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TENDER SPECIFICATION

TENDER NO. BHEL: NR(SCT):JJR:ESP: 521

FOR

ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF
ELECTROSTATIC PRECIPITATORS PACKAGE OF 3 X 500 MW UNITS
1-3 (THREE UNITS) AT JHAJJAR, INDIRA GANDHI STPP (IGSTPP) at
JHAJJAR, Distt. Jhajjar , Haryana

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 1400
OHSAS 18001 certified co
SubContract and Purchas

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
Fax 091-0120-2515464 / 2515467
Email: sku@bhelsnr.co.in / msd@bhelsnr.co.in

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

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TENDER NOTICE

Sub: Tender enquiry for “Erection, Testing, Commissioning and Handing over of ELECTROSTATIC PRECIPITATORS PACKAGE OF 3 X 500 MW UNITS # 1-3 (Three Units) at JHAJJAR, Indira Gandhi STPP (IGSTPP) at JHAJJAR, Distt- Jhajjar (Haryana)”

TENDER NO. BHEL: NR(SCT):JJR:ESP:521

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.10 Crores (Rupees Ten Crores only) during preceding three years (2004-05, 2005-06 & 2006-07). 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 19.06.2008** 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 19.06.2008** before opening of technical bids commences. Technical bids shall **be opened at 15.30 Hrs. on 19.06.2008**. 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) **BHEL reserves the right to go for a Reverse Auction instead of Opening the submitted sealed bid, which will be decided after technical evaluation. As such, the bidders should submit their best prices in the 'Sealed Price Bid'. However, bidders are required to confirm their acceptance of "General terms and conditions" governing RA specifically in their technical bid. The "General terms and conditions" governing RA are given in the SCC of the NIT. Bidders are also required to furnish following details in their techno-commercial bid, for this purpose (RA).**
- Authorization of representative who will participate in the on line Reverse Auction Process;
- a. Name and Designation of official
 - b. Postal Address (Complete)
 - c. Telephone Nos. (Land line & Mobile both)
 - d. FAX No.
 - e. E-mail address
 - f. Name of Place/State/Country, wherefrom he will participate in the RA.
- (xi) Bids, once submitted, shall not be returned.
- (xii) Purchase Preference will be given to CPSU's as per Govt. Guidelines.

Sr. DGM/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 : 19.06.2008
DATE OF OPENING : 19.06.2008

NIT NO. / NAME OF WORK
<p style="text-align: center;">TENDER NO. BHEL: NR(SCT):JJR:ESP:521</p> <p>Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of “Erection, Testing, Commissioning and Handing over of ELECTROSTATIC PRECIPITATORS PACKAGE OF 3 X 500 MW UNITS # 1-3 (Three Units) at JHAJJAR, Indira Gandhi STPP (IGSTPP) at JHAJJAR, Distt-Jhajjar (Haryana)”</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.

Sr. DGM/SCP

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)

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

1. Name of the Owner : ARAVALI POWER CORPORATION PVT LTD(APCPL)
2. Name of the Lead Partner : NTPC Ltd (NTPC)
3. Address : INDIRA GANDHI STPP
District JHAJJAR
Haryana
4. Installed capacity : New project
5. New Installation : 3 x 500 MW
6. Nearest Railway station : Jharli -- 3 km
Jhajjar Town - 35 km
Bahadurgarh - 70 km
Delhi – 150 km
7. Nearest City : Bahadurgarh 70 Km
8. Nearest Airport : Delhi - 150 km
9. Maximum Temperature : 48 Deg C
10. Minimum Temperature : Appx 2 Deg C

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 subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. 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 there of.
- 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 its 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, its 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 lumbers 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 – B**ANALYSIS OF SIMILAR JOBS EXECUTED / IN PROGRESS**

S.No.	Agency By whom Awarded	Location of project	Capacity & unit nos.	Scope of work and tonnage	Date of award	Contract value
1	2	3	4	5	6	7

%age work completed and due date for completion	Date of completion if job is already over	No. of skilled/ unskilled workers deployed at peak	No. of Engrs. & Super- visors deployed at peak	Details of major T&P like cranes, Tractor Trailors, Winches, welding M/cs supplied		Consumables by whom
				By Con- Tractor	By other Agency	
8	9	10	11	12	13	14

(SIGNATURE OF TENDERER)
WITH STAMP

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	Registration no. wherever Applicable	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

