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TENDER SPECIFICATIONS

TENDER NO. BHEL/ NR/SCT/ FRK- 6/BLR/557

FOR

“Erection, testing, commissioning and trial operation of Boiler of 1 x 500 MW Unit-6, at Farakka Super Thermal Power Project (FSTPP) at Farakka town of Murshidabad district of West Bengal”

PART I – TECHNICAL BID



Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)



ISO 9001-2000, ISO
14001 and OHSAS
18001 certified
company
SubContract and
Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2515476 / 2515464 / 2515479
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TENDER NO. BHEL/ NR/SCT/ FRK- 6/BLR/557

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S-----

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TENDER NOTICE

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of Erection, testing, commissioning and trial operation of Boiler of 1 x 500 MW, Unit-6 at Farakka Super Thermal Power Project (FSTPP) at Farakka town of Murshidabad district of West Bengal

TENDER NO. BHEL/ NR/SCT/ FRK- 6/BLR/557

QUALIFYING REQUIREMENTS:

1. Tenderers who wish to participate should have executed, during last seven years, works of similar nature covered in this tender, for at least one boiler with capacity of each unit of 195MW or above.

OR

“Should be executing works of similar nature, as covered in this tender, against direct BHEL’s order for a Boiler of 490 MW or above rating.”

2. Party should also have an average annual turnover of minimum of Rs. 22 Crores (Rupees Twenty Two Crores only) during preceding three years (2004-05, 2005-06 & 2006-07) OR (2005-06, 2006-07 & 2007-08). The bidders shall submit audited balance sheets in support of this.
3. Bidders selection is subject to approval of BHEL’s customer for this work i.e M/S NTPC.

NOTES:

- (i) The Tender Documents comprises of following:
 - (a) Special Conditions of Contract (SCC), Tender Notice, Project Synopsis, GCC etc.
 - (b) Rate Schedule
- (ii) Tender Documents with complete details are hosted on BHEL’s web page www.bhel.com. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit Rs.1000/- (Rupees

One thousand only) in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer

- (iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e **upto 30.09.2008** on payment of Rs.1,000/- (non-refundable) either in cash or by crossed demand draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender no. and work.
- (iv) Tenders must be submitted to the undersigned (Room No. 104) at the address given above **latest by 30.09.2008** before opening of technical bids commences. Technical bids shall **be opened at 15.30 Hrs. on 30.09.2008**. Tenders received after the due date & time shall be liable to be summarily rejected.
- (v) Earnest Money Deposit (EMD): Refundable, Non-interest bearing **EMD of Rs 2,00,000/-** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/NOIDA. Those bidders who have already deposited ' One Time 'EMD' of Rs. 2,00,000/- with BHEL, PSNR, NOIDA need not submit EMD with the present tender.
- (vi) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.
- (vii) **All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.**
- (viii) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.
- (ix) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/post.
- (x) Bids, once submitted, shall not be returned.
- (xi) Unsolicited rebate/discount shall not be accepted after bid opening.
- (xii) Purchase Preference will be given to CPSU's as per Govt. Guidelines.

AGM/SCP



ISO 9001-2000, ISO
14001 and OHSAS 18001
certified company
SubContract and
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TENDER NOTICE – NEWS PAPER

LAST DATE OF SALE : 30.09.2008
DATE OF OPENING : 30.09.2008

NIT NO. / NAME OF WORK
<p style="text-align: center;">TENDER NO. BHEL/ NR/SCT/ FRK- 6/BLR/557</p> <p>Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of “Erection, testing, commissioning and trial operation of Boiler of 1 x 500 MW Unit-6, at Farakka Super Thermal Power Project (FSTPP) at Farakka town of Murshidabad district of West Bengal”</p>

NOTES:-

1. Purchase Preference will be given to CPSU as per Govt. Guidelines.
2. Please visit our website at www.bhel.com for complete details of the tender.

AGM/SCP

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)

PROCEDURE FOR SUBMISSION OF SEALED TENDERS:

The tenderers must submit their tenders as required in **two parts** in separate sealed covers **prominently superscribed as Part-I Technical bid and Part-II , Price bid** also indicating on each of the cover tender specification no., date and time as mentioned in tender notice.

TECHNICAL BID (COVER-I)

Except **Price bid Part-II**, complete set of tender document consisting of General conditions of Contract, “Technical specification & Special terms and condition” (Part-I) issued by BHEL shall be enclosed in **Part I Technical Bid only**. All schedules, data sheets and details called for in the specification shall also be submitted along with technical bid. All details / Data / Schedules including offer letter duly signed and stamped are to be **submitted in duplicate**.

PRICE BID (COVER-II)

Tenderers may please note that price bid is **to be submitted only in original copy** of Tender i.e. Price bid (Part-II) issued by BHEL and no duplicate copy of same is required.

These two separate covers i.e. cover I & II shall together be enclosed in a **third envelope (Cover-III)** and this sealed cover shall be superscribed with tender specification No., due date, time and submitted to officer inviting tender as indicated in tender notice on or before due date as indicated.

PROJECT SYNOPSIS

National Thermal Power corporation ltd. has entrusted BHEL for Design, Engineering, Manufacturing, Supply, Installation, Testing and commissioning of Steam Generator, Turbine Generator packages along with their auxiliaries for 1 x 500 MW for Farakka Super Thermal Power Project, Stage-III which is located near Farakka town in Murshidabad district of West Bengal. The Stage-III of the Project shall comprise of one (1) unit of 500 MW. Stage-I & Stage-II of the project comprises of three (3) units of 210 MW each and two (2) units of 500MW each are presently under commercial operation. The ultimate capacity of the project will be 2130 MW (Stage-I, 3x210 MW + Stage-II, 2x 500 MW + Stage-III, 1X500 MW).

The nearest railhead New Farakka Railway Station of Eastern Railway is approximately 2.0 km away from the project site. Maldah is the nearest major towns located within 50Km distance from the project site. The nearest commercial airport is Kolkata and located at a distance of approximately 300-km. New Farakka Railway station is around 300 Km away from Howrah.

SECTION- I

GENERAL INSTRUCTIONS TO TENDERERS

1. This tender specification as a whole, furnishing all the details and other documents as required in the following pages, shall be duly signed and sent in a sealed cover (IN DUPLICATE) super-scribing the name of work as given in the tender notice.
2. The tender shall be addressed to : OFFICER INVITING TENDER AS INDICATED IN THE TENDER NOTICE.
3. Tenders submitted by post shall be sent as "**REGISTERED/ SPEED/ COURIER POST**" and shall be posted with due allowance for any postal delay. The tenders received after the due date and time of opening are liable to be rejected. Offers received by Telegram/telex/ Fax/ E-mail/ Internet may be considered as per terms of NIT.
4. Tenders shall be opened at the time and date as specified in the tender notice in the presence of such of those tenderers or their authorised representatives who may be present.
5. The tenderers shall closely peruse all the clauses, specifications and drawings indicated in the Tender Documents before quoting. Should the tenderer have any doubt about the meaning of any portion of the Tender Specifications or find discrepancies / omission in the Drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, scope of work etc., he shall atonce contact the authority inviting the tender for clarification before the submission of the tender.
6. Before tendering, the tenderers are advised to inspect the site of work and the environments and be acquainted with the actual working and other prevalent conditions, facilities available, position of material and labour. No claim will be entertained later on grounds of lack of knowledge.
7. Tenderer must fill up all the schedules and furnish all the required information as per the instructions given in various sections of the tender specification. Each and every page of the Tender Specification must be SIGNED, STAMPED AND SUBMITTED ALONG WITH THE OFFER by the Tenderer in token of complete acceptance thereof. The information furnished shall be complete by itself.
8. The tenderer shall quote the rates in English Language and international numerals. These rates shall be entered in figures as well as in words. In case of difference in rates between words and figures THE LESSER OF THE TWO will be treated as valid rate. For the purpose of tender, the metric system of units shall be used.
9. All entries in the tender shall either be typed or be written in ink. Erasure and over writings are not permitted and may render such tenders liable to summary rejection. All cancellations and insertions shall be duly attested by the tenderer.
10. **QUALIFICATIONS OF TENDERERS** : Only tenderers who have previous experience in the work of this nature and description detailed in this tender specification are expected to quote for this work. Offers from tenderers who do not have proven and established experience in the field are not likely to be considered.

- 11 **DATA TO BE ENCLOSED** : Full information shall be given by the tenderer in respect of the following. Non submission of these information may lead to rejection of the offer.
- 11.1 **FINANCIAL STATUS** : Financial viability as per proforma enclosed at **ANNEXURE-`A`**
- 11.2 **INCOME TAX CERTIFICATES** : A Certificate of Income tax clearance from the appropriate authority in the forms prescribed therefor duly indicating annual turnover. These certificates shall be valid for one year from the date of issue or for the period prescribed therein for all tenders submitted during the period.
- 11.3 **PREVIOUS EXPERIENCE** : A statement giving particulars (duly supported by documentary evidence) of the various service rendered in progress for each similar works by the tenderer indicating the particulars and value of each work, the site location, the duration, date of completion etc., strictly as per proforma enclosed at **ANNEXURE-B**.
- 11.4 **ORGANISATION CHART** : The organisation pattern that are totally available with him and that will be employed by the tenderer for this work in the form of monthwise and categorywise deployment plan duly indicating the number of Engineers, Supervisors, skilled and unskilled workers etc., as per proforma enclosed at **ANNEXURE-`C`**.
- 11.5 An attested copy of the **Power of Attorney**, in case the tender is signed by an individual other than the sole Proprietor, shall also be attached.
- 11.6 **IN CASE OF AN INDIVIDUAL** : His full name, experience, address and nature of business.
OR
- IN CASE OF PARTNERSHIP FIRMS** : The names of all the partners with addresses and their experience. A copy of the partnership deed/ instrument of Partnership duly certified by a Notary Public shall be enclosed.
OR
- IN CASE OF COMPANIES** : Date and place of registration including date of commencement certificate in case of public companies and the nature of business carried or by the Company. Certified copies of memorandum and Articles of Association are also to be furnished. Also indicate names, addresses and experience of the Directors.
- 11.7 A list of tools and tackles (including cranes, tractor-trailers, winches, Derricks, welding sets etc., wherever applicable) that the tenderer is having and those that will be deployed on this job as per proforma enclosed at **ANNEXURE-`D`**.
- 11.8** Analysis of unit rate quoted as per proforma enclosed at **ANNEXURE-`E`**.
- 11.9 Declaration sheet as per proforma enclosed at **ANNEXURE-`F`**.
- 11.10 In addition to the above, the particulars required elsewhere in tender documents.
- 11.11 Checklist and schedule of general particulars duly filled in, signed and stamped as per **ANNEXURE-`G`**.

NOTE : In terms of clauses 11.1 to 11.11 above, all the data required to be enclosed with the tender need to be furnished neatly typed, signed and stamped in the given formats only (in the

form of separate sheets) failing which the tender may be considered as incomplete and is liable for rejection. Documentary proofs wherever necessary also need to be enclosed.

- 12 **EARNEST MONEY DEPOSIT** : Every tender must be accompanied by the prescribed amount of Earnest Money Deposit in any one of the following forms.

NOTE : Bank Guarantee, Cheques, Currency Notes, Money Orders or Postal Orders will not be accepted.

- 12.1 **Cash(As permissible under Income Tax Act)** : The amount should be remitted by the party to the Cashier of Bharat Heavy Electricals Limited and cash receipt issued by him shall be enclosed alongwith the tender.

12.2 Pay Order or Demand Draft in favour of Bharat Heavy Electricals Limited, Noida.

12.3 Tenders received without Earnest Money in full in the manner prescribed above will not be considered.

12.4 The Earnest Money Deposit of the successful tenderer will be retained towards part of Security Deposit.

12.5 In the case of unsuccessful tenderers, the Earnest Money will be refunded normally within fifteen days of acceptance of award of work by the successful tenderer.

12.6 BHEL reserves the right of **forfeiture of Earnest Money deposit** in case the successful tenderer,

(a) After opening of Tender, revokes his tender within the validity period or increases his earlier quoted rates.

(b) Does not commence the work within the period as per LOI/Contract. In case the LOI/Contract is silent in this regard then within 15 days after award of contract.

12.7 EMD shall not carry any interest.

12.8 Tenderers, who so ever desires, may deposit one time Earnest Money Deposit of Rs. 2,00,000/- in cash(**As permissible under Income Tax Act**) /DD/pay order only with the cashier of BHEL. Tenderers who furnish one time EMD as above, will not be required to furnish EMD time and again alongwith their tenders submitted to BHEL/ PSNR. However they will be required to indicate the cash receipt No. and date of one time EMD in all their tenders.

13 **AUTHORISATION AND ATTESTATION** : Tenders shall be signed by persons duly authorised / empowered to do so. Certified copies of such authority and relevant documents shall be submitted alongwith the tenders.

14 **VALIDITY OF OFFER** : *THE OFFER SHALL BE KEPT OPEN FOR ACCEPTANCE FOR A MINIMUM PERIOD OF SIX MONTHS FROM THE DATE OF OPENING OF TENDERS.* In case Bharat Heavy Electricals Limited calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenderers.

15 **EXECUTION OF CONTRACT** :The successful tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent by Bharat Heavy Electricals Limited.

The successful tenderer shall be required to execute an agreement in the prescribed form as per **ANNEXURE-'I'** with the BHEL within a reasonable time after the acceptance of his tender and in any case before submitting the first bill for payment.

- 16 **SECURITY DEPOSIT** : Upon acceptance of tender, the successful tenderer must deposit the required amount of security deposit within the time specified in the Letter of Intent for satisfactory completion of work.
- 16.1 The total amount of Security Deposit shall be as follows :
- (a) In case of work costing upto 10 lakhs : 10% of the contract value.
 - (b) In case of work costing above Rs 10 lakhs and upto Rs 50 lakhs : 1 Lakh + 7.5 % of the amount exceeding Rs. 10 Lakhs.
 - (c) In case of work costing more than Rs 50 lakhs : 4 Lakhs + 5 % of the amount exceeding Rs. 50 Lakhs.
- 16.2 The Security Deposit will be deposited within 15 days from the date of issue of Letter of Intent but before start of work in any one of the following forms :-
- (a) The total Security Deposit as indicated in the Letter of Intent in **cash** (As permissible under Income Tax Act).
 - (b) Pay Order, Demand Draft in favour of BHEL.
 - (c) Local cheques of scheduled banks, subject to realization.
 - (d) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc.
(Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).
 - (e) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.
 - (f) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act . The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
 - (g) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and the balance 50% may be recovered from the running bills.
 - (h) EMD of the successful tenderer shall be converted and adjusted against the security deposit.
- 16.3 The security deposit shall not carry any interest.

NOTE: Acceptance of Security Deposit against Sl. No. (d) and (f) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

- 16.4 Security deposit shall not be refunded to the contractor except in accordance with the terms of the contract.
- 16.5 The validity of the Bank Guarantee furnished towards Security Deposit under (e) above shall be upto the period of completion of work as stipulated in the Letter of Intent + 1 month and the same will be kept valid by proper renewal till the satisfactory completion of the Guarantee Period.
- 16.6 If the value of the work done at any time exceeds the accepted agreement value, the Security Deposit shall be correspondingly enhanced and the extra Security Deposit shall be immediately deposited by the Contractor or recovered from payments due to him.
- 16.7 Failure to deposit the Security Deposit within the stipulated time, may lead to forfeiture of Earnest Money Deposit and Cancellation of the award of work.
- 16.8 If any part of Security Deposit of the Contractor is held in the form of approved securities, it shall be kept transferred in the name of Bharat Heavy Electricals Limited, in such a manner that the same can be realised fully without referring to the Contractor. BHEL shall not be responsible for any depreciation in the value of the Security while in BHEL's custody or for any loss of interest thereon.
- 16.9 BHEL reserves the right of **forfeiture of Security Deposit** in addition to other claims and penalties in the event of the contractor's failure to fulfil any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit, against any claims of any other contracts with BHEL.
- 16.10 **RETURN OF SECURITY DEPOSIT** : If the contractor fully performs and completes the work in all respects to the entire satisfaction of BHEL and presents an absolute "**No Demand Certificate**" in the prescribed form and returns properties belonging to BHEL taken, borrowed or hired by him for carrying out the said works, half the amount of Security Deposit will be released to the contractor after deducting all costs, expenses and other amounts that are to be paid to BHEL under this or other contracts entered into with the Contractor. It may be noted that in no case the Security Deposit shall be refunded / released prior to passing of final bill. Balance half of the amount of Security Deposit will be released only after the Guarantee Period is over.

NOTE : All the BGs are to be submitted as per BHEL/PSNR performa.

- 17 **No interest** shall be payable by BHEL on Earnest Money Deposit, Security Deposit or on any moneys due to the contractor.
- 18 **REJECTION OF TENDER AND OTHER CONDITIONS:**
- 18.1 The acceptance of Tender will rest with BHEL which does not bind itself to accept the lowest tender or any tender and reserves to itself full rights for the following without assigning any reasons whatsoever.
- (a) To reject any or all of the tenders.
- (b) To split up the work amongst two or more Tenderers.
- (c) To award the work in part.

- (d) In either of the contingencies stated in (b) and (c) above to modify the time for completion suitably.
- 18.2 Conditional and un-witnessed tenders, tenders containing absurd or unworkable rates and amounts, tenders which are incomplete or otherwise considered defective and tenders not in accordance with the tender conditions, specifications, etc., are liable to be rejected.
- 18.3 If a tenderer expires after the submission of his tender or after the acceptance of his tender, BHEL may at its discretion, cancel such tender. If a partner of a firm expires after the submission of the tender or after the acceptance of the tender, BHEL may cancel such tender at its discretion unless the firm retains its character.
- 18.4 BHEL will not be bound by any Power of Attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. BHEL may, however, recognise such Power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.
- 18.5 If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract, if awarded and forfeit the Earnest Money/ Security Deposit/ any other moneys due.
- 18.6 Canvassing in any form in connection with the tender is strictly prohibited and the tenders submitted by the contractor who resorts to canvassing are liable to be rejected.
- 18.7 Should a tenderer or contractor or in the case of a firm or Company of contractors/ one or more of its Partners/ share holders / Directors have a relation or relations employed in BHEL, the authority inviting tender shall be informed to the fact alongwith the offer, failing this BHEL may, at its sole discretion reject the tender or cancel the contract and forfeit the Earnest Money/ Security Deposit
- 18.8 The successful tender should not sub-contract the part or complete work detailed in the tender specification without written permission of BHEL. The tenderer is solely responsible to BHEL for the work awarded to him.
- 18.9 **NO DEVIATIONS** to the tender conditions will normally be accepted. however, if the tenderer insists for certain deviations to the conditions, financial implication thereof shall be loaded to the quoted price for evaluating the tenderer's offer.

SECTION - II

GENERAL TERMS AND CONDITIONS

- 19.0 The following terms and expressions shall have the meaning hereby assigned to them except where the context otherwise requires.
- 19.1 **BHEL** (or B.H.E.Ltd.) shall mean Bharat Heavy Electricals Limited, a Company registered under the Indian Companies Act, 1956, with its Registered Office at BHEL HOUSE, SIRI FORT, NEW DELHI-110049 or its authorised officers or its Engineer or other employees authorised to deal with any matters with which these persons are concerned, on its behalf.
- 19.2 **`GENERAL MANAGER'** shall mean the Officer in Administrative charge of the contracting Unit of BHEL.
- 19.3 **`ENGINEER' or `ENGINEER-IN-CHARGE'** shall mean Engineer deputed by BHEL. The terms includes Deputy General Manager, Construction Manager, Resident Manager, Site Engineer, Resident Engineer and Assistant Site Engineer of BHEL at the site as well as the officers in charge at Head Office.
- 19.4 **`SITE'** shall mean the place or places at which the plants/ equipment are to be erected and services are to be performed as per the specifications of this Tender.
- 19.5 **`CLIENTS OF BHEL' or `CUSTOMER'** shall mean the project authorities to whom BHEL is supplying the equipment.
- 19.6 **`CONTRACTOR'** shall mean the individual, firm or company who enters into contract with BHEL and shall include their executors, administrators, successors and permitted assigns.
- 19.7 **`CONTRACT' or `CONTRACT DOCUMENT'** shall mean and include the agreement, the work order, the accepted appendices of rates, Schedules of Quantities, if any, General Conditions of Contract, Special Conditions of Contract, Instructions to Tenderers, the drawings, the technical specifications, the special specifications, if any, the tender documents and the Letter of Intent/ Acceptance letter issued by BHEL. Any conditions or terms stipulated by the tenderer in the tender documents or subsequent letters shall not form part of the Contract unless specifically accepted in writing by BHEL in the Letter of Intent and incorporated in the Agreement.
- 19.8 **`GENERAL CONDITIONS OF CONTRACT'** shall mean the `Instructions to Tenderers' and `General Conditions of Contract' pertaining to the work detailed.
- 19.9 **`TENDER SPECIFICATIONS'** shall mean the Special Conditions, Technical Specifications, appendices, Site information and drawings pertaining to the work for which the tenderers are required to submit their offer. Individual Specifications Number will be assigned to each tender specifications.
- 19.10 **`TENDER DOCUMENTS'** shall mean the General Conditions of Contract (19.8) and Tender Specifications (19.9).
- 19.11 **`LETTER OF INTENT'** shall mean the intimation by a letter / telegram / telex / fax to the tenderer that the tender has been accepted in accordance with provisions contained in the

letter. The responsibility of the contractor commences from the date of issue of this letter and all the terms and conditions of contract are applicable from this date.

- 19.12 **`COMPLETION TIME'** shall mean the period by date specified in the Letter of Intent or date mutually agreed upon for handing over the erected equipment/ plant which are found acceptable by the Engineer being of required standard and conforming to the specifications of the Contract.
- 19.13 **`PLANT'** shall mean and connote the entire assembly of the plant and equipment covered by the Contract.
- 19.14 **`EQUIPMENT'** shall mean all equipment, machineries, materials, structurals, electricals and other components of the plant covered by the Contract.
- 19.15 **`TESTS'** shall mean and include such test or tests to be carried out by the contractor as are prescribed in the Contract or considered necessary by BHEL in order to ascertain the quality, workmanship, performance and efficiency of the contracted work or part thereof.
- 19.16 **`APPROVED', `DIRECTED' or `INSTRUCTED'** shall mean approved, directed or instructed by BHEL.
- 19.17 **`WORK' or `CONTRACT WORK'** shall mean and include supply of all categories of labour, specified consumables, tools and tackles required for complete and satisfactory site transportation, handling, stacking, storing, erecting, testing and commissioning of the equipment to the entire satisfaction of BHEL.
- 19.18 **`SINGULAR' and `PLURAL'** etc. Words carrying singular number shall also include plural and vice versa where the context so requires. Words importing masculine gender shall be taken to include the feminine gender and words importing persons shall include any Company or Association or Body of Individuals, whether incorporated or not.
- 19.19 **`HEADINGS'** The headings in these General Conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or the contract.
- 19.20 **`MONTH'** shall mean calendar month.
- 19.21 **`WRITING'** shall include any manuscript, type written or printed statement under the signature or seal as the case may be.
- 20 **LAW GOVERNING THE CONTRACT AND COURT JURISDICTION:** The Contract shall be governed by the Law for the time being in force in the Republic of India. The Civil Court at Delhi/ New Delhi, having ordinary Original Civil Jurisdiction shall alone have exclusive jurisdiction in regard to all claims in respect of this Contract.
- 21 **ISSUE OF NOTICE** The Contractor shall furnish to the Engineer, the name, designation and address of his authorised agent and all complaints, notices, communications and references shall be deemed to have been duly given to the Contractor, if delivered to the Contractor or his authorised agent or left at or posted to the address either of the contractor or his authorised agent and shall be deemed to have been so given in the case of posting on the day on which they would have reached such address in the ordinary course of post or at which they were so delivered or left.

22 **USE OF LAND** No land belonging to BHEL or its customer under temporary possession of BHEL shall be occupied by the Contractor without the written permission of BHEL.

23 **COMMENCEMENT AND COMPLETION OF WORK**

23.1 The contractor shall commence the work within the time indicated in the Letter of Intent and shall proceed with the same with due expedition without delay.

23.2 If the successful tenderer fails to commence the work within the stipulated time, BHEL, at its sole discretion, will have the right to cancel the contract. His Earnest Money and/ or Security Deposit will stand forfeited without any further reference to him without prejudice to any and all of BHEL's other rights and remedies in this regard.

23.3 All the works shall be carried out under the direction and to the satisfaction of BHEL.

23.4 The transported equipment, erected /constructed plant or work performed under the Contract, as the case may be, shall be taken over when it has been completed in all respects and/or satisfactorily put into operation at site.

24 **MEASUREMENT OF WORK AND MODE OF PAYMENT**

24.1 All payments due to the contractor shall be made by `Account Payee' Cheques.

24.2 For progress/ running bill payments, the contractor shall present detailed measurement sheets in triplicate duly indicating all relevant details based on technical documents and connected drawings for the work done during the month/ period under different categories in line with terms of payment as per Letter of Intent. The basis of arriving at the quantities/ weights shall be the relevant documents and drawings released by BHEL. These measurement sheets shall be prepared jointly with Engineer and signed by both the parties.

24.3 These measurement sheets will be checked by the Engineer and quantities and percentages eligible for payment under different groups shall be decided by him. The abstract of quantities and percentages so arrived at based on the terms of payment shall be entered in the **Measurement Book and signed by both the parties.**

24.4 Based on the above quantities, contractor shall prepare the bills in the prescribed proforma and work out the financial value. These will be entered in the Measurement Book and signed by both the parties. Payment shall be made by BHEL after effecting the recoveries due from the contractor.

24.5 All recoveries due from the contractor for the month / period shall be effected in full from corresponding running bills unless specific approval from Competent authority is obtained to the contrary.

24.6 Measurement shall be restricted to that quantity for which it is required to ascertain the financial liability of BHEL under this contract.

