing-Tier-5	31,000.00	Try	STR	1A
35-516	Front Bracing-Tier-6	30,000.00	Try	STR	1A
35-517	Front Bracing-Tier-7	26,000.00	Try	STR	1A
35-518	Front Bracing-Tier-8	23,000.00	Try	STR	1A
35-521	Side Bracing-Tier-1	101,000.00	Try	STR	1A
35-522	Side Bracing-Tier-2	90,000.00	Try	STR	1A
35-523	Side Bracing-Tier-3	61,000.00	Try	STR	1A
35-524	Side Bracing-Tier-4	32,000.00	Try	STR	1A
35-525	Side Bracing-Tier-5	36,000.00	Try	STR	1A
35-526	Side Bracing-Tier-6	40,000.00	Try	STR	1A
35-527	Side Bracing-Tier-7	45,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
35-528	Side Bracing-Tier-8	39,000.00	Try	STR	1A
35-531	Rear Bracing-Tier-1	75,000.00	Try	STR	1A
35-532	Rear Bracing-Tier-2	55,000.00	Try	STR	1A
35-533	Rear Bracing-Tier-3	18,000.00	Try	STR	1A
35-534	Rear Bracing-Tier-4	19,000.00	Try	STR	1A
35-535	Rear Bracing-Tier-5	32,000.00	Try	STR	1A
35-536	Rear Bracing-Tier-6	25,000.00	Try	STR	1A
35-537	Rear Bracing-Tier-7	23,000.00	Try	STR	1A
35-538	Rear Bracing-Tier-8	25,000.00	Try	STR	1A
35-701	HSFG FASTENERS	16,000.00	Try	STR	1A
35-721	HSFG FASTENERS FOR 35PG - TIER 1	17,000.00	Try	STR	1A
35-722	HSFG FASTENERS FOR 35PG - TIER 2	24,000.00	Try	STR	1A
35-723	HSFG FASTENERS FOR 35PG - TIER 3	16,000.00	Try	STR	1A
35-724	HSFG FASTENERS FOR 35PG - TIER 4	15,000.00	Try	STR	1A
35-725	HSFG FASTENERS FOR 35PG - TIER 5	16,000.00	Try	STR	1A
35-726	HSFG FASTENERS FOR 35PG - TIER 6	14,000.00	Try	STR	1A
35-727	HSFG FASTENERS FOR 35PG - TIER 7	15,000.00	Try	STR	1A
35-728	HSFG FASTENERS FOR 35PG - TIER 8	15,000.00	Try	STR	1A
35-730	HSFG FASTENERS - CEILING	28,000.00	Try	STR	1A
35-811	FLOOR GRILLS AND GUARD PLATE	110,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
35-812	Edge Strip And Guard Plate	16,000.00	Try	STR	1A
35-821	STAIRS - LOWER	18,000.00	Try	STR	1A
35-822	STAIRS - MIDDLE	12,000.00	Try	STR	1A
35-823	STAIRS - UPPER	14,000.00	Try	STR	1A
35-851	HAND RAILS AND POSTS	33,000.00	Try	STR	1A
35-993	CONSUMABLES AND RECTI	42,000.00	Try	NB	0
35-995	CHUTE PIPE AND LADDE	43,000.00	Try	STR	1A
36-111	COLUMNS NEAR APH Tier 1	400,000.00	Try	STR	1A
36-112	COLUMNS NEAR APH Tier 2	400,000.00	Try	STR	1A
36-113	COLUMNS NEAR APH Tier 3	220,000.00	Try	STR	1A
36-151	BEAMS AND BRACINGS NEAR APH Tier 1	400,000.00	Try	STR	1A
36-152	BEAMS AND BRACINGS NEAR APH Tier 2	400,000.00	Try	STR	1A
36-153	BEAMS AND BRACINGS NEAR APH Tier 3	205,000.00	Try	STR	1A
36-311	MAIN FLOOR I MBL 1ST	18,000.00	Try	STR	1A
36-312	MAIN FLOOR I MBL 2ND	18,000.00	Try	STR	1A
36-313	NON-MBL FLOOR BETWEE	230,000.00	Try	STR	1A
36-314	NON-MBL FLOOR BETWEE	353,000.00	Try	STR	1A
36-315	NON-MBL FLOOR BETWEE	73,000.00	Try	STR	1A
36-316	NON-MBL FLOOR BETWEE	43,000.00	Try	STR	1A
36-321	MAIN FLOOR II MBL IST	6,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
36-322	MAIN FLOOR II MBL 2ND	36,000.00	Try	STR	1A
36-323	NON-MBL FLOOR BETWEE	82,000.00	Try	STR	1A
36-324	NON-MBL FLOOR BETWEE	97,000.00	Try	STR	1A
36-325	NON-MBL FLOOR BETWEE	8,000.00	Try	STR	1A
36-326	NON-MBL FLOOR BETWEE	6,000.00	Try	STR	1A
36-331	MAIN FLOOR III MBL 1	38,000.00	Try	STR	1A
36-332	MAIN FLOOR III MBL 2	66,000.00	Try	STR	1A
36-333	NON-MBL FLOOR BETWEE	87,000.00	Try	STR	1A
36-334	NON-MBL FLOOR BETWEE	46,000.00	Try	STR	1A
36-335	NON-MBL FLOOR BETWEE	136,000.00	Try	STR	1A
36-336	NON-MBL FLOOR BETWEE	52,000.00	Try	STR	1A
36-337	NON-MBL FLOOR BETWEE	129,000.00	Try	STR	1A
36-338	NON-MBL FLOOR BETWEE	4,000.00	Try	STR	1A
36-341	MAIN FLOOR IV MBL 1ST	44,000.00	Try	STR	1A
36-342	MAIN FLOOR IV MBL 2ND	30,000.00	Try	STR	1A
36-343	NON-MBL FLOOR BETWEE	67,000.00	Try	STR	1A
36-344	NON-MBL FLOOR BETWEE	131,000.00	Try	STR	1A
36-345	NON-MBL FLOOR BETWEE	48,000.00	Try	STR	1A
36-346	NON-MBL FLOOR BETWEE	17,000.00	Try	STR	1A
36-351	MAIN FLOOR V MBL IST	5,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
36-352	MAIN FLOOR V MBL II ND	15,000.00	Try	STR	1A
36-353	NON-MBL FLOOR BETWEE	61,000.00	Try	STR	1A
36-354	NON-MBL FLOOR BETWEE	54,000.00	Try	STR	1A
36-355	NON-MBL FLOOR BETWEE	3,000.00	Try	STR	1A
36-356	NON-MBL FLOOR BETWEE	3,000.00	Try	STR	1A
36-361	MAIN FLOOR VI MBL 1ST	47,000.00	Try	STR	1A
36-362	MAIN FLOOR VI MBL 2ND	43,000.00	Try	STR	1A
36-363	NON_MBL FLOOR ABOVE	68,000.00	Try	STR	1A
36-364	NON MBL FLOOR ABOVE MBL VI	80,000.00	Try	STR	1A
36-365	NON MBL FLOOR ABOVE MBL VI	106,000.00	Try	STR	1A
36-366	NON MBL FLOOR ABOVE MBL VI	74,000.00	Try	STR	1A
36-371	Floor Beams @ 79100 (MBL-7) 1st Pass	19,000.00	Try	STR	1A
36-372	Floor Beams @ 79100 (MBL-7) 2nd Pass	6,000.00	Try	STR	1A
36-373	Floor Beams @ 83400 (Tier-8)	87,000.00	Try	STR	1A
36-374	Floor Beams @ 87500 (MBL-8) 1st Pass	133,000.00	Try	STR	1A
36-375	Floor Beams @ 87500 (MBL-8) 2nd Pass	14,000.00	Try	STR	1A
36-376	Floor Beams @ 90500 (Tier-8)2nd Pass	20,000.00	Try	STR	1A
36-377	Floor Beams 2nd Pass Tier-8	9,000.00	Try	STR	1A
36-381	LAND & CONN PLAT LOW	86,000.00	Try	STR	1A
36-382	LAND & CONN PLAT MID	183,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
36-383	LAND & CONN PLAT UPP	41,000.00	Try	STR	1A
36-391	MISCELLANEOUS PLATFO	62,000.00	Try	STR	1A
36-392	MISCELLANEOUS PLATFO	226,000.00	Try	STR	1A
36-393	APH, SCAPH, HANDLING	346,000.00	Try	STR	1A
36-394	MISCELLANEOUS PLATFO	92,000.00	Try	STR	1A
36-395	MISCELLANEOUS PLATFO	6,000.00	Try	STR	1A
36-396	Slide Bearing Plates	1,000.00	Try	STR	1A
36-398	HEAVY SLIDE BEARING PLATES	2,000.00	Try	STR	1A
36-610	BOILER ROOF STRUCTUR	205,000.00	Try	STR	1A
36-611	BOILER ROOF SHEETING	33,000.00	Try	STR	1A
36-613	RAIN WATER PIPES and	24,000.00	Try	STR	1A
36-620	BOILER SIDE CLADDING	57,000.00	Try	STR	1A
36-621	BOILER SIDE CLADDING	16,000.00	Try	STR	1A
36-630	OTHER BOILER SIDING	225,000.00	Try	STR	1A
36-631	OTHER BOILER SIDING SHEETING	75,000.00	Try	STR	1A
36-700	Hsfg Bolts	83,000.00	Try	STR	1A
36-701	Fasteners	2,000.00	Try	STR	1A
36-721	HSFG FASTENERS FOR 36PG - TIER 1	29,000.00	Try	STR	1A
36-722	HSFG FASTENERS FOR 36PG - TIER 2	12,000.00	Try	STR	1A
36-723	HSFG FASTENERS FOR 36PG - TIER 3	20,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
36-740	POSTS AND HANGERS	25,000.00	Try	STR	1A
36-811	FLOORGRILLSANDGUARDP	420,000.00	Try	STR	1A
36-812	FLOORGRILLSANDGUARDP	222,000.00	Try	STR	1A
36-813	FLOORGRILLSANDGUARDP	170,000.00	Try	STR	1A
36-814	FLOORGRILLSANDGUARDP	84,000.00	Try	STR	1A
36-820	STAIRS AND LADDERS	88,000.00	Try	STR	1A
36-821	STAIRS AND LADDERS	62,000.00	Try	STR	1A
36-822	STAIRS AND LADDERS	10,000.00	Try	STR	1A
36-823	STAIRS AND LADDERS	6,000.00	Try	STR	1A
36-851	HANDRAILS AND POSTS	33,000.00	Try	STR	1A
36-852	HANDRAILS AND POSTS	40,000.00	Try	STR	1A
36-853	HANDRAILS AND POSTS	21,000.00	Try	STR	1A
36-993	CONSUMABLESANDERECIT	36,000.00	Try	NB	0
37-010	BLR OUTER CSG COMPS	51,800.00	Try	Insl.	3C
37-810	BLR OUTER CASING	64,750.00	Try	Insl.	3D
38-210	INTER CONN PLATFORMS	25,000.00	Try	STR	1A
38-299	MILL HANDLING MONORA	260,000.00	Try	STR	1A
38-310	CONN PLATFORMS TO MI	40,000.00	Try	STR	1A
38-410	MILL MAINTANANCE PLA	180,000.00	Try	STR	1A
38-510	LIFT BEAMS AND BRACI	50,000.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
38-610	ELEVATOR CLADDING ST	110,000.00	Try	STR	1A
38-611	ELEVATOR CLADDING SH	35,000.00	Try	STR	1A
38-710	LIFT MACHINE ROOM DE	113,000.00	Try	STR	1A
38-810	FLOORGRILLS AND GUAR	18,000.00	Try	STR	1A
38-820	STAIRS AND LADDERS	5,000.00	Try	STR	1A
38-850	HAND RAILS AND HAND	70,000.00	Try	STR	1A
38-993	CONSUMABLES AND EREC	24,000.00	Try	NB	0
39-012	FOUNDATION MATERIALS	79,700.00	Try	STR	1A
39-101	COLUMNS FRAMES BEFOR	489,000.00	Try	STR	1A
39-102	COLUMNS FRAMES BEFOR	447,000.00	Try	STR	1A
39-141	COLS FRAMES NEAR ID	185,000.00	Try	STR	1A
39-142	COLS FRAMES NEAR ID	800,000.00	Try	STR	1A
39-150	COL FRAMES BETN I.D.	93,000.00	Try	STR	1A
39-299	Platforms - Before ESP	170,000.00	Try	STR	1A
39-304	FAN HANDLING STRUCTU	24,800.00	Try	STR	1A
39-305	FAN HANDLING STRUCTU	20,000.00	Try	STR	1A
39-306	FAN HANDLING STRUCTU	97,100.00	Try	STR	1A
39-700	HSFG FASTENERS FOR P	29,000.00	Try	STR	1A
39-810	FLOOR GRILL	103,500.00	Try	STR	1A
39-820	STAIRS	25,560.00	Try	STR	1A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
39-850	HAND RAIL AND HAND R	56,700.00	Try	STR	1A
39-993	CONSUMABLES AND EREC	7,000.00	Try	NB	0
41-350	ACOIL GUN ASSY	700.00	Try	NPP	1C
41-390	OIL GUN VICE&RACK	1,100.00	Try	NPP	1C
41-500	HEA IGNITOR	950.00	Try	NPP	1C
41-710	Oil Gun Assembly - DD items	2.00	Try	NPP	1C
42-001	PNEUMATIC FITTINGS	50.00	Try	PP	1B
42-002	STEAM BLOW MATERIALS		Try	PP	1B
42-005	INSTRUMENT FITTINGS	80.00	Try	PP	1B
42-010	LFO PUMP SET		Try	PP	1B
42-046	DO PUMP-MOTOR ASSY	150.00	Try	PP	1B
42-065	DRAIN OIL TANK	2,400.00	Try	PP	1B
42-070	BURNER STN SKID ASLY	6,100.00	Try	PP	1B
42-120	PIPING,PH FUEL OIL		Try	PP	1B
42-152	PIPING,OP.FLR LFO	3,000.00	Try	PP	1B
42-154	PIPING,OP.FLR DO	500.00	Try	PP	1B
42-157	PIPING,OP.FLR AIR	20.00	Try	PP	1B
42-200	SUB.DEL FO SYSTEM	5,500.00	Try	PP	1B
42-300	BHEL VALVE F.O. SYS	800.00	Try	PP	1B
42-700	BULKED BPS COMPONENT	500.00	Try	PP	1B
42-710	Fuel Oil System - DD Items	1,700.00	Try	PP	1B
42-858	Fuel Oil System - Shop items	12,000.00	Try	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
42-992	IMPORTED ELECTRODES	25.00	Try	NB	0
43-004	ASSY SCNR&GUN AIR SY	4,000.00	Try	NPP	1C
43-005	ASSY MILL AIR SYSTEM	25,000.00	Try	NPP	1C
43-104	M/C SCNR&GUN AIR SYS	19,000.00	Try	NPP	1C
43-105	M/C MILL AIR SYSTEM	82,000.00	Try	NPP	1C
43-200	SUBDEL,IGNR,SCNR AIR	16,000.00	Try	NPP	1C
43-710	Seal Air & Scanner Air System - DD items	800.00	Try	NPP	1C
45-200	Windbox - Sub Delivery	4,500.00	Try	NPP	1C
45-710	Wind Box & SOFA Assembly - DD items	800.00	Try	NPP	1C
45-801	WINDBOX AND SOFA TUBE ATTACH	44,000.00	Try	NPP	1C
45-802	WINDBOX ASSEMBLY - 32" WIDTH	215,000.00	Try	NPP	1C
45-804	WINDBOX - SOFA ASSEMBLY	48,500.00	Try	NPP	1C
45-805	WINDBOX SUPPT AIR CYL MOUNTG	41,000.00	Try	NPP	1C
45-858	Wind Box & SOFA Assy - Shop items	47,000.00	Try	NPP	1C
47-200	Fuel Piping - Sub-delivery	49,000.00	Try	NPP	1C
47-281	FUEL PIPE SUPPORTS	50,000.00	Try	NPP	1C
47-283	FUEL PIPE MISC ITEMS	17,500.00	Try	NPP	1C
47-289	ST PIPE SHOP BEND REST OF MiLL	390,000.00	Try	NPP	1C
47-710	Pulverised Fuel Piping - DD items	4,000.00	Try	NPP	1C
47-858	Fuel Piping - Shop items	57,000.00	Try	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
48-012	DUCT - -FDFAN TO A.H	181,700.00	Try	NPP	1C
48-014	EXP.JT - -FDFAN TO A.H	5,155.00	Try	NPP	1C
48-015	SUPPORT-FDFAN TO A.H	36,080.00	Try	NPP	1C
48-018	MISC. DUCT&SPRT MATL	34,795.00	Try	NPP	1C
48-019	AIRDUCT SUP FDN MATL	5,155.00	Try	NPP	1C
48-022	DUCT - FDFAN INTRCON	12,890.00	Try	NPP	1C
48-112	DUCT - -PAFAN-PRI-AH	188,155.00	Try	NPP	1C
48-114	EXP.JT - -PAFAN-PRI-AH	14,175.00	Try	NPP	1C
48-115	SUPPORT-PAFAN-PRI-AH	24,485.00	Try	NPP	1C
48-116	DUCT MISC.	12,890.00	Try	NPP	1C
48-141	SEAL AIR HAG&ID GATE	9,020.00	Try	NPP	1C
48-142	DUCT - -COLDAIRBUS	173,980.00	Try	NPP	1C
48-144	EXP.JT - -COLDAIRBUS	5,155.00	Try	NPP	1C
48-145	SUPPORT-COLDAIRBUS	25,775.00	Try	NPP	1C
48-200	INS TAPPINGS ON DUCT	6,440.00	Try	NPP	1C
48-202	DUCT - AH-WIND BOX	239,705.00	Try	NPP	1C
48-204	EXPJT - AH-WIND BOX	56,705.00	Try	NPP	1C
48-205	SUPORT AH-WIND BOX	61,860.00	Try	NPP	1C
48-206	CLH/VLH -Hot Air	15,465.00	Try	NPP	1C
48-207	FLOWMTR-SEC AIRFLOW	32,215.00	Try	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
48-208	DUCT-SEC.AIR TO WB	192,022.00	Try	NPP	1C
48-212	DUCT - WIND BOX CONN	128,875.00	Try	NPP	1C
48-214	EXPJT - WIND BOX CONN	14,176.00	Try	NPP	1C
48-222	SQ DUCT AH-HOT AIR BUS	231,970.00	Try	NPP	1C
48-224	EXPN PCS AH-HOT AIR BUS	18,040.00	Try	NPP	1C
48-225	SUPPORT AH-HOT AIR BUS	38,660.00	Try	NPP	1C
48-262	Rect Duct Aihtr Toprinozzle And Seca	134,030.00	Try	NPP	1C
48-264	Expn Piece Aihtr Toprinozzle and Seca	45,105.00	Try	NPP	1C
48-265	Supports Aihtr Toprinozzle And Seca	16,750.00	Try	NPP	1C
48-267	FLOW METER- SOFA	5,155.00	Try	NPP	1C
48-372	DUCT - ECO HOPPER TO AH	37,370.00	Try	NPP	1C
48-382	DUCT - ECO-HOPPER	157,225.00	Try	NPP	1C
48-384	EXPNJT - ECO-HOPPER	50,260.00	Try	NPP	1C
48-385	SUPPORT - ECO-HOPPER	69,592.00	Try	NPP	1C
48-386	DUCT - ECO TO ECO HOPPER	341,516.00	Try	NPP	1C
48-395	CLH/VLH-FLUE GAS	20,620.00	Try	NPP	1C
48-432	DUCT - AH-BLROUTFL	132,740.00	Try	NPP	1C
48-434	EXPJT - AH-BLROUTFL	9,020.00	Try	NPP	1C
48-435	SUPORT AH-BLROUTFL	41,240.00	Try	NPP	1C
48-462	DUCT - BLROUTFL-EP	534,830.00	Try	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
48-464	EXPJT - BLROUTFL-EP	46,395.00	Try	NPP	1C
48-465	SUPORT BLR OUTFL-EP	67,015.00	Try	NPP	1C
48-662	CIRCULAR DUCT HOT BUS MILLS	153,360.00	Try	NPP	1C
48-664	EXPN PCS HOT BUS MILLS	14,175.00	Try	NPP	1C
48-665	SUPPORTS HOT BUS MILLS	21,910.00	Try	NPP	1C
48-667	FLOW METER	21,910.00	Try	NPP	1C
48-700	BULKED BPS COMPONENT	7,735.00	Try	NPP	1C
48-911	Slide Brg Pl & Pac Bellow-Blr	5,155.00	Try	NPP	1C
48-912	Slide Brg Pl-Id Sys	1,290.00	Try	NPP	1C
48-915	Man Hole Doors (450X450)	19,330.00	Try	NPP	1C
48-993	ERECTON-MATERIALS	55,194.00	Try	NB	0
65-200	Coal Feeder- Sub-Delivey	1,000.00	Try	RM	2A
65-710	Coal Feeder - DD items	200.00	Try	RM	2A
65-736	36GRAVIMETRIC FEEDER	62,600.00	Try	RM	2A
67-200	Coal Feeding System- Sub dely.	950.00	Try	RM	2A
67-204	RAW COAL GATES	4,100.00	Try	RM	2A
67-272	BUNKER OUTLET GATE -36" MOTOR	9,400.00	Try	RM	2A
67-276	FEEDER INLET GATE- 36" CHAIN	8,600.00	Try	RM	2A
67-283	FEEDER OUTLET ISOLATION GATE	12,200.00	Try	RM	2A
67-710	Coal Feeding System - DD items	500.00	Try	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
67-801	DOWN SPOUT	9,300.00	Try	RM	2A
67-802	BUNKER EMPTYINGCHUTE	32,000.00	Try	RM	2A
67-803	FEED PIPE TO MILL	24,000.00	Try	RM	2A
95-088	FSSS FLAME SCANNER	450.00	Try	PP	1B
96-588	ELECT.ACTUATOR-A&FG	600.00	Try	NPP	1C
97-282	FLOWMETERS	3,500.00	Try	PP	1B
97-284	FIELD GAUGES	400.00	Try	PP	1B
97-297	MTM CLAMPS & PADS	1,000.00	Try	PP	1B
97-599	PNEU.ACTUR A&FG SYS	3,200.00	Try	NPP	1C
99-099	MISC CHAIN PULLY BLO	100.00	Try	NPP	1C
99-100	FAN HANDLING EQUIPT	20,000.00	Try	NPP	1C
99-300	PUMP HANDLING EQUIPT	3,150.00	Try	NPP	1C
99-400	SCAPH,RAPH HANDLG EQ	2,300.00	Try	NPP	1C
	Flash Tank A	3850	BPL	PP	1B
	Flash Tank B	3200	BPL	PP	1B
	Unit Flash Tank	1200	BPL	PP	1B
	ID Fan Motor (2 Nos)	87400	BPL	RM	2A
	FD Fan Motor (2 Nos)	30000	BPL	RM	2A
	PA Fan Motor (2 Nos)	34000	BPL	RM	2A
	Mill Motor (9 Nos)	71100	BPL	RM	2A
52341	L AH-HP PUMP WITH MOTOR	2.500	RPT APH	RM	
52011	LARG AH-ROTOR POST	53.000	RPT APH	RM	2A
52010	LARG AH-ROTOR ASSY	1,330.000	RPT APH	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
52012	LARG AH-ROTORPINRACK	7.500	RPT APH	RM	2A
52030	LARG AH-ROTORHOUSING	76.000	RPT APH	RM	2A
52041	HOT END CONN PLATE	128.800	RPT APH	RM	2A
52042	COLD END CONN PLATE	246.800	RPT APH	RM	2A
52000	SPECIAL TOOLS/CONTRA	1.140	RPT APH	NB	0
52261	LARG AH-GUIDE BEARNG	7.950	RPT APH	RM	2A
52262	LARG AH-SUPRT BEARNG	22.000	RPT APH	RM	2A
52013	LARG AH-ROTORSEALS	18.500	RPT APH	RM	2A
52054	LARG AH-AXIAL SEAL	1.400	RPT APH	RM	2A
52055	LARG AH-BY PASS SEAL	1.730	RPT APH	RM	2A
52100	LARGE AH ROTOR DRIVE	14.500	RPT APH	RM	2A
52101	LARG AH-AUX ROTDRIVE	10.500	RPT APH	RM	2A
52600	LARGE AH ECI COMPONENTS	1.500	RPT APH	RM	2A
50510	STEAM COIL A P H	13.000	RPT APH	RM	2A
52220	LARG AH-GENS DETAILS	3.200	RPT APH	RM	2A
52271	OIL PIPING GUIDE BRG	0.540	RPT APH	RM	2A
52272	OIL PIPING SUPRT BRG	0.520	RPT APH	RM	2A
52338	LARGE AH-MULTIMEDI CLNG DEV-CE	3.050	RPT APH	RM	2A
52339	LARGE AH-RETRACT CLNG DEV (HE)	1.500	RPT APH	RM	2A
52211	LARG AH-AIRSEAL PIPE	0.800	RPT APH	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
52274	LUB OIL CIRCULATION UNIT	1.120	RPT APH	RM	2A
52275	LARGE AIR HEATER-LUBRICANTS	1.550	RPT APH	RM	2A
52301	WASH MANIFLD GAS INL	2.450	RPT APH	RM	2A
52302	WASH MANIFLD GAS OUT	2.700	RPT APH	RM	2A
52988	LARG AH COMMISSIONING SPARE	0.500	RPT APH	NB	0
55012	FD STAIR HAND RAIL	2.000	RPT FAN	RM	2A
55019	FD FAN MOTOR CANOPY	1.500	RPT FAN	RM	2A
55022	ID STAIR HAND RAIL	3.000	RPT FAN	RM	2A
55029	ID FAN MOTOR CANOPY	3.000	RPT FAN	RM	2A
55032	PA STAIR HAND RAIL	2.300	RPT FAN	RM	2A
55039	PA FAN MOTOR CANOPY	2.400	RPT FAN	RM	2A
55210	FD FAN LOS CANOPY	1.200	RPT FAN	RM	2A
55220	ID FAN LOS CANOPY	1.200	RPT FAN	RM	2A
55230	PA FAN LOS CANOPY	1.200	RPT FAN	RM	2A
55728	ID FAN SUCTION BOX	21.000	RPT FAN	RM	2A
55828	ID FAN DIFFUSER	18.800	RPT FAN	RM	2A
56072	SA STAIR HAND RAIL	1.200	RPT FAN	RM	2A
55015	FD FAN COUPLING GUARD	0.060	RPT FAN	RM	2A
55420	ID SET INDN SHAFT	0.180	RPT FAN	RM	2A
55410	FD SET INDN SHAFT	0.130	RPT FAN	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
55510	FD FAN EXPN JOINTS	1.850	RPT FAN	RM	2A
55011	FAN FIX MATERIAL	0.950	RPT FAN	RM	2A
55021	ID FAN FIX MATERIAL	2.000	RPT FAN	RM	2A
55024	ID FAN C S AIR FAN	3.000	RPT FAN	RM	2A
55031	PA FAN FIX MATERIAL	1.000	RPT FAN	RM	2A
55091	FIRST FILL LUBRICANT	6.720	RPT FAN	RM	2A
55216	1 STG FD ROTOR	6.300	RPT FAN	RM	2A
55516	1 STG FD HOUSING	16.500	RPT FAN	RM	2A
55635	2 STG PA HOUSING	8.600	RPT FAN	RM	2A
55816	FD FAN DIFFUSER	9.000	RPT FAN	RM	2A
55920	ID FAN LUBE OIL SYS	6.600	RPT FAN	RM	2A
56077	SA FAN CI ITEMS	0.020	RPT FAN	RM	2A
55328	2 STG ID ROTOR	32.500	RPT FAN	RM	2A
55335	2 STG PA ROTOR	7.500	RPT FAN	RM	2A
55430	PA SET INDN SHAFT	0.160	RPT FAN	RM	2A
55628	2 STG ID HOUSING	47.000	RPT FAN	RM	2A
55716	FD FAN SUCTION BOX	8.600	RPT FAN	RM	2A
55025	ID FAN CPLNG GUARD	0.120	RPT FAN	RM	2A
55027	ID FAN CI ITEMS	0.050	RPT FAN	RM	2A
55035	PA FAN CPLNG GUARD	0.100	RPT FAN	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
55520	ID FAN EXPN JOINTS	2.300	RPT FAN	RM	2A
55530	PA FAN EXPN JOINTS	1.250	RPT FAN	RM	2A
55820	ID FAN COUPLING	5.000	RPT FAN	RM	2A
55830	PA FAN COUPLING	1.400	RPT FAN	RM	2A
55835	PA FAN DIFFUSER	5.500	RPT FAN	RM	2A
55919	FD FAN INSUL WOOL	15.000	RPT FAN	RM	2A
55931	PA FAN SILENCER	58.100	RPT FAN	RM	2A
55939	PA FAN INSUL WOOL	10.500	RPT FAN	RM	2A
56079	SA FAN MTR CANOPY	0.350	RPT FAN	RM	2A
56670	RADIAL SEAL AIR FAN MOTOR	2.800	RPT FAN	RM	2A
55017	FD FAN CI ITEMS	0.040	RPT FAN	RM	2A
55037	PA FAN CI ITEMS	0.040	RPT FAN	RM	2A
55735	PA FAN SUCTION BOX	5.500	RPT FAN	RM	2A
55810	FD FAN COUPLING	1.380	RPT FAN	RM	2A
55910	FD FAN LUBE OIL SYS	3.000	RPT FAN	RM	2A
55911	FD FAN SILENCER	68.000	RPT FAN	RM	2A
55930	PA FAN LUBE OIL SYS	4.500	RPT FAN	RM	2A
56075	SA FAN CPLNG GUARD	0.060	RPT FAN	RM	2A
56161	PENT HOUSE FAN	1.200	RPT FAN	RM	2A
56173	SA FAN ROTOR	1.700	RPT FAN	RM	2A