- | | |
|--|---|
| <p>1. State Bank of India
CAG Branch,
10th Floor, Vijaya Building,
Barakhamba Road,
New Delhi – 110001.</p> <p>2. Canara Bank
74, Janpath,
New Delhi – 110001.</p> <p>3. Punjab National Bank,
74, Janpath,
New Delhi – 110001.</p> <p>4. Bank of Baroda,
Corporate Banking Branch,
11th Floor, BOB Building,
Sansad Marg,
New Delhi – 110001.</p> <p>State Bank of Hyderabad,
Surya Kiran Building, K.G. Marg,
New Delhi – 110001.</p> <p>5. State Bank of Mysore,
Anriksh Bhawan, K.G. Marg,
New Delhi – 110001.</p> <p>6. State Bank of Mysore,
Industrial Finance Branch,
18, Ramanashree Arcade,
M.G. Road, Bangaloe – 560001.</p> <p>7. State Bank of Travancore,
Travancore House, IF Branch,
K.G. Marg, New Delhi – 110001.</p> <p>8. Deutsche Bank,
Tolstoy Marg,
New Delhi – 110001.</p> | <p>9. HDFC Bank Ltd.,
5th Floor, HT House,
K.G. Marg,
New Delhi – 110001.</p> <p>10. Citi Bank N A
Jeevan Vihar Building,
Sansad Marg,
New Delhi – 110001.</p> <p>11. Standard Chartered Bank,
H2 Block, Connaught Place,
New Delhi – 110001.</p> <p>12. ICICI Bank Ltd.,
ICICI Tower,
Bisham Pitamah Marg,
Pragati Vihar,
New Delhi – 110003.</p> <p>13. IDBI Bank Ltd.,
19, K.G. Marg,
Surya Kiran Building,
New Delhi.</p> <p>14. HSBC Ltd.,
ECE House,
28 KG Marg,
New Delhi – 110001.</p> |
|--|---|

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 Roads shall be kept clear and wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).
 - d) 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 COMPLIANCE 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, foundation and grouting
36.	Consumables
37.	Tools & Plants / IMTE's
38.	Supervisory staff & workmen
39.	Material handling and storage
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.	Finish Painting
46.	Progress reporting
47.	Drawings and documents
48.	Income tax, Service Tax, Works Tax AND Sales Tax Registration
49.	Extra work
50.	Price variation
51.	Rate schedule
52.	Instructions to tenderers & Insurance

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 equipment 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.

34.5 **BHEL-Power Sector (NR) is an ISO 9001-2000, ISO 14001-1996 and OHSAS 18001-1999 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 **200 trees** or equivalent in the vicinity of the project as per the available space and as per the advise of Engineers by contractor. In case no area is earmarked for tree plantation, the contractor may take up any other equivalent environment related project after due approval of the BHEL Engineer. for the entire duration of contract.

35.0 CIVIL WORKS, FOUNDATIONS AND GROUTING.

Foundation and other necessary civil works for supporting structures, equipment etc, will be provided by BHEL. 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. up to 50 mm as may be required for the erection of equipment/plants will be carried out by the contractor at no extra cost. Grouting of all columns, equipment base plates, anchor boltholes etc are included in the scope. The foundation pockets shall be cleaned by using compressed air. The grouting mixture shall be either composed of port land cement or ready mix grout of proved quality. **However, in both the cases the vendor has to arrange Portland cement and ready mix grout component respectively within the included cost and no payment shall be released by BHEL to the contractor on this account.** Before arranging the type of cements/grouting materials, the contractor must take approval from BHEL/Customer for the brand to be used. 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, labors 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. All necessary arrangement along with watering till complete curing has to be arranged by the vendor

35.1 NTPC/ BHEL shall provide foundations for all the equipment and columns including necessary other civil work. 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 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.

35.2 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 DELETED

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.

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.

The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those, which are specifically indicated as BHEL scope. All consumables to be used for the work shall have prior approval of BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