24.7 Measurement shall be taken jointly by persons duly authorised by BHEL and the Contractor.

- 24.8 The Contractor shall bear the expenditure involved, if any, in making the measurements and testing of materials to be used/ used in the work. The Contractor shall, without extra cost to BHEL, provide all the assistance with appliances and other things necessary for measurement.
- 24.9 If, at any time due to any reason whatsoever, it becomes necessary to re-measure the work done, in full or in part, the expenses towards such remeasurement shall be borne by the Contractor.
- 24.10 ***Passing of bills covered by such measurements does not amount to acceptance by BHEL of the completion of the work measured. Any left out work has to be completed by the Contractor, as directed.***
- 24.11 Final measurement bill shall be prepared in the proforma prescribed for the purpose, based on the certificate issued by the Engineer that the entire work as stipulated in the tender specifications has been completed in all respects to the entire satisfaction of BHEL. The Contractor shall give unqualified 'No Claim' and 'No Demand' certificates. All the tools and tackles loaned to him should be returned in condition satisfactory to BHEL. The abstract of final quantities and financial values shall also be entered in the Measurement Book and signed by both the parties. The final bill shall be paid within a reasonable time after completion of the work. After the payment of final bill, only the guarantee obligation percentage value shall remain unpaid which shall be released in accordance with clause 32.

25 RIGHTS OF BHEL

BHEL reserves to itself the following rights in respect of this contract without entitling the contractor to any compensation.

- 25.1 To get the work done through another agency at the risk and cost of the contractor, in the event of poor progress or the contractor's inability to progress the work for completion as stipulated in the contract, poor quality of work, persistent disregard of instructions of BHEL, assignment, transfer, subletting of the contracted work without written permission of BHEL, non-fulfillment of any contractual obligations etc. and to claim / recover compensation for such losses from the contractor including BHEL's supervision charges and overheads from Security Deposit/ other dues.
- 25.2 To withdraw any portion of work and / or to restrict / alter quantum of work as indicated in the contract during the progress of work and get it done through another agency and/ or by the departmental labour to suit BHEL's commitments to its customer or in case BHEL decides to advance the completion due to other emergent reasons/ BHEL's obligation to its customer.
- 25.3 To terminate the contract after due notice and forfeit the Security Deposit and recover the loss sustained in getting the balance work done through other agencies in addition to liquidated damages in the event of :
- (a) Contractor's continued poor progress.
 - (b) Withdrawal from or abandonment of the work before completion of the work.
 - (c) Corrupt act of the contractor.
 - (d) Insolvency of the contractor.

- (e) Persistent disregard of the instructions of BHEL.
 - (f) Assignment, transfer, subletting of the contract work without BHEL's written permission.
 - (g) Non-fulfillment of any contractual obligations.
- 25.4 To recover any moneys due from the Contractor from out of any moneys due to the Contractor under this or any other Contract or from the Security Deposit.
- 25.5 To claim compensation for losses sustained including BHEL's supervision charges and overheads in case of termination of contract and to levy liquidated damages for delay in completion of work, at the rate of 1/2% of the contract value per week of delay or part thereof subject to a ceiling **of 10% of the contract value.**
- 25.6 To determine the Contract or to restrict the quantum of work and pay for the portion of work done in case BHEL's contract with its customer is terminated for any reason.
- 25.7 To effect recoveries from any amounts due to the contractor under this or any other contract or in any other form the moneys which BHEL is forced to pay to anybody due to contractor's failure to fulfil any of his obligations.
- 25.8 To restrict or increase the quantity and nature of work to suit site requirements, since the tender specification is based on preliminary documents and quantities furnished therein are indicative and approximate and the rates quoted shall not be subject to revision.
- 25.9 To deploy BHEL's skilled and semiskilled workmen in case of emergency / poor progress/ deficiency in skill on the part of the employees of the contractor and to recover the expenditure on account of the same from the moneys due to the contractor.
- 25.10 While every endeavor will be made by BHEL to this end, BHEL can not guarantee uninterrupted work due to conditions beyond its control. The Contractor will not be entitled to any compensation/ extra payment on this account.
- 25.11 In the event of any dispute of technical nature, the decision of BHEL shall be final and binding on the Contractor.

26 RESPONSIBILITIES OF CONTRACTOR IN RESPECT OF LOCAL LAWS, EMPLOYMENT OF WORKERS, ETC.

The following are the responsibilities of the Contractor in respect of observance of local laws, employment of personnel, payment of taxes etc.:

- 26.1 As far as possible, unskilled workers shall be engaged from the local areas in which the work is being executed.
- 26.2 The contractor at all times during the continuance of this contract, shall in all his dealings with the local labour for the time being employed on or in connection with the work, have due regard to all local festivals, religious and other customs.
- 26.3 The Contractor shall comply with all State and Central Laws, Statutory Rules, Regulations, etc., such as The payment of wages Act, The Minimum Wages Act, The workmen's Compensation Act, The Employer's Liability Act, The industrial Disputes Act, The Employees' Provident Fund Act, Employees' State Insurance Scheme, the Contract Labour

- (Regulations and Abolition Act, 1970) and other Acts, Rules and Regulations for labour as may be enacted by the Government during the tenure of the Contract and having force or jurisdiction at site. The contractor shall give to the local Governing Body, Police and other concerned Authorities all such notice as may be required under law.
- 26.4 The Contractor, in the event of his engaging 20 or more workmen, will obtain independent license under the Contract Labour (Regulations and Abolition Act, 1970) from the concerned authorities based on the certificate (Form-V) issued by the principal employer/ customer.
- 26.5 The contractor shall pay all taxes, fees, license charges, deposits, duties, tolls, royalty, commissions or other charges which may be leviable on account of any of his operations connected with this contract. In case BHEL is forced to make any such payment, BHEL shall recover the same from the contractor either from moneys due to him or otherwise as deemed fit.
- 26.6 While BHEL will pay the **inspection fees of the Boiler/ Electrical** Inspectorate, all other arrangements for the periodical visits of Boiler/ Electrical Inspector to site, inspection certificates etc. will have to be made by the contractor at his cost. The contractor will also meet all expenses in connection with his welder's qualification/ requalification tests etc.
- 26.7 The contractor shall be responsible for the provision of health and sanitary arrangements more particularly described in the Contract Labour (Regulations and Abolition Act, 1970) and safety precautions as may be required for safe and satisfactory execution of the contract.
- 26.8 The contractor shall be responsible for proper accommodation including adequate medical facilities for the personnel employed by him.
- 26.9 The contractor shall be responsible for the proper behavior and observance of all regulations by the staff employed by him.
- 26.10 The contractor shall ensure that no damage is caused to any person / property of other parties working at site. If any such damage is caused, it shall be the responsibility of the contractor to make good the losses and compensate them.
- 26.11 All the properties/ equipment/ components of BHEL/ its customer loaned with or without deposit, to the contractor shall remain the properties of BHEL/ its customer. The contractor shall use such properties for the purpose of execution of this contract. All such properties/ equipment/ components shall be taken to be in good condition unless notified to the contrary by the contractor within 48 hours. The contractor shall return them in good condition as and when required by BHEL/ its customer. In case of non-return, loss, damage, repairs etc., the cost thereof, as may be fixed by the Engineer, will be recovered from the contractor.
- 26.12 It shall not be obligatory on the part of BHEL to supply any tools and tackles or materials other than those specifically agreed to be given by BHEL. However, depending upon availability / possibility, BHEL/ its customer's equipment and other materials may be made available to the contractor on payment of hire charges as fixed by them, subject to the conditions laid down by BHEL/ its customer from time to time. Unless paid in advance, such hire and other charges shall be recovered from out of dues to the contractor or security deposit in one installment.

- 26.13 The contractor shall fully indemnify and keep indemnified BHEL/ its customer against all claims of whatever nature arising during the course of execution of this contract.
- 26.14 In case the contractor is required to undertake any work outside the scope of this contract, the amount payable shall be as may be mutually agreed upon.
- 26.15 Any delay in completion of works or non-achievement of periodical targets, due to reasons attributable to the contractor, will have to be compensated by the contractor either by increased manpower and resources or by working extra hours or more than one shift at no extra cost to BHEL.
- 26.16 The contractor shall execute the work under the conditions usual to such power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate and coordinate with other agencies at project site and proceed in a manner that shall help in the progress of work at site as a whole.
- 26.17 The contractor will be directly responsible for payment of wages to his workmen. A pay-roll sheet giving details of all payments made to the workmen duly signed by the contractor's representative should be furnished to BHEL, if called for.
- 26.18 In case of any class of work for which there is no specification laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer.
- 26.19 No levy, payment or charges made or imposed shall be impeached by reason of any clerical error or by reason of any mistake in the amount levied, demanded or charged.
- 26.20 ***No idle labour charges will be admissible in the event of any stoppage of work resulting in the contractor's workmen being rendered idle due to any reason at any time.***
- 26.21 The contractor shall take all reasonable care to protect the materials and the work till such time the plant / equipment has been taken over by BHEL / its customer.
- 26.22 Contractor shall not stop work or abandon the site for whatsoever reason or dispute, excepting for force majeure conditions. All problems / disputes shall be separately discussed and settled without effecting the progress of work. Stoppage or abandonment of work, other than under force majeure conditions, shall be treated as breach of work of contract and dealt with accordingly.
- 26.23 The contractor shall keep the area of work clean and shall remove the debris etc. while executing day-to-day work. Upon completion of work, the contractor shall remove from the vicinity of work, all scrap, packing materials, rubbish, unused and other materials and deposit them in places specified by the Engineer. The contractor will also demolish all the hutments, sheds, offices, etc. constructed and used by him and shall clean the debris. In the event of his failure to do so, the same will be arranged to be done by the Engineer and the expenses recovered from the contractor.
- 26.24 The contractor shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and timely execution shall be the essence of this contract. The contractor shall be responsible to ensure that the quality, assembly and workmanship conform to the dimensions and clearance given in the drawings and/ or as per the instructions of the Engineer.

26.25 The contractor shall furnish fortnightly labour deployment report indicating the classification and number of workmen engaged, date wise and category wise. Besides, the contractor shall also furnish progress reports on work at regular intervals as required by the Engineer.

27 RESPONSIBILITIES OF CONTRACTOR IN RESPECT OF SAFETY OF MEN, EQUIPMENT, MATERIAL AND ENVIRONMENT.

27.1 All safety rules and codes applied by BHEL and its customer at site shall be observed by the contractor and his workmen without exception. The contractor shall be responsible for the safety of the equipment / material and work to be performed by him and shall maintain all lights, fencing guards, signs etc. or other protections necessary for the purpose. Contractor shall also take such additional precautions as may be indicated from time to time by the Engineer, with a view to prevent pilferage, accidents, fire hazards etc. Suitable number of clerical staff, watch and ward, store keepers to take care of equipment, materials, construction tools and tackles shall be posted at site by the contractor till the completion of the work under this contract. The contractor shall arrange for such safety devices as are necessary for this type of work and carry out the requisite site tests of handling equipment, lifting tools, tackles etc. as per usual standards and practices.

27.2 The contractor shall provide to it's work force and ensure the use of the following personal protective equipment as found necessary and as directed by the authorized BHEL officials.

- (a) Safety Helmets conforming to IS-2925
- (b) Safety Belts conforming to IS-3521
- (c) Safety shoes conforming to IS-1989
- (d) Eye & Face Protection devices conforming to IS-8520 and IS-8940
- (e) Hand & body protection devices conforming to IS-2573, IS-6994, IS-8807 & IS-8519.

27.3 All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, safety nets, ladders, equipment etc. used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item.

27.4 All electrical equipment, connections and wiring for construction power, it's distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carry out all types of electrical works. All electrical appliances including portable electric tools used by contractor shall have safe plugging system to source of power and be appropriately earthed.

27.5 The contractor shall not use any hand lamp energised by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

27.6 Where it becomes necessary to provide and / or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provision and/or storage in accordance with the rules and regulations laid down in the relevant Government Acts,

such as Petroleum Act, Explosives Act, petroleum and Carbides of Calcium Manual of the Chief Controller of Explosives, Government of India etc. Prior approval of the authorised BHEL official at the site shall also be taken by the contractor in all such matters.

- 27.7 The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working, when natural daylight may not be adequate for clear visibility.
- 27.8 In case of a fatal or disabling injury / accident to any person at construction sites due to lapses by the contractor, the victim and / or his / her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and / or his / her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.
- 27.9 In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover the cost of such damages from the payments due to the contractor after holding an appropriate enquiry.
- 27.10 In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from the payments due to the contractor, after notifying the contractor suitably and giving him opportunity to present his case.
- 27.11 If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and / or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized BHEL official, BHEL shall have the right to take the corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.
- 27.12 The contractor shall submit report of all accidents, fires, property damage and dangerous occurrences to the authorized BHEL official immediately after such occurrence, but in any case not later than 12 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. In addition, periodic reports on safety shall also be submitted by contractor to the authorized BHEL official from time to time as prescribed.
- 27.13 During the course of construction, alteration or repairs scrap lumbars with protruding nails, sharp edges etc., and all other debris including combustible scrap shall be kept cleared from working areas, passage ways and stairs in and around site.
- 27.14 Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck or permitted to strike each other violently. When cylinders are transported by powered vehicles, they shall be secured in a vertical position.
- 27.15 The contractor shall be responsible for the safe storage of his radioactive sources.
- 27.16 All the contractor's supervisory personnel and sufficient number of workers shall be trained for fire fighting and shall be assigned specific fire protection duties. Enough number of such trained personnel must be available during the tenure of the contract.
- 27.17 Contractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, erection site, other temporary structures, labour colony area etc. Access to such fire protection equipment shall be easy and kept open at all times. Compliance of the

above requirement under fire protection shall in no way relieve the contractor of any of his responsibility and liabilities to fire accident occurring. In the event fire safety measures are not to BHEL's satisfaction, BHEL shall have option to provide the same and recover the cost plus incidentals from contractor's bills and / or impose penalty as deemed fit by the Engineer.

- 27.18 Before commencing the work, the contractor shall appoint /nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.
- 27.19 If safety record of the contractor in execution of the awarded job is to the satisfaction of Safety Department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job.

28.0 CONSEQUENCES OF CANCELLATION

- 28.1 Whenever BHEL exercises its authority to terminate the contract / withdraw a portion of work under clause 25, the work may be got completed by any other means at the contractor's risk and cost provided that in the event of the cost of completion (as certified by the Engineer which shall be final and binding on the contractor) being less than the contract value, the advantage shall accrue to BHEL. If the cost of completion exceeds the moneys due to the contractor under the contract, the contractor shall either pay the excess amount demanded by BHEL or the same shall be recovered from the contractor. This will be in addition to the forfeiture of Security Deposit and recovery of liquidated damages as per relevant clauses.
- 28.2 In case BHEL completes the work under the provisions of this clause, the cost of such completion to be taken into account for determining the excess cost to be charged to the contractor shall consist of cost of materials purchased and / or labour provided by BHEL with an addition of such percentage to cover supervision and establishment charges as may be decided by BHEL.

29.0 INSURANCE

- 29.1 BHEL / its customer shall arrange for insuring the materials / property of BHEL / its customer covering the risks during transit, storage, erection and commissioning.
- 29.2 It shall be the sole responsibility of the contractor to insure his workmen against risks of accidents and injury while at work as required by the relevant Rules and to pay compensation, if any, to them as per Workmen's Compensation Act. The contractor shall also insure his staff against accidents. The work will be carried out in a protected area and all the Rules and Regulations of BHEL / its client in the Project Area which are in force from time to time will be followed by the contractor.
- 29.3 If due to negligence and/or non-observance of safety and other precautions, any accident / injury occurs to any other persons/ public, the contractor shall pay necessary compensation and other expenses, if so decided by the appropriate authority.
- 29.4 The contractor will take necessary precautions and due care to protect the material, while in his custody from any damage/ loss till the same is taken over by BHEL or customer. For lodging / processing of insurance claim the tractor will submit necessary documents. BHEL will reserve the right to recover the loss from the contractor, in case the damage / loss is due to carelessness / negligence on the part of the contractor. In case of any theft of material under contractor's custody , matter shall be reported to police by the contractor

immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL for taking up with insurance.

- 29.5 If due to negligence/ carelessness on the part of the contractor, any material/ equipment gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserves the right to recover deductible franchise and also unsettled portion of insurance claim amount from the contractor.
- 29.6 If due to negligence/ carelessness on the part of the contractor, any surrounding properties also gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserves the right to recover deductible franchise and to unsettled portion of insurance claim amount from the contractor.
- 29.7 The contractor may note that BHEL T&Ps / IMTEs are not insured. The Contractor will take necessary precautions and due care to protect the same while in his custody from any damage/ loss till the same is handed over back to BHEL. In case the damage / loss is due to carelessness/ negligence on the part of the contractor, the Contractor is liable to get them repair/ replaced immediately and in case of his failure to do so within a reasonable time , BHEL will reserve the right to recover the loss from the contractor.

30.0 STRIKES AND LOCKOUTS

- 30.1 The contractor will be solely responsible for all disputes and other issues connected with his workmen. In the event of contractor's workmen resorting to strike or the contractor resorting to lockout and if the strike or lockout so declared is not settled within a period of one month, BHEL shall have the right to get the erection work executed by employing its own men or through other agencies or both. The cost incurred by BHEL in this regard shall be recovered from the contractor.
- 30.2 For any purpose whatsoever, the employees of the contractor shall not be deemed to be in the employment of BHEL

31.0 FORCE MAJEURE

- 31.1 The following shall amount to force majeure conditions. Acts of God, Act of any Government, War, Sabotage, Riots, Civil Commotion, Police Action, Revolution, Flood, Fire, Cyclone, Earthquake and Epidemic and other similar causes over which the contractor has no control.
- 31.2 If the contractor suffers delay in the due execution of the contract, due to delays caused by force majeure conditions, as defined above, the agreed time for completion of the work covered by this contract shall be extended by a period of time equal to the period of delay, provided that on the occurrence of any such contingency, the contractor immediately reports to BHEL in writing the causes for the delay but the Contractor shall not be eligible for any compensation on this account.
- 32.0 **GUARANTEE** Even though the work will be carried out under the supervision of the Engineer, the contractor will be responsible for the quality of the workmanship and shall guarantee the work done for a period of twelve months from the date of completion of work as certified by the Engineer, and shall rectify, free of cost to BHEL, all defects arising out of faulty erection during the guarantee period starting from the date of completion of rectification. In the event of the contractor failing to repair the defective works within the time specified by the Engineer, BHEL may proceed to undertake the repairs of such

defective works at the contractor's risk and cost, without prejudice to any other rights and recover the same from out of any moneys payable to the contractor or by other legal means.

- 33.0 **ARBITRATION** : All disputes between the parties to the contract arising out of or in relation to the contract, other than those for which the decision of the Engineer or any other person is by the contract expressed to be final and conclusive, shall after written notice by either party to the contract to the other party, be referred to sole arbitration of the General Manager or his nominee. The arbitration shall be conducted in accordance with the provisions of the Arbitration and Reconciliation Act, 1996. The parties to the contract understand and agree that it will be no objection that the General Manager or the person nominated as Arbitrator had earlier in his official capacity to deal directly or indirectly with the matters to which the contract relates or that in the course of his official duties had expressed views on all or any of the matters in dispute or difference. The award of the Arbitrator shall be final and binding on the parties to this contract. In the event of the Arbitrator dying, neglecting or refusing to act or resigning or being unable to act for any reason or his award being set aside by the Court for any reason, it shall be lawful for the General Manager or his successor, as the case may be, either to act himself as the Arbitrator or to appoint another Arbitrator in place of the outgoing Arbitrator in the manner aforesaid. The Arbitrator may, from time to time, with the consent of both the parties to the contract, enlarge the time for making the award. Work under the contract shall be continued during the arbitration proceedings. The venue of the arbitration shall be the place from which the contract is issued or such other place as the Arbitrator at his discretion may determine.

---X---X---

ANNEXURE-A

FINANCIAL VIABILITY

1. Owner's capital in the business (incase of Partnership, please mention percentage shares and amounts).
2. Quantum of business done during last three financial years.
 - i) Rs.
 - ii) Rs.
 - iii) Rs.
3. Value of fixed Assets of the business in last three years.
 - i) Rs.
 - ii) Rs.
 - iii) Rs.
4. Guarantee limits (if any) enjoyed by the firm.
5. Over draft limits (if any enjoyed by the firm.
6. Please enclose audited profit and loss account and balance sheet for last 3 years (indicate no. of sheets).
7. Certificate from Scheduled Bank to prove Contractor's financial capacity to undertake the work duly indicating the financial limits the tenderer enjoys.

(Signature of tenderer)
With Stamp

NOTE:

All the above documents should be duly certified by auditors/ Bank as may be applicable.

ANNEXURE – C

MONTHWISE MANPOWER DEPLOYMENT PLAN

S.No.	Category	No. of Person available on roll of the Organisation	Month (Indicate No. of persons to be deployed in each month)						
			1st	2 nd	3 rd	4 th	5 th	6 th	and so on
1.									
2.									
3.									
		Total							

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE – D

(A) STATUS OF TOOLS & PLANTS

S.No.	Name of Equipment	Quantity owned no. wherever Applicable	Registration Documents enclosed for proof of Ownership	Location	Present to be deployed for this job	Quantity proposed
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(B) MONTHWISE T&P DEPLOYMENT PLAN

S.No.	Description of T & P	Month (Indicate No. to be deployed in each month)							
		1st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th and so on

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE - E**ANALYSIS OF UNIT RATE QUOTED**

S.NO.	DESCRIPTION	PERCENTAGE OF THE UNIT RATE QUOTED	REMARKS

1.	Salary & wages for staff & workers		
2.	Consumables		
	(a) Gases		
	(b) Welding Electrodes		
	(c) P.O.L.		
	(d) Others		
3.	Depreciation & maintenance for T&P		
4.	Depreciation & Maintenance for other items		
5.	Establishment and Administration expenses of site		
6.	Overheads		
7.	Profit		

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE - F

DECLARATION SHEET

I, -----hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.----- are true and complete to the best of my knowledge. I have gone through the specification, conditions and stipulations in detail and agree to comply with the requirements and intent of specification.

I, further certify that I am the duly authorised representative of the under mentioned tenderer and a valid power of attorney to this effect is also enclosed.

Tenderer's Name & Address

Authorised representative's signature with name and address.

ANNEXURE - `G'**CHECKLIST AND SCHEDULE OF GENERAL PARTICULARS**

NOTE : Tenderers are requested to fill in the following details and no column should be left blank

1. Name and address of the tenderer
2. Telegraphic/ telex address
3. Phone No. (Office)/ Fax No.
4. Name & designation of the official of the tenderer to whom all the references shall be made.
5. Tenderer's proposal No. & date
6. Whether EMD submitted (By cash/Pay order / bank draft) by.....
7. Validity of offer/ rates quoted for six months from the date of opening of tender Yes/No
8. Financial Status as per Clause 11.1 (in the format as per Annexure-A) Yes/No
9. Income tax Clearance certificate as per Clause 11.2 Yes/No
10. Details of experience as per clause 11.3 (in the format as per Annexure-B) Yes/No
11. Monthwise & Categorywise manpower deployment plan as per Clause 11.4 (in the format as per Annexure-C) Yes/No
12. Attested copy of power of attorney as per clause 11.5 Yes/No
13. Details about type of the firm as per clause 11.6 Yes/No
14. Status of T&P and monthwise deployment plan as per clause 11.7 (in the format as per Annexure-D) Yes/No
15. Analysis of unit rate quoted as per Clause 11.8 (in the format as per Annexure-E) Yes/No

16. Declaration sheet as per clause 11. 09
(in the format as per Annexure-F)

Yes/No

Date _____

(SIGNATURE OF TENDERER)
WITH STAMP

WITNESS
(SIGNATURES WITH FULL PARTICULARS)

1.

2.

ANNEXURE - I

AGREEMENT

Agreement No. and Date _____
 Name of the Work _____

Name of the Contractor with
 full address _____

Value of work awarded _____

Letter of Intent No. and Date _____

Scheduled Commencement Date _____

Scheduled Completion Date _____

THIS AGREEMENT MADE THIS _____ DAY OF _____ 2000 between BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Enterprise) a Company incorporated under the Companies Act, 1956, having its Registered Office at BHEL House, Siri Fort New Delhi- 110049 (herein after called BHEL) of the ONE PART.

AND

M/S _____
 _____ (hereinafter called the `Contractor') of the SECOND PART.

WHEREAS M/s -----state that they have acquired and possess extensive experience in the field of -----

And Whereas in response to an Invitation to Tender No. ----- issued by BHEL for execution of ----- the contractor submitted their offer No.----- dated -----And whereas BHEL has accepted the offer of the Contractor on terms and conditions specified in the Letter of Intent No.-----dated -----read with the references cited therein.

THIS AGREEMENT WITNESSES AND it is hereby agreed by and between the parties as follows:

1. That the contractor shall execute the work of -----and more particularly described in Tender Specification No -----including Drawings and Specifications (hereinafter called the said works) in accordance with and subject to terms and conditions contained in these presents, instructions to Tenderers, General Conditions of Contract, Special Conditions, Annexures, Letter of Intent dated -----and such other instructions, Drawings, Specifications given to him from time to time by BHEL.
2. The Contractor is required to furnish to BHEL Security deposit in the form of cash/ approved securities/ Bank Guarantee valid upto ----- for a sum of Rs.----- towards satisfactory performance and completion of the Contract.
3. The Contractor has furnished a Bank Guarantee bearing no.-----dated -----for a sum of Rs.-----executed by ----- in favour of BHEL towards Security Deposit valid upto -----

OR

The Contractor has furnished to BHEL an initial Security Deposit of Rs.-----in the form of cash / approved Securities/ B.G No.----- dated ----- for Rs.-----executed by ----- in favour of BHEL valid upto ----- and has agreed for recovery of

the balance security deposit by BHEL @ 10% of the value of work done from each running bill till the entire Security Deposit is recovered.

OR

The contractor has furnished to BHEL an initial Security Deposit of Rs.----- (Rs.----- vide Bank draft No.----- dated ----- and by adjusting EMD of Rs.----- submitted vide Bank draft No.----- dt.-----) and has agreed for recovery of balance Security Deposit by BHEL @ 10% of the value of work done from each running bill till the entire security deposit is recovered.

4. The Contractor hereby agrees to extend the validity of the Bank Guarantee for such further period or periods as may be required by BHEL and if the Contractor fails to obtain such extension(s) from the Bank, the Contractor, shall pay forthwith or accept recovery of Rs.----- from the bills in one installment and the contractor further agrees that failure to extend the validity of the Bank Guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum of Rs.-----.