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
56373	RADIAL SEAL AIR FAN BEARINGS	0.330	RPT FAN	RM	2A
56473	RADIAL SEAL AIR FAN STATOR	7.600	RPT FAN	RM	2A
56870	SEAL AIR FAN COUPLING(RADIAL)	0.040	RPT FAN	RM	2A
57S41	SEAL AIR PIPING-SCR	7.000	RPT GD	NPP	1C
57S77	ELECTRIC ACTUATR-SCR	6.000	RPT GD	NPP	1C
57S78	ELECTRIC ITEM-SCR GD	0.020	RPT GD	NPP	1C
57S91	BLOWER WITH MOTR-SCR	2.000	RPT GD	NPP	1C
57S97	KGV CHECK VALV-SCR	2.200	RPT GD	NPP	1C
57CX0	GATE-WITH CLADDING	35.000	RPT GD	NPP	1C
57141	SEAL AIR PIPING	30.000	RPT GD	NPP	1C
57466	PLATFORMS AND LADDERS	174.570	RPT GD	NPP	1C
57497	KGV CHECK VALVE	8.900	RPT GD	NPP	1C
57566	PLATFORMS AND LADDERS-SCR GD	42.400	RPT GD	NPP	1C
57620	GATE-SCR BYPASS	98.600	RPT GD	NPP	1C
57491	BLOWER WITH MOTOR	15.800	RPT GD	NPP	1C
57010	GATE-FD FAN OUTLET	32.600	RPT GD	NPP	1C
57083	DAMPER-SA SCAPH BYPASS	24.200	RPT GD	NPP	1C
57577	ELECT ACTUATOR FOR GATEDAMPER	55.600	RPT GD	NPP	1C
57578	ELECTRICAL ITEMS FOR GATEDAMP	0.060	RPT GD	NPP	1C
57666	PLATFORMS AND LADDERS-SCR GD	13.200	RPT GD	NPP	1C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
57110	GATE-PA FAN OUTLET	29.000	RPT GD	NPP	1C
57113	DAMPER-PA FAN OUTLET	16.700	RPT GD	NPP	1C
57160	GATE-COLD AIR TO MILLS	25.600	RPT GD	NPP	1C
57173	DAMPER-PA APH INLET	14.800	RPT GD	NPP	1C
57270	GATE-HOT AIR TO MILLS	38.400	RPT GD	NPP	1C
57273	DAMPER-HOT AIR TO MILL	14.200	RPT GD	NPP	1C
57430	FLUE GAS AH OUT GATE	87.400	RPT GD	NPP	1C
57480	GATE-ID FAN INLET	74.500	RPT GD	NPP	1C
57490	GATE-ID FAN OUTLET	74.500	RPT GD	NPP	1C
57033	DAMPER-SA SCAPH INLET	20.300	RPT GD	NPP	1C
57063	DAMPER-SA SCAPH OUTLET	24.200	RPT GD	NPP	1C
57143	DAMPER-COLD AIR TO MILL	8.500	RPT GD	NPP	1C
57203	DAMPER-SA APH OUTLET	35.000	RPT GD	NPP	1C
57223	DAMPER-PA APH OUTLET	18.700	RPT GD	NPP	1C
	JOURNAL HEAD, HP 1103, MACHINED (3 Nos Per Mill)	7,800.000	Hyd Mill	RM	
	PGB ASSEMBLY (1 No Per Mill)	15,930.000	Hyd Mill	RM	
	JOURNAL HEAD LINER ASSLY. (3 Nos Per Mill)	7,653.600	Hyd Mill	RM	
	JOURNAL SKIRT ASSLY. (3 Nos Per Mill)	1,759.200	Hyd Mill	RM	
	JOURNAL SHAFT ASSLY (3 Nos Per Mill)	18,624.000	Hyd Mill	RM	
	BOWL HUB & VANE WHEEL ASSEMBLY (1 No Per Mill)	18,345.900	Hyd Mill	RM	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
	MILLSIDE ASSEMBLY (1 No Per Mill)	19,636.000	Hyd Mill	RM	
	JOURNAL SPRING ASSLY, HP 1103 (3 Nos Per Mill)	3,912.900	Hyd Mill	RM	
	DRIVE ASSEMBLY (1 No Per Mill)	2,421.400	Hyd Mill	RM	
	MULTIPLE PORT OUTLET PLATE ASSY (1 No Per Mill)	4,419.300	Hyd Mill	RM	
	250 LPM MILL LUBE OIL SYSTEM WITH TANK (1 No Per Mill)	4,300.000	Hyd Mill	RM	
	SEPARATOR TOP ASSEMBLY (1 No Per Mill)	5,157.300	Hyd Mill	RM	
	SEPARATOR BODY AND JOC ASSEMBLY (1 No Per Mill)	30,264.000	Hyd Mill	RM	
	ROTOR AND ROTOR SUPPORT ASSY HP1103 (1 No Per Mill)	2,307.600	Hyd Mill	RM	
	Mill Handling System (Main Girders & End Carriage Assembly)	33,000.000	Hyd Mill	RM	
	GEARBOX FOR DYNAMIC CLASSIFIER (1 No Per Mill)	450.000	Hyd Mill	RM	
	VFD FOR DYNAMIC CLASSIFIER (1 No Per Mill)	500.000	Hyd Mill	RM	
	MOTOR FOR DYNAMIC CLASSIFIER (1 No Per Mill)	495.000	Hyd Mill	RM	
	KGV ASSY & ACCESSORIES (HP1103) (26") (4 Nos Per Mill)	1,200.000	Hyd Mill	RM	
	MILL MOTOR COUPLING-HP1103 (DC) (1 No Per Mill)	2,400.000	Hyd Mill	RM	
	Total for 1 Mill	180,576.200			
	Total for 9 Mills	1625185.8	Hyd Mill	RM	2A
PGMA	Description	Wt. in Kg	Unit	Items	Rate Sch. Identifier
	Deaerator Header	52000	Hyd DA	PP	1B
	Deaerator Storage Tank Sec-1	55000	Hyd DA	PP	1B
	Deaerator Storage Tank Sec-2	52000	Hyd DA	PP	1B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
	Deaerator Storage Tank Sec-3	55000	Hyd DA	PP	1B
34-xxx	Bunker Structure	2000000	Try	Str.	1A
PGMA	Description	Wt. in Kg	Unit	Items	Rate Sch. Identifier
80-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	165000	Try	P91/92	5A
80-301	MS FROM BOILER STOP VALVE TO ESV	518000	Try	P91/92	5A
80-303	MS HEADER TO AUX PRDS	13000	Try	P91/92	5A
80-304	MS HEADER TO HPBP VALVE	27000	Try	P91/92	5A
80-307	HP AND LP BYPASS WARM UP	925	Try	P91/92	5A
80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	350000	Try	P91/92	5A
80-312	LPBP VALVE UPSTREAM AND DOWNSTREAM	91000	Try	P91/92	5A
80-320	CRH FROM TURBINE TO REHEATER	280000	Try	HP	5B
80-321	HPBP VALVE TO CRH PIPING	20400	Try	HP	5B
80-322	CRH HEADER TO DEAERATING HEATER	13500	Try	HP	5B
80-323	STEAM TO BFP DRIVE TURBINE	6200	Try	HP	5B
80-324	CRH HEADER TO AUX PRDS	1200	Try	HP	5B
80-326	PIPES FOR FLOW NOZZLE # MFC ACTIVITY ONL	0	Try	HP	5B
80-329	EXTRACTION STEAM TO BFP DRIVE TURBINE	9700	Try	HP	5B
80-331	EXTRACTION STEAM TO LP HEATER#2	8200	Try	HP	5B
80-332	EXTRACTION STEAM TO LP HEATER#3	8200	Try	HP	5B
80-335	EXTRACTION STEAM TO DEAERATING HEATER	11400	Try	HP	5B
80-336	EXTRACTION STEAM TO HP HEATER#1	9800	Try	HP	5B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
80-337	EXTRACTION STEAM TO HP HEATER#2	5500	Try	HP	5B
80-338	EXTRACTION STEAM TO HP HEATER#3	6900	Try	HP	5B
80-339	AUX STEAM TO BFP DRIVE TURBINE	1550	Try	HP	5B
80-340	AUX STEAM HEADER	9200	Try	HP	5B
80-342	AUX STEAM TO SCAPH	11000	Try	HP	5B
80-343	AUX STEAM TO SOOTBLOWERS	4600	Try	HP	5B
80-345	AUX STEAM FOR OIL LINE TRACING	6800	Try	HP	5B
80-349	AUX STEAM TO GLAND SEALS & GSC#TG SCOP	920	Try	HP	5B
80-351	AUX STEAM TO UNLISTED USERS#SG SCOPE	28800	Try	HP	5B
80-368	SCAPH DRAIN TANK VENT/SV EXHAUST TO ATM	4000	Try	LPP	5C
80-395	AUX STEAM TO FUEL OIL ATOMISING	9500	Try	HP	5B
80-399	STEAM BLOWING	64500	Try	HP	5B
80-401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE	28000	Try	LPP	5C
80-402	CD FROM LPH1/DC INLET TEE TO TG TP	12000	Try	LPP	5C
80-403	CD FROM TG TP TO DEAERATING HEATER	28800	Try	LPP	5C
80-421	BOILER FEED PUMP RECIRCULATION	16700	Try	HP	5B
80-423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	231500	Try	HP	5B
80-424	BFD BETWEEN HTRS AND GROUP PROTECTION	162000	Try	HP	5B
80-425	BFD FROM FINAL HPH TO SG TP	92500	Try	HP	5B
80-430	SPRAY WATER TO HPBP	2900	Try	HP	5B
80-433	SPRAY WATER FROM BFP INTERSTAGE	14500	Try	HP	5B
80-451	BOILER INTEGRAL PIPING DRAINS	35000	Try	HP	5B
80-452	HP PIPING DRAINS#SG SCOPE	34000	Try	HP	5B
80-453	LP PIPING DRAINS#SG SCOPE	4100	Try	LPP	5C
80-455	DRAIN FROM UNLISTED EQPT/VESSEL#SG SCOPE	29400	Try	LPP	5C
80-463	TG AUX COOLING WATER	23038	Try	LPP	5C
80-473	DEMINERALISED WATER SYSTEM	1157	Try	SS	5C
80-477	SERVICE WATER PIPING	10955	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
80-478	DRINKING WATER PIPING	3686	Try	LPP	5C
80-650	FUEL OIL SUPPLY AND RETURN PIPING	40000	Try	LPP	5C
80-935	CLH # VLH FOR MS PPG #HERP 80#920	600	Try	H&S	5E
80-936	CLH # VLH FOR SG PPG #HERP 80#921	9000	Try	H&S	5E
80-937	CLH * VLH FOR CRITICAL PPG -HERP	7500	Try	H&S	5E
80-941	VLH AND CLH FOR BFD PIPING # HERP 80#928	85000	Try	H&S	5E
80-942	VLH AND CLH FOR TG CYCLE PIPING HERP	20000	Try	H&S	5E
81-012	CLEAN DRAIN FLASH TANK # DIA 1500 MM# OS	2400	Try	H&S	5E
81-036	CW STORAGE TANK 16#25 CUM# OS	7600	Try	H&S	5E
81-041	IMPURE CONDENSATE TANK	24000	Try	H&S	5E
81-060	SPECIAL TANKS AND VESSELS# OS	60000	Try	H&S	5E
81-100	CONDENSATE PUMP# MM	3000	Try	H&S	5E
81-110	COOLING WATER PUMP# MM	400	Try	H&S	5E
81-318	FIX COM FOR MISCELLANEOUS PPG INSULATION	7000	Try	Insl.	3C
81-325	MINERAL WOOL MATTRESS# MM	50000	Try	Insl.	3A
81-341	SEALING COMPOUND FOR INSL# MM	1200	Try	Insl.	3C
81-350	ALUMINIUM CLADDING FOR INSULATION# MM	25000	Try	Insl.	3D
82-300	MS FROM SUPERHEATER TO BOILER STOP VALVE	15000	Try	P91/9 2	5A
82-301	MS FROM BOILER STOP VALVE TO ESV # MM	42000	Try	P91/9 2	5A
82-303	MS HEADER TO AUX PRDS # MM	1000	Try	P91/9 2	5A
82-304	MS HEADER TO HPBP VALVE# MM	2000	Try	P91/9 2	5A
82-307	MS AND HRH BYPASS WARM#UP # MM	75	Try	P91/9 2	5A
82-310	HRH FROM REHEATER TO INTERCEPTOR VALVE #	30000	Try	P91/9 2	5A
82-312	LPBP VALVE UPSTREAM&DOWNSTREAM # MM	7000	Try	HP	5B
82-319	H & S # BFP SUCTION LINE # MM	200	Try	H&S	5E