- 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** Any special filler wires are supplied by the manufacturing unit as a normal supplies shall 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. 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** It shall be the responsibility of the contractor to obtain prior approval of BHEL, 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. 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-III**, 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-IV**. 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** The **operation** of all BHEL's cranes (**for 100 MT and below cranes**) being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange, at his own cost, trained operators and fuel and other minor consumables (i. e. cotton cloth / cotton waste etc.) for their operation. **Further, Helpers and 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 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 maintenance of BHEL's T&Ps should be carried out by contractor as per manufacturer's / BHEL's maintenance schedule at his cost. These 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.
- The contractor at his own cost shall arrange all supervision and labour required for maintenance of cranes. For attending breakdowns, the contractor shall arrange for labour. Minimum one mechanic and two helpers shall be exclusively marked for the above work. However specialist's supervision, if required, for attending breakdowns shall be arranged by BHEL as assessed by BHEL Engineer
- 37.8** **Maintenance of BHEL cranes (100 MT and above), will be carried out by a separate agency appointed by BHEL.** However, the helpers for day today maintenance and fuel for these cranes shall be in the scope of this contract.
- For Maintenance of BHEL cranes (less than 100 MT), while these shall be covered under AMC awarded by BHEL,** the contractor at his own cost shall arrange all supervision and labour required for routine / day-day maintenance of cranes. 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** All tools and tackles, machinery, equipment, instruments required for the work have to be arranged by the contractor including its transportation before and after work and including storage, insurance etc.
- 37.11** The contractor shall provide all required tools and plants, inspection, measuring and test equipment and handling & transportation equipment for the scope of work covered under these specifications. Some of the major T & Ps to be necessarily provided by the contractor is listed in ANNEXURE- IV. BHEL will provide the services of their T & Ps listed vide ANNEXURE-III, free of charge, on sharing basis.

- 37.12** All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification.
- 37.13** Contractor shall provide all the necessary scaffolding materials, temporary structures, as may be required and necessary safety devices etc.
- 37.14** Contractor's responsibilities with regard to operator, fuel, lubricants and daily upkeep of T & P s provided by BHEL is further detailed in relevant section.
- 37.15** Timely deployment of adequate quantity of T & P is the responsibility of the contractor. The contractor shall be prepared to augment the T & P at short notice to match the planned program and to achieve the milestones.
- 37.16** Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.
- 37.17** The T & P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. The movements of cranes, and other equipment should be such that no damage / breakage occurs to foundations, other equipments, material, property and men. All arrangements for the movement of the T & P etc., shall be the contractor's responsibility.
- The contractor shall arrange adequate nos. of wooden sleepers for compaction of approach for crane movement and material stacking near work site failing which BHEL may get the same done at their risk & cost.
- 37.18** The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring instruments (MMDs) and tests. Test/calibration certificates shall be furnished to BHEL. MMDs shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL.
- 37.19** The area and infrastructure development of the erection area is 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.
- 37.20** 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.
- 37.21** 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.
- 37.22** 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.
- 37.23** 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.
- 37.24** 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.

- 37.25** 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
- 37.26** 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.
- 37.27** 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.
- 37.28** 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.
- 37.29** 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.
- 37.30** **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.

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** It is the responsibility of the contractor to engage his workmen in shifts or on overtime basis 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.
- 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 ETC

- 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.
- 39.17** 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 regards 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 .
- 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. 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 these regards 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.

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 section 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** 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.
- 41.11** Not applicable
- 41.12** Not applicable
- 41.13** 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.
- 41.14** 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.
- 41.15** 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.
- 41.16** 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.
- 41.17** 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.
- 41.18** 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.
- 41.19** 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.
- 41.20** Checking of air gaps and adjustment of stator / rotor for magnetic center of HT motors shall be carried out as part of erection.
- 41.21** Whenever required the contractor shall arrange for pre-qualification of process task performers.
- 41.22** 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.

- 41.23** **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. For cabling job as included in above in the scope, while BHEL shall supply cable lugs (beyond 4 sqmm size free of cost, bidder shall supply necessary copper-tinned cable lugs (upto 4 sqmm), clamp, ferrule, wire markers, pvc binding strap, adhesive tape etc. Bidder's quoted rates shall be inclusive of this. Cable gland shall be of double compression type and of brass material.
- 41.24** 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.
- 41.25** 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.
- 41.26** 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.
- 41.27** 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.
- 41.28** The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.
- 41.29** 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 contractor. The contractor shall arrange for removal, calibration and re-installation of the instruments. The contractor 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 contractor as above.
- 41.30** 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.
- 41.31** 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.

- 41.32** 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 65-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
- 41.33** 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.
- 41.34** 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.
- 41.35** 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.
- 41.36** 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.
- 41.37** 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.
- 41.38** 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.
- 41.39** Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.
- 41.40** 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.
- 41.41** 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.
- 41.42** 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.
- 41.43** 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.
- 41.44** 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.
- 41.45** 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.