OR

In case the contractor furnishes the bank guarantee at a later date the contractor hereby agrees to extend the validity of bank guarantee for such further period or periods as may be required by BHEL and if the contractor fails to obtain such extension(s) from the bank, the contractor shall pay forthwith or accept recovery of the amount of bank guarantee given in lieu of security deposit from the bills in one installment and the contractor further agrees that failure to extend the validity of bank guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum.

5. That in consideration of the payments to be made to the Contractor by BHEL in accordance with this Agreement the Contractor hereby covenants and undertakes with BHEL that they shall execute, construct, complete the works in conformity, in all respects, with the terms and conditions specified in this Agreement and the documents governing the same.
6. That the Contractor shall be deemed to have carefully examined this Agreement and the documents governing the same and also to have satisfied himself as to the nature and character of the Works to be executed by him.
7. That the Contractor shall carry out and complete the execution of the said works to the entire satisfaction of the Engineer or such other officer authorised by BHEL, within the agreed time schedule, the time of completion being the essence of the Contract.
8. That BHEL shall, after proper scrutiny of the bills submitted by the Contractor, pay to him during the progress of the said works such sum as determined by BHEL in accordance with this Agreement.
9. That this Agreement shall be deemed to have come into force from ----- the date on which the letter of intent has been issued to the Contractor.
10. That whenever under this contract or otherwise, any sum of money shall be recoverable from or payable by the Contractor, the same may be deducted in the manner as set out in the General Conditions of Contract or other conditions governing this Agreement.
11. That all charges on account of Octroi, Terminal and other taxes including sales tax or other duties on material obtained for execution of the said works shall be borne and paid by the Contractor.

- 12. That BHEL shall be entitled to deduct from the Contractor's running bills or otherwise Income Tax under Section 194 (C) of the Income Tax Act, 1961.
- 13. That BHEL shall be further entitled to recover from the running bills of the Contractor or otherwise such sum as may be determined by BHEL from time to time in respect of consumables supplied by BHEL, hire charges for tools and plants issued (Where applicable) and any other dues owed by the Contractor.
- 14. That it is hereby agreed by and between the parties that non- exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents and the liability of the Contractor with respect to compensation payable to BHEL or Contractor's obligations shall remain unaffected.
- 15. It is clearly understood by and between the parties that in the event of any conflict between the Letter of Intent and other documents governing this Agreement, the provisions in the Letter of Intent shall prevail.

16. The following documents

- 1. Invitation to Tender No-----
and the documents specified therein.
- 2. Contractor's Offer No-----
dated-----.
- 3. _____
- 4. _____
- 5. _____
- 6. Letter of Intent No _____ dated _____.
- 7. _____

shall also form part of and govern this Agreement.

IN WITNESS HEREOF, the parties hereto have respectively set their signatures in the presence of

WITNESS

(CONTRACTOR)
(to be signed by a person holding
a valid Power of Attorney)

- 1.
- 2.

WITNESS

(For and on behalf of BHEL)

- 1.
- 2.

ANNEXURE – H

BANK GUARANTEE FOR SECURITY DEPOSIT

B.G. NO.

Date

This deed of Guarantee made this ----- day of -----two thousand by ----- (Bank) hereinafter called the "The Guarantor" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) in favour of M/s Bharat Heavy Electrical Limited (A Govt. of India Undertaking) a company incorporated under the Companies Act, 1956, having its registered office at BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its unit at Power Sector – Northern Region, Noida, Distt. Gautam Budh Nagar, (UP) hereinafter called "The Company" (which expression shall unless repugnant to the context or meaning thereof by deemed to include its successors and assigns)

WHEREAS -----(hereinafter referred to as the Contractor) have entered into a contract arising out of Letter of Intent no.----- dt.----- (hereinafter referred to as "the contract") for the construction of ----- with the company.

AND WHEREAS the contract inter-alia provides that the contractor shall furnish to the company a sum of Rs.----- (Rupees-----) towards security deposit for due and faithful performance of the contract in the form and manner specified therein.

AND WHEREAS the contractor has approached the Guarantor and in consideration of the arrangement arrived at between the contractor and the Guarantor, the Guarantor has agreed to give the Guarantee as hereinafter mentioned in favour of the company.

The Guarantor do hereby guarantee to the company the due and faithful performance, observance or discharge of the Contract by the contractor and further unconditionally and irrevocably undertake to pay to the Company without demur and merely on a demand, to the extent of Rs.----- (Rupees-----) against any claim by the company on them for any loss, damage, costs, charges and expenses caused to or suffered by the company by reasons of the contractor making any default in the performance, observance or discharge of the terms, conditions, stipulations or undertakings or any of them as contained in the contract.

The decision of the company whether any default has occurred or has been committed by the contractor in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them as contained in the contract and / or as to the extent of loss, damage, costs, charges and expenses caused to or suffered by the company by reason of the contractor making any default in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them shall be conclusive and binding on the Guarantor irrespective of the fact whether the contractor admits or denies the default or questions the correctness of any demand made by the company in any Court, Tribunal or Arbitration proceedings or before any other Authority.

The company shall have the fullest liberty without affecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the contract or extend time of performance by the contractor or to postpone for any time and from time to time any of the powers exercisable by it against the contractor and either enforce or forebear from enforcing any of the terms and conditions governing the contract or securities available to the company and the Guarantor shall not be released from its liability under these presents by any exercise by the company of the liberty with reference to the matters aforesaid or by reasons of time

being given to the contractor or any other forbearance, act or commission on the part of the company or any indulgence by the company to the contractor or any other matter or thing whatsoever which under the law relating to sureties would, but for this provision have the effect of so releasing the Guarantor from its liability under this guarantee.

The Guarantor further agrees that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the contract and its claim satisfied or discharged and till the company certifies that the terms and conditions of the contract have been fully and properly carried out by the contractor and accordingly discharges this Guarantee, subject however, that the company shall have no claim under this Guarantee after ----- i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time, as the case may be) unless a notice of the claim under this Guarantee has been served on the Guarantor before the expiry of the said period in which case the same shall be enforceable against the Guarantor notwithstanding the fact that the same is enforced after the expiry of the said period.

The Guarantor undertakes not to revoke this Guarantee during the period it is in force except with the previous consent of the Company in writing and agrees that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the contractor or the Guarantor shall not discharge the Guarantor's liability hereunder.

It shall not be necessary for the company to proceed against the contractor before proceeding against the Guarantor and the Guarantee herein contained shall be enforceable against them notwithstanding any security which the Company may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealized.

Notwithstanding anything contained herein before, our liability under the Guarantee is restricted to Rs.----- (Rupees-----). Our guarantee shall remain in force until -----, i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time) unless a claim or demand under this guarantee is made against us on or before ----- we shall be discharged from our liabilities under this Guarantee thereafter.

Any claim or dispute arising under the terms of this documents shall only be enforced or settled in the courts of at New Delhi / Delhi only.

The Guarantor hereby declares that it has power to execute this guarantee and the executant has full powers to do so on behalf of the Guarantor.

IN WITNESS whereof the ----- (Bank) has hereunto set and subscribed its hand the day, month and year first, above written.

Signed for and on behalf of the Bank

(Signatory No.-----)

WITNESSES

1. Name & Address
2. Name & Address

Notes :

1. The above BG shall be executed on the non-judicial stamp papers of adequate value procured in the name of the bank in the state where the bank is located.
2. The above BG is required to be sent by the executing bank directly to BHEL at the address where tender is submitted / accepted under seal cover.

LIST OF MEMBER BANKS

1. State Bank of India
CAG Branch,
10th Floor, Vijaya Building,
Barakhamba Road,
New Delhi – 110001.
2. Canara Bank
74, Janpath,
New Delhi – 110001.
3. Punjab National Bank,
74, Janpath,
New Delhi – 110001.
4. Bank of Baroda,
Corporate Banking Branch,
11th Floor, BOB Building,
Sansad Marg,
New Delhi – 110001.

State Bank of Hyderabad,
Surya Kiran Building, K.G. Marg,
New Delhi – 110001.
5. State Bank of Mysore,
Antriksh Bhawan, K.G. Marg,
New Delhi – 110001.
6. State Bank of Mysore,
Industrial Finance Branch,
18, Ramanashree Arcade,
M.G. Road, Bangaloe – 560001.
7. State Bank of Travancore,
Travancore House, IF Branch,
K.G. Marg, New Delhi – 110001.
8. Deutsche Bank,
Tolstoy Marg,
New Delhi – 110001.
9. HDFC Bank Ltd.,
5th Floor, HT House,
K.G. Marg,
New Delhi – 110001.
10. Citi Bank N A
Jeevan Vihar Building,
Sansad Marg,
New Delhi – 110001.
11. Standard Chartered Bank,
H2 Block, Connaught Place,
New Delhi – 110001.
12. ICICI Bank Ltd.,
ICICI Tower,
Bisham Pitamah Marg,
Pragati Vihar,
New Delhi – 110003.
13. IDBI Bank Ltd.,
19, K.G. Marg,
Surya Kiran Building,
New Delhi.
14. HSBC Ltd.,
ECE House,
28 KG Marg,
New Delhi – 110001.

SECTION – I (a)
SPECIFICATION
FOR
HEALTH, SAFETY AND ENVIRONMENT (HSE)

1.0 SCOPE

This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied with by the Contractors during construction.

Requirements stipulated in this specification shall supplement the requirements of HSE Management given in relevant Act (s) /legislations, General Condition Contract (GCC). Special Conditions of Contract (SCC) and job specification where different documents stipulates different requirements, the most stringent be adopted.

2.0 REFERENCES

This document should be read in conjunction with following :

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Scope of work
- Relevant IS Codes (refer Annexure-I)
- Reporting Formats (refer Annexure-II)

a. REQUIREMENTS OF HEALTH, SAFETY & ENVIRONMENT (HSE) MANAGEMENT SYSTEM TO BE COMPLIED BY CONTRACTORS.

b. MANAGEMENT RESPONSIBILITY

3.1.1 The Contractor to comply with HSE requirement at Construction sites as enclosed to cover commitment of their organization to ensure health, safety and environment aspects in their line of operations.

3.1.2 The HSE management system shall cover the HSE requirements including but not limited to what is specified under Para 1.0 and para 2.0 above.

3.1.3 Contractor shall be fully responsible for planning and implementing HSE requirements. Contractor as a minimum requirement shall designate/deploy the following to co-ordinate the above :

No. of workers deployed upto 250 - Designate one safety Supervisor

Above 250 & upto 500 - Deploy one qualified and Experienced safety engineer/ officer

Above 500
(for every 500 or less) - One additional safety engineer/ officer, as above.

Contractor shall indemnify & hold harmless Owner/BHEL & their representatives free from any and all liabilities arising out of non-fulfillment of HSE requirement.

- 3.1.4 The Contractor shall ensure that the Health, Safety and Environment (HSE) requirements are clearly understood & faithfully implemented at all levels at site.
- 3.1.5 BHEL shall promote and develop consciousness for Health, Safety and Environment among all personnel working for the Contractor. Regular awareness programmes and work site meetings shall be arranged on HSE activities to cover hazards involved in various operations during construction.
- 3.1.6 The Contractor shall arrange suitable first aid measures such as First Aid Box, trained personnel to give First Aid and install fire protection measures such as adequate number of steel buckets with sand and water to the satisfaction of BHEL/Owner.
- 3.1.7 Non-Conformance on HSE by Contractor (including his Sub-contractors) as brought out during review / audit by BHEL/Owner representative shall be resolved forthwith by Contractor. Compliance report shall be provided to BHEL.
- 3.1.8 The Contractor shall ensure participation of his Resident Engineer / Site-In-Charge in the Safety Committee / HSE Committees meetings arranged by BHEL / Owner. The compliance of any observations shall be arranged urgently. He shall assist BHEL / Owner to achieve the targets set by them on HSE during the project implementation.
- 3.1.9 The Contractor shall adhere consistently to all provisions of HSE requirements. In case of non-compliance or continuous failure in implementation of any of HSE provisions, BHEL / Owner may impose stoppage of work without any Cost & Time implication to BHEL / Owner and / or impose a suitable penalty for non-compliance with a notice of suitable period, upto a commulative limit of 1.0% (one percent) of Contract value. This penalty shall be in addition to all other penalties specified else where in the contract. The decision of imposing stoppage of work, its extent & minority penalty shall rest with BHEL / Owner & binding on the Contractor.
- 3.1.10 All fatal accidents and other personnel accidents shall be investigated by a team of Contractor's senior personnel for root cause & recommended corrective and preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to BHEL / Owner. BHEL / Owner shall have the liberty to independently investigate such occurrences and Contractor shall extend all necessary help and co-operation in this regard.

3.2 HOUSE KEEPING

- 3.2.1 Contractor shall ensure that a high degree of house keeping is maintained and shall ensure interalia; the following :
 - a) All surplus earth and debris are removed / disposed off from the working areas to identified locations (s).
 - b) Unused/Surplus Cables, Steel items and steel scrap lying scattered at different places within the working areas are removed to identified locations (s).
 - c) All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).

- d) Roads shall be kept clear and materials like : pipes, steel, sand boulders, concrete, chips and brick etc., shall not be allowed on the roads to obstruct free movement of men & machineries.
- e) Fabricated steel structurals, pipes & piping materials shall be stacked properly for erection.
- f) Water logging on roads shall not be allowed.
- g) No parking of trucks/trolleys, cranes and trailers etc., shall be allowed on roads which may obstruct the traffic movement.
- h) Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.
- i) Trucks carrying sand, earth and pulverized materials etc., shall be covered while moving within the plant area.

In case of non-compliance of any of above, BHEL shall have the liberty to get it done from some other agency at this risk and cost.

3.3 HEALTH, SAFETY AND ENVIRONMENT

- 3.3.1 The Contractor shall provide safe means of access to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen, and BHEL / Owner. Contractor shall ensure deployment of appropriate equipment and appliances for adequate safety and health of the workmen and protection of surrounding areas.
- 3.3.2 The contractor shall ensure that all their staff and workers wear Safety Helmet and Safety shoes. Contractor shall also ensure use of safety belt, protective goggles, gloves etc., by the personnel as per job requirements. All these gadgets shall conform to relevant IS specifications or equivalent.
- 3.3.3 The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health for driving of vehicles, handling and erection of material and equipments. All lifting equipments shall be tested certified for its capacity before use. Adequate and suitable lighting at every work place and approach there to, shall be provided by the Contractor before starting the actual operations at night. It is mandatory for contractor to get his workmen medically examined / checked for fitness of work assigned once a year and furnish the certificate to that effect from RMP / Govt. Hospital.
- 3.3.4 Hazardous and / or toxic materials such as solvent, coating or thinners shall be stored in appropriate containers.
- 3.3.5 All hazardous materials shall be labeled with the name of the materials, the hazards associated with its use and necessary precautions to be taken.
- 3.3.6 Contractor shall ensure that during the performance of the work, all hazards of the health of personnel, have been identified, assessed and eliminated.
- 3.3.7 Chemical spills shall be contained and cleaned up immediately to prevent further contamination.

- 3.3.8 All personnel exposed to physical agents such as ionizing or non-ionizing radiation, ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.
- 3.3.9 Where contact or exposure of hazardous materials could exceed limits or could otherwise have harmful effects, appropriate personnel protective equipment such as gloves, goggles, aprons, chemicals resistant clothing and respirator shall be used.
- 3.3.10 All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials substances and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the express authorization of BHEL / Owner.

4.0 DURING JOB EXECUTION

- 4.1 Implement Health, Safety and Environment requirements including but not limited to as brought out under para 3.0. Contractor shall ensure to :
- arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc., as applicable.
 - arrange all HSE permits before start of activities (as applicable) like hot work, confined space, work at heights, storage of chemical / explosive materials and its use and implement all precautions mentioned therein.
 - Submit timely the completed checklist on HSE activities, Monthly HSE report, accident reports, investigation reports etc., as per BHEL / Owner requirements. Compliance of instructions on HSE shall be done by Contractor and informed urgently to BHEL / Owner.
 - Ensure the Resident Engineer / Site-Incharge of the Contractor shall attend all the Safety Committee / HSE meetings arranged by BHEL/Owner. In case of his absence from site that a second senior most person shall be nominated by him in advance and communicated to BHEL/Owner.
 - Display at site office and work locations caution boards, list of hospitals, emergency services available.
 - Display posters, banners made available by BHEL for safe working to promote safety consciousness.
 - Assist in HSE audits by BHEL / Owner and submit compliance report.
 - Generate and submit HSE records / report as per HSE plan.
 - Appraise BHEL / Owner on HSE activities at site.

ANNEXURE - I

RELEVANT IS – CODES FOR PERSONAL PROTECTION

IS: 2925-1984	Industrial Safety Helmets
IS: 4770-1968	Rubber gloves for electrical purposes
IS: 6994, 1973 (Part-I)	Industrial Safety Gloves (Leather & Cotton Gloves)
IS: 1989-1986 (Part I & III)	Leather safety boots and shoes
IS: 3738-1975	Rubber knee boots
IS: 5557-1969	Industrial and Safety rubber knee boots
IS: 6519-1971	Code of practice for selections, care and repair of Safety footwear
IS: 11226-1985	Leather Safety footwear having direct moulding sole
IS: 5983-1978	Eye protectors
IS: 9167-1979	Ear protectors
IS: 3521-1983	Industrial Safety belts and harness

ANNEXURE – II

1.0 HEALTH, SAFETY & ENVIRONMENT (HSE) PLAN

PROJECT: ----- CONTRACTOR :-----

DATE :----- OWNER :-----

(To be prepared by each construction Agency)

ACTIVITY DESCRIP TION	PROCEDURE/ W.I/ GUIDELIES	CODE OF CONFOR- MANCE	PERFORMING FUNCTIONS			AUDIT FUNCTION CUSTOMER REVIEW AUDIT REQUIREMENT
			PERFOR- MER	CHECK- ER	APPRO- VER	

PREPARED BY

REVIEWED BY

APPROVED BY
(RESIDENT ENGINEER)

2.0 MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (1/6)

PROJECT:----- CONTRACTOR:-----

DATE :----- OWNER:-----

INSPECTION BY:-----

Note: Write 'NA' wherever the item is not applicable.

ITEM	YES	NO	REMARKS	ACTION
------	-----	----	---------	--------

HOUSING KEETING

Waste containers provided and used

Sanitary facilities adequate and clean

Passageways and Walkways Clear

General neatness of working areas

Others

PERSONNEL PROTECTIVE EQUIPMENT

Goggles: Shelds

Face protection

Hearing protection

Safety Shoes provided

Hand protection

Safety Belts

Others

EXCAVATIONS / OPENINGS

Openings properly covered or barricaded

Excavations shored

Excavations barricaded

Overnight lighting provided

Other

MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (Contd.. 2/6)

ITEM	YES	NO	REMARKS	ACTION
WELDING, CUTTING				
Gas cylinders chained upright				
Cables and hoses not obstructing				
Screens or shields used				
Flammable materials protected				
Fire extinguisher (s) accessible				
Other				
SCAFFOLDING				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Other				
LADDERS				
Extension side rails 1 m above				
Top of landing				
Properly secured				
Angle + 70 from horizontal				
Other				

MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (Contd.3/6)

ITEM	YES	NO	REMARKS	ACTION
HOIST. CRANES AND DERRICKS				
Condition of cables and sheaves	OK			
Condition of slings, chains, hooks & eyes	O.K.			
Inspection and maintenance logs	maintained			
Outriggers	used			
Signs/barricades	provided			
Signals	observed and understood			
Qualified operators				
Other				
MACHINERY, TOOLS AND EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
VEHICLE AND TRAFFIC				
Rules and regulations	observed			
Inspection and maintenance				
Licensed drivers				
Other				

MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (Contd.4/6)

ITEM	YES	NO	REMARKS	ACTION
TEMPORARY FACILITIES				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
Secured against storm damage				
General neatness				
In accordance with electrical requirements				
Other				
FIRE PREVENTION				
Personnel instructed				
Fire extinguishers checked				
No smoking in Prohibited areas				
Hydrants Clear				
Other				
ELECTRICAL				
Proper wiring				
ELCB's provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				

MONTHLY HSE CHECKLIST CUM COMPLANCE REPORT (Contd.5/6)

ITEM	YES	NO	REMARKS	ACTION
HANDLING AND STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguishers nearby				
Other				
WORKING AT HEIGHT				
Erection plan				
Safety belts and lanyards; chute lines				
Other				
ENVIRONMENT				
Chemical and other Effluents properly disposed				
Cleaning liquid of pipes disposed off properly				
Water used for hydrotesting disposed off as Per agreed procedure				
Lubricant Waste/Engine Oil properly disposed				
Waste from Canteen, offices, sanitation etc., Disposed properly				
Disposal of surplus earth, stripping materials, Oily rags and combustible materials done Properly				

MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (Contd.6/6)

ITEM	YES	NO	REMARKS	ACTION
Green belt protection				
Hygienic conditions at labour camps O.K?				
Availability of First Aid facilities				
Proper sanitation at site, office and Labour camps				
Arrangement of medical facilities				
Measures for dealing with illness				
Availability of Potable drinking water For workmen & staff				

**Signature of Resident
Engineer with Seal**

3.0 ACCIDENT CUM FIRE REPORT

(To be submitted by contractor after every accident within 24 hours of accident)

Report : _____

Name of Site: _____

Date: _____

CONTRACTOR _____

NAME OF THE INJURED _____

FATHER'S NAME _____

SUB-CONTRACTOR M/S _____

DATE & TIME OF ACCIDENT _____

LOCATION _____

BRIEF DESCRIPTION OF ACCIDENT

CAUSE OF ACCIDENT

NATURE OF INJURY/DAMAGE

MEDICAL AID PROVIDED/ACTIONS TAKEN

INTIMATION TO LOCAL AUTHORITIES

DATE:

**SIGNATURE OF CONTRACTOR
WITH SEAL**

TO: SITE-IN-CHARGE/BHEL

1 COPY

4.0 SUPPLEMENTARY ACCIDENT & INVESTIGATION REPORT

Project:_____ Supplementary to Report No. _____
(Copy enclosed)

Site:_____ Date:_____

CONTRACTOR_____

NAME OF THE INJURED _____
FATHER'S NAME _____
SUB-CONTRACTOR M/S _____
DATE & TIME OF ACCIDENT _____
LOCATION _____

BRIEF DESCRIPTION & CAUSE OF ACCIDENT

NATURE OF INJURY/DAMAGE

COMMENTS FROM MEDICAL PRCTICETIONER, WHO ATTENDED THE VICTIM / INJURED

SUGGESTED IMPROVEMENT IN THE WORKING CONDITION, IF ANY

LOSS OF MANHOURS AND IMPACT ON SITE WORKS

ANY OTHER COMMENT BY SAFETY OFFICER

DATE:

SIGNATURE OF CONTRACTOR
WITH SEAL

TO: SITE-IN-CHARGE/BHEL

1 COPY

5.0 MONTHLY HEALTH, SAFETY & ENVIRONMENT (HSE) REPORT

(To be submitted by each Contractor)

Actual work start Date: _____ For the month of _____

Project: _____ Report No. _____

Name of the Contractor: _____ Status as on: _____

Name of Work: _____ Name of safety officer _____

ITEM	THIS MONTH CUMMULATIVE
------	------------------------

Total Strength (Staff + Workmen)

Number of HSE meetings organized at site

Number of HSE awareness programmes
Attended at site

Whether workmen compensation policy taken Y/N

Whether workmen compensation policy is valid Y/N

Whether workmen registered under ESI Act Y/N

Number of Fatal Accidents

Number of Loss Time Accidents (Other than Fatal

Other accidents (Non Loss Time)

Total No. of Accidents

Total man-hours worked

Man-hour loss due to fire and accidents

Compensation cases raised with Insurance

Compensation cases resolved and paid to workmen

Remarks

Date

Safety Officer/Resident Engineer
(Signature & Name)

To: SITE-IN-CHARGE,BHEL

1 COPY

SECTION - III `A'**SPECIAL CONDITIONS OF CONTRACT****INDEX**

CLAUSE No.	DESCRIPTION
34.	General
35.	Civil works, foundations and grouting
36.	Consumables
37.	Tools & Plants / IMTE's
38.	Supervisory staff & workmen
39.	Material handling and storage for E/T/C
40.	Preservation of components
41.	Erection
42.	Welding, HT, RG and NDT
43.	Application of Insulation and refractory
44.	Testing, Pre-commissioning, commissioning and post-commissioning.
45.	Touch up/ Finish Painting
46.	Progress reporting
47.	Drawings and documents
48.	Taxes and Duties
49.	Extra work
50.	Price variation
51.	Rate schedule
52.	Instructions to Tenderers

SECTION - III `A'

SPECIAL CONDITIONS OF CONTRACT

34.0 GENERAL

- 34.1** The intent of this specification is to provide services for execution of the project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lumpsum price shall deem to be inclusive of all such contingencies.
- 34.2** The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification supplied by BHEL from time to time.
- 34.3** The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. 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 affected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.
- 34.4** Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices:
- a** Provision, as required, of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated inspection, measuring and testing equipments as specified and otherwise required for the work, consumables for erection, testing and commissioning including material handling.
 - b** Proper out-turn as per BHEL plan and commitment.
 - c** Completion of work as per BHEL Schedule.
 - d** Good quality and accurate workmanship for proper performance of the equipment.
 - e** Repair and rectification.
 - f** Preservation / Re-conservation of all components during storage / erection / commissioning till handing over.
 - g** The contractor is expected to carryout hose keeping of work area on daily/regular basis to keep the work place neat and tidy and available for the safe working. In case the contractor fails to do so, BHEL reserves the right to get the same done at the risk and cost of the contractor. The cost with applicable overheads shall be recovered from the monthly bills of the contractor.
- 34.5** BHEL-Power Sector (NR) is ISO 9001-2000, ISO 14001-1996, OHSAS 18001-1999, ISO 27001 and SA-8000 certified company. Quality of work, to customer's satisfaction and system requirements is the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, tools, plant, inspection, measuring and testing equipments etc. as per instructions of BHEL engineer.
- The contractor shall also comply with applicable legislation and regulations with regards to Health, Safety and Environmental aspects for minimizing risk arising from occupational health & safety hazards, controlling pollution and wastage. The Contractor will be responsible for Health, Safety & Environment management (HSE) at site for the

construction activities to be carried out by them in accordance with requirements given under section I (a) of GCC and elsewhere in this tender document. The contractor, who is awarded the work, shall have to sign an MOU w.r.t implementation of HSE conditions with BHEL (Safe Work Practices).