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
82-320	CRH FROM TURBINE TO REHEATER # MM	20000	Try	HP	5B
82-321	HPBP VALVE TO CRH HEADER # MM	1600	Try	HP	5B
82-322	CRH HEADER TO DEAERATING HEATER # MM	1300	Try	HP	5B
82-323	STEAM TO BFP DRIVE TURBINE # MM	500	Try	HP	5B
82-324	CRH HEADER TO AUX PRDS # MM	100	Try	HP	5B
82-329	EXTRACTION STEAM TO BFP DRIVE TURBINE #	900	Try	HP	5B
82-331	EXTRACTION STEAM TO LP HEATER#2 # MM	800	Try	HP	5B
82-332	EXTRACTION STEAM TO LP HEATER#3 # MM	800	Try	HP	5B
82-334	EXTRACTION STEAM TO LP HEATER#5 # MM	2000	Try	HP	5B
82-335	EXTRACTION STEAM TO DEAERATING HEATER #	1000	Try	HP	5B
82-336	EXTRACTION STEAM TO HP HEATER#1 # MM	900	Try	HP	5B
82-337	EXTRACTION STEAM TO HP HEATER#2 # MM	500	Try	HP	5B
82-338	EXTRACTION STEAM TO HP HEATER#3 # MM	600	Try	HP	5B
82-339	AUX STEAM TO BFP DRIVE TURBINE # MM	150	Try	HP	5B
82-340	AUX STEAM HEADER # MM	800	Try	HP	5B
82-342	AUX STEAM TO SCAPH # MM	800	Try	HP	5B
82-343	AUX STEAM TO SOOTBLOWERS # MM	400	Try	HP	5B
82-345	AUX STEAM FOR OIL LINE TRACING # MM	600	Try	HP	5B
82-349	AUX STEAM TO GLAND SEALS & GSC#TG SCOP #	80	Try	HP	5B
82-351	AUX STEAM TO UNLISTED USERS#SG SCOPE # M	2500	Try	HP	5B
82-363	EXHAUST STEAM FROM PRIME MOVERS#TG SCO #	3400	Try	LPP	5C
82-370	HP DRAIN FLASH TANK VENT TO ATMOSPHERE #	8000	Try	LPP	5C
82-399	STEAM BLOWING # MM	11000	Try	HP	5B

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
82-418	EJECTION MATERIALS FOR INSTRUMENTS # MM	50	Try	LPP	5C
82-421	BOILER FEED PUMP RECIRCULATION # MM	1300	Try	HP	5B
82-423	BOILER FEED PUMP TO HPH INCLUDING BYPA #	18500	Try	HP	5B
82-424	BFD BETWEEN HEATERS&GR PROTECTION VALV #	13000	Try	HP	5B
82-425	BFD FROM FINAL HPH TO SG TP # MM	7500	Try	HP	5B
82-430	SPRAY WATER TO HPBP # MM	300	Try	HP	5B
82-433	SPRAY WATER FROM BFP INTERSTAGE # MM	1100	Try	HP	5B
82-451	BOILER INTEGRAL PIPING DRAINS # MM	2800	Try	HP	5B
82-452	HP PIPING DRAINS#SG SCOPE # MM	3000	Try	HP	5B
82-453	LP PIPING DRAINS#SG SCOPE # MM	400	Try	LPP	5C
82-463	TG AUX COOLING WATER UNIT SYSTEM # MM	123038	Try	LPP	5C
82-468	MAIN CIRCULATION WATER PIPING# MM	100000	Try	LPP	5C
82-830	HANGERS & SUP FOR CRITICAL PPG,LIGHT UP	57000	Try	H&S	5E
82-901	SD VALVES&SPECIALITIES#BOILER LIGHTUP #	10000	Try	H&S	5E
82-920	H&S FOR BOILER HYDRO TEST # MM	9400	Try	H&S	5E
82-921	H&S FOR BOILER LIGHTUP#STEAM LINES # MM	25000	Try	H&S	5E
82-928	H & S FOR BOILER LIGHT UP # TG SCOPE # M	7600	Try	H&S	5E
82-930	H&S FOR SYNCHRONISATIONN # TG SCOPE # MM	72000	Try	H&S	5E
82-933	H AND S FOR LP PIPING# MM	1797	Try	H&S	5E
82-992	IMPORTED ELECTRODES # MM	17700	Try	NB	
82-993	MISC ERECTION MATLS# MM	50	Try	H&S	5E
83-319	PERMANENT STEAM BLOWING PIPING# OS	1800	Try	HP	5B
83-334	EXTRACTION STEAM TO LP HEATER#5# OS	18800	Try	HP	5B
83-363	EXHAUST STEAM FROM PRIME MOVERS#TG SCOPE	30200	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
83-370	HP DRAIN FLASH TANK VENT TO ATMOSPHERE #	71000	Try	LPP	5C
83-371	TURBINE FLASH TANK VENT TO CONDENSER # O	4300	Try	LPP	5C
83-373	AUX STEAM HEADER SV EXHAUST # OS	2500	Try	LPP	5C
83-375	UNLISTED SV EXHAUSTS # TG SCOPE# OS	1900	Try	LPP	5C
83-379	HP HEATER SV EXHAUST TO FLASH TANK # OS	5600	Try	LPP	5C
83-381	HP HEATER VENTS#TG SCOPE # OS	400	Try	LPP	5C
83-382	LP HEATER VENTS # OS	2200	Try	LPP	5C
83-385	VENT FROM UNLISTED LINES/EQPT TO CONDE #	6800	Try	LPP	5C
83-388	CONDENSER AIR EVACUATION PIPING	4000	Try	LPP	5C
83-400	CONDENSATE SUCTION# OS	12800	Try	LPP	5C
83-401	CD FROM PUMP TO LPH1/DC INLETTEE&RECIR #	3100	Try	LPP	5C
83-402	CD FROM LPH1/DC INLET TEE TO TG TP # OS	2700	Try	LPP	5C
83-403	CD FROM TG TP TO DEAERATING HEATER # OS	3000	Try	LPP	5C
83-407	CONDENSATE FOR SEALING OF VACUUM # OS	3200	Try	LPP	5C
83-408	CONDENSATE DUMP FROM HEADER # OS	1600	Try	LPP	5C
83-412	CONDENSATE TRANSFER# OS	40000	Try	SS	5D
83-418	ERECTION MATERIALS FOR INSTRUMENTS# OS	450	Try	LPP	5C
83-419	DEAERATER SV EXHAUST TO ATMOSPHERE # OS	5000	Try	LPP	5C
83-420	BOILER FEED PUMP SUCTION# OS	25000	Try	LPP	5C
83-434	UNLISTED SPRAY WATER # SG SCOPE# OS	4600	Try	LPP	5C
83-435	UNLISTED SPRAY WATER # TG SCOPE# OS	2000	Try	LPP	5C
83-442	GLAND STEAM COOLER DRAINS # OS	300	Try	LPP	5C
83-443	LPH#1 DRAIN TO CONDENSER # OS	6300	Try	LPP	5C
83-444	LPH#2/3/4/5 DRAINS & DRIP PUMP INLET # O	10400	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
83-446	DEAERATING HEATER OVERFLOW AND DRAIN # O	3700	Try	LPP	5C
83-447	HP HEATER DRAINS # OS	33000	Try	LPP	5C
83-448	DRAIN FROM UNLISTED EQPT/VESSEL#TG SCOPE	13500	Try	LPP	5C
83-449	TG CYCLE PIPING DRAINS & VENTS # OS	15800	Try	LPP	5C
83-454	SCAPH DRAINS # OS	2100	Try	LPP	5C
83-457	MANIFOLDS FOR HP FLASH BOX AND CONDENS	1000	Try	LPP	5C
83-459	HP FLASH TANK DRAIN TO CONDENSER # OS	1200	Try	LPP	5C
83-460	SG AUX COOLING WATER UNIT SYSTEM # OS	75000	Try	LPP	5C
83-463	TG AUX COOLING WATER UNIT SYSTEM # OS	73038	Try	LPP	5C
83-468	MAIN CIRCULATION WATER PIPING# OS	400000	Try	LPP	5C
83-471	BOILER WASH WATER TO & FROM UNIT # OS	37000	Try	LPP	5C
83-473	DEMINERALISED WATER SYSTEM# OS	1157	Try	SS	5D
83-477	SERVICE WATER # OS	10955	Try	LPP	5C
83-478	DRINKING WATER PIPING# OS	3686	Try	LPP	5C
83-480	FIRE WATER#OTHER AREAS # OS	42500	Try	LPP	5C
83-493	HP FLASH TANK VENT TO CONDENSER # OS	2300	Try	LPP	5C
83-494	LP FLASH TANK VENT TO CONDENSER # OS	3100	Try	LPP	5C
83-495	LP FLASH TANK DRAIN TO CONDENSER # OS	2700	Try	LPP	5C
83-545	LP CONDENSATE PIPING WITHIN TG HALL FORU	12600	Try	LPP	5C
83-601	LOW PRESSURE DOSING PIPING# OS	2600	Try	SS	5C
83-604	ACID CLEANING # OS	103000	Try	LPP	5C
83-610	SERVICE AIR SUCTION & DISH TO RECEIVER #	13000	Try	LPP	5C
83-612	SERVICE AIR FOR UNIT # OS	24600	Try	LPP	5C
83-614	INST AIR SUCTION & DISCH TO RECEIVER # O	13000	Try	LPP	5C
83-616	INST AIR FOR UNIT # OS	24800	Try	LPP	5C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

PGMA	Description (Package B: Unit # 4)	Wt. in Kg	Unit	Items	Rate Sch. Identifier
83-673	LUB OIL PIPING SYSTEM # OS	5800	Try	LPP	5C
83-830	HANGERS & SUP FOR CRITICAL PPG,LIGHT UP	228000	Try	H&S	5E
83-920	H&S FOR BOILER HYDRO TEST # OS	37600	Try	H&S	5E
83-921	H&S FOR BOILER LIGHTUP#STEAM LINES # OS	100000	Try	H&S	5E
83-926	H AND S FOR TEMPORARY PIPING ACID AND AL	500	Try	H&S	5E
83-927	H AND S FOR TEMPORARY PIPING # STEAM BLO	500	Try	H&S	5E
83-928	H & S FOR BOILER LIGHT UP # TG SCOPE # O	30400	Try	H&S	5E
83-930	H&S FOR SYNCHRONISATIONN # TG SCOPE # OS	48000	Try	H&S	5E
83-933	H AND S FOR LP PIPING# OS	7190	Try	H&S	5E
83-940	AUXILIARY STEEL # OS	200000	Try	H&S	5E
83-993	CONSUMABLES & ERECTION MATERIALS # OS	450	Try	NB	

9.2.1 BOQ for Misc. Bunker structural works (Part of Package A & B): -

(Note: This is in addition to the BHEL supplies as fabricated items for Structural framing of Bunker house etc.)

ST NO	Item Description	Unit	Quantity Per Package
1500	ROOFING / SIDE CLADDING: Roofing / side cladding work including all labour, material (unless otherwise specified in BOQ/contract specification), equipment, transportation, handling, scaffolding, laps, hooks, washers, corner pieces etc. at all level as per specification, drawings and as directed by engineer - in - charge.		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
A1502	METAL DECK SHEET Type-I, Fixing permanently color coated galvanised MS troughed metal sheet decking plate of approved colour over roof purlins for cast-in-situ roof slab as per relevant IS code and Grade as per specification. Bare metal thickness(BMT) of deck plate shall be minimum 0.8mm with minimum trough depth of 44mm (or as per design whichever is higher) of grade G250 as per AS1397/grade SS255 as per ASTM A653M/ grade S250GD as per EN 10326 with zinc coating to class Z275 and shall serve as permanent shuttering to the roof slab 40mm - 100mm thick measured over crest of metal decking & shall have adequate strength to support weight of green concrete and imposed loads of min 100 kg/sqm (for two span condition) during construction between beams as per manufacturer's recommendations/ calculations/ test certificates for approval including fixing of plates to beams, side lapping, end lapping etc. all complete for below mentioned spans. The sheet shall be permanently coated with silicon modified polyester(SMP silicon content 30%-50%) paint or super polyester paint of minimum 20 micron DFT on exposed surface (facing operating floor) over primer coat of minimum 5 micron(nominal) and minum 10 micron (nominal) SMP or super polyester paint over primer coat of minum 5 micron (nominal) on other face. SMP and polyester paint system shall be of industrial finish of product type 4 of AS/NZ2728, including fixing of sheet to top flange of beam with drawn arc welding of headed shear anchor studs @ 260mm c/c in the trough and stitch screws between two adjacent sheets and sealing with epoxy sealant. The shear anchor studs shall conform to type B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16 mm dia & 65 mm length manufactured from cold drawn round steel bars confirming to ASTM A 29 of grade designation 1010 through 1020 of standard quality with either semi killed or killed welded by drawn arc stud welding through metal deck sheet.		
a	Span Upto 1800mm	MT	19
B1502	METAL DECK SHEET Type-II, Fixing permanently color coated galvanised MS troughed metal sheet decking plate of approved colour over roof purlins for cast-in-situ roof slab as per relevant IS code and Grade as per specification. Bare metal thickness(BMT) of deck plate shall be minimum 0.8mm with minimum trough depth of 44 mm (or as per design whichever is higher) of grade G250 as per AS1397/grade SS255 as per ASTM A653M/ grade S250GD as per EN 10326 with zinc coating to class Z275 and shall serve as permanent shuttering to the floor slab 150 mm thick measured over crest of metal decking & shall have adequate		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
	strength to support weight of green concrete and imposed loads of min 100 kg/sqm (for two span condition) during construction between beams as per manufacturer's recommendations/ calculations/ test certificates for approval including fixing of plates to beams, side lapping, end lapping etc. all complete for below mentioned spans. The sheet shall be permanently coated with silicon modified polyster(SMP silicon content 30%-50%) paint or super polyster paint of minimum 20 micron DFT on exposed surface (facing operating floor) over primer coat of minimum 5 micron(nominal) and minum 10 micron (nominal) SMP or super polyester paint over primer coat of minum 5 micron (nominal) on other face. SMP and polyster paint system sahll be of idutrial finish of product type 4 of AS/NZ2728, including fixing of sheet to top flange of beam with drawn arc welding of headed shear anchor studs @ 260mm c/c in the trough and stich screws between two adjacent sheets and sealing with epoxy sealant.The shear anchor studs shall confirm to type B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19 mm dia & 100 mm length manufactured from cold drawn round steel bars confirming to ASTM A 29 of grade designation 1010 through 1020 of standard quality with either semi killed or killed welded by drawn arc stud welding through metal deck sheet.		
a	Span Upto 1800mm	MT	18
b	Span Exceeding 1800mm and upto 2500 mm	MT	9
A1503	Providing and fixing shear anchor studs for fixing metal deck sheet to floor structural beams conforming to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19mm diameter and 100mm length manufactured from cold drawn round steel barsconforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet etc all complete as per specification.	QUINTAL	9
B1503	Providing and fixing shear anchor studs for fixing metal deck sheet to roof structural purlins conforming to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16mm diameter and 65mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet etc all complete as per specification.	QUINTAL	7

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
A1505	Fixing External/ Inner sheet of Permanent colour coated metal cladding / roofing with troughed M.S. sheets of minimum 0.5 mm bare metal thickness of min. grade G350 as per AS1397/grade SS340 class 4 or as per ASTM A792M/ grade S350 GD as per EN 10326 with zinc coating to class Z275 / aluminium zinc alloy coating to class AZ150 on both sides including fixing to supports / rails by concealed fixing system, corrosion resistant self tapping / self drilling type fasteners with suitable cap, flashing, etc. all complete over columns, beams, bracings etc. at all levels. The exposed face the sheet shall be permanently coated with silicon modified polyster(SMP silicon content 30%-50%) paint or super polyster paint of minimum 20 micron DFT on exposed surface over primer coat of minimum 5 micron and minum 10 micron SMP or super polyester paint over primer coat of minimum 5 micron on other face. SMP and polyster paint system sahll be of industrial finish of product type 4 of AS/NZ2728.	MT	17
A1519	Fixing Factory made (Continuous Line) prefabricated sandwiched Permanent colour coated metal cladding comprising top sheet as troughed(minimum depth of trough shall be 30 mm) permanently colour coated sheet & bottom sheet as plain permanently colour coated for covering of exposed metal/concrete / brick surfaces with insulation shall be of Polyurethane type of minimum 50mm thick (excluding trough). The polyurethane shall be Chlorofluorocarbon (CFC) free and self-extinguishing and shall conform to IS 12436: 1988. It shall have Modular Density 40 +/- 2 Kg/m3 and Thermal Conductivity @ 10 Deg.C 0.017 - 0.020 W/M 0k, Water absorption (% by vol) 3.1, Critical Oxygen Index 23 and Compressive Strength 1.2 Kg/sq.cm, sandwiched between the two sheets, each sheet shall be high strength tensile steel sheet 0.5mm bare metal thickness (minimum) of YS350 as per IS 15961 /grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z 275 / aluminium-zinc alloy coating to class AZ150 on both sides, both sheet shall be permanently coated with silicon modified polyster (SMP with silicon content of 30% to 50%) paint of minimum 20 micron DFT on exposed surface on 5 microns (min.) epoxy primer/phosphate primer coat and 10 micron (min.) SMP on 5 micron (min.) epoxy primer/phosphate primer on other face, SMP paint system shall be of industrial finish of product type 4 of AS/NZS 2728, troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading / deflection and purlins / runner spacing), colour and shade, at all levels,	MT	24