- 41.46** 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.
- 41.47** Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles 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.
- 41.48** 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.
- 41.49** The contractor shall assist BHEL in preparation of as built piping drawing.
- 41.50** Erection of power cylinders, motorised 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 organised 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.
- 41.51** 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.
- 41.52** The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.
- 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 tests 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 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 approved electrodes and filler wire will be arranged and used by the contractor**, within the finally quoted price. BHEL reserves 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, if applicable. 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 LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by BHEL. Necessary help in conducting the UT shall however be rendered by contractor.
- 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. 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 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.
- 42.22** Lead intensifying screens for front and back of the film should 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 & T 91 materials welding, clauses no. 54.0 of this tender will be applicable besides above-mentioned clauses. –(Not applicable)
- 43.0** **APPLICATION of REFRACTORY and INSULATION**
- 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.
- 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 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 erected equipments by the contractor to establish the tightness of the erected equipment from the outlet of FD fan through the steam generator up to stack. Contractor has to check/ensure gas tightness for the system erected by him.
- 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** 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:
- Erection etc. of blowers and blanks and putty required for conducting air tightness test and GD Test are to be installed. (Putty to be procured by the contractor).
- Dismantling of the temporary equipment will be done by the agency that has erected the equipment. He will also return the equipment to the stores.
- 44.7** Not applicable .
- 44.8** Commissioning of the ESP 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 IMTEs till such time the commissioned units are taken over by

the BHEL's customer for the entire scope awarded to contractor.

- 44.9** NA
- 44.10** It shall be the responsibility of the contractor to provide various category of workers in sufficient numbers along with Supervisors during Pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 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 is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.
- 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 FINISH PAINTING

45.1 All exposed metal parts of the equipment, structure, auxiliaries, piping, 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, 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 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.

45.3 After applying the primer paints, wherever required, all structure / equipment / items, shall be finish painted with paints as specified by BHEL engineer. 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 finish painting. Paint is to be BHEL approved make only and painting should be as per colour scheme and quality approved / specified by Engineer. **One coat each of Epoxy Finish Coat and Aliphatic Polyurethane paint will be applicable for the required surfaces to be painted for all external boiler/ESP structures and uninsulated piping . Synthetic enamel paint is applicable for Soot Blower Components only**

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 equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages.

45.8 The painters have to under go 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 and surcharge 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.
- 48.3** 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.
- 48.4** 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 above **NO CLAIM / COMPENSATION** on account of any increase whatsoever, (irrespective of whether variation are steep / unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, 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 TENDERER MAY NOTE THAT PARTY ALREADY AWARDED ANY OF THE FOLLOWING WORK SHALL NOT BE CONSIDERED FOR THE SUBJECT ENQUIRY.”**
- **Main Boiler Part-A and Rotating Machines of 3 X 500 MW UNITS # 1 and 3 at JHAJJAR Indira Gandhi STPP (IGSTPP) at JHAJJAR, Distt. Jhajjar , Haryana**
- 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.
- LIQUIDATED DAMAGES (LD)**
- 52.5** 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 listed in the 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 OTHERS**
- 52.7.1** In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.
- 52.7.2 Bidders selection is subject to approval of BHEL's customer.**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.
- 52.7.3 Unsolicited rebate / discount shall not be accepted after bid opening.**
- 52.8 INSURANCE**
- 52.8.1** In addition to provisions of clause no. 29.0 of GCC regarding insurance, Employer's liability and also Group Personnel Insurance for employees are also to be taken by

contractor.

- 52.8.2** 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.
- 52.8.3** 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.
- 52.8.4** The Contractor shall provide insurance cover to all persons employed/engaged by him throughout the period of Contract, including the extended period, if any.

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

CLAUSE NUMBER	DESCRIPTION
53	SCOPE OF WORK
54	ERECTION OF ELECTROSTATIC PRECIPITATOR
55	PRE-COMMISSIONING TESTS AND COMMISSIONING
56	BROAD SCOPE OF ELECTRICAL AND C&I WORKS
57	MATERIALS HANDLING
58	BRIEF DESCRIPTION OF ELECTRICAL AND C&I WORKS
59	FACILITIES TO BE PROVIDED BY BHEL / CONTRACTOR
60	TIME SCHEDULE
61	OVER RUN
62	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 and performance and guarantee testing of 3x 500 MW at IG STPP , JHAJJAR , HARYANA . ESP Package for units # 1,2 & 3 along with the associated auxiliaries, supports and controls is one of the packages.