34.6 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least **300 trees** or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers for the entire duration of contract.

35.0 CIVIL WORKS, FOUNDATIONS AND GROUTING.

35.1 NTPC/ BHEL shall provide foundations for all the equipments and columns. The contractor for their scope shall check the dimensions of the foundations, locations of pockets, pitch of anchor bolts and other inserts as per drawings. Further, top elevation of foundations shall be checked with respect to benchmark etc. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.

Complete grouting of pockets, Underpinning of base plates of structures/ equipments, including anchor / foundation bolts, beneath base, base hollows etc. as may be applicable and grouting of foundations 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. srinkcomp , conbextra etc), form work, shuttering, and any other requirements is in the contractor's scope. Contractor shall obtain approval of BHEL for cement (ordinary 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.

After the grouting has finally set and cured, alignment of equipments involved shall be checked again, if required, to verify for any disturbance or any other reason and if required the re-alignment shall be done as part of work.

35.2 Chipping and dressing of foundations up to a 50 mm thickness is in the scope of contract. While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with Prussian blue to get the required contact with frames.

35.3 The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to be aligned and fixed on the foundations using approved quality special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost.

35.4 **Grouting work of foundation bolt, base plate etc. including materials will be carried out within the final accepted rates of this contract.** Contractor for subject work has to maintain neat & clean foundations for the Civil works to ensure perfect grouting. While grouting will be carried out, the contractor has to ensure that all the matching joints

which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor.

- 35.5** The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.
- 35.6** Besides grouting as above, any civil works required for safe and efficient operation of tools and tackles like grouting / excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc and any other temporary supports shall also be the contractor's responsibility. For these civil works, all materials including cement and required facilities shall have to be arranged by contractor at his own cost.
- 35.7** Contractor shall ensure at all times that his work areas & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL. No separate payments for dewatering of sub soil or surface water if required at any time during execution of the work including monsoon period shall be considered by BHEL.

35.8 **PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENTS**

Building foundations and other necessary civil works for supporting structures, equipments etc. will be provided by BHEL / customer. The dimensional accuracy, axes, elevation, levels etc. with reference to benchmarks of foundations and anchor blot 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.

All temporary foundations and anchor points required for installing erection equipments and winches etc. are in the scope of contractor. All building materials like cement, steel 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.

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.

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 and de-burr the same.

Foundation and other necessary civil works for supporting structures, equipment etc, will be provided by BHEL/ customer. The dimensions of the foundation and anchor bolt pits shall be checked by contractor for their correctness with respect to the above access as per the erection drawings. Further, top elevation column foundations shall be checked with respect to benchmark etc. All minor adjustment of foundation levels dressing and chipping of foundation surfaces etc. upto 50 mm as may be required for the erection of equipment/plants will be carried out by the contractor without any extra cost. The contractor using his own materials at his cost shall cast all foundations and anchor points required for installing winches. Installation of starters, distribution etc, shall be done by the contractor while only incoming supply to the common isolating switch will be arranged by BHEL. Grouting of all columns, equipment base plates, anchor bolt holes etc are included in the scope. The grouting mixture shall be either composed of Portland cement or ready mix grout or of other quality specified in the drawings, documents and specifications of proved quality. However, in both the cases Contractor will supply Portland cement and ready mix grout component respectively. Application of the two options will depend on drawing/specification/ instruction of BHEL Engineer. The contractor shall arrange for sand, stone chips, gravels, anti shrink compound, plasticizer, shuttering, grout mixing machine, labours etc at his cost. The contractor shall prepare the required test pieces/test cubes to ensure the strength of grout and get the same tested in laboratory at his cost. Test cube shall also be taken during grouting for testing in the laboratory and shall be tested at his cost.

The grout shall be high strength grout having a minimum characteristic compressive strength of 60 N/mm² at 28 days. The grout shall be chloride free, cement based, free flowing, and non-metallic grout. The Grout shall have good flow-ability even at very low water/ grout powder ratio. The Grout shall have characteristics of controlled expansion to be able to occupy its original volume to fill the voids and to compensate for shrinkage. Grout shall be of pre-mix variety so that only water needs to be added before use. The mixing of the Grout shall conform to the recommendations of the manufacturer of the Grout.

After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout, a low dam shall be set around the base at a distance that will permit pouring and manipulation of the grout. The height of such dam shall be at least 25mm above the bottom of the base. Suitable size and number of chains shall be introduced under the base before placing the grout, so that such chains can be moved back & forth to push the grout into every part of the space under the base.

The grout shall be poured either through grout holes if provided or shall be poured at one side or at two adjacent sides to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases. In addition to the above, recommendations of Grout manufacturer shall also be followed. The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout, which extends beyond the edges of the structural or equipment base plates shall be cut off, flushed and removed. The edges of the grout shall then be pointed and finished with 1:2 cement mortar pressed firmly to bond with the body of the grout and smoothed with a tool to present a smooth vertical surface. The work shall be done in

a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.

After the grout is set and cured, the Contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during such post grouting check- up and verifications. Such pre and post grout records of alignment details shall be maintained by the Contractor in a manner acceptable to the BHEL / Employer.

NOTE: Boiler drum with its required structure along with ESP structure of first tier including accessible civil works shall be handed over to this contractor for remaining scope of boiler work. Any other civil work required for this Boiler Package shall be within the scope of contractor. The Contractor for this package should make a note of this while quoting.

- 35.9** **Installation and erection of steel Helical Springs and Viscous Dampers for PA, FD & ID Fans shall be in the contractor's scope.**
- 36.0** **CONSUMABLES**
- 36.1** The contractor shall provide within finally accepted price / rates, all consumables like all welding electrodes (including alloy steel and stainless steel), filler wires, TIG filler wires (over & above as supplied by the unit along with the plant materials, which will be given free of cost to bidder), all gases (inert, welding, 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 provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding materials hardware items etc required for temporary works such as supports, scaffoldings are to be arranged by him. Sealing compounds, 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.
- 36.2** All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost.
- 36.3** It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non-availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.
- 36.4** **TIG filler wire and welding electrodes for P 91 alloy steel materials shall be supplied by BHEL Mfg. Units free of cost for erection.** Any other special filler wires and welding electrodes which are supplied by the manufacturing unit as a normal supplies shall also be issued free of charge for erection. Required quantity as arrived at by calculation / standards will only be supplied. It would be the contractors' responsibility to account for the consumption of these filler wires. **Weight of free supplied consumables for welding shall not be payable.** These have to be erected without extra cost, within the scope of contract. Additional requirement beyond standard / calculated quantity will be at cost recovery basis only unless and otherwise accounted for. Surplus quantity of TIG filler wire, if any, shall be properly stored and returned to BHEL stores. The contractor has to take care of above in their offer.

- 36.5** Only BHEL/NTPC approved welding electrodes applicable for this Project shall be used by the contractor and the contractor is required to obtain prior approval of BHEL/ NTPC regarding suppliers, type of electrodes etc before procurement of welding electrodes. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number, date of expiry etc and produce test certificate for each lot / batch with correlation of batch / lot number with respective test certificate. No electrode without a valid test certificate will to be used.
- 36.6** BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants / special consumables if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained.
- 36.7** Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost.
- 36.8** In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at market value plus the departmental charges of BHEL from time to time (30% at present). Postponement of such recovery is normally not permitted. The decision of Engineer in this regard shall be final and binding on the Contractor.
- 36.9** All lubricants and chemicals required for cleaning, pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL / BHEL's client. All services including labour and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. and is included in scope of this contract without any extra cost to BHEL. The consumption of lubricants / chemicals shall be properly accounted for. Surplus material if any shall be properly stacked and returned to BHEL/ CUSTOMER stores at no extra cost to BHEL. Recoveries shall be affected for wastage by the contractor.
- 36.10** Transportation of oil drums, from stores, filling of oil and filling of oil for flushing, first filling of oil and subsequent changeover or topping / making up till the unit is fully commissioned and handed over to customer is included in scope of this contract. The contractor shall have to return all the empty drums to BHEL / BHEL's client store at no extra cost. Any loss / damage to above drums shall be to contractor's account.
- 36.11** All charges on account of Octroi, terminal or sales tax and other duties on materials obtained for the works from any source shall be borne by the contractor.
- 37.0** **TOOLS AND PLANTS / IMTE's**
- 37.1** **T&P / IMTE's being provided by BHEL, as per Annexure-II**, to sub-contractor free of hire charges shall be shared by other subcontractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding.
- 37.2** Besides the T&P and IMTEs being made available to contractor free of hire charges by BHEL, all other T&Ps and IMTEs which are required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by the contractor. Indicative lists of **T&Ps and IMTEs to be arranged by the contractor** are given **as per Annexure-III**. He should ensure that these are in good working condition. In the event of the failure of contractor to bring necessary and sufficient T&Ps and IMTEs, BHEL will be at liberty to arrange the same and hire charges as applicable shall be deducted from contractor's bill. Decision of BHEL in this regard shall be final and binding on contractor.

- 37.3** All distribution boards, connecting cables, wire ropes, hoses, pipes etc, including temporary air / water / electrical connections etc shall have to be arranged by the contractor at his own cost.
- 37.4** In case of non-availability of the T&Ps to be provided by BHEL due to breakdown, major overhauls, distribution pattern or any other reason, the contractor shall plan / amend / alter his activities to meet erection / commissioning targets in consultation with BHEL.
- 37.5** **Operators for BHEL's cranes of capacity 100T or more will be provided by BHEL. For all other cranes provided by BHEL, the operators shall have to be arranged by contractor within his scope of work.**
Fuel for operation of all BHEL cranes shall be provided by contractor within the final accepted rates.
All Lubricants for the BHEL cranes such as Mobil oil, gear oil, brake oil, hydraulic oil, torque converter oil and grease will be provided by BHEL free of cost. The contractor will give the requirement for above well in advance.
- 37.6** The contractor shall engage trained and experienced operators for the operation of BHEL's T&Ps. Their skill / performance will be checked by BHEL Engineer before they are allowed to operate the same. However checking of skills by BHEL does not absolve the contractor of his responsibilities for proper and safe handling of equipment, consistent good performance of operators and regular performance evaluation of operators.
- 37.7** The day to day **operation and maintenance** of BHEL's T&Ps (**Other than cranes**) shall be carried out by contractor as per manufacturer's / BHEL's maintenance schedule at his cost. The contractor shall arrange, at his own cost, trained operators, fuel and other consumables for their operation. The contractor shall arrange at his cost all spares needed for upkeep of huck bolting machine, DG Set, Induction Machine and Hydraulic Test pumps supplied by BHEL. For upkeep of all other T & P's supplied by BHEL, the Contractor shall arrange spares.
 BHEL supplied T&Ps shall be maintained in good working condition during the entire period of use. T&Ps in defective / damaged condition shall be rectified promptly to the full satisfaction of BHEL engineer. Contractor shall maintain records for maintenance of major T&Ps. These shall be made available for Inspection whenever required. In case of any lapses on the part of the contractor, BHEL at its own discretion get the servicing / repair of equipment done at the risk and cost of the contractor with BHEL overheads. Further, if there are breakdowns / damages due to negligence of the contractor, the complete service / repair charges and cost of all the spares damaged with BHEL overheads shall be recovered from contractor's RA bills.

37.8 Agency for preventive & breakdown maintenance of BHEL cranes shall be arranged by BHEL. However, the contractor against this contract shall arrange all supervision and labour required for routine / day-day maintenance of cranes at his own cost. For attending breakdowns of these cranes, the contractor shall arrange for labour. However specialist's supervision, for attending breakdowns shall be arranged by BHEL as assessed by BHEL Engineer. Repair of self and dynamo shall be the responsibility of the contractor. The cranes shall be fitted with a set of new batteries at the time of initial issue from the stores. However, the charges of the replacement of the other damaged / worn out parts of BHEL cranes will be borne by BHEL, provided the damage is not due to the negligence of the contractor.

All the spares & lubricants (except for diesel) for the cranes (BHEL's Cranes) shall be supplied by BHEL. For all BHEL cranes, if there are breakdowns / damages due to negligence of the contractor, the complete service / repair charges and cost of all the spares damaged with BHEL overheads shall be recovered from contractor's RA bills.

37.09 Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting contractor at his cost. All necessary manpower tools, support, consumables, illumination etc. will have to be arranged by contractor at his cost. If required, contractor has to return the crane with original boom.

37.10 The area and infrastructure development of the area to be carried out by the customer. However in construction projects of this magnitude it is possible that all the areas / approaches may not be ready. In such cases consolidation of ground and arrangement of sleepers / sand bag filling etc for safe operation / movement of equipment including cranes / trailers etc shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

37.11 In the event of contractor not using and maintaining BHEL T&Ps according to BHEL's instructions. BHEL will have the right to withdraw such item without any notice and no claim in this regard shall be entertained and contractor shall be responsible for delay in execution on this account.

37.12 The contractor has to maintain a logbook and shall furnish regular maintenance and utilization report of the BHEL T & P's under his possession, as per requirement of BHEL.

37.13 Any loss / damage to any part of BHEL T&Ps and IMTEs shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss.

37.14 It shall be responsibility of the contractor to take delivery of T&Ps from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL store / place as intimated by Engineer in project site in good working conditions after use.

37.15 The contractor shall return BHEL T&Ps and IMTEs issued to him in good working condition as and when desired by BHEL (on completion or reduction of workload). If contractor delays return of T&P and IMTE, hire charges as applicable shall be levied by BHEL from time, it was requisitioned till the time of actual return.

T&Ps and IMTEs returned in damaged / unserviceable condition shall be got repaired by BHEL at its own discretion and entire cost of repair with BHEL overheads shall be recovered from the contractor.

- 37.16** Replacement cost including BHEL overheads in respect of irreparable / completely damaged / non return of T&Ps and IMTEs shall be recovered from the contractor's running / final bills
- 37.17** Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, manila ropes, winches and slings etc. History card and maintenance records for major T&Ps will be maintained by the contractor and will be made available to BHEL Engineer for inspection as and when required. Fitness certificate of T&P shall have to be submitted before it is put in use. Identification for such T&Ps will be done as per BHEL Engineer's advice.
- 37.18** Contractor shall ensure deployment of reliable and calibrated IMTEs (Inspection measuring and testing equipment). The IMTEs shall have test / calibration certificates from authorized / Government approved / accredited agencies traceable to National / International standards. Each IMTE shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.
- 37.19** Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such IMTE so that work does not suffer when the particular instrument is sent for calibration. If any IMTEs not found fit for use, BHEL shall have the right to stop the use of such item. It will be necessary for the contractor to deploy proper item. Any readings taken by the defective instrument will be recalled and repeat the readings taken by that instrument with a proper one. In case he fails to do so, BHEL may deploy IMTEs and retake the readings at contractor's cost.
- 37.20** BHEL shall have lien on all T&P, IMTEs and other equipment of the contractor brought to the site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of contract / extended period. The contractor and / or his sub-contractors, without the prior written approval of the Engineer, shall remove no material brought to the site.
- 37.21** **The month wise T&P deployment plan to be submitted as per format (at Annexure-D to General Conditions of Contract)** is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account.
- 37.22** **One CONSTRUCTION ELEVATOR / PASSENGER LIFT for boiler** will be provided to the contractor by BHEL duly erected and operational. Required minor servicing and re-commissioning, if any, at the time of receiving, maintenance, dismantling, statutory clearances shall be in the scope of erection agency against the contract, at no extra cost to BHEL throughout the contractual period.
- All day to day and routine maintenance and checking of the lift is to be carried out by the contractor as per the recommendations of the supplier. He should periodically check the brakes and carry out the all works to ensure the safety for all those using the hoist.
- The hoist should never be overloaded as this can lead to serious accidents. Ensuring all safety aspects in operation of lift shall be responsibility of contractor. All the landing platforms are to be erected by him. They are to be provided with proper barricades and hand railings. No separate payment for the temporary jobs will be made. The contractor will have to dismantle such temporary works and return the material to the stores.

The dismantling of the foundations required for the passenger lifts and area clearance is included in the scope of the contractor.

38.0 SUPERVISORY STAFF AND WORKMEN

38.1 The contractor shall deploy all the skilled workmen like millwright fitters, welders, crane operators, drivers, gas cutters, riggers, sarangs, masons, carpenters, electricians, helpers and instrument technicians to carry out the works as per specifications. In addition to skilled, semi-skilled and unskilled workmen required for all the works, suitable workmen required for handling and transporting of equipment from site storage to erection site, erection, testing and commissioning as contemplated under this specification shall be deployed. Only fully trained and competent men with previous experience on the job shall be employed. They shall hold valid certificates wherever necessary.

BHEL reserves the right to decide on the suitability of the workers and other personnel who will be deployed by the contractor. BHEL reserves the right to insist on removal of any employee / workman of the contractor at any time, if they find him unsuitable. The contractor shall remove him forthwith.

38.2 The supervisory staff including qualified Engineers deployed by the contractor shall ensure proper out-turn of work and discipline on the part of the labour put on the job by the contractor. They should in general see and ensure that the works are carried out in a safe and proper manner and in coordination with other labour and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

38.3 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations / activities at site. The contractor and his personnel shall cooperate with other personnel / contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

38.4 The contractor's supervisory staff shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. The contractor shall be responsible to ensure that assembly and workmanship conforms to the dimensions and tolerances given in the drawings / documents / instructions given by BHEL Engineer from time to time.

38.5 The contractor shall deploy the necessary number of qualified and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.

38.6 **There shall be three shifts working for the execution of awarded contract.** It is the responsibility of the contractor to engage his workmen to execute the awarded scope of work in three shifts basis. The contractor may have to organize his work on overtime basis also for achieving the targets set by BHEL and also during the period of commissioning and testing of unit. The contractor's finally accepted rates / prices shall include all these contingencies within finally awarded rates / prices of this contract.

38.7 During the course of erection,

- If the progress is found unsatisfactory,
- If the target dates fixed from time to time for every mile stones are to be advanced / not being met,
- if it is found that the skilled workmen like fitters, operators, technicians etc deployed are not sufficient,

BHEL after giving reasonable opportunity to the contractor will induct on the work the required workmen in addition to contractor's workmen to improve the progress. The expenses so incurred will be recovered from the contractor's bills with overheads.

- 38.8** If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road kerb, fence, enclosure, water pipes, cables, drains, electric / telephone poles, wire, trees or any other property or to any part of erected components, the contractor shall make the same good at his own expense. In default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses from any money due to the contractor. BHEL's decision will be final and binding.
- 38.9** Though every endeavor shall be made to ensure that all plant materials are supplied as per schedule. However in a job of this kind it is possible that some materials may be delayed. In order to achieve the ultimate targets, the contractor may have to augment his manpower and resources. No compensation on this account shall be admissible.
- 38.10** **The month wise manpower deployment plan to be submitted as per format (at Annexure-C to General Conditions of Contract)** is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required manpower, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account. The contractor shall identify separate persons at site for quality control and safety.
- 39.0** **MATERIAL HANDLING AND STORAGE FOR E/T/C**
- 39.1** All the equipment furnished under this contract shall be received from the project stores, sheds / storage yards and transported to pre assembly area / erection site and stored in the storage spaces in a manner so that they are easily retrievable till the contractor erects them. **While drawing / lifting material from BHEL / customer stores, contractor shall ensure that the balance / other materials are stacked back immediately. No claim is admissible on this account**
- 39.2** While BHEL will endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed, it shall be contractor's responsibility to assist BHEL in identifying materials well in time for erection. They should take the delivery of the same, following the procedure indicated by BHEL, and transport the material safely to pre-assembly yard / erection site in time, according to program.
- 39.3** The contractor shall take delivery of components, equipment / consumables from storage area after getting the approval of BHEL Engineer on standard indent forms.
- 39.4** The contractor shall identify and deploy necessary Engineers / supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope.
- 39.5** All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes / slings etc. shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.
- 39.6** Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's drawings. Slings / shackles of proper size shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damage. Dragging of piping / valves should be avoided. In case of any damage the cost shall be covered from the contractor.
- 39.7** Approach road conditions from the stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above circumstances

without any extra cost.

- 39.8** Contractor shall be responsible for examining all the plant and materials issued to him and notify the Engineer immediately of any damage, shortage, discrepancy etc before they are moved out of the stores / storage area. The contractor shall be solely responsible for any shortages or damages in transit, handling, storage and erection of the equipment once received by him. As the erection work will be spread in different areas / locations of the project, contractor has to arrange sufficient number of watch / ward personal to avoid any pilferage of material. As per General Conditions of contract under provisions of clause No 29 BHEL will reserve the right to recover the cost of repair / replacement, if any, to bring back the equipment in original order, in case the equipment / material is lost / damaged while in the custody of the contractor. BHEL's decision in this regard shall be final and binding on the contractor.
- 39.9** The contractor shall maintain an accurate and exhaustive record-detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.
- 39.10** All the material in the custody of contractor and stored in the open or dusty locations must be covered with suitable weather proof / fire retardant covering material wherever applicable and shall be blocked up on raised level above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost.
- 39.11** If the material belonging to the contractor are stored in area other than those earmarked for his operation the engineer will have the right to get it moved to the area earmarked for the contractor at the contractors risk and cost.
- 39.12** The contractor shall be responsible for making suitable indoor storage facilities to store all equipment (drawn by the contractor from BHEL / customer stores), which require indoor storage till the time of their installation. The Engineer will direct the contractor in this regard, which item in his opinion will require indoor storage, and the contractor shall comply with Engineer's decision.
- 39.13** The contractor shall ensure that all surplus / damaged / scrap / unused material, packing wood / containers/ special transporting frames etc are returned to BHEL at a place in project area identified by the Engineer. The contractor will maintain an account for all items received and returned to BHEL. Any shortage in returning such items shall be chargeable to the contractor except for a 5% allowable against wastage for packing wood only.
- 39.14** The contractor shall hand over all parts / materials remaining extra over the normal requirement with proper identification tags to the stores as directed by the concerned BHEL engineer.
- 39.15** The contractor shall ensure that all the packing materials and protective devices installed on equipment during transit and storage are removed before installation.
- 39.16** It shall be the responsibility of the contractor to keep the work / storage areas in neat, tidy and working conditions. All surplus/unusable packing and other materials shall be removed and deposited at location(s) specified by BHEL within the project premises. If required weighing of the same within the project premises will have to be carried out.
- 40.0** **PRESERVATION OF COMPONENTS**
- 40.1** After taking delivery from BHEL / customer's stores, plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere.
- a) Items stored outdoors shall be blocked up at least six inches (6") off the ground

- b) Motors, valves, electrical equipment, control equipment and instruments etc shall be stored indoors in a warehouse provided by contractor. Motor windings shall be kept dry by use of external heat or space heaters.
- c) Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean.
- d) Insulation materials shall be stored indoors or otherwise protected against getting wet.
- 40.2** It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled and erected by him till such time of final painting. It shall be contractor's responsibility to arrange for required paints (primer), thinners, labour, scaffolding materials, cleaning materials like wire brush, emery sheets, etc, cleaning of surface and provide one coat of preservatives / paints (primer) from time to time as decided by BHEL engineer. The accepted rate shall include this work also. It is to be noted that such painting may have to be done as and when required till such time the final painting is carried out.
- 40.3** The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts then and there for their protection.
- 40.4** Any failure on the part of contractor to carry out works according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.
- 41.0 ERECTION**
- 41.1** 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,
- Scaffolding and rigging operations,
 - Machine / flame / electric cutting, grinding, welding, radiography and stress relieving
 - Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, as cleaning, checking, leveling, blue matching, aligning and assembly.
 - Machining, surface grinding, drilling, doweling, shaping
 - Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.
- 41.2** 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.
- 41.3** No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost.
- 41.4** The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion and removed from work site.
- 41.5** It shall be the responsibility of the contractor to provide ladders on columns for initial work till such time stairways are completed. For this, the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary

welding on any structural member is permitted except under special circumstances with the approval of BHEL. In case it is absolutely necessary then the contractor shall cut the temporary structure and rectify the column as directed by the engineer.

- 41.6** The contractor is strictly prohibited in using the Boiler / ESP / Auxiliary Components for any temporary supporting or scaffolding works etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor's bills.
- 41.7** Boiler auxiliary columns are plate formed box section and the erection joint is welded type where as the columns are butt type with HSFG bolted flange and partition plates, boiler main column are having flange with splice plates and bolted connections. However, the contractor has to carry out work at site as per drawing.
- 41.8** The material for platform and other structural sections under PG-36 shall be supplied in running meters. These shall be cut to size / shape / fabricated to required size / shape and to be welded by contractor.
- 41.9** Certain adjustment in length may be necessary while erecting pipelines / ducts / casings etc. The contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh by adopting specified heat treatment procedures.
- 41.10** Economizer, super-heaters, re-heater coils, burner panels may have to be hydraulically tested individually, if required, before erection as instructed by BHEL Engineer within finally accepted rates.
- 41.11** 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.
- 41.12** Assistance in mechanical work associated with the power cylinders, valves, valve actuators etc., coming under various groups shall be provided by contractor within the finally accepted rates.
- 41.13** Hanger rods are shown in the pressure parts arrangement drawings for boiler. Any cutting / welding of these hangers rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of a torque wrench.
- 41.14** The headers are provided with hand holes. The contractor, shall as per requirement, carry out removal and re-fixing of hand hole plates within finally accepted rates.
- 41.15** Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before installation.
- 41.16** Skin casing sheet for covering the boiler roof panels, rear arch tube and other areas will be supplied by BHEL. Any cutting, addition and re-fabrication to suit the site conditions shall be carried out within the finally accepted rates.
- 41.17** ESP collecting electrodes may require straightening and repair due to minor transport damages before erection and spot heating in position to get correct alignment and same will be carried out by the contractor at no extra cost.
- 41.18** The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition. Checking of alignment and re-coupling of the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction.
- 41.19** 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.