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
	including all labour, materials, equipment, handling, transportation, special coated fastener conforming to corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test, fixing insulated sandwiched metal sheet with the structural members below for supporting the sheeting system, scaffolding, equipment, end and side laps, cutting of openings, preparation of working drawings, testing, etc., all complete, as per specifications. Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets. Coated surface shall be provided with a protected guard film (polyethylene) of about 40 microns to avoid any damage to the coating during handling. Overlap shall be min. 100 mm or as specified by manufacturer.		
2300	STRUCTURAL WORKS: Structural steel works including all labour, material (unless otherwise specified in BOQ/contract specification), equipments unless otherwise specified, transportation, handling etc. at all level as per specification, drawings and as directed by engineer - in - charge.		
A2301	Site transportation from BHEL store and erection (field connections will be bolted type unless stated otherwise) of Medium and High Tensile structural steel (Grade designation E350 (unless stated otherwise) Quality B0 (Fully killed), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel member/materials to store etc all complete.	MT	3906

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
B230 1	Site transportation from BHEL Store and erection (field connections will be bolted type unless stated otherwise) of Mild steel (Grade designation E250 (unless stated otherwise) Quality A/BR (Semi killed/killed) for Rolled section and B0 for plates (shall be tested for impact resistance at Room temperature), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete.	MT	1674
C230 1	Site Transportation from BHEL Store and erection of Medium and High Tensile structural steel (Grade designation E350 Quality B0 (Fully killed), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete.	MT	240
D230 1	Site Transportation from BHEL Store and erection of Mild steel (Grade designation E250 Quality A/BR (Semi killed/killed) for rolled section and B0 for plates (shall be tested for impact resistance at Room temperature), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary	MT	480

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
	structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete.		
2307	Supplying, fabrication, erection and alignment of factory made electroforged galvanised grating units with mild steel having minimum galvanisation conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.		
a	Minimum galvanisation of 610 g/sqm	MT	78
2308	Supplying, fabrication, erection and alignment of factory made galvanised welded grating units(minimum 610 g/sqm galvanisation) with mild steel conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.	MT	1
2311	Providing and fixing in position of permanent mild steel bolts (class 4.6 as per IS : 1367 and grade `C' as per IS: 1363) and nuts, washers etc. up to and inclusive of 39 mm diameter and upto 300mm long for structural steel work etc all complete.	KG	558
2312	Providing and fixing in positing of high strength structural bolts (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	KG	1116 00
A231 2	Providing and fixing in positing of high strength structural bolts (of property class 10.9 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	KG	1116 00

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
2313	Dismantling of steel structure, lowering of material and carriage of the dismantled material up to field fabrication shop / projects storage including temporary dismantling, cutting, re-welding, supporting, and restoring to correct position all temporarily dismantled members, re-alignment of all adjacent connected members to their correct positions (weight of such adjacent members and temporarily dismantled members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	MT	28
2314	Addition to, alterations in and/or modification of "Erection Marks" including cutting of parts, gauging of welds, cutting, grinding, fabrication, welding, drilling holes, straightening, removal of bends, raising to the required level, painting, transportation, return of unutilised steel pieces to the project store, temporarily dismantling, cutting, re-welding, supporting and restoring to correct position of all the temporarily dismantled members, realignment of adjacent connected members (weight of such temporarily dismantled and adjacent members not payable) etc all complete for the following:		
a	In erected position	MT	28
b	In fabrication yard	MT	28
2315	Re-erection of dismantled fabricated structural steel members including carriage of modified "Erection Marks" from the field fabrication shop to erection site, lifting to required position, aligning in position, tack welding, final welding and touch up painting including temporary dismantling and re-erection of temporarily dismantled members, cutting, rewelding, supporting and restoring to the correct position of all temporarily dismantled members, re-alignment of adjacent connected members (weight of such temporarily dismantled members and adjacent members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	MT	28
A2317	Supply, fabrication and erection of minimum 4 mm thick stainless steel liner conforming to ASTM A 240 S304 (Type 304) ; With Mill Finish Grade 2B (Cold rolled, Annealed & Pickled and Skin passed) on M.S. plate for inside surfaces of hopper & mouth of hopper of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel, fabrication detailed drawing etc.all complete. (The measurement for the item of stainless steel liner in hopper shall be based on the actual finished weight of SS liner over hopper)	MT	76

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
A2318	Providing and fixing in position PTFE type sliding bearings of reputed manufacturer for required vertical load and end displacement/rotation as per approved construction drawings. PTFE bearing shall be sliding against highly polished stainless steel and the coefficient of friction between them shall be less than 0.06 at 55 kg/sq.cm. In order to prevent cold flow in PTFE surface it shall be rigidly bonded by a special high temperature resistance adhesive to the stainless steel substrata. The stainless steel surface that slides against the PTFE is mirror polished. The stainless steel shall be bonded to the top plate by special high strength adhesive. The thickness of stainless steel plate shall be between 1.0 mm to 1.5 mm.		
c	40 Tons	EA CH	3
d	50 Tons	EA CH	3
e	60 Tons	EA CH	2
f	100 Tons	EA CH	4
A2319	Providing and fixing preformed flexible open ended bellow strap of neoprene of minimum thickness 2 mm and minimum width 200 mm under un-stretched condition with aluminium stripped edges as sealing below top of bunker and bottom of tripper floor to avoid the coal dust nuisance all complete.	RM	276
2322	Supply, fabrication and fixing of GI pipe hand railing (900 mm high) of 32 mm/40 mm dia (Medium Grade) including transportation, loading/unloading, painting etc. all complete.	MT	7
2323	Conducting radiography test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	RM	28
2324	Conducting ultrasonic test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	RM	28
2325	Conducting ultrasonic test on steel plates as per ASTM-A435 or equivalent wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	SQ M	56
2326	Conducting magnetic particle test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	RM	28
2327	Conducting dye penetration test on welds wherever specified by the engineer including provision of necessary equipments, measuring	RM	28

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

ST NO	Item Description	Unit	Quantity Per Package
	devices, gauges etc. all complete (over and above the work already specified in the specifications.)		

9.3 BOQ for Mobilisation of special resources (Part of Package A & B): -

ST NO	Item Description	Unit	Quantity Per Package
	Deployment of Requisite Manpower as mentioned below at site, within 15 days, as and when intimated by BHEL. This deployment shall be over and above the requirement as per Contractual clause. The deployed manpower shall report to BHEL and may be deployed at any location. BHEL shall make payment on pro rata monthly basis on actual deployment (considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per service day, for such delay		
1.0	Engineer / Supervisor	Manmonth	128
2.0	Computer operator (Skilled)	Manmonth	64
3.0	Service Staff (Semi Skilled)	Manmonth	64
4.0	Safety officer (Skilled)	Manmonth	64
5.0	Quality Officer (Skilled)	Manmonth	64
	Execution/Mobilisation of special resources (PVC & ORC shall Not be applicable on Section C)		

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

10.1 Brief feature of Steam Generator & Auxiliaries

Steam Generator is Main equipment including all related auxiliary equipments as specified below. The steam generator will be of once through, two pass, single reheat, radiant furnace, dry bottom, balanced draft, outdoor type, pulverized coal fired having super critical parameters with all necessary auxiliaries, integral piping, etc. Scope includes Erection, alignment and welding, bolting, fastening, grouting as applicable of:

1. Boiler structure, Bunker structure, Bunker, Trestles, Galleries (PG-34,35,36,38,39) **(Structure will be bolted type).**
2. Water cooled furnace complete with separators, water wall, headers, steam generating tubes, furnace bottom hoppers, drains, observation ports, etc. (PG 04,05,06,07,08,09,10, 11,12,15)
3. Super heaters including safety valves with silencers, motorised main steam stop valves with integral bypass valve, start-up vents, air vents, nitrogen connections, etc. Re-heaters including safety valves with silencers, drains, air vents, etc.(PG-24)
4. In line, bare tube economizer, including vents, drains etc.(PG-19)
5. De-superheating spray system: Sprays for Super heaters and Re-heaters. (PG-16,17)
6. Steam soot blowing system including long fully retractable rotary blowers for super heater, re-heater and economizer; Sweep action soot blowers for regenerative air preheater along with necessary accessories. Soot blower System will be complete with drains, entire piping, fittings, control valves, safety valves etc (PG-20,21)
7. Complete draft plant for the balanced draft system (PG -48,56)
 - a) 2 nos. Forced draft fans with drives, associated auxiliaries and accessories.
 - b) 2 nos. Induced draft fans with drives, associated auxiliaries and accessories.
 - c) 2 nos of Primary air fan with drives, associated auxiliaries and accessories.
 - d) Regenerative tri-sector air pre-heater 2 nos (PG-52)
 - e) 4 nos. steam coil air pre-heater (SCAPH) with drain collection system.
 - f) Air and Gas duct work with necessary metallic expansion joints, dampers and support steel work up. (PG-48)
 - g) Duct stiffening devices, mating flanges, access doors and brackets, supporting structure as applicable.
8. Raw coal feeder system (PG-61)
9. 2 nos. Seal Air Fans (PG-55,56)
10. **09 Nos of coal pulverizers** (bowl mills), complete with all necessary accessories (including classifiers, MDV, seal air fans, etc). (PG-61) **(Front milling system)**
11. 2 nos Scanner air fans. (PG-43)
12. Fuel oil system will cater to Light Diesel oil (LDO) firing requirements of each Steam Generator. Fuel oil burners will be complete with diffusers, tips extension pipes, atomizers, burner shut off valves, flexible hoses and all other ancillaries. (PG-45)
13. Valves, dampers etc with actuators. (PG-57)
14. Hoists and cranes as applicable (PG-99 and PEM)
15. Thermal insulation & refractory. (PG-31,32,33,37)
16. Ducts and dampers (PG-48)
17. Refractory and Thermal insulation. (PG-31,32,33,37)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

18. Lift support Structure(PG-35)
19. Roof Sheeting(PG-36)
20. Buckstay (PG-08)
21. Seal Boxes & Skin Casing (PG-09)
22. Enclosure (Penthouse, Rear Arch, S-panel) (PG-31)
23. Ignitor System
24. PF Pipe/Coal Pipe & Supports
25. PP supports fixed & Variable load hanger
26. MTM pad to PP components
27. Assistance for Acromate insert fixing
28. Acromate welding (if required)
29. CC Pump including DMCW piping from dearetor to CC pump.
30. Arrangement for Biomass.
31. LP Piping in and around SG area (Inside boiler upto ESP area including TG building area)
32. **BHEL-Trichy/BHEL-PEM/BHEL-Bhopal valves (As applicable)**
33. **Insulation supplied by BHEL-PEM**
34. **Fuel Oil Pump House equipments**
35. Bhopal valves
36. Mics. permanent Approach platforms.

Note: Permanent Lift Structure to be erected before Boiler Lightup milestone.

10.2 DEAERATOR: Installation of deaerator along with FST and Platform shall be in the scope of bidder.

10.3 Other Items:

1. **Biomass:** Biomass feeding arrangement is envisaged in this boiler hence erection of the equipment for Biomass firing arrangement shall be in contractor scope.
2. **Welder Training Center** – Contractor shall setup a small welder trailing center with 2 welding booths equipped with GTAW and SMAW setup in a pota cabin/sutable enclosed space to train and hone skill of high pressure welders who are giving high rate of welding defects. All consumables shall be in contractor scope. No separate payment shall be made in this regard.

10.4 Power Cycle Piping:

Erection, Testing and Commissioning of Power Cycle Piping and all associated Piping & Insulation works including handling at site stores / storage yard, transporting to site, inspection, pre-assembly, erection, alignment, welding NDT, fixing of hangers & supports, chemical cleaning / pickling, oil flushing, water flushing, hydro testing steam blowing, surface finish, supply & application of Primer & finish paints and application of refractory & insulation works as per requirement / as given in the drawings including labeling & flow direction on the piping / over insulation & hangers and supports, pre-commissioning,

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

commissioning, trial operation & handing over to customer and its associated items /systems, hangers and supports, valves of following piping systems:

- a. Complete Main steam, Hot Reheat & Cold Reheat piping system between boiler and turbine nozzles
- b. HP bypass and LP bypass piping system.
- c. Feed water piping system including booster pumps suction, discharge, BFP discharge piping, re-circulation, BFP warm up (if applicable) & leak off.
- d. Auxiliary Steam piping system including Aux. steam unit & station headers, **Aux. steam interconnection between units**, aux. steam to Deaerator & BFP drive turbine etc.
- e. BFP Drive turbine exhaust to condenser
- f. All extraction steam piping including extraction to HP & LP Heaters, Deaerator, BFP Drive turbine etc.
- g. Condensate piping including CEP suction, discharge, recirculation etc.
- h. Spray piping system for Superheater, Reheater, Auxiliary PRDS, Flash Tanks/Boxes & HP/ LP Bypass system,
- i. Heater drains and vents piping **along with safety valves**
- j. Flash tanks/flash boxes including their manifolds, drain & vent piping,
- k. HP Bypass & LP bypass warm-up line
- l. Spindle Leak-off line
- m. Exhaust piping of Safety valves/ relief valves/ERVs on MS, CRH & HRH piping,
- n. Piping of HP & LP heaters, Deaerator, aux. steam piping & on other piping systems (as applicable) mentioned above, Valve gland sealing piping,
- o. **Temporary piping for steam blowing, chemical cleaning, detergent flushing & hydro static testing including piping from Portable DM plant to SG area (as per Site scheme).**
- p. Steam drains from above-mentioned piping /equipment to flash Tank(s)/flash tank manifolds,
- q. **Miscellaneous piping like drains and vents pipe upto nearest drain.**
- r. Any other piping system required to make the power cycle piping system complete.
- s. IBD/ CBD Tank including its exhaust pipe
- t. Valve, fittings, Steam traps, orifice plate, air release valve, safety valves, flow nozzles, flow meters, control valves, skids etc supplied by BHEL-PEM
- u. Demagnetizing of Pipe, as required.
- v. Safety valve supplied by BHEL-Hyd for HP heater and feed pipe
- w. Hanger & Supports
- x. Mineral wool mattress alongwith cladding sheet and iron component etc supplied by BHEL-Trichy

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

- y. Mineral wool mattress alongwith cladding sheet and iron component etc supplied by BHEL-PEM
- z. Direct gauges for steam lines

10.5 LP Piping:

Erection, Testing and Commissioning of LP Piping **in SG Area**, Insulation works including handling at site stores / storage yard, transporting to site, inspection, pre-assembly, erection, alignment, welding NDT, fixing of hangers & supports, chemical cleaning / pickling, oil flushing, water flushing, hydro testing steam blowing, surface finish, supply & application of Primer & finish paints and application of refractory & insulation works as per requirement / as given in the drawings including labeling & flow direction on the piping / over insulation & hangers and supports, pre-commissioning, commissioning, trial operation & handing over to customer and its associated items /systems, hangers and supports, valves of following piping systems:

- a. Exhaust steam from prime movers
- b. HP drain flash tank vent to atmosphere
- c. Drain flash tank vent to condenser
- d. Aux steam header SV exhaust
- e. Unlisted SV exhausts
- f. HPH SV exhaust to flash tank
- g. HP heater vents
- h. LP heater vents
- i. Vent from unlisted PPG/equipment to condenser
- j. Condenser air evacuation piping
- k. Condensate suction
- l. CD from pump to LPH1/DC inlet TEE and Re
- m. CD from LPH 1/DC inlet tee to TG TP
- n. CD from TG TP to deaerating heater
- o. Condensate for sealing of vacuum
- p. Condensate dump from header
- q. Erection materials for instruments
- r. Deaerator safety valve exhaust to ATM
- s. Turbine flash tank drain to condenser
- t. Gland steam cooler drains
- u. LP heater-1 to condenser
- v. LP heater-2/3/4/5 drains and drip pump
- w. Deaerating heater over flow and drain
- x. HP heater drains
- y. Drain from unlisted eqpt/vessel
- z. TG cycle piping drains and vents
- aa. LP piping drains
- bb. SCAPH drains

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

- cc. Drain from unlisted eqpt/vessel
- dd. Manifolds for HP flash box and condenser
- ee. HP flash tank drain to condenser
- ff. SG aux cooling water
- gg. TG Aux cooling water
- hh. Boiler water wash to and from unit
- ii. Service water piping
- jj. Drinking water piping
- kk. HP flash tank vent to condenser
- ll. LP flash tank vent to condenser
- mm. LP flash tank drain to condenser
- nn. LP condensate piping within TG hall for
- oo. Service air-comp suction and discharge to receiver
- pp. Service air for individual units
- qq. Instrument air for individual unit
- rr. Fuel oil supply and return piping
- ss. Lube oil piping system
- tt. Trichy valves - LP piping
- uu. Condensate transfer
- vv. Demineralised water system
- ww. Low pressure dosing piping
- xx. Hanger & support
- yy. Impure condensate tank
- zz. Direct gauges for non-steam lines
- aaa. Local control eqpt for non-steam lines
- bbb. Instrumentation for startup system
- ccc. Valve, fittings, Steam traps, orifice plate, air release valve, safety valves, flow nozzles, flow meters, control valves, skids etc supplied by BHEL-PEM
- ddd. Miscellaneous piping like drains and vents pipe upto nearest drain
- eee. Fire Hydrant and Spary piping including QBD
- fff. Any other piping system required to make the LP piping system complete.

10.6 Critical piping (Power Cycle Piping) - The piping components are sent in parts for convenient transportation / layout requirements. They are to be cleaned, pre-assembled in stage by stage, welded, erected and aligned as per the drawing dimensions / tolerance and instructions of BHEL Engineers.

10.6.1 The work on piping systems (air, water, oil, steam, gas etc.,) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc., welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings / documents.

10.6.2 Pre Assembly joints to be marked in isometrics drawings in consultation with BHEL Engineers and submit to BHEL before starting work. Contractor to maintain Line History

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

sheet (LHS) of all Pipe lines as per BHEL Format and submit before HT to BHEL/Customer for getting HT Clearance.

- 10.6.3** Erection of all drains / vents / relief / escape / safety valve, piping to various tanks/ sewage / drain canal / flash box / flash tank / condenser / sump / atmosphere etc. from the stubs on the piping to the equipments erected by the contractor is completely covered in the scope of work.
- 10.6.4** Pipes shall not be dropped to avoid impact or bump.
- 10.6.5** The scope of work includes marking of labelling & flow direction on the piping over insulation/other parts at the one place or number of places as instructed by BHEL Engineer. All consumable required for this work shall be in the scope of contractor.
- 10.6.6** Normally weld neck items will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like tees, weld neck flanges, reducers, elbows, flanges, inserts etc., shall be suitably edge prepared and matched with pipes for welding. No extra cost shall be paid for this.
- 10.6.7** Erection of platform and supporting structures around the equipments / valves / filters etc., is covered in the scope of contract and shall be erected by the contractor as per accepted tonnage rate for structure.
- 10.6.8** The Contractor shall carry out the reaming and honing of coupling holes with his own reamers, honing machine and honing accessories etc at his own cost.
- 10.6.9** Wherever pipes / bends / equipments are supplied in pre-fabricated / assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.
- 10.6.10** All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints, as per the instruction of BHEL Engineer.
- 10.6.11** All piping supplied in running meter has to cut and edge prepare as per the standards / drawings and as per the instruction of BHEL Engineer within the quoted rate.
- 10.6.12** Wherever drawings indicate site routing and site fabrication, such pipes (in general equal to and less than 2" dia) will be issued in running meters as straight length. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. In some cases attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor.
- 10.6.13** Fittings like bends, tees, elbow, mitre bends, reducers, flanges, thruster blocks, etc., will be supplied as loose items and edge preparation if required shall be carried out by the contractor.
- 10.6.14** For pipes nominal size 2" and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above sizes if the routing is shown in layouts it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per BHEL Engineer's advice.
- 10.6.15** Contractor should fabricate bends of ≤ 2 " diameter size at site from running meters of piping for the above and cut, edge prepare and lay the piping as per BHEL Engineer's instructions.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

- 10.6.16** Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer.
- 10.6.17** The surface of the pipes to be joined shall be suitably prepared as per instructions of BHEL Engineers. Edge preparation shall be done by chamfering machine, whenever required and all welding surfaces must be cleaned thoroughly. All works due to the mistake of the contractor shall be repaired / redone at contractor's cost. Instrumentation drains, stubs which are sent in loose from manufacturing units are to be welded at site as per BHEL Engineer's instructions.
- 10.6.18** All the weld joints on equipments and piping shall be ground or filed after completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,
- 10.6.19** Flow nozzles, orifice, spray nozzles etc., shall be mounted / erected after chemical cleaning / flushing / or steam blowing at site.
- 10.6.20** Erection of Flow nozzles, flow switches, steam traps, filters, flow meters, other metering elements, spray nozzles, steam traps, flow orifices, flow indicators, control valves, aux. control valves, NRVs, suction strainers, servomotors, CRH NRV, HPBP Valve and suction strainers of BFP, CEP & Booster pumps etc forming part of the system (under this scope of work) irrespective of the suppliers is also to be carried out by the agency without any extra cost after chemical and / or steam blowing / oil flushing at site. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
- 10.6.21** The contractor has to fabricate stainless steel orifice plate within the quoted rate. No extra payment will be made for fabrication of above orifice plates. The required stainless steel plate will be supplied by BHEL.
- 10.6.22** Fixing, fitting, welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system for the erected equipments / pipe lines is the scope of this specification.
- 10.6.23** The contractor shall also weld all thermo wells, small length of pipes to all pressure, flow and level tapping points, isolating valves and root valves on all equipment under scope of erection of this contract. All embedded temperature measuring elements provided in the bearings will have to be terminated at the junction box by the contractor. Thermo wells tapping point connections incorporated shall be plugged during the pressure testing and steam blow out of piping systems. Upon completion of blow out operation all thermo wells and flow elements with branch pipes be installed and welded.
- 10.6.24** For hangers and supports the instruction given in the drawings and documents must be followed for handling, erection and setting of cold / hot values and locking etc.
- 10.6.25** The hangers and supports for pipelines and pressure parts may be supplied in dismantled / knocked down condition. It is the responsibility of the contractor to assemble them as per approved drawings and install them in position as per site engineer instructions.
- 10.6.26** Contractor has to fabricate and erect temporary spool pieces wherever required due to non receipt of valves in time and after receipt of valves the spool pieces are to be replaced

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

with regular valves at free of cost. For spool pieces materials will be supplied free of cost by BHEL.