- 41.20** 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 SCAPH and other equipment as per BHEL engineer's instructions is included in the scope of work.
- 41.21** Forced lube oil system of motors or rotating equipment form parts of the work under this specification.
- 41.22** Certain rotating machinery after initial runs and commissioning of the equipment have to be hot aligned as per the instructions of BHEL engineer. Cleaning air pre-heater, fans, boiler 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.
- 41.23** Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.
- 41.24** 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. Quoted tonnage rate shall be inclusive of the above.
- 41.25** 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.
- 41.26** 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.
- 41.27** The air-preheater rotor may be disturbed during the initial operation. This may change the original clearances. It requires rechecking and correction of seal clearances. Contractor shall carry out such checks and resetting of clearances as per the instructions of BHEL engineer. The resetting may have to be repeated till satisfactory results are obtained.
- 41.28** Checking of air gaps and adjustment of stator / rotor for magnetic center of HT motors shall be carried out as part of erection.
- 41.29** The fans, mills and other rotating machines shall be checked for clearances and other vital tolerances. The IGV unit shall be serviced. Necessary assistance for balancing of equipment during trial run, if required, shall be provided by the contractor free of cost.

- 41.30** Complete penetration of water wall (Panel to Panel) welding shall be achieved either by one side or both sides welding.
- 41.31** Whenever required the contractor shall arrange for pre-qualification of process task performers.
- 41.32** All attachments welding including those for insulation works coming on pressure parts / non-pressure parts which the contractor has erected shall be done by IBR / BHEL tested welders only.
- 41.33** All electrical cabling including proper glanding, termination, dressing etc., control and instrumentation works required for completion of Electrostatic Precipitator including its commissioning shall be part of this work. This will include erection of all electrical equipment such as rectifier, transformers, and power supply and control panel, laying of trays and cables and other associated equipment.
- 41.34** 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.
- 41.35** 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.
- 41.36** 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.
- 41.37** The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor if required shall carry out scraping of bearing housing. No extra claim for blue matching up to 1mm initial gap will be entertained.
- 41.38** The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.
- 41.39** 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. All instruments such as pressure gauges / temperature gauges, switches etc. forming part of product group (PG) are under the erection scope of this contract and shall be installed and commissioned by the contractor of this package at no extra cost to BHEL. However the calibration of these instruments shall be done by C&I agency as above
- 41.40** All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, 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.

- 41.41** The contractor shall completely erect and test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves and accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.
- 41.42** Pipes sent in standard length shall 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 upto 80 -mm nominal bore will have to be fabricated at site. Only cold cutting methods are to be employed for cutting of pipes and tubes irrespective of the size and material. Gas Cutting, if any, will be allowed only in CS LP piping
- 41.43** 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.
- 41.44** 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.
- 41.45** 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 specifications.
- 41.46** Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes within the scope of the work.
- 41.47** All fittings like 'T'-pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection after chemical cleaning and during commissioning.
- 41.48** 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.
- 41.49** Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.
- 41.50** 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.
- 41.51** No temporary supports should be welded on the pressure parts and piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases the contractor if required, shall carry out heat treatment.
- 41.52** Spring suspensions / constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrests / locks etc., have to be carried out as and when required.
- 41.53** 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, flanges, orifices, 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.

- 41.54** 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.
- 41.55** Layout of small-bore piping in boiler, oil systems etc. as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out. As built drawing is to be submitted by the contractor after erection completion.
- 41.56** 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.
- 41.57** Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles/orifices, compensators, bellows and control valves to be provided on auxiliaries and pipe lines are covered within the scope of this specification. This will be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The welding of all the above items will be contractor's responsibility even if the:
- (a) Product groups, under which these items are released, are not covered in the scope of this tender.
 - (b) Items are supplied by any agency other than BHEL.
- 41.58** 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.
- 41.59** The contractor shall assist BHEL in preparation of as built piping drawing.
- 41.60** Erection of power cylinders, motorized valves, valve actuators etc. coming under various groups is covered under the scope of this specification. However C&I calibration / commissioning for pneumatic valves & power cylinders shall be arranged by BHEL through C&I agency at no cost to the contractor for this package. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account. The alignment and any mechanical adjustments including link adjustment, opening & reconnection of links, replacement of valve / actuator or any mechanical part, air filter & regulator cleaning etc. required during calibration and operation, the same shall be carried by the contractor for this package. However, if re-calibration is required till handing over of the equipments the same shall be organized by the contractor for this package as detailed above with in the final accepted rates. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account.
- 41.61** The erection of all pneumatic power cylinders for the burner-tilt mechanism and SADC is covered within the scope of this specification. BHEL will get these power cylinders for

the burner-tilt mechanism and SADC calibrated & commissioned. The contractor for this scope of work shall assist and co-ordinate for the same with the agency engaged by BHEL to calibrate such pneumatic actuators.

- 41.62** The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.
- 41.63** Following pre-assemblies in yard at ground level may be done to achieve the targets within stipulated time schedule.
- for Boiler Columns, M B L s (Bracing and Gusset plate etc).
 - for Ceiling Structure.
 - for pressure parts, down comer etc.
 - for Stairs, Landings, Handrails etc.
 - for Duct, Duct support etc.
 - for ESP Frames, Walls and Funnels.
- In addition to above other pre assemblies may also be required as decided at site to meet the stipulated erection schedules.
- 41.64** **The required rate of progress for the welding in boiler shall be around 4600- 5000 equivalent weld joints per month and average rate for the erection shall be around 1500-1800 MT per month. These are the minimum desired limits of progress need to be achieved. But depending on the site conditions, these may be increased / adjusted in consultation with BHEL engineers to meet the project schedule.**
- 41.65** BHEL at its sole discretion may permit the use of special T& Ps supplied for the plant to contractor for use during erection. The contractor after its use shall have to return it in good working condition without damaging the same. Any damaged T & P shall have to be rectified / replaced by the contractor or it shall be arranged at the risk and cost of the contractor.
- 41.66** **Erection of four puddle flanges and straight pipes size 2235 mm x 17.5 mm appx. at inlet and outlet of CW system for condenser between NTPC T/P crossing CW pit wall and up to T/P (up to or beyond centerline of 'A' row of columns as straight length for TG scope as decided by BHEL site engineer). This pipe beyond CW pit is to be buried beyond CW pit wall. Civil work for this work is not covered in the scope of this contract. Similarly branching-off of four pipe tapings of ACW on CW of Nb 800 from the CW inlet and outlet pipes up to 500 mm above the ground / as decided by site engineer may have to be carried out as the situation warrants prior to burying them in the earth. The erection & testing etc shall be done as per the scope of piping as per the drawing, documents and specifications and shall be paid as per the rates of price schedule of contract.**
- 42.0 WELDING, HEAT TREATMENT, RADIOGRAPHY AND NON-DESTRUCTIVE TESTING**
- 42.1** The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / specification in practice in BHEL. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements. **Semi automatic welding (GMAW) process shall be used for non-pressure parts / ducting / structures etc to the maximum possible, considering its cost efficiency, better quality and time saving features.**
- 42.2** Welding of pressure parts, equipment, piping, high tensile structural steel shall be done

by certified high pressure welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for high-pressure works.

- 42.3** All welders including tack welders, structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR 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.
- 42.4** Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welder's having passed qualification a test does not absolve the contractor of contractual obligation to continuously check the welder's performance.
- 42.5** 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.
- 42.6** The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. 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. All weld joints also for temporary piping required for alkali flushing, acid cleaning and steam blowing should be got done by HP welders only. The root run should be done by TIG welding. All arrangements required for the above shall be the responsibility of the contractor at no additional cost. Argon Purging is to be done for TIG Run of SS Pipes
- 42.7** All expenses for testing of contractor's welders including destructive and nondestructive 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.
- 42.8** The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.
- 42.9** **Only BHEL/NTPC approved electrodes and filler wire will be arranged and used by the contractor**, within the finally quoted price. BHEL / NTPC reserve the right to test any approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number / batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the

same.

- 42.10** All butt / fillet welds shall be subject to dye penetration test/ other tests as per the instructions of the engineer at no additional cost.
- 42.11** The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He 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 other wise of the welds shall be final.
- 42.12** 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.
- 42.13** 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.
- 42.14** Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part 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.
- 42.15** 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.
 - 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.
- 42.16** The contractor shall also be equipped for carrying out other NDT like Radiography test/ LPI / MPI / Ultrasonic testing / Hardness test etc. as required as per welding schedules / drawings and documents etc. within the finally accepted price / rates. All type of required testing for the weld joints is under the scope of this contract
- 42.17** The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.
- 42.18** The contractor for radiography work shall use iridium-192 or any other source required for the work. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

- 42.19** Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be in between the range of 1.5 to 2.0.
- 42.20** 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.
- 42.21** Lead numbers and letters are to be used (generally 6 mm 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.
- 42.22** Lead intensifying screens for front and back of the film could be used as per the above-referred ASME specification.
- 42.23** 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.
- 42.24** For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.
- 42.25** Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.
- 42.26** 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.
- 42.27** The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.
- 42.28** Contractor shall note that 100% radiography 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 radiographed 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.
- 42.29** All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.
- 42.30** 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.
- 42.31** 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.
- 42.32** Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.
- 42.33** 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-radiographed at contractor's cost.

- 42.34** If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.
- 42.35** 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 for the work as per directions of BHEL.
- 42.36** 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 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.
- 42.37** For P91 pipes materials welding, clauses no. 54.0 of this tender will be applicable besides above-mentioned clauses. However T 91 materials of boiler tubes shall be welded as per specifications for boiler equipment. The welding electrodes for T91 material shall be supplied by BHEL's Mfg. Unit and shall be issued free for erection to the contractor.

43.0 APPLICATION OF INSULATION AND REFRACTORY

- 43.1** All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length without any extra cost to BHEL.
- 43.2** Contractor has to supply and apply heat resistant primer on welded portions before application of insulation.
- 43.3** 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. The wool mattresses shall be handled by the contractor in such a way that these do not get deformed.
- 43.4** The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.
- 43.5** The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing
- 43.6** 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.
- 43.7** 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 be made by him at his cost. If any damage occur 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.
- 43.8** 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 they will also supply anti-corrosive black bituminous paint and bituminous sealing compound required for above works at his cost. However, if any material is received from the unit, the same shall be issued free of cost to the contractor**

- 43.9** Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractor's responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also be covered within the scope of this contract.
- 43.10** A logbook shall be maintained by the contractor to obtain clearance for application of insulation. If the contractor does the work on his own accord without prior permission the area may have to be redone at his cost.
- 43.11** Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:
1. Wool / LRB mattresses and cladding sheets..... 2%
 2. Insulation bricks and mortar..... 2%
 3. Castable refractory..... 1%
- 43.12** The entire surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals.
- 43.13** The contractor shall leave certain gaps and opening while doing the work as per instructions of BHEL engineer to facilitate inspection during commissioning and to fix gauges, fittings and instruments. The gaps will have to be finished as per drawings at a later date by the contractor at his cost.
- 43.14** If during erection and commissioning any of the parts are to be 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.
- 43.15** Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.
- 43.16** 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.
- 43.17** Insulation of expansion joints, dampers, etc shall be carried out after NDT / gas tightness test is completed.
- 43.18** Special type of Insulation wool used in pent house shall not be cut indiscriminately.
- 43.19** Contractor shall mix and apply the refractory / insulation as per the instructions of BHEL Engineer. Castable refractory / insulation after application shall be cured as per the instructions of BHEL Engineer. The contractor shall provide the required quantity of wire nails, planks for formwork and other materials for centering and grouting work.
- 43.20** Application of castable and pourable refractory between tubes, around burners, on ceiling and as directed by Engineer and as per detailed drawings and specifications.
- 43.21** Dressing of insulation brick to suit site conditions, curing refractory concrete

applied/sheet cladding over insulation forms a part of this work.

- 43.22** Contractor shall observe all precautions for laying / curing of castable refractory. Any defective works found shall be re-laid by contractor at his cost.
- 43.23** Making structural supporting work for pourable insulation, laying pourable insulation, adhering to all specifications and instructions during application forms a part of this work.
- 43.24** Day to day cleaning of insulation debris and scraps to be ensured by the contractor. Excessive wastage and non removal of waste insulation materials from work / plant area will attract cost recovery.

44.0 TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST COMMISSIONING

- 44.1** The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include hydraulic test of boiler, land flow test, clean air flow test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system 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.

All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications.

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.

- 44.2** Commissioning of ESP shall involve required tests such as air leak test, gas distribution test, motor no load test, rapping mechanism trial runs, interlock tests, charging of transformer fields, commissioning of all electrical equipment / panels, heaters and their proper tuning etc. The contractor shall provide all consumables, labour, scaffoldings and items required for satisfactory testing.
- 44.3** 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 FD fan through the steam generator up to stack.
- 44.4** All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing.
- 44.5** The scope of pre-commissioning activities cover installation of all necessary equipment including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, chemical cleaning, steam blowing or for any other tests. The scope also covers the off site disposal of effluents.
- 44.6** All items / material required for conducting hydraulic test, alkali boil out, acid cleaning, steam blowing etc., will be supplied by BHEL / its customer. However, receipt of materials from store, its transportation, servicing, erection, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that **no separate payment shall be released for any temporary works** that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them. Broadly the work on

temporary systems will be divided as under:

Boiler: Erection etc. of all temporary piping along with insulation and supports for steam blowing and affluent disposal are to be carried out as part of Boiler work. The Contractor will be responsible for their operation and any servicing required till completion of commissioning activities.

For Chemical Cleaning, Installation and operation of all equipments, temporary piping, tanks and electrical switchgear along with their accessories shall be carried out by another agency of BHEL. While agency appointed by BHEL will be responsible for their Chemical Cleaning Operation, the Boiler Contractor shall make ready main boiler equipments required for chemical cleaning process and they will closely associate themselves with the BHEL's agency during the process.

Erection etc. of blowers and blanks and putty required for conducting air tightness test and GD Test shall **be carried out as part of Boiler work** (Putty to be procured by the contractor without any extra cost to BHEL).

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 on all the parties.

Dismantling of the temporary equipment and piping will be done by the agency that has erected the equipment and piping and they will also responsible to return these materials to the stores.

- 44.7** Boiler Drum will be dispatched without fixing internals and internals will be sent separately. The internals have to be fixed as and when required. Dismantling and re-assembly to be done to suit various commissioning requirements.
- 44.8** Commissioning of the boiler will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid cleaning, passivation, preservation, steam blowing and floating of safety valves. Flushing of all the lines by air, oil or steam as the case may be, trial run of the boiler, servicing of valves and any other works incidental to commissioning are to be carried out. During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTE's till such time the commissioned units are taken over by the BHEL's customer.
- 44.9** It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement.
- 44.10** 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&P's, IMTE's 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.
- 44.11** It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.
- 44.12** 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 are 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.

- 44.13** During commissioning, opening / closing of valves, changing of gaskets, realignment 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.
- 44.14** The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.
- 44.15** The valves will have to be checked, cleaned or overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.
- 44.16** In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.
- 44.17** 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.
- 44.18** The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.
- 44.19** Cleaning and servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.
- 44.20** At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the Engineer and incorporate the same at no additional cost. The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor
- 45.0 TOUCHUP / FINISH PAINTING**
- 45.1** All exposed metal parts of the equipment, structure, auxiliaries, piping, ducts and other items (covered within the scope of this contract) after installations are to be painted. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping and any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting.
- 45.2** Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and **to be touch up painted with suitable approved primer and finish paint matching with quality of shop paint / approved final colour.** Besides above two coats of approved primer paint is to be applied on all the bare / unpainted surfaces. The gas cut stubs would require being ground and rounded.

The painting and insulation of entire boiler package is in the scope of this contract with materials (Scope of painting covers entire boiler including those structures and equipments which are erected by other contractor of BHEL and handed over to this contractor). The contractor should take care of this while quoting and it may be noted that no extra payment shall be made to the contractor for painting (including materials) of boiler structures and equipments which are received by him from other contractor of BHEL.

- 45.3** After applying the primer paints, wherever required, all structure / equipment / items, shall be painted with paints as specified by BHEL engineer/ its customer. The number of coats / paint thickness shall be as indicted in the drawing / documents. However at least two coats of finish painting is to be applied. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish / paint thickness is achieved. Certain equipment / Items are required to be painted with approved quality heat resistant paint / primer. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.
- 45.4** Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer.
- 45.5** **Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for touchup / finish painting. Paint shall be of BHEL/ its customer's approved make only (i.e. enamel, epoxy, fire resistant or of any other required category specified by BHEL / its customer, drawings, documents and specifications for this package) and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work.**
- 45.6** The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lumpsum price/rates.
- 45.7** **The contractor shall provide legends with direction of flow on equipments and piping in size specified by Engineer. Letter writing shall be done in Hindi /Local language/ English or in all the languages as specified by the engineer.**
- 45.8** The painters have to undergo test and only qualified painters will be allowed to work.
- 46.0** **PROGRESS REPORTING**
- 46.1** Contractor is required to draw mutually agreed monthly erection 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.
- 46.2** Weekly progress review meetings will be held at site during which actual progress during the week vis-à-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 non-conformities.
- 46.3** The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report and other reports

as per Performa considered necessary by the Engineer.

- 46.4** The progress report shall indicate the progress achieved against planned, with reasons indicating delays, if any. This should give the remedial actions which the contractor intends to take to make good the slippage or lost time, so that further works again proceed as per the original program and the slippage do not accumulate and effect the overall program.
- 46.5** The daily manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
- 47.0 DRAWINGS AND DOCUMENTS**
- 47.1** The detailed drawings, specifications available with BHEL engineers will form part of this tender specification. These documents will be made available to the contractor during execution of work at site. The contractor will also ensure availability of all drawings / documents at work place.
- 47.2** Necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan, which shall be returned to BHEL Engineer at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.
- 47.3** The contractor shall maintain a record of all drawings and documents available with him in a register as per format given by BHEL Engineer. Contractor shall ensure use of pertinent drawings / data / documents and removal of obsolete ones from work place and returning to BHEL.
- 47.4** The data furnished in various annexure enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work.
- 47.5** Should any error or ambiguity be discovered in the specification or information the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.
- 47.6** Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimension / details, without specific approval of BHEL.
- 48.0 TAXES AND DUTIES**
- 48.1** **TDS under Income Tax, Sales Tax, VAT etc**, if any, shall be deducted at prevailing rates on gross invoice value from the running bills unless Exemption Certificate from appropriate Authority / Authorities is furnished.
- 48.2** **Price quoted shall be inclusive of all taxes except service tax.** The service tax, as legally leviable & payable by the contractor under the provisions of applicable law/act, shall be paid by BHEL as per contractor's bill. However, contractor shall have to submit proof of service tax deposited by them immediately after the deposit but not later than the next bill submitted after the due date of deposit. The contractor shall furnish proof of Service Tax registration with Central Excise Division covering the services covered under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by contractor on BHEL for this project. The contractor shall obtain prior approval of BHEL before billing the service tax amount and should submit proper CENVATABLE invoice as per Service Tax Rules.

With introduction of Cenvat credit rules 2004 which came into force w.e.f. 10.09.2004, excise duty paid on input goods including capital goods used for providing the output service and service tax paid on input service can be taken credit of against the service tax payable on output service. As such, while offering the rates, the contractors may take into account the benefit of above provisions as the cost of input to contractors will

- be the cost net of excise duty and service tax and adjust their offer price accordingly to make it more competitive.
- 48.3** In VAT applicable States, "Tax Invoice" if required under the relevant State VAT law shall be submitted alongwith other compliances as per concerned VAT Act.
- 48.4** Contractor shall get his organization registered with concerned sales tax/VAT authorities within 15 days of award of this contract, if applicable. The delay on this account and delay in bringing the material shall be to contractor's account and no extension of time shall be allowed on this account. The sales tax/VAT registration for this contractor shall be forwarded to BHEL within 30 days from the date of LOI. In case the contractor is already registered for sales tax/VAT with Govt. Authorities he must quote his registration no, while submitting their tender.
- 48.5** Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing their materials, plants, and equipment at site for the execution of the work, including arrangement of Road permit as applicable under this contract.
- 49.0** **EXTRA WORK:**
- 49.1** BHEL may consider for payment of extra works on man hour basis @ Rs.30/- (Rupees thirty only) per man hour only for such of those works which:
- A** Require major revamping or rework and which are totally unusual to normal erection work.
 - B** Require rectification / modification for improvement in the design during commissioning,
 - C** Requiring fresh fabrication of components in place of rejected / replaced components.
- 49.2** The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals.
- 49.3** The extra works, if any, shall be carried out by a separate gang, which will be identified for certification of man-hours. This gang will not be utilized for any other work during the period that they are engaged in the extra-work. Logbook should be maintained and should be signed jointly by the contractor's representative and BHEL Engineer on day-to-day basis. However, signing of the logbook does not necessarily mean acceptance of the extra works, which would be identified by Engineer, whether work is covered in one of the above categories. Only those works and man-hours that are certified by the BHEL Engineer-in-charge will be considered for payment. The decision of BHEL in this regard shall be final and binding on the contractor.
- 50.0** **PRICE VARIATION**

- 50.1 The finally accepted rates for scope of work as defined in this tender are subjected to price variation provisions as per following formula:

$$P1 = \frac{0.75 \times P0 (F1 - F0)}{F0}$$

P1 = Increase/decrease in billing amount (variation) for the particular month of billing.

P0 = Gross billed amount for the month as per contract provisions.

F1 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month under consideration i.e. for which bill has been raised.

F0 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month of opening of technical bid.

- 50.2 The contractor will be required to raise the bills for price variation payments on a monthly basis irrespective of the facts whether any increase or decrease in CPI. Price variation as per above formula will be calculated and paid / deducted on the total contract value on month-to-month basis from the date of award. BHEL however reserves the rights to freeze variation for that much of duration of delays, from time to time, which are entirely attributable to the contractor. **Average of applicable index of PVC paid shall be taken as index for PVC FOR final 4% amount.**

- 50.3 **With the provision of price variation** as per above clauses **NO CLAIM / COMPENSATION** on account of any increase whatsoever, (irrespective of whether escalation are steep/ unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, coarse / fine aggregates, steel, wood, electrodes, gases or any other item / reason) **will be payable** during the entire period of execution including extended period, if any.

51.0 RATE SCHEDULE

- 51.1 Contractor shall fully understand equipment description and scope of work before quoting. The scope of work and responsibility of the contractor as mentioned under these specifications shall be covered within the quoted rates.

- 51.2 The tenderer shall quote the rates as per the rate schedule only, in part II price bid (Original). Conditional price bids or price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.

Contractor's total quoted price as per rate schedule will be taken as tentative only. The contractor undertakes to erect / commission actual quantities as per advice of BHEL Engineer and accordingly **the final contract price shall be worked out on the basis of quantities actually erected at site** and payments will also be regulated for the same. The quantities may vary to any extent and no compensation will be payable in variation of quantity. However, in case of over all variation in Contract value (as indicted in LOI), **beyond (minus) 30%, the contractor will be eligible for compensation** as per the following provision:

“The total executed value shall be raised by 10 % subject to the condition that the total value of work executed plus increase as above shall be limited to 70 % of the awarded contract value”

Contractors are requested to take above into account while quoting. The contractor confirms that the rate quoted above takes care of such variation during execution stage.

51.3 THE TENDERER SHALL QUOTE RATES FOR THE ENTIRE SCOPE OF WORK. THE RATES ARE TO BE QUOTED IN THE RATE SCHEDULES FORMAT IN A SEALED ENVELOP.

52.0 INSTRUCTIONS TO TENDERER

52.1 Offers received without data / information, required under tender clauses-11.1 to 11.11, is liable to be rejected. All these data / information should be duly supported by documentary evidences (Refer note below clause-11)

52.2 No deviations to the tender conditions will normally be accepted.

52.3 The tenderers are advised to actually visit the site and fully acquaint themselves with site conditions, location of stores, transportation routes, quantum of work etc. before quoting their rates for this work. BHEL shall not be responsible in any way for non-familiarization of the site conditions. Once the tenderer has quoted for the work, it is implied that he has ascertained various site conditions and NO CLAIM whatsoever will be entertained by BHEL on any such account.

52.4 The contractor in the event of this work being awarded to him shall establish a site office at site and keep posted an authorized responsible officer who should hold a valid power of attorney for the purpose of the contract. Any order or instruction 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.

52.5 LIQUIDATED DAMAGES (LD)

For delay in completion of work attributable to the contractor, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the contract value as mentioned under clause no.25.5 of the GCC of the tender.

52.6 SECURITY DEPOSIT

The contractor shall submit Security Deposit within 15 days from the date of issue of LOI as per clause no. 16.2 of the General Conditions of Contract (GCC). In case the contractor opts to furnish Bank Guarantee as a part of Security Deposit, the BG shall be issued as per the Performa enclosed as per Annexure- H of the GCC and also that the BG should be issued preferably through any of the Member Banks as listed in GCC;

For BG through any other Nationalized Bank (Not covered in the list of Member Banks of GCC), the discretion of its acceptance shall lie solely with BHEL.

52.7 INSURANCE

- 52.7.1 Besides provisions under clause no. 29.0 of GCC regarding insurance, the following shall also be applicable. The contractor shall also take care of the same while submitting their offer.
- 52.7.2 Insurance for all materials pertaining to the Contractor (T&Ps, Construction Materials etc.) during transit, storage and during construction shall be in his (Contractor's) scope.
- 52.7.3 The Contractor shall provide insurance cover to all persons employed/engaged by him throughout the period of Contract, including the extended period, if any.
- 52.7.4 [In addition to insurance as per Workmen's Compensation Act, Employer's liability and also Group Personnel Insurance for employees are also to be taken by contractor.](#)

52.8 OTHERS

- 52.8.1 In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.
- 52.8.2 The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation / Techno-commercial bids and acceptance of customer. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

SECTION - III B**SPECIAL CONDITIONS OF CONTRACT**

CLAUSE NUMBER	DESCRIPTION
53	SCOPE OF WORK
54	PIPING OF P91 MATERIAL (SPECIAL PROCESS)
55	DRUM LIFTING (SPECIAL PROCESS)
56	CHEMICAL CLEANING
57	FACILITIES TO BE PROVIDED BY BHEL / CONTRACTOR
58	TIME SCHEDULE
59	OVER RUN
60	TERMS OF PAYMENT

SECTION - III B**SPECIAL CONDITIONS OF CONTRACT****53.0 SCOPE OF WORK**

53.1 BHEL has been awarded the work of Design, Manufacture, supply, installation, erection, testing & commissioning of 1 x 500 MW coal based unit # 6, Stage – III at Farakka Super Thermal Project (FSTPS), Distt. Murshidabad, WB. With the commissioning of stage III, the capacity of plant shall become 2130 MW. The scope of work under this tender broadly consists of Material Handling, erection, supervision, pre-commissioning, testing & commissioning and assistance in performance testing of the equipment/system and works, completion of facilities and handing over to the NTPC of One set of Steam Generator complete with all accessories and auxiliaries including Pressure Parts, integral piping, fittings, Milling System with Coal Feeder, PA Fans, Draft System including ID & FD fans, Regenerative Air Pre-Heaters & Steam Coil Air Pre-Heater (SCAPH), Fuel Oil Pressurizing & firing system, ducting, dampers, expansion joints, Thermal Insulation and cladding, APH wash water system, Auxiliary PRDS, Auxiliary Steam Piping, Misc. Hoist & Cranes, Equipment Cooling Water System, Low Pressure Piping System, Power Cycle Piping, associated Electrical System, Soot Blowing System, Elevators in Boiler area, Electrostatic Precipitator, Equipment Cooling Water, Instrument Air, Plant air & Service Water Piping, painting and insulation etc.

The scope of these specifications for Erection, testing & commissioning of Boiler, ESP, Rotating Machines, Auxiliaries, Piping, Painting & insulation etc. is not limited to but covers mainly following:

- **Taking delivery of the boiler materials from the project storage yard / stores / sheds/ from vehicles / rails, to erection site, erection, testing and commissioning of boiler and its auxiliaries like static & rotating machines, piping, insulation and flue gas ducting etc.**
- **The preservation, safe keeping, watch and ward of all the materials received for Erection, Testing & Commissioning (ETC).**
- **Receipt, unloading & transportation of burner blocks, mill bases and furnace bottom ring headers to erection site. The burner blocks, mill bases, furnace bottom ring headers etc. are to be also unloaded from trailers/railway siding by the contractor and shifted to the site of erection before lifting for erection in position.**
- **Checking, dressing, chipping and leveling of foundations.**
- **Pre-assembly, erection, alignment of various equipments, pressure parts, trim and integral piping, non-pressure parts, pulveriser fuel piping, structure, all piping specified in the specifications, machining and grouting etc.**
- **Erection of four puddle flanges and straight pipes at inlet and outlet of CW system for condenser as specified in the specification (between customer T/P crossing CW pit wall and up to T/P (up to or beyond centerline of 'A' row of columns) for TG scope as decided by BHEL site engineer.**
- **Handling arrangements for rotating machines.**
- **Carrying out of Special processes as per clause 54.0 & 55.0**

- **Welding, heat treatment, radiography, UST, Hardness testing and other non-destructive tests whatever required**
- **Painting and Insulation works of entire boiler scope (including boiler drum and structures erected by other BHEL's contractor for the Boiler and Auxiliaries package).**
- **Hydraulic testing, air leak test, land flow test, clean air flow test and other pre commissioning tests,**
- **Insulation, touchup and finish painting including supply of paints etc.,**
- **Assistance during Chemical cleaning, alkali boil out, acid cleaning and passivation, PG test as per the scope given in the tender.**
- **Steam blowing and safety valve floating including erection and dismantling of all temporary piping, valves, pumps, tanks etc. required for above operations and other commissioning activities including post commissioning operations and stabilisation of the unit,**
- **Unit trial operation, resolving any deficiencies observed and handing over of 1 x 500 MW Boiler Unit No. 6 of [Farakka Super Thermal Power Project \(FSTPP\)](#).**

General idea of equipments to be supplied by BHEL:

BHEL shall mainly supply following major equipments for the main steam generator and auxiliaries for 1 x 500 MW Boiler Unit No. 6 of [Farakka Super Thermal Power Project \(FSTPP\)](#). This doesn't indicate all equipments but covers all major ones. Some of the items may also be added / deleted from them as per the final engineering, however all the equipments are to be erected as per tonnage rate stipulated in the contract.

A) Mechanical:

- i) Complete boiler pressure part system, Boiler drum with drum internals, Water-cooled welded wall furnace system with headers and extended side wall etc., Complete circulation system including connecting piping and down comers, Superheater/ Reheater system including headers, connecting pipes, Economiser system including connecting pipes, headers and recirculation system, Desuperheaters for superheater system and emergency desuperheater for reheater system including spray control valves/ piping.
- ii) Complete boiler integral piping, valves and fittings as per schematics/ details including the drain and vent piping, safety valve exhaust piping, drain pans, drain piping to ground level, silencers for first spring loaded safety valve at drum and superheater outlet, electromatic safety valves and start up vent of SH. Silencers for first spring loaded safety valves and electromatic relief valves at RH outlet. Sample coolers and sampling pipes as per scheme.
- iii) Complete raw coal piping from bunkers to feeders and from feeders to mills with necessary gates, coupling and supports, etc., one number diverter chute piece per boiler for use in bunker emptying.
- iv) Pulverised fuel pipings from pulverisers to bunker windbox including necessary couplings, supports, hangers and gates.
- v) Raw coal gravimetric feeders and drives.

- vi) Coal Mills including classifier and drives.
- vii) Seal air fans for mills with drives, filters, piping and supports.
- viii) Burner windbox of tilting tangential type with linkages, burner tilt power cylinders including coal burners and air-cooled oil guns.
- ix) Fuel oil pumping unit for HFO with necessary strainers, valves and fitting & Steam tracing system as per schematics, drain oil line from Pump/strainer to oil sump near Pump House.
- x) Fuel oil heating unit for HFO with necessary strainers, valves & fittings. The heating unit is envisaged to be located within the Fuel Oil Pump House. Piping from Pump House upto Burner and return line upto Pump House will be supplied. HFO piping shall be provided with steam tracing system.
- xi) Light oil-pumping unit with necessary strainers, valves and fittings, piping from Pump House upto burner will be supplied. Drain oil line from pump/strainer to oil sump near pump house.
- xii) Complete boiler front fuel oil for HFO, light oil, auxiliary steam, compressed air, steam tracing system with necessary piping, valves, fittings, supports etc., and return line upto terminal point.
- xiii) BHELSPARK HEA ignitors.
- xiv) Scanners and scanner cooling air system including fans, drives, filters, air piping and supports.
- xv) Axial reaction FD fans with drives, silencers and suction filters.
- xvi) Axial reaction PA fans with drives, silencers and suction filters.
- xvii) Radial ID fans with Inlet Damper and hydraulic coupling system.
- xviii) Regenerative Airheaters with one electric drive & one air motor drive including lubrication system, soot blowing systems, provision for off load water washing and fire fighting system, rotor stoppage alarm, fire sensing device (thermocouple type) and elements handling arrangements.
- xix) Steam Coil Air Preheater for Secondary air located in bypass duct.
- xx) Handling arrangement for coal mill and mill motor including runway beams and monorail. Electrically operated lifting tackles for fans and Regenerative Airheaters as detailed elsewhere in this specification.
- xxi) Boiler steam soot blowing system complete with blowers, piping, valves and fittings as per schematic.
- xxii) Start up temperature probes.
- xxiii) Complete boiler and auxiliaries supporting structural steel, stairways, platforms and walkways, handrails, complete foundation bolts, anchor channels, for all the equipment and columns. Structural steel material and

purlins for boiler roof, weather covering at drum level and burner operating floors. Metapoly sheet covering at fireman's floor and boiler roof.

- xxiv) Interconnecting platforms
- xxv) Pent house ventilation system.
- xxvi) Complete buck stays and tie bars for the boiler.
- xxvi) Complete outer sheet Ribbed aluminium casing for boiler and plain aluminium sheet casing for equipments and ductwork. Boiler inner casing wherever necessary.
- xxviii) Complete air and gas ducts with necessary expansion joints, dampers/ gates and supports upto chimney inner flue bottom flange.
- xxix) Complete refractory and insulating material along with the required fixing materials and reinforcements for equipment included under Boiler package.
- xxx) Complete electrostatic precipitator dust collecting system.
- xxxi) Boiler rough mountings including access doors, inspection doors and peepholes.
- xxxii) Special tools required for boiler and auxiliaries maintenance
- xxxiii) Interconnection piping and valves for Aux steam piping, fuel oil main lines, cooling water piping, service water piping, compressed air/ instrument air piping.
- xxxiv) Initial fill of lubricants, Matching flanges & connecting materials for equipments supplied by BHEL.
- xxxi) HP Bypass system valves.
- xxxii) [Steel Helical Springs and Viscous Dampers for PA, FD & ID Fans](#)

B. Electricals, Controls and Instrumentation:

- i) Pressure, Temperature and Draft tapings and test pockets, Local Vibration monitoring system for ID, FD & PA fan and HT motors accessible bearings (Dual axis), Secondary air and primary air flow measurement, Differential Pressure & temperature switches. Micro-processor based controls for Burner Management System, Secondary Air Control system, Soot Blower Control system, HP Bypass Control, APRDS control, Gravimetric Control System & Electromatic Relief valve control.
- ii) Control panels, cubicles, motor control centres, drives and cables for boiler.
- iii) All controls instrumentation equipments cabling for TG and Generator area.

C. Others:

- CW Piping from inlet & outlet of Condenser upto Terminal Point (i.e. near 'A' row of STG Building) including RE Joints, BF Valves.
- ACW Piping upto Terminal point.
- Condensate Reserve storage tank.
- Power Cycle Piping and valves covering main steam, Cold Reheat, Hot Reheat, Boiler Feed & Condensate System to make system complete within the terminal points.
- Thermal insulation for equipments and piping.
- Dosing systems - LP Dosing (Ammonia & Hydrazine) system, HP Dosing (Phosphate) system.
- Central Lube Oil Storage & Transfer System.

53.2 The PG wise break up of boiler, ESP, Rotary and Static Auxiliaries and piping is tentative as indicated under Annexure-I. Regarding the tonnage indicated the decision of the BHEL Engineer with respect to scope, and keeping the work suitability, quality and time schedule will be final and binding on the contractor.

However the work of Boiler shall be broadly as per following:

Boiler scope mainly includes main boiler / furnace, structures, pressure parts, air heaters and associated ducts (including ducts between air heater and FD/PA fans), burners, coal mills, Pulverised coal piping, oil system, integral piping, Power Cycle Piping (as specified) elevator structures along with dust proof cladding etc. flue gas ducts from BOF to chimney, ESP, fans (ID/FD/PA/SA), coal mills, feeders, ESP, associated ducts, structures etc. and other equipments not mentioned for completing the system for SG package.

The scope broadly covers entire scope of work of Boiler and Auxiliaries excluding accessible structure works for boiler drum and boiler drum lifting and for first tier of ESP which shall be carried out by other contractor of BHEL and the same shall be taken over by the contractor for this package for carrying out remaining works. Hence, Accessible Boiler structure mainly required for boiler drum lifting, boiler drum in aligned position and also accessible ESP structure of first tier, erected by other BHEL contractor shall be received by the contractor for further erection work, commissioning and testing of boiler package. (Details as per Annexure-I)

Contractor to further note that Complete Painting and insulation for the boiler, associated auxiliaries and piping and structures as per drawings, documents and specifications shall be within the scope of work (This shall also include painting/Insulation of structure and boiler drum erected by other contractor and received by this contractor for the unit).

53.3 Approx. weight to be erected for the Boiler & Auxiliaries, ESP, piping and insulation etc. for part - A shall be 32,500MT (consisting of 30,500 MT of boiler components & 2,000 MT for piping systems as indicated in Annexure-I). The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above boiler and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted tonnage rates. The contractor undertakes to erect / commission actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same. **However, in case of overall reduction**

in contract value beyond 30%, the contractor will be eligible for compensation as per clause no. 51.2 given above.

Contractors shall take above into account while quoting the unit rates quoted as per Rate Schedule so as to take care of such variation during execution stage

53.4 The contractor under this contract shall also **provide free of cost services** of skilled persons for a total period of **147 Man-months** exclusively for use by BHEL. This manpower will be required for following services

- Qualified computer operators for office work. (42 man months)
- Clerks / Skilled workers for working in store, office and colony. (42 man-months)
- Unskilled workers for working in store, office and colony. (63 man-months)

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

In case contractor fails to provide above-mentioned man-power as desired by BHEL, the latter shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages at Farakka for the workers categories stated above plus 10% will be made from the final bill of the contractor.

53.5 The scope of work will also include providing **free of cost services of qualified & Engineers** for direct supervision of various works covered under this tender specification or other than the scope covered under this tender as decided by BHEL. These qualified engineers shall be provided for **45 (forty five) man-months** as per site conditions. The supervisors shall possess a minimum qualification of a mechanical / electrical engineering degree/ diploma. They shall be deployed in all areas covered under various specifications as well as other related areas as may be deemed essential based upon work requirements, though not specified. They shall be guided by BHEL Engineers to ensure smooth work progress as and when /where required /deployed. No separate payment shall be paid for providing the services as per this clause. The contractor shall provide these free of cost services within the quoted rates as per Rate Schedule.

In case contractor fails to provide above-mentioned man-power as desired by BHEL, the latter shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of Rs. 10,000/- against each engineer's man-months will be made from the final bill of the contractor.

53.6 The customer M/s. NTPC and / or their Consultant 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, without any cost implications to the 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

53.7 The contractor will be responsible for **Health, Safety & Environment management at site** for the construction activities to be carried out by them in accordance with requirements given under section I (a) of GCC.

Some of the common safety rules to be followed during working are as follows: -

- No outsider is allowed to enter construction area without permission.
- No body is allowed to enter at construction site without Safety Shoe.
- Never enter work area without Safety helmet & chin strap in place.
- No climbing/working allowed without proper safety belt above 2 m. height.
- Do not exceed the speed limit 25 Kmph within premises.
- No debris obstacles allowed on the roads & passages.
- All accidents/incidents to be reported to site Incharge.
- Do not walk on pipelines or false ceiling.
- Maintain good Housekeeping at work site.
- No photography/ Videography allowed without permission
- Risk factor in construction is approximately 3 times the manufacturing sector.
- 85% of the workforce is drawn from rural background. They lack technical perspective & relevant industrial common sense. Safety awareness to be developed among these workers employed by Sub-contractors.
- Infrastructure to be developed for carrying out jobs properly in a safe manner.
- All Site supervisors & engineers (including subcontractor's) must be imparted structured training on construction safety before start of the job & record to be maintained.
- Availability of qualified & trained Site Engineer at site during all working hours.
- Site Safety training to be imparted to all workers & plan to be made to cover every worker.
- Tools box talk (5-15 minutes) by supervisor prior to commencement of any job.
- All accident / incidents (Near Miss) to be reported & investigated.(formats & procedure should be finalized)
- Daily Safety Checking by Each Site Engineer along with Safety engineer.
- Weekly co-ordination meeting of all Safety engineers with BHEL safety officer.
- Monthly safety meeting with Site In-charges.
- Reports: Weekly/monthly/annual SHE report format should be finalized.
- All Safety equipment must be ISI marked & checked by Safety officer before use.
- Tag system for erection & use of scaffoldings.
- Bamboo/wooden Scaffolding material not allowed.
- LPG cylinders not allowed for gas cutting.
- Good House keeping. Separate waste bins to be used for flammable & non-flammable material.
- Safety awareness programs for workers by display of boards, posters, competitions, talks etc.
- Deployment of Safety Supervisors for every 250 workers and part there of at work site.
- Display of List of First Aid trained persons.
- Testing certificates for lifting tools & tackle.
- Provision & maintenance of fire extinguishers at construction site & material stores.
- Display of emergency telephone numbers at various locations.
- For work in confined space use 24 V lamp fitting & use tools with air motors or electric tools with max. 24 V.
- For confined space entry Gas test must be done before & at regular intervals.
- Checking & tag of equipment like grinding machine, welding machine, gas cutting set etc. by supervisors before use.

Further, the contractor is required to provide proper Safety Net System wherever the hazard of fall from height is present as per instructions of BHEL Engineer at site. The safety net shall be fire resistant, duly tested and shall be of ISI mark and the nets shall be located as per site requirement to arrest or to reduce the consequences of a possible fall of persons working at different heights.

- 53.8** Contractor shall make necessary arrangements to ensure that the atmosphere in working area (under the scope of work in this tender) and on roads is free from particulate matter like dust, sand etc. by keeping the top surface wet for ease in breathing. Provision of required tanker with spraying arrangement has to be ensured by contractor within the quoted rates, at no extra cost to BHEL

Contractor shall ensure following:

1. Contractor has to maintain contact with local hospital having scanning & other ultra modern medical facilities required during emergency including Ambulance.
2. Contractor has to ensure pre employment medical check for all staff & workers.
3. Contractor has to ensure that adequate First Aid facilities with trained nurse & ambulance are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following
 - Male nurse (in shifts)
 - Oxygen set up
 - Breathing apparatus
 - Eye wash facility
 - Stretcher
 - Trauma blanket
 - Medicines.

The contractor against this contract is required to arrange and maintain certified ambulance at site for entire contract period. The above emergency facility set up including ambulance, male nurse etc. will be shared by BHEL and its other contractors working at Farakka project at no extra cost to BHEL and its sub-contractors. In case, under unavoidable circumstances, if the ambulance is not available, the contractor will have to arrange for the same as under clause 53.8.1

- 53.9 Contractor shall make necessary arrangements to ensure following:**
- 1. Contractor shall ensure deployment of qualified level-2 Engineer for NDT services at site.**
 - 2. Contractor shall ensure deployment of Qualified & Experienced Safety Engineer / Officer at site.**
 3. Contractor shall ensure that all the **T & Ps deployed** by them, including cranes, (Indicative lists of **T&Ps and IMTEs** to be arranged by the contractor are given as per Annexure-III.) **are regularly certified by approved testing agency & the relevant certificates to this effect are to be given to BHEL for records.**

It may be noted that **non-compliance to the above three conditions** will result in **penal action** as may be decided by the competent authority of BHEL.

The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries. It may be noted that non-compliance to HSE requirements will result in penal action. **In case of violations of safety requirements, the Contractor shall be liable for a penalty of Rs. 200/- for the first violation and Rs. 500/- for the subsequent violations. For serious lapses, as decided by BHEL Engineer, fines upto Rs. 5000/- at a time can be imposed.**

The amount towards penalties as above will be deducted from running bills of the Contractor. The amount so collected above will be utilized for supporting the safety activities at site. The decision of BHEL on above will be final and binding on the Contractor.

54.0 (SPECIAL PROCESS) For Piping Systems, **P91 materials** is envisaged for PGMA 80-300 , 80-301 and 80-304 . Special care is essential for carrying out the installation of this system and strict quality norms and welding procedure will have to be followed at site. The Contractor is advised to get familiarized with the work procedure. In addition to the general clauses for Welding, HT and NDT given under clause 42 of this tender, the following clauses will be applicable. This welding is to be carried out strictly under the supervision of BHEL Engineer and all repairs etc will be carried out as per the laid out procedure.

The details mentioned hereunder comprise of the major requirements for the process. The Contractor has to provide all services and consumables required for completion of the work.

Erection, welding, heat treatment and NDE works or as specified by the BHEL during execution of PIPING OF P91 MATERIAL and for the combination of materials like P-22 with P-91, X-22 with P-91 or any other combinations of alloy steels shall be the part of contract. Some of the salient details in regards to P91 material are being indicated in the clauses mentioned below however the erection, welding and NDT process are to be done as per the procedure /specifications to be furnished by BHEL / as per the instructions by site engineer.

- 54.1** Prior to erection, supplied pipes shall be inspected thoroughly and if any defect like crack, lamination, and deposit noticed, the same shall be confirmed by Liquid Penetrant Inspection (LPI). If confirmed, it shall be referred to BHEL.
- 54.2** Cutting of P-91 material shall be done by bandsaw / hacksaw /machining / grinding only.
- 54.3** Edge preparation shall be done only by machining/ by chamfering machine. In extreme cases, edge can be prepared by grinding with prior approval of BHEL.
- 54.4** During edge preparation care should be taken to avoid excessive pressure to prevent heating up of the pipe edges.
- 54.5** All edge preparation done at site shall be checked by Liquid Penetration Test. Weld built-up on edge preparation is prohibited.
- 54.6** The pipe fit-up for welds shall be carried out properly, as per drawing specifications, by using temporary pipe clamps arranged by the contractor to ensure proper alignment and root gap. Use of site manufactured clamps for fit-up is acceptable. Neither tack welds nor bridge piece shall be used to secure alignment. Partial root weld of minimum 20mm length by GTAW may be allowed with the prior permission of BHEL engineers.
- 54.7** Suitable reference punch marks shall be made on both the pipes (at about 200 mm from the EP) at least on four axis to facilitate U. T on weld joint.
- 54.8** Provide Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations.
- 54.9** No pre-heating is required for **fixing Thermocouples** (of Ni-Cr / Ni – Al of 0.5 mm gauge size) **with resistance spot welding**.
- 54.10** Argon gas to be used both for purging as well as shielding shall be of 99.99 purity levels conforming to IS 5760-1998. Dry Argon gas with requisite quality shall be used for purging the root side of weld. The gas flow rate to be maintained during purging is 10 to 25 liters / minute and for shielding during GTAW is 8 to 14 liters / minute
- 54.11** The purging dam (blank) shall be fixed on either side of the weld bevel prior to Pre-heating. The dam shall be fixed inside the pipe and it shall be located away from the heating zone. Purging is to be done for root welding (GTAW) followed by two filler passes of SMAW in case of butt welds.

- 54.12** Wherever possible, solid purging gas chambers are to be used which can be removed after welding. If not possible, only water-soluble paper is to be used.
- 54.13** Wherever possible, solid purging gas chambers are to be used which can be removed after welding. If not possible, only water-soluble paper is to be used.
- 54.14** Purging is not required in case of nozzle and attachment welds, when they are not full penetration joints.
- 54.15** Start purging from inside of pipe when root temperature reaches 220 deg. Centigrade. Provide continuous and adequate Argon gas to ensure complete purging in the root area. The minimum preflushing time for purging before start of welding shall be 5 minutes, irrespective of the pipe size.
- 54.16** Preheating: Prior to start of pre-heating ensure that surfaces are clean and free from grease, oil and dirt. Pre-heating temperature shall be maintained at 220 deg. Centigrade by using induction heating. The temperature shall be ensured by using a calibrated autographic recorder and two calibrated thermocouples fixed at 0 and 180 degree positions on both pipes 50 mm away from the edge. The thermocouples shall be welded with spot welding machine. The pre-heating arrangement shall be inspected and approved by BHEL engineer. Alternate arrangements shall be made during power failure. Two numbers additional square thermocouple are to be fixed for emergency use. Gas burners shall be employed to maintain the temperature until the power resumes.
- 54.17** Welding: Root welding shall be done using GTAW process (as per WPS) five minutes after the start of Argon purging. Filler wires shall be clean and free from rust or oil. Argon purging shall be continued minimum two filler passes of SMAW.
- 54.18** Post Weld Heat Treatment: Heating shall be done by Induction heating only as per the procedure / specifications provided by the BHEL engineers. Generally the PWHT temperatures for P-91 with P- 91 material shall be 760 + 10 Deg. C and the soaking time shall be 2.5 minutes per mm of weld thickness, subject to a minimum of two hours. The rate of Heating / Cooling is to be strictly maintained.
- 54.19** The PWHT temperature shall not deviate from the values specified in the chart range since any deviations to the specified holding temperature range, will adversely affect the mechanical properties of the weldment and may lead to rejection of the weldment. The weld joints should be kept dry. Under no circumstances any water / liquid is allowed to come in contact with weld as well as preheated portion of the pipe
- 54.20** The recording of time and temperature shall be continuously monitored with a calibrated recorder right from pre-heating. This shall be ensured at every one hour by site-authorized personnel.
- 54.21** The width of the thermal insulation beyond the heating band shall be at least two times the heating bandwidth on either side of the weldment.
- 54.22** All equipment like recorder, thermocouple, compensating cable, oven, thermostat etc. should have valid calibration carried at BHEL approved labs. The calibrated reports should be reviewed and accepted by calibration In-charge at site prior to use.
- 54.23** Same procedures of welding and heat treatments shall be followed for the weld joints repairs. The NDE shall be conducted for the entire weld joint.

- 54.24** All the NDE i.e. LPI, MPI, UT and hardness shall be performed on the weld joints as per the standards/ specifications / direction of BHEL. The maximum allowable hardness at weld and parent metal shall be 300 HV10. Joints having hardness above 300 HV shall be re-heat treated and hardness shall be checked again.
- 54.25** Welders qualified as per ASME Section – IX and IBR on P-91 material shall only be engaged for the welding of P91 materials. Welders shall have to undergo all the training for above. **The welders shall have to be tested and qualified by BHEL site.** Contractor shall arrange for the same and entire expenditure towards this shall be borne by the Contractor.
- 54.26** **Contractor shall deploy exclusive Engineer and Supervisor who will be responsible for the completion of all activities from weld fit-up to final clearance of weld joints after satisfactory NDE and acceptance by BHEL / Customer / IBR.**
- 54.27** No interruption is allowed during preheating, welding and PWHT. Hence all equipment for the purpose of power supply, welding, heating etc. hence all alternative arrangements, (Diesel generator for providing power to the welding and heating equipment, reserve thermocouple connections, gas burner arrangement for maintaining temperature etc.) shall be arranged by the contractor within the normal scope of this contract. All the preventions / procedures to be ensured to avoid abruption to on going heating / cooling process. Before start of erection, welding and heat treatment process for P 91 materials all the associated persons shall acquire complete knowledge on the subject from BHEL site engineers to avoid metallurgical failures.
- 54.28** The Induction heating equipment shall be drawn from BHEL stores, transported, installed and commissioned wherever required at site. For routine and breakdown maintenance, Contractor shall have to deploy sufficient Manpower, Tools & Plants within his quoted rate. The contractor shall provide electrical cables and switches required. All the equipment shall be protected by providing covers or sheds at site by the contractor within the quoted rate. Any loss / damage of equipment / tools by the contractor shall be recovered from the contractor.
- 54.29** **All the consumables to carry out the work for the P91 materials** required for welding and heating process i.e. K type thermocouples fiberglass insulated with heavy duty T/C connector, heating elements (annealing cables), compensating cables, insulating materials (glass fiber cloth temperature rating 1260 o C, glass fiber cord dia 3 mm (twisted) temp rating 1260 deg C, ceramic fiber blanket RT grade density 96 kg / cub M-temp rating 1260 deg C, ceramic fiber rope fiber glass 12 mm dia.- temp rating 1260 o C), gas burner arrangement, all gases, purging dams, blanks, welding electrodes, filler wires, etc. except those consumables supplied by BHEL units if any shall be **in the scope of contractor.**

Consumables like Welding electrodes and filler wires for P 91 materials supplied by BHEL mfg. units shall be issued free of cost for erection. Contractor has to use them in most economical way. Wastage of these consumables due to any willful negligence shall be recovered from the contractor.