- 10.6.27** Welding, non-destructive testing and heat-treatment as prescribed in BHEL Welding / Heat treatment manual is to be carried out by the contractor. The contractor shall conduct non-destructive tests like radiography, ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer's instructions within the quoted rate.
- 10.6.28** Contractor shall arrange all equipments, alignment bolts, tools, Consumables like welding electrodes in their scope (all types except those supplied by BHEL), and argon gas cylinders etc., for welding of pipes at his cost. Consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor's scope. Only filler wires as stipulated by manufacturing units and identified in relevant shipping list will be supplied to the contractor free of cost. Any excess requirement shall be arranged by the contractor / BHEL at contractor's cost. Argon / Nitrogen gas for stainless steel tubes purging during welding to be arranged by contractor within the quoted rates.
- 10.6.29** The Matching Pieces / Nozzles / Reducers (including the reducers to be connected with HP Heaters) supplied for connecting BFP discharge piping with the Heaters are forming part of the systems and are also in the scope of work.
- 10.6.30** Cutting and removal of dummies for all the shop welded stubs (irrespective of the equipments supplier for the above) for all the terminal points and preparation of edge where the piping is to be terminated is also in the scope of the contractor without any extra payment.
- 10.6.31** All dimensions / elevations refer to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer's advice.
- 10.6.32** Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.
- 10.6.33** Prior to erection of any components, inspection to be done for any foreign materials and damages and they are to be removed / attended as per instructions of BHEL engineer.
- 10.6.34** Erection of all the items/piping systems, supplied by BHEL's Manufacturing units or Vendor as integral part of the systems covered under this scope of work, shall be done by the contractor as per the accepted tonnage rate.

10.7 GALVANISED STEEL PIPING

- a. Galvanized pipe shall be joined by screwing in to socket and screwed ends of GI pipes shall be thoroughly cleaned and painted with a mixture of red and white lead before joining. The exposed threaded portion on either side of the socket joint shall be applied with Zinc Silicate Paste or as specified in relevant procedures/documents. All these consumables are in the scope of contractor and shall carry out within the quoted rate.
- b. GI pipe with flanged joints shall have screwed flanges. Flanged joints faces shall be painted with red lead and bolting up evenly on all sides with compressed asbestos gaskets in between two flanges.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

- c. Teflon tapes shall be used to seal out screwed joints and shall be applied to the male threads only. Threaded parts shall be wiped clean of oil or grease with appropriate solvent if necessary and allowing proper time for drying before applying the sealant. Pipe ends shall be attached by screwing the pipe through the flange and pipe and flange shall be refaced accurately.
- d. Required threading should be done by the contractor at site as specified in the drawing. The pipes shall be cut only by Hacksaw / Machining.
- e. Required Teflon tapes are to be arranged by the contractor within the quoted rate.
- f. ALL THE SCREWED JOINTS ARE TO BE SEAL WELDED IF REQUIRED BY CUSTOMER, SUITABLE ELECTRODES FOR FULL SEAL WELDING ARE TO BE ARRANGED BY THE CONTRACTOR AT HIS COST.

PVC WELDING: For PVC welding required solvent cement and cleaning agent / consumables will be supplied by BHEL. Necessary storage and application procedure to be followed as per supplier recommendation. Contractor shall take adequate care in handling, usage of these consumables to avoid wastage.

10.8 GENERAL

Site Visit by the Bidder

10.8.1 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.

10.8.2 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 limit and extent of surface and subsurface water to be encountered during the performance of the work, and the requirement of drainage and pumping.
- vii) The type of equipment and facilities needed, for and in the performance of the work.
- viii) 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

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

- 10.8.3** 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.
- 10.8.4** Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on ISO 9001 – latest Standards.
- 10.8.5** Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like piping, Turbine, Generator erection, Cabling, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope. Sometimes, more than one agencies 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.
- 10.8.6** 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.
- 10.8.7** 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
- 10.8.8** Contractor should obtain the formal statutory clearance from Chief Inspector of Boilers to carry out erection & Welding of piping (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., 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
- 10.8.9** All necessary certificates and licenses, permits & clearances to carry out this work from the respective IBR authorities/statutory/ local authorities/ Electrical Inspectorate are to be arranged by the Contractor at his cost in time to ensure smooth progress of work and render all assistance, service required in this regard.
- 10.8.10** 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

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.

- 10.8.11** 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.
- 10.8.12** 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 from contractor's bills.
- 10.8.13** 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.
- 10.8.14** 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.
- 10.8.15** The Contractor shall perform any services, tests etc. which may not be specified but nevertheless, required for the completion of work within quoted rates.
- 10.8.16** The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.
- 10.8.17** 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.
- 10.8.18** All works such as cleaning, leveling, 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.
- 10.8.19** 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.

- 10.8.20** 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.
- 10.8.21** 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.
- 10.8.22** 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 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.
- 10.8.23** 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.
- 10.8.24** 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.
- 10.8.25** Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups 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.
- 10.8.26** 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

Contractor must expedite. No claim for extra payment for such work will be entertained.

- 10.8.27** 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.
- 10.8.28** 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.
- 10.8.29** 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.
- 10.8.30** 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.
- 10.8.31** Gases like argon, oxygen, acetylene etc that are required for erection related activities shall be arranged by the Contractor at his cost. For T-91 material site weld joints argon as per grade-3 of is 5760: 1998 with oxygen and water vapour restricted to max 6 ppm each and with argon purity level of minimum 99.99% shall be arranged and used by the Contractor. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level.
- 10.8.32** **It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement. Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.**
- 10.8.33** **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.**
- 10.8.34** 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.
- 10.8.35** 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.
- 10.8.36** 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

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.

- 10.8.37** Wherever Construction sequences are furnished by BHEL, the contractor shall follow the same sequence.
- 10.8.38** 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.
- 10.8.39** 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.
- 10.8.40** 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 permanent equipment shall be paid as per agreed payment terms as applicable. The decision of BHEL Engineer in this regards shall be final and binding on contractor.
- 10.8.41** Effluent has to be disposed off safely from neutralizing pit to a safe area as per instruction of BHEL Engineer. Neutralisation pit for EDTA cleaning/Acid cleaning is to be made by the Contractor. After completion of job pit has to be dismantled and area is to be levelled before handing over of area to owner. The pit size shall be approx. 30x30x1.5m, however it shall suitably decide jointly at site as per site requirement. Cost incurred in construction of neutralization pit shall be borne by the contractor.
- 10.8.42** 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.
- 10.8.43** 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.
- 10.8.44** 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. The decision of BHEL Engineer in this regard is final.
- 10.8.45** 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

- 10.8.46** Any damage by the landscape contractor's team to such utilities will be penalized and contractor shall be responsible for cost for such damages.
- 10.8.47** Contractor at his cost shall lay all necessary temporary piping including cutting and edge preparation, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL.

10.9 SITE INSPECTION

- 10.9.1** The owner / employer 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 / employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.
- 10.9.2** 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.
- 10.9.3** 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 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

10.10 UTILITY POINTS

- 10.10.1** 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.
- 10.10.2** 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.

10.11 DOCUMENTATION

- 10.11.1** Contractor shall be supplied with two extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy 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.
- 10.11.2** After successful completion, testing and commissioning of installation work, as built drawings / documents if any, in line with the actual work carried out as per site routing drawing shall be submitted by the contractor as agreed for the project.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

10.12 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 copy 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.

10.13 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, lub 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 supplied 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 Id. (1A)**

10.14 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.

10.15 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. Buckstay 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.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

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 this types of jobs as normal cope of vendor's work.

10.17 Statutory approval

Necessary approval for drawings, documents, Load Testing, license of hoists, Boiler lifts, Misc cranes like FANs, Mills ,Compressor House, different buildings 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.

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.

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.

10.18 LDO Strainers, LDO Cleaning, LDO Pumps Commissioning/ servicing / Rectification

LDO Strainers, LDO Guns cleaning, LDO Pumps and associated items servicing, rectification, commissioning in LDO Pump house & in Boiler are to be done by Boiler vendor. Vendor has to arrange the scaffolding, Consumables, Diesel, petrol, Cleaning agents ,tools, T&Ps for these purposes. For carrying out above activities, draining, cleaning of LDO from Pumps, Strainers and associated items are to be done and contaminated LDO is/are to be collected in drums/containers/dirty oil tanks and for this vendors has to arrange facilities for disposal of the same. Emptying of dirty oil tank/drums/containers, cleaning and disposal of contaminated oil is in boiler vendor's scope. Extra pumps for disposal of contaminated LDO are to be arranged by boiler vendors. All above activities are required to be repeated in no. of occasions till handing over of Unit(s) and are treated as normal scope of work without any extra commercial implications on BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

10.19 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.

10.20 Dewatering

Dewatering of Low Lying areas like lift pits ,Boiler working areas, other low lying areas (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.

10.21 Housekeeping/Area Cleaning

The contractor has to do area cleaning on every date on daily basis. Noncompliance of the above cleaning shall call for penal recovery of **Rs.2000.00 on each instance** and at the same time, cleaning of the area shall be done by BHEL at Cost recovery basis. No excuses on this above account shall be entertained by BHEL on whatsoever account.

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.

10.22 Approach platforms, fixtures

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

10.23 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 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 no. 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X: General

These types of activity is treated as vendor's normal scope of work without any extra commercial implication on BHEL.

10.24 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.

10.25 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XI: Welding Schedule

Following points may be noted with respected to the Welding schedule

Erection/Final Welding Schedule of subject Project shall be made available during Erection. EWS enclosed with this specification is issued only for general understanding about the scope of work and does not entitle contractor of any compensation on account of any changes in final ESW issued by BHEL during execution of works at site.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XII: FOUNDATIONS & GROUTINGS

12 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENT OF BOILER, & AUXILIARIES

- 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, axes, 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. Dressing and chipping of foundations up-to **30 mm** for achieving proper levels 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. 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 nuts movement. If required cleaning of the threads to be done with proper dies.
- 12.4 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 reinforcement 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.
- 12.5 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.
- 12.6 Civil work for Neutralisation pit for EDTA cleaning shall be in BHEL scope, However, any other work to be executed for completion of neutralising pit shall be in the scope of **Package A** and same shall be used for both the units. After completion of job, dismantling of pit shall be in scope of **Package B**. Pit Size shall be approx. 30x30x1.5m. (area leveling shall be in BHEL scope). No Extra payment shall be made to the contractor for the aforementioned work.
- 12.7 Contractor shall carry out scrapping and blue matching of embedded plates/ packers of rotating equipments. Chipping and the leveling 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XII: FOUNDATIONS & GROUTINGS

- 12.8 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. 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.
- 12.9 After the grouting has finally set and cured, alignment of equipments 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.
- 12.10 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.
- 12.11 Total grouting of the columns / equipments including pocket grouting, grouting at the gap between foundation and base plates top surface of column / equipments 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 nonshrink cement shall be arranged by the contractor at his cost. The quoted rate shall be inclusive of the same.
- 12.12 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.
- 12.13 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 with Portland cement is approved, necessary cement, sand etc. to be arranged by the contractor including the fine aggregates.
- 12.14 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.
- 12.15 **PROCEDURE FOR GROUTING:** Contractor has to carry out the grouting as per the work instructions for grouting available at site 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.)

- 13.1 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 unrequited 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.
- 13.8 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.
- 13.9 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.
- 13.10 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIII: MATERIAL HANDLING, TRANSPORTATION AND SITE STORAGE

- 13.11 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.
- 13.12 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 interference is unavoidable shall make such special arrangements as may be reasonably required to minimize the effect of such interference.
- 13.13 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.
- 13.14 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's 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 applicable overheads.
- 13.15 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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.)

14.1 Erection

- 14.1.1 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.
- 14.1.2 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 effected for such excess drawls at the rate prescribed by manufacturing units.
- 14.1.3 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.
- 14.1.4 Approach road in the vicinity of Boiler area only, to be maintain by Contractor.
- 14.1.5 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 connect the joints at no extra cost.
- 14.1.6 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
- 14.1.7 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.
- 14.1.8 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.
- 14.1.9 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.
- 14.1.10 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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.

- 14.1.11 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 BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.
- 14.1.12 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.
- 14.1.13 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.
- 14.1.14 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any equipment or part during the course of erection will have to be done by the contractor.
- 14.1.15 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.

14.2 ERECTION OF BOILER & ITS AUXILIARIES AND ROTATING MACHINES

- 14.2.1 Brief list of System / sub-system to be erected by the contractor & approximate weight of individual 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 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.
- 14.2.2 Preparation of preassembly bed is very much essential for preassembly of MBLs, columns, ceiling girders, panels, coils etc. on consolidated ground and to avoid sagging and shrinking the temporary supports are to be provided. The preassembled component should have minimum three supports to avoid sagging.
- 14.2.3 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 14.2.4 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.
- 14.2.5 The following measuring and test equipments with proper calibration certificates are to be made available by the contractor before taking up the structural and other pressure parts erection. Steel tapes minimum 5M,30M in sufficient numbers, torque wrench 650-1000 ft pounds, bolt tension calibrator, torque wrench with calibration, temperature recorder, two theodolites with one second accuracy etc. Periodic calibration of the measuring instruments is to be done once in six months and certificate for the same to be submitted to BHEL for records.
- 14.2.6 Detailed procedure available with BHEL site office should be collected before taking up the job by the contractor for preassembly of ceiling girders. Each ceiling girder will be supplied in only 2 pieces (Top & Bottom). **For reference drawing attached.** Bolting is to be carried out by contractor. The heaviest assembled ceiling girder including girder pin will be around **175 MT** approx. and maximum elevation of ceiling girder bottom is **96.690 mtr.** Depth of ceiling girder is 6.0 mtr. And length of ceiling girder is 32.010 mtr.
- Total No. of Ceiling Girders: 7 Nos
 - Total No. of Cross Girders: 4 Nos
 - During preassembly at ground, Seal weld may be required at Girder split splice location for ensuring stability and alignment.
 - Blue match on Girder Splice plates to be done.
 - Structural Framework and other preparatory works for ceiling girder pre assembly are to be done.
 - Suitable equipment for splice bolt hole reaming (only by mechanical means not by heat) and bolt tightener are to be used. The expected bolt size is M24 Grade 8.8 / M30 Grade 10.9 / M36 Grade 10.9.
 - Ceiling girder will be supplied with lifting lugs as per existing practice.

LARA-CEILING GIRDER FORECAST FOR 7 GIRDER ARRANGMENT (E350-B0 Material for flange & Web)

CG NAME	END PROFILE	MID PROFILE
CG1	WB5970X1250-100/36	WB6000X1350-115/32
CG2	WB5970X1100-75/32	WB6000X1200-90/32
CG3	WB5970X1100-75/32	WB6000X1200-90/25
CG4	WB6000X1300-115/40	WB6000X1500-115/40

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

CG5	WB5970X1000-75/36	WB6000X1100-90/32
CG6	WB5980X1100-90/36	WB6000X1200-100/32
CG7	WB5980X1200-90/32	WB6000X1300-100/32
Cross Girder-1	WB3000X1200-85/56	
Cross Girder-2	WB3000X1200-85/56	
Cross Girder-3	WB3000X1200-85/56	
Cross Girder-4	WB3000X1200-85/56	

- 14.2.7 Camber, sweep and twist are to be checked. The tolerances for individual piece camber and sweep, individual length, level of girder assembly, flatness of the web, out of squareness of assembly, overall length of the assembly etc. to be ensured before taking up the job. Major deviation if any observed should be intimated to BHEL for getting the resolution before proceeding further.
- 14.2.8 Suitable crane to be used for handling / lifting the ceiling girder will be provided by BHEL. Leveled area will be provided by BHEL for erection. However, backfilling and consolidation, if 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.
- 14.2.9 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 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 drum lifting/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.
- 14.2.10 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. Facility for random checking by torque wrench will have to be done. The required calibrated torque wrench will be provided by the contractor.
- 14.2.11 Some platform materials in PG 36 and PG 38, 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.
- 14.2.12 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be fabricated clamping type ladders. No temporary welding on any structural members is permitted except under special circumstances with the approval of BHEL. The necessary materials for the ladders are to be arranged by bidder within quoted rate. Any ladder supplied by the manufacturing unit for this purpose will be issued to

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

contractor free of cost and the same is to be returned once the platforms are completed. In case it is absolutely necessary then the contractor shall cut the temporary structure and rectify the column as directed by the engineer.

- 14.2.13 Scrap disposing chutes are to be provided by the contractor within the quoted rate at different areas like along the boiler main column, bunker structure and duct supporting structures. Material for the scrap chute will be provided by BHEL.
- 14.2.14 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. 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.
- 14.2.15 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).
- 14.2.16 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 operation they have to be attended by the contractor during the tenure of the contract.
- 14.2.17 In case of any class of work for which there is no such specifications as laid down in the contract such as blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.
- 14.2.18 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 provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost.
- 14.2.19 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.
- 14.2.20 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends of all piping including high pressure piping to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL, which shall include specific heat treatment procedures etc.,
- 14.2.21 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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.

- 14.2.22 **The enclosed welding schedule for Boiler & PCP is tentative and for reference only. The applicable welding schedules will be issued during erection of work at site.**
- 14.2.23 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) 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.
- 14.2.24 The contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The contractor shall also service the lub oil system, carry out the pressure test of oil coolers etc.,
- 14.2.25 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 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.
- 14.2.26 All attachment welding including those for insulation and refractory work coming on the pressure parts shall have to be done by the contractor. The hooks are suitable for stud welding machines. Contractor's quoted rate shall include all these contingencies. Attachment welding on pressure parts shall be done by qualified and certified welders only. Welding of Insulation hooks at site shall be welded on the fins by manual welding / stud welding machines.
- 14.2.27 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.
- 14.2.28 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before and after installation.
- 14.2.29 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

the requirement. Works of major nature not covered under this clause.

- 14.2.30 Complete penetration of water wall (Panel to panel) tube to tube and fins welding shall be achieved either by single side or double side welding. The decision of BHEL Engineer is final.

NOTE: The water wall/spiral wall panels will be supplied with fin cut to a length of 300 mm on ends for alignment and welding of tube to tube of panels at site.

The bidder may require to cut fins further to a maximum length of 1000 mm for alignment and welding of tube to tube in water wall/spiral wall panels and welding of fins on both sides after completion of panel to panel welding within the quoted rate. No extra payment will be made for the above works.

- 14.2.31 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.
- 14.2.32 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.
- 14.2.33 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.
- 14.2.34 Hanger rods are shown in the pressure parts arrangement drawing for boiler. Any cutting / welding and required heat treatment and necessary NDT of such hanger rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of torque wrench.
- 14.2.35 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.
- 14.2.36 For all the site routed piping as built drawings are to be submitted by the contractor immediately after erection. The Number of site welds indicated for site routed piping under the heading "Quantum of HP joints" is approximate. It is to be noted that piping for fine fittings, trim piping, oil system (PG 42) soot blower system shall be supplied mostly in running meters which will be erected and all joints are to be welded as per the drawings/site routing within the quoted rates by the bidder.
- 14.2.37 Hydraulic test of SCAPH has to be carried out on the ground before lifting it to the position.
- 14.2.38 Seal boxes should be reinforced with insulation pins as per drawing releases in attachment drawings and after that all seal boxes to be painted with bituminous paint of IS158 by the bidder. The required paint shall be supplied by the bidder within the quoted rate.
- 14.2.39 Grab Bars for accessing into the furnace area shall be provided in each seal box as per drawings.
- 14.2.40 **Heavy component lifting:** 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,

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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.

1. 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.
2. Precautions to be used while erecting the collector channel supports.
3. Equal loading of the hangers is to be ensured. Ring headers are erected before erection of water wall bottom hopper panels. Headers are to be arrested before welding to panels/headers/tubes/coils as the case may be. Sequence of welding to be followed while welding higher size joints.
4. Each water wall tube is provided with an orifice assembly in the bottom ring header. Orifice adapter is welded inside the header and welded at shop. After chemical cleaning operations, the orifice assemblies are to be erected at site as per directive of engineer and drawings.
5. 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.
6. The gaps between coils and steam cooled / WW panels /between coils etc. to be maintained in line with drawing. Please check up the permissible tolerance before taking up the work.
7. Preassembly of end bars with crown plates including stress relieving for coil assemblies.
8. The required accuracy level to be ensured before welding as per drawing. Necessary radiography/NDT along with heat treatment to be done.
9. CC pump motor installation is taken up only after completion of system pipe work supports. When mounted the pump should accommodate movement in the pipe without imposing excessive loads on the casing and branches. Sufficient clearance should be available beneath the motor to facilitate removal during maintenance. It is to be assembled as per the directions available with engineer.
10. Ensure completion of the maintenance hoists meant for CC pumps immediately else the area may be used by other agencies for laying the cables for various equipments coming in that area, inadvertently and they have to be removed later. Heat exchanger installation is also to be completed and necessary cooling water lines, thermocouples, pressure gauges etc. to be completed. The power cable connection made to the pumps should ensure free down ward expansion of the boiler at the level.
11. Down comer pipes erection can be done by carrying out preassembling the pipes whatever feasible as per availability. The suction manifold received in loose pieces and to be pre-assembled in the floor nearby. After welding the suction manifold, it is to be positioned, aligned and then only the down comers from the steam separator/ drum are to be connected. Erection of suction spool pieces, and hand operated valves for the system to be erected. The CC

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

pump volute without impeller is fitted to the bottom of the suction spool. Bottom flange of the volute is carefully levelled and aligned before welding the suction spool. After completion of welding in all respects cutting and trimming of erection attachment to be done. CC pumps volute is to be blanked for carrying out hydro test. After hydro test, the blanks are removed and pump erection taken up. The tightening of the bolts to be done with torque wrench as per the instructions of the supplier.

12. Before taking up the erection of any item, pre erection checks to be carried out like width and length of the item, availability of flexible connectors, damages on the coils, permanent bows if any, sponge test for the coil and completion of ground inspection by inspector of boilers as deemed. Ensure the removal of the transportation supports in each coils prior to erection.
13. Erection of LTRH/ Economizer coils as applicable can be done by preassembling the upper and lower coils. Pre erection checks like width, length etc., and sponge test of coils for thoroughness to be done before erection. Required hanger tubes erection to be completed before LTRH / Economizer coils erection. **The preassembly of cassette baffles of LTRH and Eco coils can be carried out before their erection.**
14. Check for the gaps between SH steam cooled front wall and Eco/SH horizontal assemblies, gap between SH steam cooled rear wall and SH horizontal assemblies/ eco assemblies, spacing between rear WW arch and pendant assemblies and finish SH coils. Detailed drawings are to be referred during execution. The items indicated are suggestive only.
15. Check for the inner space between eco coils, LTRH, RH and SH coils as per drawing
16. Ensure proper completion of steam cooled spacers. Check for clearances for soot blower lance tubes.
17. Ensure that soot blower lance tube in 0 dead travel position unless until charged. Radiant roof skin casing sheets are to be welded after application of castable refractory.
18. 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.
19. Ensure removal of drains plugs provided in the silencers, the gap between exhaust pipe and roof is sealed properly.
20. DWLGs to be erected as per drawing. Joint protocol to be made for its correct erection with supports.
21. 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 separator/drum to be used for giving supports.
22. Sample coolers are to be erected preferably in clean area. All the lines should be air blown before termination on both ends. Sockets are to be used for sampling lines. **TIG welding must be used for sampling lines instead of arc welding.**
23. All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as per the drawings. Electrometric relief valve controller is supported separately in column so that the vibration from boiler is not transmitted. Provide pre compression springs where required to take care of the load. All the motor operated valve stems should be vertical preferably. All the valve packing with asbestos base to be lubricated once in 6 months till handing over. Necessary gland packing will be supplied by BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

24. Transport binders on all coils are to be removed.
25. Gas distribution baffles and vibration snubbers, mechanical spacer bars etc. are to be erected as per drawings.
26. Buck stays are preassembled and raised to their respective elevations and hung prior to erection of furnace walls. Before fixing them to furnace walls, ensure completion of panel to panel welding and voids in the buck stay region. The necessary scalloped bars/plates/pads are to be welded after leveling. Ensure completion of vertical buck stays including support hangers, links. The erection of leveler channels with guides to be completed.
27. All the furnace guides to be erected as per drawing keeping gap of about 3 mm for free boiler expansion.
28. 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.
29. 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.
30. 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.
31. Some of the few important locations for voids filling: -
 - Around penetration for pendent surfaces and radiant roof/SH screen tubes/second pass roof tubes
 - Between loose front WW tubes above front upper panels and below radiant roof
 - Gap between radiant roof tubes at the junction of front wall
 - Extreme rear arch tubes and side WW/extended WW panels
 - Extreme SH screen tubes and SH extended steam cooled walls
 - Gaps between tubes /nipples in the steam cooled rear, side and front wall and respective headers
 - Extreme tubes of front and side WW lower panels
 - Side WW/extended side WW and extreme tubes of radiant roof
 - Extended side steam cooled wall and extreme tubes of SH screen tubes
 - Steam cooled side wall and extreme tubes of second pass roof
 - Between tubes in upper corner tubes
 - Between tubes in lower transition tubes
 - Gap between tubes/nipples of side WW lower header at the ash hopper throat region
 - Voids due to lifting slots in fusion/fin welded panels
 - Voids due to erection slots in fusion/fin welded panels
 - Fusion/fin welded panel fin slits at the panel tube-tube butt joint locations

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- **The above list is suggestive only. Voids are to be closed suitably to retain refractory in position and to achieve the gas tightness**

14.2.41 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 steam separator erection.

14.2.42 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.

14.2.43 Necessary assistance for balancing of equipment during trial run shall be provided by the contractor.

14.2.44 Vital clearance of mill should be checked at site and adjusted if required.

14.2.45 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 center shall be carried out as part of erection.

14.2.46 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.

14.3 MILL BUNKER STRUCTURE, COAL BUNKER, GALLERIES, SILOS ETC. INCLUDING MILL MAINTENANCE PLATFORM, PIPE & CABLE RACKS ETC.

14.3.1 Erection, alignment, welding, bolting, grouting and painting as applicable for fabricated structures (supplied form BHEL units) of Mill bunker structures, Coal bunkers, Transfer points, Trestles, Conveyor galleries etc.

14.3.2 Supply and installation of items as per BOQ for Bunker structural works in Mill Bunker structures, Transfer points, Trestles, Galleries etc.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 14.3.3 Where ever the design & supply together is covered in the scope of bidder necessary approvals from BHEL / CUSTOMER shall be taken by bidder for the design, inspection procedure & vendor. List of items for which such approvals required will be frozen during execution of the contract.
- 14.3.4 Contractor shall procure and supply the items to project site as per the BOQ for structural works from BHEL / CUSTOMER approved vendors, meeting the specification Drawings and instructions of the Engineer.
- 14.3.5 The structures of Bunker, Fuel bunker, Junction tower and Trestles & galleries are supplied in respective PGs as mentioned in **Chapter IX**.
- 14.3.6 **Total no. of bunker per Boiler is Nine.** The bunkers will be supplied in segments. Contractor has to carry out longitudinal welds for joining segments in staggered arrangement and circumferential weld for forming the shell & Hopper. The ring stiffeners will be welded with the shell and will have a site joint at the shell joint location.
- 14.3.7 SS liners will be fixed in the shells and for site joint location it will be supplied as loose, which has to be fixed by the contractor by welding.
Minimum 4.0 mm thick stainless steel liner of grade SS:304(as manufactured by SAIL Finish Grade 2B (Cold rolled, Annealed & Pickled and Skin passed) on M.S. plate for inside surfaces of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel etc. all complete.
- 14.3.8 Contractor shall provide the temporary structures like scaffolding, Access ladders, working platforms etc. and removal of the same after completion of erection.

14.4 **MAIN SUPPORTING STRUCTURES, EXTERNAL STRUCTURES, ELEVATOR STRUCTURES, STAIRWAYS, GALLERIES & PLATFORMS & HANDLING ARRANGEMENT**

- 14.4.1 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.
- 14.4.2 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.
- 14.4.3 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 14.4.4 Electroformed 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 **and not by gas cutting**. Cold galvanizing compound is to be applied on the cut surface/edge. Cold galvanizing paint supply is in Contractor scope.
- 14.4.5 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.
- 14.4.6 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 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 structures.

14.5 **OTHER PRODUCTS AND SYSTEMS AND COMMON REQUIREMENTS**

- a) The ducting within Boiler island upto ESP inlet, with associated dampers/gates and their drives, supports and suspensions etc for these system. The ducting covered under this scope of work is flue gas ducting up to boiler outlet flange, boiler outlet flange to ESP 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 including interconnections, 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/guidence 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 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 (incl radiography and stress relieving works). 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.

ARRANGING PAINTS, PRIMERS FOR TOUCHUP PAINTING (AS APPLICABLE) AS PER TENDER SPECIFICATION FOR ALL ERECTED MATERIALS IS IN THE SCOPE OF CONTRACTOR.

14.6 Reconciliation of Material issued by BHEL (free of cost):

General Notes

- a. 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.
- b. 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.
- c. Contractor will have to make his own arrangement at his own cost for procurement of any other materials except as mentioned above/ BOQ, as required for the works and of such quality as acceptable to BHEL.
- d. 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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.**

- e. 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.
 - f. 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.
- 14.6.1 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.
 - 14.6.2 Mechanical erection works associated with the power cylinders, valves, valve actuators etc., coming under various groups shall be provided by contractor within the finally accepted rates. The Erection and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.
 - 14.6.3 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.
 - 14.6.4 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.
 - 14.6.5 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.
- 14.7 **ROTARY 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.
- 14.7.1 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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, however, be supplied free of cost by BHEL.

- 14.7.2 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 control and power cabling after realignment. Quote tonnage rate shall be inclusive of the above.
- 14.7.3 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
- 14.7.4 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.
- 14.7.5 The fans, mills and other rotating machines shall be checked for clearances and other vital tolerances.
- 14.7.6 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.
- 14.7.7 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.
- 14.7.8 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.
- 14.7.9 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 14.7.10 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 be machined by the contractor at his own cost. However, the materials for dowel pins shall be issued by BHEL free of cost.
- 14.7.11 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.
- 14.7.12 Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismount such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.
- 14.7.13 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.
- 14.7.14 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 touch up 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.
- 14.7.15 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 14.7.16 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.
- 14.7.17 Wherever piping erected by the contractor is connected to equipment / piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor who is erecting the piping under this specification.
- 14.7.18 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL, will 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/machining and de-burr the same. However, machining of the packers wherever necessary shall be arranged by the contractor.
- 14.7.19 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to equipment and personnel. Calibration/fitness testing certificates from recognized agency are to be submitted to BHEL site office for equipment/instrument/appliances to be used, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.
- 14.7.20 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
- 14.8 CEILING GIRDER –**
- 14.8.1 Arrangement drawing: Attached
- 14.8.2 Pre-checks of ceiling girder before Assembly-Identify Girder Top & Bottom pieces – Check Work order / PGMA / DU No, girder designation etc. Place girder pieces on levelled bed in sequence for bolting. Use lifting lugs provided in the web of the girder during all handling operations. Buff clean the seating surfaces, check and repair damages if any on machined surfaces of individual pieces, by grinding before bolt placement. Verticality of the web of both top and bottom pieces of the girder shall be checked by plumb and piano wire method. Check the bolt hole size verticality and co-axiality with “GO” and “NO GO” gauges.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 14.8.3 Post-checks of ceiling girder before assembly - Matching ends of top piece and bottom piece of ceiling girder shall be butted over whole length with a clearance not exceeding 0.2mm and held tightly together in hand snug tight condition.
Ensure the horizontal plane of Girder assembly by verifying the center line of girders to be at the same level by water level method.
Check the squareness of the girder compartment by verifying the spacing between the girders and diagonals between work points.
Centre line alignment of welded beams, rolled beams shall be within 2 mm.
- 14.8.4 Bolting methodology of the ceiling girder. (Refer Document Std. Pub 2302: Tightening Procedure HSFG Bolts and IS3640, attached herewith)
To ensure the monolithic behavior in Ceiling girders splice (split location), it is mandatory to adopt Fit- Bolt concept: (reference document attached).
Refer Trichy Document Std. Pub 2302: Tightening Procedure HSFG Bolts, attached herewith.
- 14.8.5 In case of any damage in surface of the “flange to be bolted” - Damage in surface of the flange to be bolted has to be repaired by grinding and Splice protection sheet to the required thickness after confirmation from Engineering. Splice protection sheet / structure is the part of ceiling girder.
- 14.8.6 Procedure for Blue matching - Buff clean the seating surfaces and blue match girder Top piece with bottom piece to ensure minimum 80% contact area in the locations where the gap exceeds 0.2mm. Use lifting lugs provided in the web of the girder during all handling operations.
- 14.9 **Piping:**
- a. 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.
 - b. 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 imposing excessive loads on the casing and branches. Sufficient clearance should be available beneath the motor to facilitate removal during maintenance.
 - c. 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.
- 14.9.1 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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.

- 14.9.2 The pipes, tubes and equipments shall be checked for clearances and other vital tolerances.
- 14.9.3 Whenever required the contractor shall arrange for pre-qualification of process task Performers.
- 14.9.4 Instrument tapping for all systems and associated equipment's to be welded/fitted by the contractor with in the quoted price.
- 14.9.5 The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.
- 14.9.6 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.
- 14.9.7 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.
- 14.9.8 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 joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.
- 14.9.9 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.
- 14.9.10 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.
- 14.9.11 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.
- 14.9.12 The contractor shall prepare as built piping drawing & submit to BHEL Engineer for approval & verification of material used.
- 14.9.13 Plate Type Heat exchangers will be supplied for cooling of Auxiliary Cooling water lines. Erection of Plate heat exchanger is not in the scope of this tender. However, end connection/terminal connection of piping with all such equipments (where erection of equipment is not the the scope of this tender) shall be in the scope of this tender.
- 1 Brief list of equipments / 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

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.

- 2 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.
- 3 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 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:
 - I. Scaffolding and rigging operations
 - II. Flame / electric cutting, grinding, welding, radiography and stress relieving & wrap inspection by HOLIDOY equipment.
 - III. Fitting, fettling, filing, straightening, chamfering chipping, Scrapping, reaming, cleaning, checking, leveling, blue matching, Aligning and assembly.
 - IV. Surface grinding, drilling, doweling, shaping.
 - V. Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication
- 4 It shall be the responsibility of the contractor to provide ladders for all pipe trenches for erection purpose. Rollers to be provided for the pipe to be welded for easy work. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.
- 5 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.
- 6 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.
- 7 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.
- 8 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIV: ERECTION

- 9 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 of sizes NB 250 and above 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.
- 10 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).
- 11 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.
- 12 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.
- 13 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

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.)

- 15.1 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.
Links & Pipes for interlinking SH headers & RH headers are supplied with P91/P92 materials
- 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.
- 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

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. **100% RT will be applicable to all the circuits however applicable percentage of RT shall be guided by the field welding schedule.**
- 15.9 **Non Destructive Testing (NDT) - Phased Array Ultrasonic Testing (PAUT) for the materials/items erected by the bidder, if applicable, shall be carried out by contractor within quoted price.**
- 15.10 **Non Destructive Testing such as RT, CRT, UT, MPI, PAUT, hardness test, SR etc. wherever applicable shall be in Contractor scope. In case of any delay (i.e. 2 days from the date of completion of joint/intimation) in execution of NDT, BHEL shall be entitled to execute the work at cost recovery basis.**
- 15.11 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.
- 15.12 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.
- 15.13 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.
- 15.14 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, Non Pressure Parts like Crown Plate support assy, 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. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.
- 15.15 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,
- 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

- 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.
- 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.
- 15.16 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.
- 15.17 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL through its manuals/procedures etc.
- 15.18 The contractor for radiography work shall use Iridium-192; the geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while radiography is being carried out. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).
- 15.19 Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only are used for weld joint radiography. Film density shall be between 1.5 and 2.0.
- 15.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.
- 15.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.
- 15.22 Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification. The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld. For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.
- 15.23 The contractor shall be fully equipped with radiography equipments, films, chemicals and other dark room facilities. There must be a number of radiographic personnel with sufficient experience and certified by BARC for field radiographic inspection. Further, the contractor must follow strictly the safety rules laid down by BARC, from time to time, contractor's radiographers shall also be registered with BARC for film badge service.
- 15.24 All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.
- 15.25 The contractor shall have a dark room & pit room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories. All radiography films shall be developed in the dark room at site.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

- 15.26 In case of radiography of less than 100%, the joints identified by BHEL at random shall be radiographed.
- 15.27 Contractor shall note that 100% radiography (as applicable) will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radio graphed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out.
- 15.28 All the Radiographs shall be properly preserved in AC room and shall become the property of BHEL. They are to be reconciled with the work done, joints radio graphed and submitted to BHEL / Customer .
- 15.29 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC /DRP certificate to be provided before taking up the work.
- 15.30 Radiography of joints shall be so planned after welding, that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.
- 15.31 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.
- 15.32 However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.
- 15.33 In case of failure of PAUT test result due to defect in joint, the joint shall be cut, re-welded and re-tested at contractor's cost.
- 15.34 Heat treatment and radiography 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.
- 15.35 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.
- 15.36 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.
- 15.37 All welded joints shall be subjected to acceptance by BHEL Engineer.
- 15.38 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.
- 15.39 Contractor shall carryout Radiography as per welding Manual booklet applicable as per IBR, enclosed. However, percentage radiography shown in the respective drawings shall be final and binding on the contractors.
- 15.40 The field joints are to be radiographed and preheating and post weld heat treatment shall be done as per BHEL procedure and manuals.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

- 15.41 The percentage of Radiography are tentative, which may be increased depending upon the quality of joints at the discretion of BHEL.
- 15.42 Penetrometer as per ASME/ISO shall be used for all exposures.
- 15.43 Contractor shall provide all skilled, unskilled work men required for the job, which will include Engineers, supervisors, operators, as required for timely and satisfactory execution of radiography work.
- 15.44 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radio graphed. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor.
- 15.45 The contractor shall also be equipped for carrying out other NDT like liquid penetrant inspection, magnetic particle inspection, etc. as and when required in the interest of work within the quoted rates.
- 15.46 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 Engineer. The contractor's scope of work include such preparation and no extra charges are payable for this.
- 15.47 It may also become necessary to adopt inter layer radiography / 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. The contractor shall take all this into account and quote the price inclusive of all such work and radiography.
- 15.48 The welded surface irrespective of place of welding shall be cleaned of slag and painted at the center with primer paint to prevent corrosion at no extra cost towards this.
- 15.49 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.
- 15.50 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.
- 15.51 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.
- 15.52 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

- 15.53 For uniform heating and better closed loop control, pre heating, post heating, controlled rate of heating & cooling and post weld heat treatment cycles for tube specifications SA213T91 & SA213T92 should be carried out using flexible ceramic pads with suitable heating machine.
- 15.54 MPI must be done on joints, those are undergone ultrasonic testing.
- 15.55 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 materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

15.56 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 (RT, 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 (RT, SR, UT) report submission & customer acceptance Log sheets esp. for Billed qty. from dt. of Billing (Vendor)	10,000 per week
12	Lack of safe approach Scaffolds/Platform for inspection & non-availability of calibrated MMDs –	1000 incident.