For carrying out the installation, the following items are being provided by BHEL free of cost:

- a) Induction Heating Machine with Outgoing Cables
- b) Suitable Power Backup (DG Set)
- c) Calibrated temperature Recorder
- d) Thermocouples attachment unit.
- e) Any other item equipment being supplied with the above set shall be issued for use free of hire charges for the work

The contractor shall be issued the above in line with the General Conditions of Contract Clause 37. Contractor has to use all his resources to utilise above items for the work.

The following will have to be provided by the Contractor:

- a) Qualified operator for Induction Machine and DG Set
- b) All cables for connecting Induction Machine and DG Set to Main Supply along with Changeover System.
- c) Welder Qualified as per ASME IX and IBR for P91 Materials. Site Welder Qualification tests will be conducted also.
- d) Exclusive Trained Welding Engineer for Supervising P91 Welding and Heat Treatment
- e) Qualified NDE Engineer (Level -II) and welding Supervisor (Level-I)
- f) Required GTAW and SMAW machines
- g) Welding Machine for Demagnetizing along with cable and Residual Field Indicator
- h) Providing Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations.
- i) Providing of Argon purging for the welding operation (including supply of consumables eg Water Soluble Paper / Aluminium Dam arrangement.)
- j) Providing Gas Burner Heating standby Arrangement.
- k) Providing of Baking ovens and portable ovens
- l) Providing Band Saw/ hacksaw/ Grinder for Cutting with tools.
- m) Providing machining for Edge preparation
- n) Providing temporary pipe clamps for erection process.
- o) Providing of UST, LPI and MPI Facility as specified in the Welding process, including supply of all consumables.
- p) Providing and applying insulation band as specified in the welding procedure.
- q) Contact Type calibrated temperature Gauge.
- r) Calibrated Thermocouples.
- s) Spot welding Machine for Fixing of Thermocouples
- t) UT Testing and Hardness testing.
- u) Any other facility / consumables required for the work which is not being provided by BHEL

The above comprise of the major requirements for the process. The Contractor has to provide all services and consumables (except for fillers and electrodes) for completion of the work.

- 54.30** DG set for backup power supply, provided by BHEL is to be operated by the contractor bi-weekly / as specified by the supplier to ensure its healthiness during excegencies of power failure for heating processes of P91 materials on account of power failures. Cables and switches, required fuels and other consumables & its operations and maintenance shall be in the scope of contractor within the awarded value.
- 54.31** The contractor shall arrange welding Machine for Demagnetizing material along with cable and Residual Field Indicator.
- 54.32** **Welding in T91 materials is envisaged in the Reheater tubes of the Boiler. The Contractor has to carry out the work for the same for completing the process. The HT, RG, UST and other NDT will have to be carried out by the contractor as per welding specifications.**

55.0 BOILER DRUM – SPECIAL PROCESS

55.1 Boiler drum erected and aligned on accessible boiler structure by BHEL's other contractor shall be taken over by the contractor of this package for further erection testing and commissioning work. All the left over works what so ever shall be under the scope of this contract and shall be paid as per the rate schedule. Minor alignments, erection of leftover structure, fixing of internals etc. and retightening of HSFG Bolts by calibrated torque wrench as per the instructions of the Engineer are also in the scope of this contract and shall be done as per the instructions of Engineer.

55.2 HSFG Bolts are to be/ may be tightened by calibrated torque wrench as per the instructions of the Engineer. These should be check tightened / re-tightened by torque wrenches before girder lifting / as instructed by the Engineer.

56.0 CHEMICAL CLEANING

56.1 **Chemical Cleaning** will be carried by a separate agency deployed by BHEL. While the work of installation of tanks, Pumps, Piping and operation of the system is in the scope of that agency, the Contractor has to extend all assistance (including providing of welding power point) and complete interface requirements for the completion of the work.

57.0 FACILITIES TO BE PROVIDED BY BHEL/ CONTRACTOR

57.1 BHEL / NTPC shall provide adequate open space for temporary storage / fabrication, free of cost to contractor within the plant boundary. It is the responsibility of the contractor to construct their office sheds, provide all utilities and dismantle, level and clear the site after completion of work or as and when required, as a part of his scope of work.

57.2 BHEL/ NTPC will provide **land for construction of labour colony** on free of charge. Further development of the land, establishing the colony, with arrangements of lighting, drinking water, sanitation etc. is in contractor's scope. The **electricity for labour colony** will be on chargeable basis at the prevailing rate of the client. Electrical source will be provided at a single point from where contractor shall make arrangement for drawl and further distribution conforming to the requirements. **For drinking water** for labour colony the contractor has to make his own arrangement including digging of bore-well if required at his own cost. The contractor may also use free drinking water from the terminal point available inside the plant for his labour colony by laying all necessary piping network for distribution of the same at his own cost. The contractor has to make his own arrangement for transportation of his workmen and other employees. BHEL / NTPC shall not provide any facility in this regard.

The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

57.3 **Water for Construction and drinking** shall be provided at one point inside the plant premises on free of charge. The contractor has to make his own arrangements of further distribution required for the supply of construction water as well as potable water for labour and other personnel at work site from this terminal point. All arrangements for further distribution have to be made by the contractor.

- 57.4** Electricity source (415/ 440 V) for utilizing **construction power** will be provided free of charge at a single point (approximately 700-750 Mtr near to the construction site of boiler) from where contractor shall make arrangement for drawl of power including power cable, suitable power distribution boards and further distribution conforming to the standards and requirements including maintenance of the distribution lines at his own cost to use construction power. The contractor shall submit to the Engineer his electrical power requirements.

Any other voltage if required shall be arranged by the contractor from power supply as above. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply. Contractor will have to provide necessary calibrated meters (tamper proof, suitably housed in a weather proof box with lock & key arrangement) at each point of power supply along with calibration certificate from authorised / accredited agency for working out the power consumption at his own cost. In case of re-calibration required for any reason the necessary charges including replacement by calibrated meters is to be borne by the contractor. Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable.

NOTE:

- They will however ensure that there is no wastage. Periodical audits will be held to ensure that these resources are being optimally used. For this the contractor has to provide an energy meter at his end.
- In case any wastage is observed BHEL reserves the right to recover any charges / penalty as deemed fit.
- Contractor will have to provide proper insulated cables for power distribution and joints, if any, will be done with proper jointing kits.

- 57.5** Required energy meter, all cables, fuses, power distribution boards, switches, switchboards, bus bars, earthing arrangements, protection devices e.g. ELCB, if any, and any other installation as specified by statutory authority, client in this regard, for drawl of construction power shall be arranged by the contractor. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, prior to these being put to use or as may be specified, shall be the responsibility of the contractor.

Electricity for construction power and light will be provided by NTPC near boiler, ESP and A/B row. Contractor shall arrange further distribution of water for construction purposes.

- 57.6** NTPC shall provide and maintain all station illumination at site. Till such time such arrangements are made, the contractor at his cost should arrange for temporary lighting in and around his work area. However adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.

- 57.7** BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply. The contractor should ensure that the works in critical areas are not held up in the event of power breakdown and for the same he should have suitable standby arrangement at his cost. In the event of breakdown in the electric supply, if the progress of work is hampered, it will be the responsibility of the Contractor to step up the progress of work after restoration of electric supply so that overall progress of work is not affected.

- 57.8** Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes and calibrated energy meter etc. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his own cost. Contractor shall be adequately equipped to arrange standby diesel welding generators in the event of construction power failure. Essential welding jobs shall not be stopped on account of main construction power failure. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.
- 57.9** The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.
- a) All electrical installations should be as per Indian Electricity rules.
 - b) All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.
 - c) Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.
 - d) Contractors have to make their own arrangement for their equipment/ DB earthing
 - e) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
 - f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
 - g) Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
 - h) Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.
- For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.
- 57.10** ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.
- 57.11** In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of power supply and no compensation for delay in work can be claimed by the contractor due to such non-supply on the grounds of idle labour, machinery or any other grounds.
- 57.12** NTPC may provide a suitable platform with proper lighting arrangement so that erection activities can be carried out through out the day and night however adequate lighting facilities such as floodlights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc as well in labour colony.
- 57.13** On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc shall be dismantled and leveled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expanses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

- 57.14** In case of non-availability of customer supplied power and / or water, it is the responsibility of the contractor to make alternative arrangements. Contractor shall be adequately equipped to arrange standby diesel welding generators in the event of construction power failure. Essential welding jobs shall not be stopped on account of main construction power failure.
- 57.15** BHEL shall provide required 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.
- 57.16** Compressed air required for construction purposes shall be arranged by Contractor. However, compressed air required for the instrumentation, start-up and plant operation purposes shall be provided by the owner as per the requirement and specifications indicated by the contractor
- 57.17** **Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE**
- 58.0** **TIME SCHEDULE**
- 58.1** The contractor is required **to commence the work within 15 days from the date of issue of letter of intent** unless BHEL decides to fix any other later date.
- 58.2** Entire scope of work of erection, testing, commissioning etc. as detailed in tender specification **shall be completed within 22 months** from the scheduled date of start of work as per the programs / milestones indicated by BHEL from time to time. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time. **In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract.**
- 58.3** The various mile stone dates to be achieved, for **BOILER # 6**, as per the current status of contract are as below:

WORK SCHEDULE

MILE STONES	MONTH
Start of Erection	within 15 days from issue of LOI
Boiler Hydro Test (drainable)	11 th Month
Boiler Hydro Test (non-drainable)	14 th Month
Boiler Light up & ABO completion	15 th Month
Acid cleaning completion & restoration	17 th Month
Steam Blowing completion	18 th Month
Safety Valve Floating	19 th Month
Coal Firing & Synchronisation (SVF)	20 th Month (within 10 days from
Trial operation & handing over	22 Nd Month

Note: Irrespective of start of work, the contractor has to organize his work and arrange all resources in consultation with BHEL to achieve above milestones or any other milestones to meet customer requirements.

58.4 The work under the scope of this contract is deemed to be completed in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

59.0 OVER RUN

59.1 In case due to reasons not attributable to the contractor, the work gets delayed and the scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of first **3 (Three) months** after the contractual completion date. In case the scheduled completion time gets **extended beyond 3 (Three) months** as stated above, the contractor shall be considered for payment of fixed over run charges, **@ Rs.1,00,000/- per month (Rupees one lakh only)** for entire scope of work on receipt of advance notice intending to claim over run and on fulfillment of following conditions:-

(a) The reasons for delay in completion of work are not attributable to contractor but however subject to the provisions of clause – 31.

(b) Contractor achieves the targets fixed during the over run period.

However, the over run charges shall be limited to 10% of the contract value.

59.2 Once the claim of over run charges is admitted no other compensation whatsoever (like for delays in receipt of materials, availability of fronts etc.) will be entertained.

59.3 The contractor shall maintain sufficient workforce (both skilled and unskilled) and other resources required for completion of the job expeditiously for the entire contractual period including total extended period.

60.0 TERMS OF PAYMENT

60.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

60.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

60.3 Subject to any deduction that BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder.

I ADVANCE PAYMENT

(a) 5% of the contract value shall be paid as interest bearing advance against submission of a Bank Guarantee for an amount equal to 1.25 times of advance valid for 24 months initially and thereafter extension for a period upto which the advance is fully adjusted. The interest chargeable shall be Prime Lending Rate of State Bank of India plus 2%.

(b) The advance paid shall be recovered from the contractor's progressive bills to an extent of **10%** of each progressive bill amount till it is fully recovered. The BG amount shall be allowed to be reduced every six months by an amount equal to the amount adjusted against running bills.

(c) The BG shall be returned after full adjustment of the entire amount of advance along with interest.

II A. PROGRESSIVE PAYMENT ON PRO-RATA BASIS

II-AA **0.25% of the contract value** on start of pre assembly work by deploying at least one number of 75 T crane, one number of 18/20 T Hydra and one no. of 20/30 T trailer in working condition at site.

- II-AB** **0.25% of the contract value** on erection of two super heater headers of Main Boiler and also first column of ESP after checking its trueness and on certification by BHEL Engineer.
- II.B** **An amount limited to 1.00 % of the contract value shall be payable in one or more installments**, solely at the discretion of Construction Manager/ BHEL at different stages of the contract execution to facilitate resource augmentation or to meet any exigency of work. In case of its non utilization 'OR' its part utilization, the entire/balance payment against this category shall be released along with commissioning of boiler (coal firing).
- II.C** **PROGRESSIVE PAYMENT ON PRO-RATA BASIS (82% of unit rates)**
(Applicable for installation of all items except Insulation work for items of main rate)
- 1 16% of the applicable contract unit rate on pro-rata basis on completion of pre assembly wherever required and 16% of the applicable contract unit rate on pro-rata basis on placement in position and rough alignment.
- OR
- 32% of the applicable contract unit rate on pro-rata basis on placement in position and rough alignment for the items where pre-assembly is not involved.
- 2 50% of the applicable contract unit rate on pro-rata basis on completion of final alignment / fastening / welding / grouting along with proper supports including radiography / NDT / stress relieving wherever involved.
- II.D** **PROGRESSIVE PAYMENT ON PRO-RATA BASIS (82% of unit rates)**
(Applicable for INSULATION AND REFRACTORY work for items of main rate)
- 1 66% of the applicable contract unit rate on fabrication/fixing of retainers, lagging & stitching of mattresses and welding of retainers, fixing of casing supports, fabrication, beading, sealing, bitumen painting, installation and screw fixing of cladding & completion of all jobs as per specifications. The above work includes transportation of required material on location and its proper protection.
- 2 16% of the applicable contract unit rate payable on system completion and area cleaning.
- NOTE: BHEL site in charge, at his discretion can split / re-group above payment schedule, to facilitate site operations.**
- III.A** **MILESTONE PAYMENTS (9% of CV)**
- 1 0.5 % of CV on successful completion of hydro test of the boiler.
- 2 0.5 % of CV on successful completion of air and gas tightness test of furnace / APH and ducts required for Boiler Light Up.
- 3 0.5 % of CV on successful completion of boiler light up and alkali boil out.
- 4 0.5 % of CV on successful completion of acid cleaning and passivation of boiler.
- 5 0.5 % of CV value on successful completion of steam blowing and SVF.
- 6 0.5 % of CV on coal firing operation.

- 7 0.5 % of CV on successful achieving full load and completion of trial operations.
- 8 4 x 0.25 % of CV on successful completion of mechanical work of each pass of ESP
- 9 4 x 0.25 % of CV on successful completion of electrical work of pass of ESP
- 10 0.5 % of CV on successful completion of air tightness test of all Ducts.
- 11 6 X 0.25 % of CV on successful completion of trial run of ID, FD & PA fans including hoists for them
- 12 10 x 0.15 % of CV on successful completion of all the milling system and its clean air flow test including hoists.

NOTE:

If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site incharge, at his discretion, after recording reasons for exercising such option, can split and release payment upto 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone / commissioning activity. Milestone Payments can be further split and released after ensuring consume rate completion and recoding reason.

- IV **Providing and applying PAINTING-Payment on Prorata basis.**
3.5 % of CV for boiler, auxiliaries including piping systems.
- V **1.5% of contract value will be payable on handing over of the boiler to BHEL's Customer** or 3 months after contractor has discharged his responsibilities as stipulated in this contract, whichever is earlier, if delay in handing over is not attributable to contractor. The boiler shall be considered as handed over on completion of trial operation.
- VI **The balance 2.5% CV shall be payable on completion of all pending work, rework wherever required, area cleaning, reconciliation of materials, fulfillment of contractual obligations, and on submission and passing of Final Bill.**

NOTE: Payments at V & VI shall be released after adjustment of the CV based on actual work carried out.

Annexure – I

ETC OF BOILER AT 1 X 500 MW FARAKKA STPS UNIT # 6**TANTATIVE WEIGHT SCHEDULE**
(BOILER PACKAGE)★ **SUMMARY OF WEIGHTS**

- Tentative weight for ETC of boiler:

1. Boiler Package:	30,500 MT
2. Piping:	2,000 MT

★ **AA: TENTATIVE WEIGHTS FOR ERECTION, TESTING & COMMISSIONING OF BOILER PACKAGE**★ **AA 01: Product Group (PG) Wise tentative Weights For ETC of BOILER**

SL NO.	PG	Description	Wt (Kgs)
1	4	BOILER DRUM WITH INTERNALS	150006
2	5	WATER WALL HEADERS	191311
3	6	WATER WALL PANELS	654377
4	7	CIRCULATION SYSTEM e.g. DOWNCOMER & RISER TUBES AND HANGERS & SUSPENSION	342705
5	8	BUCKSTAYS & FURNACE GUIDES	721265
6	9	SEAL BOXES FOR FURNACE OPENING & INSTRUMENT INSERTS	12974
7	10	SUPER HEATER HEADERS	182746
8	11	SUPER HEATER COILS	775451
9	12	SH SPACER TUBES, SAT. LINKS, DESH & DESH LINKS, SH HANGERS & SUPPORTS	446029
10	15	REHEATER HEADERS	52573
11	16	REHEATER COILS	282723
12	17	REHEATER LINKS & SUSPENSIONS	105792
13	18	FURNACE ROOF SKIN CASING	22906
14	19	ECONOMISER COILS, HEADERS & PIPES	899926
15	20	SOOT BLOWERS	72366
16	21	SOOT BLOWING STEAM PIPING	27245
17	24	BOILER TRIM PIPING, SAFETY VALVES, SILENCERS, NAME PLATES ETC.	365611
18	28	FURNACE DOORS & FASTENERS	12510
19	30	MAIN BOILER ENCL.	188602
20	31	SKIN CASING & COMPONENTS	16250
21	32	FIXING COMPONENTS FOR INSULATION	473005
22	33	INSULATION	1647583
23	35	MAIN BOILER STRUCTURES	412118
24	36	BOILER MAIN FLOORS, STAIRS & LADDERS ETC.	3960584

25	37	BOILER OUTER CASING COMPONENTS	80927
26	38	INTERCONNECTING STRUCTURES & PLATFORMS	763377
27	39	COLUMNS & FRAMES FOR DUCTING, FAN HANDLING STRUCTURES ETC.	1239048
28	41	OIL & GAS BURNERS, IGNITORS ETC.	3503
29	42	OIL SYSTEM PIPINGS	65345
30	43	IGNITOR, SCANNER & SEAL AIR SYSTEM	85115
31	45	COAL BURNERS	155236
32	47	PULVERISED FUEL PIPING & SUPPORTS	548413
33	48	AIR DUCTS, FLUE GAS DUCTS, DAMPERS, EXPN. JOINTS, DUCT SUPPORTS ETC.	2715091
34	49	AIR DUCTS, FLUE GAS DUCTS, DAMPERS, EXPN. JOINTS, DUCT SUPPORTS ETC.	
35	50, 52	SCAPH, ROTARY REGEN. AIR HEATER	1481424
36	55, 56	PA, FD, ID, SEAL AIR AND PENT HOUSE FANS	431575
37		MOTORS (PA, FD, ID, MILLS, SA, SC ETC.)	200000
38	57	GATES AND DAMPERS	589400
39	61	COAL MILLS & SUB-DELIVERIES INCLUDING ACCESSORIES ETC	1360000
40	65	COAL FEEDERS	64690
41	67	MILL PLANT AUXILIARIES	158931
42	79	ESP	8493190
43	89	GALLARIES AND HAND RALLINGS OF ESP	201310
44	80	PIPING AND INSULN	1936000
45	81	TANKS, VESSELS, EXPANDERS, INSLN, GAUGES ETC.	126948
46	99	MISC. HANDLING EQUIPMENT	53550
		TOTAL (Appx. Weight)	32500MT

**★AA 02: DETAILS OF POWER CYCLE & LP PIPING AND PG 81 GROUP
MATERAILS (included above)**

LIST OF APPLICABLE PGMAS- POWER CYCLE PIPING- CUSTOMER NO. 6916

SL NO	PGMA	DESCRIPTION	WEIGHT- Kgs	Pipe Materials	Sizes
1	80300	MS FROM MS OUTLET HDR TO BOILER STOP VALVE	35,000	SA335 P91	
2	80301	MS FROM BOILER STOP VALVE TO ESV	117,300	SA335 P91	406.4, 559, IBR
3	80303	MS HEADER TO AUX PRDS	13,300	SA335P22	355.6, 219.1, 114.3, IBR
4	80304	MS HEADER TO HPBP VALVE	22,500	SA335 P91	323.9, IBR
5	80310	HRH FROM REHEATER TO INTERCEPTOR VALVE	275,000	SA335P22	965, 711.2, ID 635 IBR
6	80320	CRH FROM TURBINE TO REHEATER	134,200	SA335P22 :: SA106GrB	323.9, 864:: 323.9, 864, 660, ID 615 IBR
7	80321	HPBP VALVE TO CRH PIPING	11,500	SA335P22	508, 355.6 IBR
8	80324	CRH HEADER TO AUX.PRDS	880	CS	I
9	80340	AUX STEAM HEADER	4,700	CS	I
10	80341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	69,400	CS	I
11	80373	AUX STEAM HEADER SV EXHAUST	4,300	CS	N
12	80418	ERECTION MATERIALS FOR INSTRUMENTS	540	CS	N
13	80431	SPRAY WATER TO AUX PRDS	2,300	CS	I
14	80452	HP PIPING DRAINS - SG SCOPE	10,700	CS	I
15	80453	LP PIPING DRAINS - SG SCOPE	2,500	CS	I
16	80812	H&S FOR AUXILIARY STEAM PIPING FOR LU	14,000	CS	N
17	80818	AUX STR OF AUXILIARY STEAM PIPING FOR LU	28,800	CS	N
18	80830	H&S OF CRITICAL PIPING FOR SB - STEAM LINES	105,300	CS	N
19	80840	AUX STR FOR MAIN STEAM PIPING FOR SB	227,300	CS	N
20	80901	SUB DELIVERY VALVES FOR LIGHT UP	6,500	CS	N
21	80902	SUBDELIVERY VALVES FOR STEAM BLOWING	190	CS	N
22	80906	BHEL VALVES FOR STEAM BLOWING	3,900	CS	N
23	81318	FIX COM FOR MISCELLANEOUS PPG INSULATION	16,700	CS	N
24	81325	MINERAL WOOL MATTRESS	156,700	CS	N
25	81341	SEALING COMPOUND FOR INSL	420	CS	N
26	81350	ALUMINIUM CLADDING FOR INSULATION	31,300	CS	N
27	81411	DIRECT GAUGES FOR STEAM LINES	290	CS	N
28	81412	DIRECT GAUGES FOR NON-STEAM LINES	20	CS	N
29	81413	LOCAL CONTROL EQPTS FOR STEAM LINES	10	CS	N
30	81414	LOCAL CONTROL EQPT FOR NON-STEAM LINES	240	CS	N
31	81415	TEST THERMOWELLS	400	CS	N
32	81416	PERFORMANCE GUARANTEE TEST MATERIALS	1,200	CS	N
33	81421	SENSING ELEMENTS FOR STEAM LINES	1,800	CS	I
34	81432	CONSUMABLES AND ERECTION MATERIALS	6,600	CS	N
35	81435	JUNCTION BOXES	10,800	CS	N
		GRAND TOTAL OF WEIGHTS(TENTATIVE)	1,316,590	CS	

LIST OF APPLICABLE PGMAS CUSTOMER NO. 6917

SL NO	PGMA	DESCRIPTION	WEIGHT-Kgs		IBR / NIBR
1	80307	HP & LP BYPASS WARM UP	1,600		I
33	80425	BFD FROM FINAL HPH TO SG	129,200		I
34	80430	SPRAY WATER TO HPBP	4,400		I
35	80432	SPRAY WATER TO BOILER DESH UPTO SG TP	16,900		I
36	80433	SPRAY WATER FROM BFP INTERSTAGE	4,300		I
37	80436	SPRAY WATER TO LPBP DESH	5,700		N
46	80452	HP PIPING DRAINS - SG SCOPE	17,500		I
47	80453	LP PIPING DRAINS - SG SCOPE	8,000		I
48	80463	AUX. COOLING WATER SYSTEM	5,000		I
49	80468	CIRCULATION WATER PIPING WITH PUDDLE FLG.	30,000		I
		GRAND TOTAL OF WEIGHTS(TENTATIVE)	222,600		N

LIST OF APPLICABLE PGMAS- BOILER INTEGRAL PIPING

SL NO	PGMA	DESCRIPTION	WEIGHT-Kgs	Materials	
1	80 XXX	BOILER INTEGRAL PIPING	435000		

★ BB 01: CONSUMABLES NOT PAYABLE

SL NO	PGMA	DESCRIPTION	WEIGHT-Kgs(APPX) PLUS OR MINUS		
1	80992 & 80XXX	FILLER WIRES AND SPECIAL IMPORTED ELECTRODES ELECTRODES	3000	APPX	

1,936,190

PGMA wise wt. for XRP -1003 Bowl Mill: NTPC, FARAKKA INCLUDED ABOVE

Weight per Mill

SI.No.	PGMA	Description	WT (KG)
1	61900	Foundation Fastener Assembly	1045
2	61000	Journal Assembly	24580
3	61100	Mill Drive and Bowl Assembly	33000
4	61200	Mill Side and Liner Assembly	23430
5	61300	Classifier Assembly	46000
6	61400	MDV Assembly	5575
7	61700	Mill Motor Coupling	160
8	67400	Seal Air Header Assembly	2520

Total Wt.