15.60.1 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

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.

15.60.2 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.
 - 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.
- 2.4 Colour coding for filler wires:
 - 2.4.1 On receipt of GTAW filler wires, codify the filter wires as per table I below . Both ends shall be coloured.

Table - 1

Specification	Brand Name*	Colour Code
RT 1/ 2 Mo (ER80s-D2)	TGSM	Green
RT 1 Cr 1 / 2 Mo (ER80S-B2)	TGS 1CM	Silver grey/White
RT 2 1/ 4 Cr 1 Mo (ER90S-B3)	TGS 2CM	Brown / Red
RT 347 (ER 347	TGS – 347	Blue

(* or other approved equivalents)

- 2.4.2 Where another set of colour code is followed, maintain a record of coding used
- 2.4.3 Where the filter wire is cut, apply the appropriate colour code at both ends of the piece.
- 2.4.4 For other filler wires, a suitable colour distinct from table 1 shall be applied

15.60.3 BAKING AND HOLDING OF WELDING ELECTRODES

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XV: Welding, Heat Treatment & Radiography and Non-destructive Testing

A. Purpose:

This section details activities regarding baking and holding of welding electrodes used at sites.

B. Procedure:

1. While handling, avoid contact of oil, grease with electrodes. Do not use oily or wet gloves.
2. It is recommended that not more than two days requirements are baked.

C. GTAW Filler Wires:

1. These wires do not require any baking.

D. Covered Electrodes:

- I. Baking and holding
- II. Identify baking oven and holding oven.
- III. They shall have a temperature control facility upto 350 °C for baking oven and 200 Deg. C for holding oven.
- IV. A calibrated thermometer shall be provided for monitoring temperature.
- V. On opening a packet of electrodes, segregate and place them in the baking oven. Avoid mix up.
- VI. After loading, raise the baking oven temperature to the desired range as per Table below.
- VII. Note the time when the temperature reaches the desired range. Maintain this temperature for the duration required as per Table below.
- VIII. On completion of baking, transfer the electrodes to holding oven, maintain a minimum temperature of 100°C till issue.
- IX. The electrode shall not be subjected to more than two cycles of baking. Maintain a register containing following details:
 - a. Brand name (e.g. Supratherme)
 - b. Size (e.g Dia 4.0 mm)
 - c. Quantity (e.g. 110 pieces)
 - d. Time at required temperature ie. Above 250°C
 - e. Time of Transfer to holding oven. Activities a, b, c to be recorded before loading into the oven.

15.61 NDT and PWHT of Pressure part and integral piping shall be guided by the site erection welding schedule.

15.62 Chapter on Quality Assurance from NTPC Contract has been enclosed with this specification for general understanding of minimum requirement and applicable provisions with respect to Field/Site works may be referred to. All NDE/SR to be carried out at site as per prevailing manual/procedure issued by BHEL during execution of contract within quoted price.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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 of LP lines. Contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing of LP lines.
- 16.7 Hydraulic testing pumps for HP lines & Boiler shall also be in the scope of Contractor, 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XVI: HYDRAULIC TEST

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 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XVI: HYDRAULIC TEST

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 test, 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.
- 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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

TESTING, PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

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

- 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 Air leak test of **Boiler, Ducts, hydraulic test of boiler, of Piping**, and flow test, clean air flow test, Gas Distribution Test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system, Steam blowing 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 Chemical cleaning (Acid cleaning of piping / EDTA cleaning / alkali flushing) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be fabricated by the contractor within the quoted rate. Required materials will be provided by BHEL free of cost. Chemicals for chemical cleaning will be provided by BHEL and handling of chemicals & other consumables and other connected activities has to be carried out by the contractor at their cost. All other consumable would have to be provided by the contractor.
- 17.6 Laying of insulation of this temporary piping, tanks are to be carried out by the contractor within quoted rate, and required insulation materials will be provided by BHEL. The welding joints in the temporary pipe lines for acid cleaning and steam blowing are to be welded by HP

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

welders only. Required NDT tests are to be carried out for the above joints as part of work as per customer / BHEL requirement.

- 17.7 All items / material required for conducting hydraulic test, alkali boil out, acid cleaning/EDTA 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 etc. of all temporary piping including valves, tanks, effluent pumps, electrical control panel and cabling along with insulation and supports for steam blowing; chemical cleaning and effluent disposal 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.

- 17.8 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.
- 17.9 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.
- 17.10 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.
- 17.11 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.
- 17.12 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.
- 17.13 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

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.

- 17.14 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.
- 17.15 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.
- 17.16 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.
- 17.17 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.
- 17.18 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.
- 17.19 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.
- 17.20 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.
- 17.21 Replacing / cleaning of filters of the erected equipments, piping system etc. during pre-commissioning / commissioning stage are within the scope of work.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 17.22 Contractor shall lay the temporary pipelines with fittings, accessories and erection / commission pumps, tanks, valves, fittings, hangers and supports and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing / water flushing / water washing / oil flushing 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 and acid cleaning tanks 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.
- 17.23 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 steam blowing, all the temporary lines to be dismantled and restoration of piping to be carried out, within quoted rate.
- 17.24 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.
- 17.25 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.
- 17.26 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 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.
- 17.27 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces.
- 17.28 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.
- 17.29 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. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 17.30 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 17.31 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.
- 17.32 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.
- 17.33 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.
- 17.34 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.
- 17.35 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.
- 17.36 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 period of six months after synchronization or till handing over of sets to customer, whichever is earlier.
- 17.37 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.
- 17.38 After floating of safety valves, the commissioning activities and trial operations will continue up to handing over of the unit. Contractor shall provide the manpower for three months from trial operation or submission of final bill with material reconciliation whichever is later. 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
 - b) Millwright Fitters

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 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 manpower **in each package** 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

- 17.39 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, 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.
- 17.40 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.
- 17.41 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.
- 17.42 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.
- 17.43 **Boroscopic examination of headers etc. to be conducted by contractor as per instruction of BHEL engineer.** This requires cutting of tubes to facilitate the boroscopic examination and re welding etc. are part of work and the same to be carried out with in the quoted rate. Boroscope shall be provided by BHEL free of cost.
- 17.44 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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

electrical hoist and load testing of electrical hoist. Required loads will be provided by BHEL free of cost.

- 17.45 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.

In accounting of temporary materials following wastage allowances are provided:

1. Structural items : 4%

- ✓ 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.
- ✓ 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

- 17.46 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.

- 17.47 The contractor shall carry out all required tests, pre-commissioning and commissioning activities required for the successful and reliable operation of boiler, rotary machines etc.

- 17.48 The 'Initial Operation'/trial operation of the complete facility as an integral unit shall be conducted for continuous upto period specified. During the period of trial operation, all systems in the scope shall operate continuously at full load at designated fuel for a period not less than 72 hours. The Initial Operation shall be considered successful, provided that each item/ part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 17.49 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.
- 17.50 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).
- 17.51 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.
- 17.52 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.
- 17.53 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.
- 17.54 The instruction of the motor manufacturer regarding storage of the motors and re conservation must be strictly followed without any deviation.
- 17.55 It shall be the responsibility of contractor to attend all punch points post commissioning and resolve the deficiency as may be necessary for handing over the unit to BHEL's Client.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XVIII: PAINTING

18 PAINTING

Touch-up Painting:

Though the final painting is not there in the scope of the contractor, in case any shop painted structure/component is required to be repainted due to the reasons attributable to the contractor such as Mis-handling, damage during erection process, other reasons incidental to the work etc, such re-painting/finish painting of the components/structures shall be in the scope of the contractor including the supply of paints and primers along with all required consumables & deployment of tools e.g wire brush, paint brush, Spray M/c, cleaning agents etc.

Contractor shall carry out surface preparation and touchup painting works as per BHEL/Customer specification and instruction of BHEL engineer at site.

18.1

Paints and painting work carried at site shall confirm to the following codes and standards:

IS:5 – Colour for ready mixed paints and enamels

IS : 101 Part 1 to 9 – Methods of sampling and test for paints, varnishes and related products

IS : 1477 Part I&II – Code of practice for painting of ferrous metals in building

IS : 2932 – Specifications for enamel, synthetic and exterior,

a) Under Coating

b) Finishing

IS: 9407 – Colour code for identification of pipelines used in thermal power plants.

Contractor shall satisfy himself, availability of all information in the specifications for proper selection of the paints and ensure their applications as per Codes.

18.2 Primer Painting: (wherever applicable incidental to touchup painting & preventive painting)

a) After surface preparation, two coats of **epoxy resin based zinc primer** shall be applied. Primer shall be applied by either spraying or bushing ensuring a continuous film without “holidays”. Primer coat shall be immediately applied without any time lag after the surface preparation.

b) Any equipment shall be carefully examined and where ever the primer coat is damaged shall be recoated with primer. However over the field welds, bolts and nuts etc. two primer coats as per a) shall be applied.

18.3 Finish Painting (wherever applicable incidental to touchup painting & preventive painting)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XVIII: PAINTING

- a) After the primer coat has dried out, the surface shall be cleaned of dust without scratching or in any way damaging the primer coat. Over this, dry surface finish painting shall be carried out.
- b) Finish painting shall be carried out in two coats. Dry film thickness of each coat shall be as per the recommendation of the primer/paint manufacturer. Minimum thickness including primer and paint coating shall be as per specification.
- c) Paint shall be applied either by brushing or spraying. It shall be ensured that brush marks are a minimum and the requirements of workmanship are as specified in IS: 1477 (for site painting works on systems, structures and components).
- d) 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.
- e) 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. Paint shall not be applied when the temperature of the surface to be painted is 5° C or below.

18.4 Touch-up painting on damaged areas -

- a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation.

Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

Final painting of piping shall be in the scope of this work. Supply of paint shall also be in the scope of contractor.

18.5 Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder.

Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.

Painting procedure to be followed for touch-up painting on damaged areas.

18.6 The scope of work includes touchup painting and colour bands, lettering, 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XVIII: PAINTING

18.7 In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

18.08

Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents.

18.09

During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost.

18.10

Specified drying time shall be permitted from one to another coat.

18.11

This work requires working at higher altitudes from ground level to as high as 50 mtr and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

18.12

Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.

18.13

Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.

18.14

In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. Laying of air hose pipe and any other line required shall be done by Contractor at his cost

18.15

Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XVIII: PAINTING

18.16

Acceptance of Final Painting for required thickness shall be as per the thickness measured by Alcometer by customer/BHEL Engineer. Contractor shall have to carry out painting till the required thickness is achieved.

18.17 Prior to application of refractory, bituminous painting (including supply) on the pressure parts and other area is under Contractor scope.

PAINTING SCHEME: Attached.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

19 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, Auxiliary 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 at Boiler and auxiliaries, Auxiliary boiler etc.

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. The systems covers under this contract including but are not limited to the following.

Boiler & its Auxiliaries, Boiler integral piping, piping (P91, P92, HP/LP piping), Non Pressure Parts, Duct, dampers gates and its support structure, Rotating Equipments, Air Pre Heaters, ID/FD/PA fans etc. It also includes connected ducts, HP&LP piping, temporary acid cleaning and steam blowing piping connected tubes, oil and coal burners, oil and steam tracing lines complete and fuel and draft plants, all drain lines, traps, flanges, fine fittings, sampling lines, fans and other equipment like Vessels, Flash tanks, steam separator, ceiling heat recovery area etc.

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 Contrator.

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

etc., issued to the contractor shall be properly stored and handled before application due the same.

- 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., un faced bonded wool, mattresses is 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 equipments 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 engaging approved welders) as per the drawings or as instructed by BHEL Engineer will have to be carried out by the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

- 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 draws / 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 mattresses 2%
 - 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. 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 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

- 19.28 Applying different layers of mineral wool as directed and as per drawings and specifications for boiler 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.
- 19.37 Application of insulation and removal of the same for temporary piping under scope of erection of this contract is also included in the scope of the work. However, BHEL will supply the insulation materials free of cost.
- 19.38 All rectification including painting of Employer's structure which are damaged by contractor during his work.
- 19.39 Special type of insulation wool used in penthouse shall not be cut. Indiscriminately. All chicken mesh, cut bits shall be accounted for.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

19.40 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.

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.

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 contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

- 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 aluminium 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 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 at no extra cost to BHEL. However, required insulation material shall be issued by BHEL free of cost.
- 19.56 The following works are also included in the scope of this contract.

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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XIX: Lining and Insulation

Cutting of the wool mattresses in the required shape and application of finishing cement of required thickness wherever required.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XX: PRESERVATION & PROTECTION OF COMPONENTS

20 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 effected 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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XXI: SPECIAL FEATURE

- 21.1 WELDING OF PRESSURE PARTS AND HIGH PRESSURE PIPING The welding of all pressure parts and high pressure piping shall be in accordance with the following requirements:
- Qualification of Weld Procedures:** Only qualified welding procedures as per ASME Section IX shall be used by contractor at site. Procedure qualification records along with WPS shall be submitted to NTPC/BHEL for review. Welding procedure shall indicate all essential and non-essential parameters as per ASME Section IX. Makes of welding consumables shall be subject to NTPC/BHEL approval.
 - Welder's Qualification** Only welders who are qualified in accordance with the latest applicable requirements of the Indian Boiler Regulations, shall be permitted to perform any welding work on the pressure parts and its attachment welding. In addition to such statutory qualification requirements, the welders shall also undergo a satisfactory preproduction qualification test to be conducted by the Contractor at site as per ASME Sec IX in presence of BHEL/NTPC representative(s), prior to performing work under these specifications. The services of an independent testing laboratory shall be retained by the Contractor to perform welder qualification tests for welders. All the welders carrying out welding at site shall carry an identification badge, which shall indicate the category and the grade of welding for which they have been tested and authorised to carry out welding
 - Records Welders** performance shall be monitored regularly and record of their performance shall be maintained by contractor in a manner acceptable to the employer. Contractor shall maintain such records including record of procedure qualification & welder qualification and hand-over to the BHEL/NTPC at the end of work.
 - MARKING** On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be stamped on separate marking plate which shall be tack welded on pipe near the weld.
 - Welding Equipment for high pressure (Boiler, PCP) -**
For GTAW process: HF Welding machines to be used.
For SMAW process: Inverter based welding machine are to be used.
Contractor to ensure the availability of sufficient nos of welding equipment during each phase of project construction so as not to impede the progress of the project
 - HEAT TREATMENT** Heat Treatment -Pre-heating, post-heating and post-weld heat treatment operations of all welds, shall be performed in accordance with the requirements of applicable code and WPS. Local post weld heat treatments shall be adopted only in cases where it is normally impracticable to subject the entire assembly as such for stress relieving operations. Heating may be by means of electric induction coils or electric resistance coils as acceptable to BHEL/NTPC. Oxyacetylene flame heating or exothermic chemical heating methods will not be permitted. **Complete recording of the temperatures through out the stress relieving cycle of the**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XXI: SPECIAL FEATURE

material and the weld subjected to heat treatment shall be made by means of chartless recorder / IIOT sensors duly password protected with a connectivity to remote server /Cloud. All hardware and software required to meet above intent shall be in the scope of bidder.

After setting up the weld joint for heat treatment operation, the BHEL/NTPC signature shall be obtained on the strips chart of the recorder prior to starting of heat treatment cycle. The right hand corner of the strip chart at the starting point of the heat treatment cycle shall contain details like the weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding etc.

Heat Treatment - weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding. Schedule shall be mentioned on data for identification.

- g. **NON-DESTRUCTIVE TESTING (NDT):** The contractor shall record results of NDTs carried out at site in the format acceptable to BHEL/NTPC. All the radiographs & its report duly signed & correlated to the job shall be handed over to the to BHEL/NTPC. Sensitivity of all the test equipment shall be compatible to the job & acceptance norms agreed. **Computed RT shall be used as an advanced Engineering Practice. Contractor to ensure minimum 10% computed radiography of weld joint to be performed in construction phase for scope agreed in FWS for boiler pressure parts.** contractor to ensure the transfer & storage of these records in Server.
- h. Sub contracting of NDT & PWHT / SR Agencies- NDT & PWHT / SR contract shall be awarded by the contractor to BHEL/Customer approved NDT & PWHT / SR agencies.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XXII: Specific Exclusion

22.1 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. E&C of ESP and FGD absorber.
- iii. E&C of ducting of ESP outlet to Chimney inlet.
- iv. E&C of MRS and BOP
- v. Fabrication of Structure.
- vi. E&C work of cable trays, cables and earthing etc
- vii. Control panels, EPMS, MCC etc.
- viii. Electrical & C&I items of handling system.
- ix. Civil works except to the extent specifically indicated elsewhere in this tender.
- x. Pneumatic copper tubing and fittings thereof.
- xi. Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
- xii. Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Package Description: Erection, commissioning & Trial Operation including application of lining, Insulation, supply & touch-up painting as and where required including Handling of materials at BHEL / Client's Stores / Storage Yard and transportation to site, and handing over of Boiler and its auxiliaries, Boiler integral piping, Structure for bunker, Pressure Part, Non Pressure Parts, Duct dampers and its support structure, Rotating Equipment's, Air Pre Heaters, ID/FD/PA fans, Mills, Power Cycle Piping (incl. MS, HRH, CRH etc.), HP Piping, LP Piping (in and around SG area), Deaerator, Refractory, Erection of Bunker & allied works, including supply & installation of items as per BOQ of following Packages at 2X800 MW NTPC LARA Stage II Project, Dist. Raigarh, CG:

1. **Package-A:** Unit # 3 Boiler and Common System of 2X800 MW NTPC Lara Project.
2. **Package-B:** Unit # 4 Boiler of 2X800 MW NTPC Lara Project.

SECTION	DESCRIPTION OF PACKAGES / ITEM OF WORK	Percentage weightage w.r.t Total Price
A	E&C of Boiler & Auxiliaries	85.6818131%
B	Erection of Bunker & Allied works	14.3181869%
C	Execution/Mobilisation of special resources (PVC & ORC Shall Not be applicable on Section C)	Fixed Cost
	Total Contract Value	A + B + C

SN	Section A: Contract (Package A)	QTY	UOM	Weightage/ Factor "X"
1A	Structure	25,763.360	MT	0.410651654604
1B	Pressure parts	9,908.785	MT	0.190914548484
1C	Non Pressure Parts	5,720.811	MT	0.092354280133
1D	Trim Piping	897.514	MT	0.030554127595
2A	Rotary machines	2,014.902	MT	0.022400423543
3A	Insulations Wool Matress	1,889.000	MT	0.027994539529
3B	Insulation -pourable and castable	270.000	MT	0.004047949612
3C	Insulation-iron parts	159.150	MT	0.002466421099
3D	Insulation -Al cladding sheets	373.100	MT	0.006028460707

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

SN	Section A: Contract (Package A)	QTY	UOM	Weightage/ Factor "X"
5A	Power Cycle Piping P-91/92	1,254.000	MT	0.066665528451
5B	HP Piping Including P-11,P-12,P-22, CS	1,515.900	MT	0.063225574615
5C	LP Piping	1,549.353	MT	0.056011382636
5E	Hangers/Pumps & Tanks	1,054.687	MT	0.023536815282
5D	SS Piping	41.157	MT	0.003148293710
Sub Total Of Boiler package		52411.72	MT	

Section B: Erection of Bunker & Allied works

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
1500	ROOFING / SIDE CLADDING: Roofing / side cladding work including all labour, material (unless otherwise specified in BOQ/contract specification), equipment, transportation, handling, scaffolding, laps, hooks, washers, corner pieces etc. at all level as per specification, drawings and as directed by engineer - in - charge.			
A1502	METAL DECK SHEET Type-I, fixing permanently color coated galvanised MS troughed metal sheet decking plate of approved colour over roof purlins for cast-in-situ roof slab as per relevant IS code and Grade as per specification. Bare metal thickness(BMT) of deck plate shall be minimum 0.8mm with minimum trough depth of 44mm (or as per design whichever is higher) of grade G250 as per AS1397/grade SS255 as per ASTM A653M/ grade S250GD as per EN 10326 with zinc coating to class Z275 and shall serve as permanent shuttering to the roof slab 40mm - 100mm thick measured over crest of metal decking & shall have adequate strength to support weight of green concrete and imposed loads of min 100 kg/sqm (for two span condition) during construction between beams as per manufacturer's recommendations/ calculations/ test certificates for approval including fixing of plates to beams, side			

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-XXIII : Bill of Quantities and % Weightage of Individual Items

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
	lapping, end lapping etc. all complete for below mentioned spans. The sheet shall be permanently coated with silicon modified polyster (SMP silicon content 30%-50%) paint or super polyster paint of minimum 20 micron DFT on exposed surface (facing operating floor) over primer coat of minimum 5 micron(nominal) and minum 10 micron (nominal) SMP or super polyester paint over primer coat of minum 5 micron (nominal) on other face. SMP and polyster paint system sahll be of idutrial finish of product type 4 of AS/NZ2728, including fixing of sheet to top flange of beam with drawn arc welding of headed shear anchor studs @ 260mm c/c in the trough and stich screws between two adjacent sheets and sealing with epoxy sealant.The shear anchor studs shall confirm to type B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16 mm dia & 65 mm length manufactured from cold drawn round steel bars confirming to ASTM A 29 of grade designation 1010 through 1020 of standard quality with either semi killed or killed welded by drawn arc stud welding through metal deck sheet.			
a	Span Upto 1800mm	MT	19	0.0016810893 84

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
B1502	METAL DECK SHEET Type-II, Fixing permanently color coated galvanised MS troughed metal sheet decking plate of approved colour over roof purlins for cast-in-situ roof slab as per relevant IS code and Grade as per specification. Bare metal thickness(BMT) of deck plate shall be minimum 0.8mm with minimum trough depth of 44 mm (or as per design whichever is higher) of grade G250 as per AS1397/grade SS255 as per ASTM A653M/grade S250GD as per EN 10326 with zinc coating to class Z275 and shall serve as permanent shuttering to the floor slab 150 mm thick measured over crest of metal decking & shall have adequate strength to support weight of green concrete and imposed loads of min 100 kg/sqm (for two span condition) during construction between beams as per manufacturer's recommendations/ calculations/ test certificates for approval including fixing of plates to beams, side lapping, end lapping etc. all complete for below mentioned spans. The sheet shall be permanently coated with silicon modified polyster (SMP silicon content 30%-50%) paint or super polyster paint of minimum 20 micron DFT on exposed surface (facing operating floor) over primer coat of minimum 5 micron(nominal) and minum 10 micron (nominal) SMP or super polyester paint over primer coat of minum 5 micron (nominal) on other face. SMP and polyster paint system sahll be of idutrial finish of product type 4 of AS/NZ2728, including fixing of sheet to top flange of beam with drawn arc welding of headed shear anchor studs @ 260mm c/c in the trough and stich screws between two adjacent sheets and sealing with epoxy sealant.The shear anchor studs shall confirm to type B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19 mm dia & 100 mm length manufactured from cold drawn round steel bars confirming to ASTM A 29 of grade designation 1010 through 1020 of standard quality with either semi killed or killed welded by drawn arc stud welding through metal deck sheet.			
a	Span Upto 1800mm	MT	18	0.0016062718 11

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
b	Span Exceeding 1800mm and upto 2500 mm	MT	9	0.0008031359 05
A1503	Providing and fixing shear anchor studs for fixing metal deck sheet to floor structural beams conforming to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 19mm diameter and 100mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet etc all complete as per specification.	QUI NT AL	9	0.0014400364 58
B1503	Providing and fixing shear anchor studs for fixing metal deck sheet to roof structural purlins conforming to Type-B studs specified in AWS D1.1/D1.1M or equivalent as shear connector of 16mm diameter and 65mm length manufactured from cold drawn round steel bars conforming to the requirement of ASTM A 29, of grade designation 1010 through 1020, of standard quality with either semi-killed or killed, welded by Drawn Arc Stud Welding through metal deck sheet etc all complete as per specification.	QUI NT AL	7	0.0008460974 34
A1505	Fixing External/ Inner sheet of Permanent colour coated metal cladding / roofing with troughed M.S. sheets of minimum 0.5 mm bare metal thickness of min. grade G350 as per AS1397/grade SS340 class 4 or as per ASTM A792M/ grade S350 GD as per EN 10326 with zinc coating to class Z275 / aluminium zinc alloy coating to class AZ150 on both sides including fixing to supports / rails by concealed fixing system, corrosion resistant self tapping / self drilling type fasteners with suitable cap, flashing, etc. all complete over columns, beams, bracings etc. at all levels. The exposed face the sheet shall be permanently coated with silicon modified polyester (SMP silicon content 30%-50%) paint or super polyester paint of minimum 20 micron DFT on exposed surface over primer coat of minimum 5 micron and minum 10 micron SMP or super polyester paint over primer coat of minimum 5 micron on other face. SMP	MT	17	0.0015123985 78

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
	and polyster paint system shall be of industrial finish of product type 4 of AS/NZ2728.			
A1519	Fixing Factory made (Continuous Line) prefabricated sandwiched Permanent colour coated metal cladding comprising top sheet as troughed (minimum depth of trough shall be 30 mm) permanently colour coated sheet & bottom sheet as plain permanently colour coated for covering of exposed metal/concrete / brick surfaces with insulation shall be of Polyurethane type of minimum 50mm thick (excluding trough). The polyurethane shall be Chlorofluorocarbon (CFC) free and self-extinguishing and shall conform to IS 12436: 1988. It shall have Modular Density 40 +/- 2 Kg/m ³ and Thermal Conductivity @ 10 Deg.C 0.017 - 0.020 W/M K, Water absorption (% by vol) 3.1, Critical Oxygen Index 23 and Compressive Strength 1.2 Kg/sq.cm, sandwiched between the two sheets, each sheet shall be high strength tensile steel sheet 0.5mm bare metal thickness (minimum) of YS350 as per IS 15961 /grade G350 as per AS1397 / grade SS340 class 4 as per ASTM A792M / grade S350GD as per EN 10326 with zinc coating to class Z 275 / aluminium-zinc alloy coating to class AZ150 on both sides, both sheet shall be permanently coated with silicon modified polyester (SMP with silicon content of 30% to 50%) paint of minimum 20 micron DFT on exposed surface on 5 microns (min.) epoxy primer/phosphate primer coat and 10 micron (min.) SMP on 5 micron (min.) epoxy primer/phosphate primer on other face, SMP paint system shall be of industrial finish of product type 4 of AS/NZS 2728, troughed sheet shall be of approved profile, sectional properties, (suitable for the specified loading /	MT	24	0.0021435940 94

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
	deflection and purlins / runner spacing), colour and shade, at all levels, including all labour, materials, equipment, handling, transportation, special coated fastener conforming to corrosion resistant Class 3 of AS3566 and tested for 1000 hours salt spray test, fixing insulated sandwiched metal sheet with the structural members below for supporting the sheeting system, scaffolding, equipment, end and side laps, cutting of openings, preparation of working drawings, testing, etc., all complete, as per specifications. Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non stainless material and be flexible enough not to interface with fit of the sheets. Coated surface shall be provided with a protected guard film (polyethylene) of about 40 microns to avoid any damage to the coating during handling. Overlap shall be min. 100 mm or as specified by manufacturer.			
2300	STRUCTURAL WORKS: Structural steel works including all labour, material (unless otherwise specified in BOQ/contract specification), equipments unless otherwise specified, transportation, handling etc. at all level as per specification, drawings and as directed by engineer - in - charge.			
A2301	Site transportation from BHEL store and erection (field connections will be bolted type unless stated otherwise) of Medium and High Tensile structural steel (Grade designation E350 (unless stated otherwise) Quality B0 (Fully killed), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel member/materials to store etc all complete.	MT	3906	0.3491208693 69

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-XXIII : Bill of Quantities and % Weightage of Individual Items

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
B2301	Site transportation from BHEL Store and erection (field connections will be bolted type unless stated otherwise) of Mild steel (Grade designation E250 (unless stated otherwise) Quality A/BR (Semi killed/killed) for Rolled section and B0 for plates (shall be tested for impact resistance at Room temperature), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete.	MT	1674	0.149623229730
C2301	Site Transportation from BHEL Store and erection of Medium and High Tensile structural steel (Grade designation E350 Quality B0 (Fully killed), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete.	MT	240	0.021451359101

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
D230 1	Site Transportation from BHEL Store and erection of Mild steel (Grade designation E250 Quality A/BR (Semi killed/killed) for rolled section and B0 for plates (shall be tested for impact resistance at Room temperature), conforming to IS 2062. Alignment, erection bolts & nuts (weight of erection bolts, nuts and welds not payable), assembly, rectification and correction of defective welding works, production test plate, inspection and testing, erection scheme, protection against damage in transit, stability of structures, installation of temporary structures, setting column bases, surface preparation by means of manual or mechanical power tools as per IS:1477 part 1, touch-up painting, rectification, dismantling and removal of all temporary structures (weight of temporary structures not payable), return of surplus / waste steel materials to store etc all complete.	MT	480	0.0429027182 02
2307	Supplying, fabrication, erection and alignment of factory made electroforged galvanised grating units with mild steel having minimum galvanisation conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. including fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.	0	0	
a	Minimum galvanisation of 610 g/sqm	MT	78	0.0511593782 34
2308	Supplying, fabrication, erection and alignment of factory made galvanised welded grating units(minimum 610 g/sqm galvanisation) with mild steel conforming to IS:2062 in flooring, platforms, drain and trench covers, walk-ways, passages, staircases with edge binding strips and anti-skid nosing in treads etc. fixing clamps, fittings, fixtures, all taxes, duties, packing, grinding, drilling, welding, edge preparation, etc. all complete.	MT	1	0.0002681648 44
2311	Providing and fixing in position of permanent mild steel bolts (class 4.6 as per IS : 1367 and grade 'C' as per IS: 1363) and nuts, washers etc. up to and inclusive of 39 mm diameter and upto 300mm long for structural steel work etc all complete.	KG	558	0.0003216040 40

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-XXIII : Bill of Quantities and % Weightage of Individual Items

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
2312	Providing and fixing in positing of high strength structural bolts (of property class 8.8 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	KG	1116 00	0.0937087632 62
A2312	Providing and fixing in positing of high strength structural bolts (of property class 10.9 and product grade `C' as per IS: 1367) and conforming to IS: 3757 and high strength structural hardened and tempered nuts (of property class `8' as per IS:1367) conforming to IS:6623 with hardened and tempered washers as per IS:6649 etc. up to and inclusive of 39 mm diameter and upto 300 mm long for structural steel work etc all complete.	KG	1116 00	0.1161988664 45
2313	Dismantling of steel structure, lowering of material and carriage of the dismantled material up to field fabrication shop / projects storage including temporary dismantling, cutting, re-welding, supporting, and restoring to correct position all temporarily dismantled members, re-alignment of all adjacent connected members to their correct positions (weight of such adjacent members and temporarily dismantled members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	MT	28	0.0011896577 02
2314	Addition to, alterations in and/or modification of "Erection Marks" including cutting of parts, gauging of welds, cutting, grinding, fabrication, welding, drilling holes, straightening, removal of bends, raising to the required level, painting, transportation, return of unutilised steel pieces to the project store, temporarily dismantling, cutting, re-welding, supporting and restoring to correct position of all the temporarily dismantled members, realignment of adjacent connected members (weight of such temporarily dismantled and adjacent members not payable) etc all complete for the following:	0	0	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-XXIII : Bill of Quantities and % Weightage of Individual Items

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
a	In erected position	MT	28	0.0031646855 05
b	In fabrication yard	MT	28	0.0025211196 91
2315	Re-erection of dismantled fabricated structural steel members including carriage of modified "Erection Marks" from the field fabrication shop to erection site, lifting to required position, aligning in position, tack welding, final welding and touch up painting including temporary dismantling and re-erection of temporarily dismantled members, cutting, rewelding, supporting and restoring to the correct position of all temporarily dismantled members, re-alignment of adjacent connected members (weight of such temporarily dismantled members and adjacent members not payable), scaffolding, staging, tools & tackles, gas cutting, welding, consumables etc all complete.	MT	28	0.0018241320 71
A2317	Supply, fabrication and erection of minimum 4 mm thick stainless steel liner conforming to ASTM A 240 S304 (Type 304) ; With Mill Finish Grade 2B (Cold rolled, Annealed & Pickled and Skin passed) on M.S. plate for inside surfaces of hopper & mouth of hopper of bunkers including fixing with stainless steel studs, bolting (including countersunk), welding with electrode classification E308L for welding of stainless steel to stainless steel and E309 for stainless steel to mild steel, fabrication detailed drawing etc.all complete. (The measurement for the item of stainless steel liner in hopper shall be based on the actual finished weight of SS liner over hopper)	MT	76	0.1432208598 48
A2318	Providing and fixing in position PTFE type sliding bearings of reputed manufacturer for required vertical load and end displacement/rotation as per approved construction drawings. PTFE bearing shall be sliding against highly polished stainless steel and the coefficient of friction between them shall be less than 0.06 at 55 kg/sq.cm. In order to prevent cold flow in PTFE surface it shall be rigidly bonded by a special high temperature resistance adhesive to the stainless steel substrata. The stainless steel surface that slides against the PTFE is	0	0	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
	mirror polished. The stainless steel shall be bonded to the top plate by special high strength adhesive. The thickness of stainless steel plate shall be between 1.0 mm to 1.5 mm.			
c	40 Tons	EA CH	3	0.0003654117 09
d	50 Tons	EA CH	3	0.0004000226 00
e	60 Tons	EA CH	2	0.0003042936 26
f	100 Tons	EA CH	4	0.0006863350 58
A2319	Providing and fixing preformed flexible open ended bellow strap of neoprene of minimum thickness 2 mm and minimum width 200 mm under un-stretched condition with aluminium stripped edges as sealing below top of bunker and bottom of tripper floor to avoid the coal dust nuisance all complete.	RM	276	0.0055250429 25
2322	Supply, fabrication and fixing of GI pipe hand railing (900 mm high) of 32 mm/40 mm dia (Medium Grade) including transportation, loading/unloading, painting etc. all complete.	MT	7	0.0046732304 46
2323	Conducting radiography test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	RM	28	0.0008255338 40
2324	Conducting ultasonic test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	RM	28	0.0001509444 25
2325	Conducting ultasonic test on steel plates as per ASTM-A435 or equivalent wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	SQ M	56	0.0001402322 40
2326	Conducting magnetic particle test on welds wherever specified including equipments, measuring devices, gauges, test report etc. all complete.	RM	28	0.0001083739 23

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-XXIII : Bill of Quantities and % Weightage of Individual Items

Section B: Bunker and Allied work		UO M	Qty	Weightage/ Factor "X"
2327	Conducting dye penetration test on welds wherever specified by the engineer including provision of necessary equipments, measuring devices, gauges etc. all complete (over and above the work already specified in the specifications.)	RM	28	0.0001125475 02

Section-C: Mobilisation of special resources

Section C

		UOM	Qty. A	Weightage/ Factor "X"	UNIT RATE (Rs.) B	AMOUNT (Rs.) C = A * B
	Deployment of Requisite Manpower as mentioned below at site, within 15 days, as and when intimated by BHEL. This deployment shall be over and above the requirement as per Contractual clause. The deployed manpower shall report to BHEL and may be deployed at any location. BHEL shall make payment on pro rata monthly basis on actual deployment (considering 26 working days in a month). In case the contractor does not deploy or delays deployment of above said manpower with reference to specific instructions from BHEL, BHEL will levy penalty of Rs. 100 per service day, for such delay					-
1.0	Engineer / Supervisor	Manmonth	128	FIXED VALUE	50,000	6,400,000
2.0	Computer operator (Skilled)	Manmonth	64	FIXED VALUE	27,000	1,728,000
3.0	Service Staff (Semi Skilled)	Manmonth	64	FIXED VALUE	22,000	1,408,000
4.0	Safety officer (Skilled)	Manmonth	64	FIXED VALUE	27,000	1,728,000
5.0	Quality Officer (Skilled)	Manmonth	64	FIXED VALUE	27,000	1,728,000

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

Execution/Mobilisation of special resources (PVC Shall Not be applicable on Section C)					12,992,000
--	--	--	--	--	-------------------

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.

Instructions to the bidders

Modality of Award:

- Step-1: Package A shall be awarded to L-1 Bidder, with acceptable L-1 rates to BHEL.
- Step-2: For the award of Packages B:
Finalized L-1 rates shall be counter offered to the other bidders in the order of Price Competitiveness (i.e. L-2, L-3 and henceforth). The bidder accepting the L1 rates shall be considered for awarding of Package B. The unit rates of Package A as derived from L-1 rates shall be applicable for unit rates of Package B and accordingly Total awarded value of Package B shall be calculated.
- In case, none of the bidders agrees to match the finalized L-1 rates for particular package, then BHEL, at its discretion, may consider award of that Package to L1 bidder or 'BHEL reserves the right not to award the particular package/s'.

1. Schedule of Rates and Quantities consist of the followings:
 - (i) Section-A: E&C of Boiler & Auxiliaries
 - (ii) Section-B: Bunker & allied works
 - (iii) Section-C: Mobilisation of special resources
2. **Bidders to quote Total Price for Section-A & Section-B of Package A in Rupees in VOL-II-Price-Bid at BHEL E-procurement Portal.** Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void.
3. Prices for Section-C: Execution/Mobilisation of special resources are already fixed by BHEL.
4. Offer evaluation (L-1, L-2 status) of the bidders shall be done based on the Total Price of **Section-A + Section-B** as quoted in the Volume II Price Bid.
5. Final awarded price shall be based on Total summation of prices of **Section-A + Section-B + Section C.**
6. **Package B shall be awarded in line with modality of award as mentioned in TCC.**
7. BHEL has pre-fixed the Weightage/Factor as detailed above in this chapter for deriving the Unit Rates. By multiplying BHEL pre-fixed Weightages / Factor and the total prices derived in sl no. 2

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

above; unit rate of individual items shall be derived. Unit Rate/Item Rate thus arrived shall be rounded off to two decimal places.

8. Based on the quantities of individual item and the item rates arrived, the total amount for individual items shall be derived. Total amount thus derived shall be rounded off to two decimal places.
9. **Bidders to note that Package A & Package B is an item rate contract. Payment shall be made for the actual quantities of work executed at the unit rate arrived above.**
10. LOA for each Package (A & B) shall be issued separately and each Package shall be considered as separate contract with separate contract period (as specified in Chapter-VI "Time Schedule" of TCC), separate start dates and separate contract value etc. All the records of the contracts viz Measurement of work, progress monitoring, monthly review, performance evaluation etc shall be maintained for both the contracts separately. Clause of GCC Viz SD, LD, ORC, PVC, Time Extension, Retention amount, guarantee period, Quantity variation, final bill etc shall be applicable for each individual package/contracts.
11. For the convenience of bidders, BHEL has issued an excel sheet with all the requisite formulae as described above. ***However, the referred excel sheet shall not form part of contract document. Further, this sheet should not be uploaded at the e-Portal.***

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-XXIV : Technical Annexure

THIS TENDER SPECIFICATION CONSISTS OF FOLLWING ANNEXURE:

S.N.	DESCRIPTION
Annexure-1	TnP Hire Charges
Annexure-2	Guidelines for NDE and Heat Treatment Agency
Annexure-3	Painting Schedule
Annexure-4	Labour Colony drawing
Annexure-5	GA Drawings
Annexure-6	Technical Specification – NTPC
Annexure-7	Customer Quality Document
Annexure-8	Approved Vendor List
Annexure-9	Welding Schedule
Annexure-10	Celing girder layout
Annexure-11	Bolt tightening procedure
Annexure-12	Fit bolt concept document
Annexure-13	Minimum wages NTPC Lara

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