136310

Weight per Unit

SI.No.	PGMA	Description	WT (KG)
1	61800	Tools and Accessories with Mill Handling System(per Unit)	44600
2	61988	Commissioning Spares(per Unit)	530

Total Wt. 45130

Weight per Unit

SI.No.	PGMA	Description	WT (KG)
2	61800	Lubricating Oil	13600

Note:

1. Weight of PGMA 61-588- Pyrite Hopper Assembly and PGMA 61-688- Tramp Iron Spout Assembly are not shown above
2. Total No of Mill per Unit- 10
3. Total Wt. per unit-1409000Kg(excluding oil)

Applicable PGMA List with weight and ODC Consignment & maximum single DU weight Cust no R503

SL NO	EQPT DETAILS	WT (KGS)	ODC SIZES L X W X H (MM)
1	ESP	3700	13560
2	APH	37000	
3	FANS IMPELLER	12000	5000 X 5000 X 1700
4	GATES & DAMPERS	14500	14400 X 800

Details of dimensions and weights of Tanks and Motors

S.No	DESCRIPTION	QTY	Wt (Kg.)	SIZE (MM)
(A)	FLASH TANKS			
3	Steam Drain F/T	1	3700	2500Dx3700L
4	Unit F/T	1	1800	1700Dx1800L
5	F.W.H.S.V.D. F/T	1	1800	1700Dx1800L
6	Boxes for Loose items	3	1000	2000Lx1000 Wx1000H
	Total Weight `A`		10.3 MT	
(B)	MISC. TANKS			
4	ECW O/H Tank	1	6000	7200Lx3000 Wx2900H
5	Boxes for Loose items	2	1000	2000Lx1000 Wx1000H
	Total Weight `B`			8.00 MT
(C)	H.T. MOTORS			
1	ID Fan	2	31500	4800Lx3400 Wx2900H

3	PA Fan	2	15000	3900Lx3050 Wx1900H
4	FD Fan	2	9150	2700Lx2300 Wx1650H
5	Mill	10	7850	2650Lx2200 Wx1500H
7	Boxes for Loose Items	6	1000	2500Lx1000 Wx1000H
	Total Weight `D`		193 MT	
	Total Weight `A` to `C`		211 MT	

TANTATIVE WEIGHT DETAILS OF PG –50, 52, 55, 56, 57, 79 & 89 INCLUDED ABOVE

PGMA	ITEM	Appx.wt(Kgs)
79 180	Foundation Malts	46500
79 101	Roll/slide supports	40000
79 181	Supporting structures	525000
79 148	Casing Structure	422000
79 128	ESP Roof Panels	207200
79 149	Casing Shell/Panel	724200
89 610	EP galleries & stairs	185000
79 143	Hopper ridges	93700
79 119	Collecting Elect. Suspension	173000
79 144	Hopper Upper Part	424600
79 147	Roof Panel Assay	175800
89 611	ESP roof hand rails	16310
79 113	Emit Syst.Suspension	21800
79 121	Emit sys. Frame top	145000
79 132	Emit Sys. Frame middle	316000
79 122	Emit Sys. Frame bottom	217000
79 123	Inspection doors	23000
79 106	Insulator housing Assy.	58000

79 142	Outer roof – EP	282000
57 010	Gate fan outlet	22000
57 013	Dampers bet FD fan	23000
79 108	Gas Dist.Assy	90000
79 120	Collecting electrode	882500
79 111	Gas screen EP	67300
79 145	Hop MLD & lower part	516700
79 220	Collecting electrode	882500
52 430	Rotor Housing(SEC)	42064
52 442	Cold end conn. Plates	87259
52 562	Support bearing(Sec)	11021
57 033	Dampers AH by pass	8500
57 480	Guillotine gate EP	99000
57 490	Guillotine gate ID	57000
79 114	Support insulators	4800
79 146	Insulator support panel	111100
79 150	Inlet-outlet funnel	169500
79 157	Splitter & guide vanes	27500
52 441	Hot end conn. Plates	51784
52 561	Guide bearings(sec)	4363
57 110	Guillotine gate PA	17300
57 460	Guillotine gate EP	28000
79 109	GD rapping mechanism	12000
79 116	Emit elelctro rapping mech	49400
52 410	Rotor Assy(Sec)	619798
55 011	FD fan foundation MA	2000
79 125	Coll.Elec.rapping mechanism	124200
79 165	App platform – hopper	251200
52 030	Larg AH rotor housing	35803
52 042	Cold end conn. Plate	51150

52 262	Larg AH support bearing	4258
52 411	Rotor Post (sec)	32602
52 412	Rotor pin rack(sec)	4748
55 216	IREAC FD fan 2500-300	38300
55 810	Axial FD fan coupling	1000
56 021	ID fan foundation MA	4200
57 113	Flue gas line to mill	7900
57 660	Gate hot air bus to	35000
79 110	GD drive arrangement	880
79 117	Drive arrgt for emit	40800
79 124	Shock bars	154000
52 001	Tools/cont (sec AH)	684
52 041	Hot end conn. Plate	31425
52 261	Larg AH guide bearing	2924
52 413	Rotor seals(sec)	6797
52 454	Axial seal (sec)	518
52 455	By pass seal(sec)	1140
52 500	Rotor drive(sec)	8554
55 910	Axl FD fan accessory	7100
55 911	Axial FD fan silencer	71000
56 228	Bac 2 suc ID fan	190000
56 820	Radial ID fan coupling	200
57 133	Damper PA fan to coll	17900
57 143	Damper Cold Air bus	4300
57 160	Cold airgate, air bus	20000
57 663	Damper hot air bus	12000
79 115	Emitting electrodes	38500
79 126	Colle.Elect Rapp Drive	8550
52 010	Larg AH-Rotor Assy	395216
52 520	AH General Details-Sec	11174

52 571	Oil PPG guideBrg(S)	510
52 572	Oil PPG Suprt Brgs(S)	534
52 574	Lub oil cir Unit(s)	1223
56 920	RAD ID fan accessory	5000
57 203	Damp APH to wind box	21000
57 223	Damp APH primary SID	30200
79 131	Geared Motors for RA	18000
79 166	Water washing system	4600
50 510	Steam coil APH	9000
50 610	SCAPH horizontal type	11800
52 011	Larg AH-Rotor Post	15553
52 012	Larg AH Rotor pin rack	3797
52 401	Wash manifold GI(sec)	2575
52 402	Wash manifld GD(sec)	1555
52 426	Cleaning equipment GD(sec)	392
55 031	PA fan foundation MA	2000
79 137	Junction Box & push	2300
79 155	Pent house for EP	262500
79 190	Heating elements	1500
52 000	Special tools/contra	427
52 013	Larg AH Rotor seals	4580
52 054	Larg AH axial seal	416
52 055	Larg AH by pass seal	875
52 100	Large AH Rotor drive	5589
52 429	Clean equipt drive Sec	823
52 460	Fire sensing sys-Sec	123
52 510	Access door(sec)	726
52 511	Air seal piping (sec)	787
52 512	Observation port	82
52 517	Rotor stop alarm-sec	60

55 335	2REAC PA fan 2000-250	29500
55 830	Axl. PA fan coupling	1000
57 380	Valve for flue gas	54000
57 403	Damper primary gas	14000
79 105	ESP sub delivery com	16000
79 160	Cable-cable racks	128000
79 162	Earthing,Cable Trays,Sup CH	138000
79 192	Auxiliary Control Panel	36100
79 193	Rapper Control Panel	2400
79 194	Statcon Panel	1200
79 195	IOS Panel	300
52 271	Oil piping guide bearing	510
52 272	Oil piping support bearing	535
52 274	Lub oil circulu Unit	1223
55 930	Axl. PA fan accessory	4500
55 931	PA fan silencer	65000
57 410	Economiser by pass GA	25000
57 423	Damper cascade Evop	16700
57 433	Damper APH boiler DU	26500
79 130	Electrical SD components	8000
52 301	Wash manifold gas inl	776
52 302	Wash manifold gas out	476
57 491	Blower with motor	9000
79 163	Ash level indicator	2500
79 191	Panel type hopper Heater	34000
52 210	Larg AH access door	726
52 211	Larg AH air seal pipe	673
52 212	Larg AH obser ports	82
52 217	Larg AH stop alarms	59
52 326	Cleaning eqpt gas out	329

52 329	Cleaning equipment drive unit	1561
52 360	Fire sensing system	82
56 173	Bac 2 suc IGNTR fan	6225
56 670	IGNTR fan motor	1600
56 870	Seal air fan coupling	50
79 161	EP perf test equipment	1000
79 172	Interlocks EP	2100
79 173	EOH	6100
79 174	Opacity Monitor & Ac	700
79 178	Bapcon & accessories	800
56 000	Tools & fixture cont	800
56 161	BAC 1 suc SA fan	1600
57 577	Elect actuator for G	41000
55 017	FD fan C&I items	100
55 037	PA fan C&I items	100
56 027	ID fan C&I items	100
79 996	Tools & tackles	420
56 988	Radial fan commng Spa	100
79 988	Commissioning spares	440
52 988	Larg AH commng spares	615
57 988	Ducts commissioning	100

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NOTE:

- a) Above details are only to give a general idea to the contractor to quote the rates in the Rate schedule. Besides PGs indicated above, there is likelihood of addition/ deletion of PGs / materials for release of some items integral to Boiler and piping. Contractor is required to carryout works as per specifications for such PGs / materials also within their applicable tonnage rate. The decision of BHEL regarding deletion of existing PG or inclusion of new / additional PG in boiler will be final & binding on the contractor. Certain items like insulation material, cladding, valves etc. may / may not be supplied by other suppliers / BHEL units like PEM etc. as per PGMA applicable for Boiler system by other units e.g PEM etc.. Such items are also to be erected as per tonnage rates & as directed by BHEL. No extra claim shall be entertained on this account.

- b) All the above systems of piping include the erection of pipes, bends, valves, fittings, impulse piping and including root valves, sampling lines, drains, hangers and supports, orifices & other accessories etc. so as to make the systems complete in all respect.
- c) Above system of piping can be regrouped / renamed or any addition / deletion in the system can be made in order to make system complete as per requirement. No extra cost shall be entertained on this account.
- d) The piping systems mentioned above are only indicative and does not cover all the piping systems to be erected / commissioned. Contractors are however required to erect commission all piping systems shown in drawings & other documents which may be necessary for erection, completion & overall commissioning of Cogeneration plant at the accepted unit rates.
- e) The weights indicated are tentative only and may vary during execution of work. The contractor is required to erect / commission all piping systems shown in drawings and documents, which may be necessary for overall commissioning of BOILER. Payment shall be released on the basis of actual work executed as per final accepted rates.
- f) Tentative weights of power cycle piping of Stainless Steel, Alloy Steel and carbon steel piping may vary as per final engineering and supplies.
- g) Bidders may note above while quoting / accepting tonnage rates for subject work.

Annexure-II**★LIST OF T&Ps & IMTEs BEING PROVIDED BY BHEL FOR USE OF CONTRACTOR FREE OF HIRE CHARGES ON SHARING BASIS.**

SL NO	EQUIPMENT	Qty	Remarks
1	Crawler Crane 200 MT	01 no.	As per site requirements
2	Crawler Crane 100MT or upto 150 MT capacity	01 no.	As per site requirements
3	EOT Crane in TG hall 125 / 30 MT	01 no.	As per requirement
4	Crawler/ Tyre mounted Crane 75 MT	02 no.	As per site requirements
5	Induction heating machine set (for P91 materials heating and welding process only)	03 sets.	
6	DG set	01 no.	for backup power supply during abruption of construction power supply (only for P91 materials heating processes)
7	Motorized Hydraulic Test Pump 0-600kg/cm ²	01 no.	
8	Construction Elevator	01 no.	
9	Huck Bolting Machine	02 nos.	As per requirement
10	Aneometer 0-15 M / Sec	01 no.	
11	Pitot Tube	01 no.	
12	mV / mA Source (0-200 mV, mA)	01 no.	
13	Chemical cleaning setup for EDTA / Any other cleaning process.	01 set	By BHEL agency

NOTE:

- Any other special T&P if supplied by the manufacturer will also be provided to the contractor free of hire charges as and when made available for work. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.
- Any other special IMTE's if supplied by the manufacturer will also be provided to the contractor free of hire charges as and when made available. Special IMTE's are to be used only for the purpose for which these are meant and to be returned in good condition.
- The T & P listed above shall be provided by BHEL and remaining required T & P shall be under the scope of contractor to execute the awarded scope of work.
- The quantity of required cranes and their deployment duration to meet the site requirements shall be as per the decision of BHEL. Contractor has to schedule his work to meet the contractual schedule.
- DG set for backup power supply, provided by BHEL for P91 materials welding and heat treatment is to be operated by the contractor weekly or more times to ensure its healthiness during excegencies for heating processes of P91 materials on account of power failures. Cables and switches which are not provided by BHEL, required fuels and other consumables & its operations and maintenance shall be in the scope of contractor within the awarded value.
- The operation of 75 MT cranes is in the scope of contractor and cranes of capacity 100mt or more shall be operated by BHEL. The fuel for operation of all the cranes in under contractor's scope.
- Other terms and conditions regarding above items shall be as per Clause No.37 (T&P/IMTE's).

ANNEXURE-III

★ **INDICATIVE LIST OF MAJOR T&P AND IMTE'S TO BE PROVIDED BY CONTRACTOR FOR EXECUTION OF TENDERED WORKS FOR MOST DURATION OF THE CONTRACT UNLESS OTHERWISE SPECIFIED.**

SL NO	EQUIPMENT	QUANTITY
1	Crawler/ Tyre mounted Crane 75 MT	1 No.
2	Hydra Crane 10 / 12 MT	2 no
3	Mobile Crane 18 / 20 MT	2 no
4	Trailer with pulling unit 20 / 30 MT	2 no
5	Trailer with pulling unit 15 MT	1 no
6	Low Bed Trailer 50 MT	As per requirement
7	Air Compressor 210 CFM	1 no
8	Electric Winch 2/3/5 MT or higher capacity	Minimum 20 nos. or As per requirement
9	Portable Oil Centrifuge machine	As per requirement
10	Hydraulic Jack	As per requirement
11	MIG / CO2 Welding machines	Min. 10 nos or as per requirement
12	Heat treatment and Stress relieving sets	As per requirement
13	Welding sets with accessories and ovens for welding electrodes backing and holding	Min. 60 or As per requirement
14	3 phase distribution boards with complete set up for use of construction power including power cabling. – 600/ 1000 Amps	Min 03 sets or as per requirement
15	Electro hydraulic pipe bending machine	As per requirement
16	Radiography arrangement including source and Recordable Ultrasonic testing arrangement	As per requirement
17	Pipe cutting and chemphering machine	As per requirement
18	Hand Operated Megger 500 / 1000 V	As per requirement
19	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy	As per requirement
20	Digital and Analogue Millimetres	As per requirement
21	U Tube Manometer 0-2000 mm Water Column	As per requirement
22	Inclined Manometer 0-50 mm Water Column	As per requirement
23	Calibrated Pneumatic Torque wrench	Min 02 nos./ As per requirement
24	Bolt Tension Calibrator	As per requirement
25	Equo-tip hardness tester	As per requirement

NOTE:

1. The above list specifies only major T&P & IMTE's (may not be complete) to be deployed by the contractor as per the work requirement. All additional IMTE's / other tools and plants including suitable capacity D shackles, slings, rails sleepers hydraulic / mechanical jacks, pipe clamps for erection etc which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate / price.

2. In case contractor fails to provide above-mentioned minimum Tools and plant / equipments as mentioned above under the scope of contractor, the latter shall have right to hire such services from other agencies at the risk and cost of the contractor as per the works requirement, on the sole discretion of construction manager.
3. Other terms and conditions regarding above items shall be as per clause no 37 (Tools & Plants/IMTE).

ANNEXURE-IVTENTATIVE DETAILS OF WELD JOINTS

- 1 The material for weld joints may be of any of material specifications listed below or others specified later as per detailed engineering. i.e. SA 209 T1, SA 210 Gr A1, SA 210 Gr A2, SA 210 Gr A3, SA 213 T 12, SA 213 T 22, SA 106 Gr B , SA 106 Gr C, SA 335 P12, SA 335 P22 , SA 335 P22, SA213TP347H, SA 213 T91, and P91 etc.

Material specification, weld joint thicknesses, sizes and numbers may vary as per detailed engineering specifications / site conditions to any extent. All required weld joints and their NDT such as Radiography, UST, MPI and DPT and HT is under the scope of this contract as per the drawings, documents, specifications, BHEL engineers instruction or incidental to work within the awarded tonnage rates, required for the work shall be in the scope of this contract. No additional payment shall be made on account of variation of joints what so ever.

- 2 Welding of joints shall be done as per welding schedules / site requirements. Welding, heat treatments and NDT for P91 shall be done as per the details indicated in the tender, other specifications to be provided during execution and as per the engineer's instructions. Welding of the joints may required to be done for similar or dissimilar metals as per specifications for the project.
- 3 **The end Connection and welding of terminal points are under the scope of this contract**

ANNEXURE-IV-A**TERMINAL POINTS****SYSTEM****TERMINAL POINTS**

- | | |
|--|--|
| • Main Steam piping | HP Turbine inlet/stop valve |
| • Hot Reheat piping | Interceptor Valve inlet |
| • Cold Reheat piping | Outlet of HP Turbine |
| • Aux Steam Piping | Interconnection with other unit/ point for future connection |
| | Connection for TG piping / equipments connections |
| • Feed Water Piping- | Final out let of HP Heaters feed line outlet. |
| • <u>AUXILIARY COOLING WATER</u> | |
| a) Supply | Customer terminal point for Boiler |
| b) Return | -do- |
| | - Four terminals at CW inlet and outlet beyond A row |
| • <u>DM WATER</u> | |
| Initial fill to boiler | At C row near boiler centerline at about 4-mtr level |
| • <u>CW PIPING</u> | |
| Supply and return lines | From 2 mtr beyond A row and upto CL of A row or beyond |
| • <u>APH & ESP WATER WASH SYSTEM</u> | -Do- |
| Boiler Hydraulic Testing | Inlet of Non-return valve in boiler hydraulic test line. |
| • <u>AIR</u> | |
| Instrumentation air & Service air | terminal on TG house row 'A'./ terminal at Boiler C row. |
| Combustion air | Inlet of FD / PA Silencer. |
| • <u>AUXILIARY STEAM</u> | Point near P & H outlet. |
| • <u>DRAIN & VENTS</u> | |
| Relief Valve discharge | a) Outside TG Hall for Steam lines.
b) Local for water lines. |
| Steam, feed water and condensate | Local to drain funnel/drain Pit/channel/sump |
| System drain & vents. | As decided Inside T/G Building/ as per drawings, documents |

- | | |
|--|--|
| Drains (SG) | All high pressure drains to respective drain header. All low-pressure drains are terminated at station drain/canal. |
|
 | |
| • <u>FUELS</u> | |
| Coal | Outlet flange of raw coalbunker. |
| Heavy oil Supply line/ Return line Drain | Inlet/ Outlet of Pump house; Fuel oil pressurizing pump suction line terminated at existing storage tank |
| Light Diesel Oil | Inlet of Pump house / as per drawings, documents. |
| • <u>FLUE GAS</u> | |
| | Ducts (flue and air) upto chimney inner flue duct connection limit point at +31.0 mtr (minimum) level of min 6.75 mm dia. With transition pc. and flange |
| • <u>ASH</u> | |
| Furnace bottom ASH | Furnace bottom hopper with stainless steel seal plates and drip mesh. |
| Fly Ash | Outlet flange of duct hoppers below Economizer.
Outlet flange of duct hoppers below AH.
Outlet flange of duct hoppers below ESP. |
| • <u>MISCELLANEOUS</u> | |
| • Sampling lines (for Boiler integral | Upto sample coolers (of Boiler integral only) located in the Operating floor. |
| • Nitrogen filling | Inlet of Isolating valve on equipment. |
| • Safety valve exhausts and vents (SG) | To atmosphere above the roof. |

Note: The terminal point may vary as per the tender specifications / contractual and site conditions with the BHEL's customer. The work has to be carried out as per the drawings, documents, specifications and engineer's instructions as per the rates specified in the contract.

EXCLUSIONS

The scope is limited to those equipments and systems, which are specifically, described in the drawings, documents and specifications all other equipment and systems are deemed to have been excluded. However the major exclusions are as detailed below:

1. AUXILIARY COOLING WATER SYSTEM
 - a) ACW booster pumps, Filters/Screens, piping & valves beyond BHEL Terminal Point.
 - b) Water / Water heat exchangers, ACW pumps, Filters / Screens, dosing system for passivation of DM water system, ACW overload tank if any and piping and valves beyond BHEL Terminal Point.
2. COMPRESSED AIR SYSTEM Compressed air plant, air receivers, Driers, Compressed air piping & valves beyond BHEL Terminal Point.
3. D.M.MAKE UP WATER SYSTEM- DM Plant, DM Water Storage tanks, DM Water transfers and make up pumps.
4. Auxiliary Boiler
5. EOT Cranes, chain pulley blocks, lifting hoists and all other material handling equipments, lifting beams etc., beyond BHEL scope.
6. Service and potable water system
7. Sump pumps
8. Plant drainage system
9. Effluent treatment system
10. Fire fighting system including fire extinguishers
11.
 - a) All civil foundations for Boiler including area paving and well / pit for Boiler Elevators (excluding foundation inserts and grouting of foundation). All concrete floors in boiler area (including concrete roofs at firing and feeder floors etc).
 - b) Rails for transformer handling Items appearing in product Group 95,96 & 97. However some items appearing in 95, 96 & 97 PG related to pressure parts welding like soot blower orifice, metal temp pads and clamps etc are in the scope of the contractor. seal welding of screwed type thermowells and socket type thermo wells have to be done by the contractor without any extra cost.

12. All oils and lubricants after trial run of unit.
13. All Power, signal cables except group cables beyond BHEL scope.
14. All Ventilation and Air conditioning system.
15. Coal handling plant, Coal bunkers and their supporting structure in bunker way, Coal weighers, ash handling system beyond BHEL terminal points, water impounded hoppers, slag crushers etc.
16. Any services like Supervision/ inspection of equipments/ O&M etc., after commissioning of each Unit.
17. All lab instruments.
18. All power & Instrument cables, cable Trays/ supports/ erection materials (other than specifically included in BHEL scope).
19. All earthing systems/lightning protection system (Underground & over ground) beyond BHEL scope.
20. All starters, MCC, Switchgears, Plant illumination and lighting installations except SBMCC & ESP MCC.
21. Complete electrical system including Transformers excluding for ESP, DG sets, Communication equipment (which are not covered in BHEL scope).
22. All mechanical auxiliary equipment such as DM Plant, HVAC, CHLORINATION Plant, Hydrogen Plant, Workshop equipment waste water treatment/ disposal, Fuel oil tanks/ dykes, etc.
23. Mill bay structures, columns, bunkers, mill bay column interconnecting beams for supporting mill maintenance platform, structural arrangement/ runway beams for mill maintenance and beams for Fuel pipe support.
24. Passenger and Goods elevators however the erection of Elevator structure including it's bracings, connecting members and cladding structures is in the scope.
25. Interconnection platforms, supports, beam, etc., beyond BHEL scope
26. Chimney
27. CW Tower, CW Pump house, CW Pumps, CW channel
28. Boiler drum lifting, its alignment and associated structure as specified in the tender specification erected by other party.
29. ESP structure of first tier erected by other party

ANNEXURE-VI

CERTIFICATE OF DECLARATION FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS

We,.....
..... Hereby declare and confirm that we have visited the project site under the subject namely,and acquired full knowledge and information about the **site conditions, wage structure, Industrial climate and total work involved**. We further confirm that the above information is true and correct and we will not raise any claim of any nature due to lack of knowledge of site condition.

Tenderers Name and Address

Place: (Signature of the Tenderer with stamp)

Date:

ANNEXURE-VII

**NON DISCLOSURE AGREEMENT
Memorandum of Understanding**

BHEL PSNR is committed to Information Security Management System as per Information Security Policy.

M/s....., providing.....service to BHEL PSNR, Noida hereby undertake to comply with the following in line with Information Security Policy of BHEL PSNR;

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.

- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL PSNR.

()
M/s. BHEL, PSNR

()
M/s.....

ANNEXUR-VIII**RATE SCHEDULE**

Rates For Erection Testing & Commissioning Of Boiler, ESP, Rotating Machines, Piping, & insulation etc.

Sl. No	DESCRIPTION OF WORK	Rate / MT in Rupees (In figures and words)	TOTAL VALUE in Rupees (In figures and words)
1	Rate in Rupees per MT for handling, erection, testing, commissioning, and trial operation and handing over of 1 x 500 MW Boiler, ESP, Rotating Machines, auxiliaries, piping, insulation and painting etc as per tender specifications. (Approx. tonnage involved is 32,500 MT as per Annexure- I)		

NOTES:

1. The quantities indicated against each item above are tentative and these are liable to vary depending upon the site requirement. The contractor has to handle / erect / commission all items indicated by BHEL Engineer for achieving unit wise milestone and completion of work.
2. PLEASE NOTE THAT RATE SCHEDULE FOR BOILER IS TO BE SUBMITTED IN SEALED ENVELOPE, AS PER ABOVE RATE SCHEDULE. PLEASE REFER CLAUSE- 51.3 (RATE SCHEDULE)
3. Only 'Unit Rate' shall be considered for evaluation and award.
4. The rate shall be entered in figures as well as in words. In case of difference in rates between words and figures, the lesser of the two will be treated as valid rate.
5. In case of omission in quoting any rate, the evaluation will be done considering the highest quoted rate obtained against that item. But the work, if awarded, will be on the lowest quoted rate obtained against that item.
6. The contractor while quoting the price / rates as above, categorically confirms having understood the fullest implications of the price variation provisions contained in [clause 50.0](#) of this tender. Accordingly, taking into considerations all aspects thereof, rates have been quoted. Further the contractor confirms that he will not come up with any other claim / compensation on account of any increase whatsoever during entire period of execution including extended period, if any.

(Seal and Signature of Tenderer)