The scope of work under this tender generally consists of:

HANDLING /TRANSPORTATION OF EQUIPMENTS / MATERIALS FROM STORAGE YARD FOR INSTALLATION, PRE-ASSEMBLY, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTROSTATIC PRECIPITATORS INCLUDING DUCTING, STRUCTURES, INSULATION, PAINTING ETC. FROM BOILER OUTLET FLANGE TO CHIMNEY FOR 3x500 MW at IGSTPP , JHAJJAR , HARYANA. ESP Package for units # 1,2 & 3

Approx. tonnage involved is 11,980 MT per UNIT i. e. Total tonnage involved for Three Units = 35940 MT as per ANNEXURE - II

The scope of these specifications not limited to but covers mainly following:

- **Taking delivery of the materials from the project storage yard / stores / sheds to erection site.**
- **Their preservation, safe keeping, watch and ward.**
- **Checking, dressing, chipping and leveling of foundations.**
- **Pre-assembly, erection, alignment of various equipments, machining and grouting.**
- **Welding, heat treatment, radiography, UT and other non-destructive tests wherever required**
- **Hydraulic testing, air leak test, clean air flow test and other pre-commissioning tests and commissioning.**
- **Installation ,testing, other pre commissioning tests and commissioning of all items in scope of this specifications.**
- **Insulation and finish painting including supply of paints etc.,**
- **Unit trial operation, resolving any deficiencies observed and handing over .**

The work to be carried out under the scope of this specification covers the complete work of handling/ transportation at site, temporary storage prior to erection, if required, cleaning , preservative painting, erection, alignment, welding, leveling, adjustment, chipping & leveling of foundation, welding of hooks, plates, insulation of all mechanical equipment, works of all electricals, cabling and C&I, final painting, etc., Gas distribution test, Gas tightness test, all pre-commissioning tests, start-up and initial run of individual equipment, final commissioning, initial run of total ESPs and other items covered in this tender etc. for IG STPP (**3x500 MW**)

Units-1,2 & 3 up to handing over of the units to BHEL/their customer including PG test of the unit. The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of works is found to be defective in workmanship not conforming to drawings/documents or other stipulations, the contractor shall dismantle and re-do the work duly replacing the defective materials at their own cost, failing which recoveries, as determined by BHEL, shall be effected from contractor's bills.

The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

NO DEVIATION IN SCOPE OF WORK, WHATSOEVER, SHALL BE ALLOWED BY BHEL.

The work to be carried out under this scope covers the complete work of Electrostatic Precipitators (ESPs), Ducts etc of Units-1,2 & 3 at IGSTPP (3 X 500 MW) including outside shell ,structural steel support and frame work, access ladders, platforms, safety rails, stairways, walk ways, access doors and weather proof pent house, Transformer handling system at roof etc.

The work to be carried out under the scope of this specification shall broadly comprise of but not to be limited to the following:

- 53.2 Foundation and other necessary civil works for supporting structures, equipment etc, will be provided by BHEL. 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 bench-mark 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 at no extra cost. Grouting of all columns, equipment base plates, anchor bolt holes etc are included in the scope. The foundation pockets shall be cleaned by using compressed air. The grouting mixture shall be either composed of port land cement or ready mix grout of approved quality. **However, in both the cases the vendor has to arrange Portland cement and ready mix grout component respectively within the awarded contractual value and no payment shall be released by BHEL to the contractor on this account.** Before arranging the type of cements/grouting materials, the contractor must take approval from BHEL/Customer for the brand to be used. 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, labors 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. A necessary arrangement along with watering till complete curing has to be arranged by the vendor.
- 53.3 All the necessary lifting tackles, tools and plants including tractors, trailers, Lorries, trucks, Pulley blocks, jacks, winches, wire rope etc. of suitable capacities etc. and other equipment incidental to carry out this work shall have to be arranged by the contractor himself at his cost. However cranes as per Annex-III will be provided by BHEL free of cost on time-sharing basis.
- 53.3 BHEL Engineer reserves the right to inspect lifting tackles and equipment before allowing their use. Such approval however, shall not relieve the contractor of his responsibility to ensure safe handling of equipment taking due precautions to avoid any accident and damage to other equipment and personnel.

- 53.4 All hardware such as rails, sleepers, maxpuller etc., required for dragging or for any other connected works shall be arranged by the contractor at his own cost.
- 53.5 The contractor shall execute the work in the most substantial and workman like manner. The same shall be, handled with care and diligence. Any loss to BHEL due to contractor's lapses shall have to be made good by the contractor. All surplus, damaged, unused materials, package materials/containers, gunny bags etc. shall be returned to BHEL.
- 53.6 If the contractor or his workmen break, deface, injures or destroy any part of building, road, kerbs, fence enclosures, water pipes, drains, electric/telephone poles or wires, trees or any other property or damage any part of erected stores, stored components etc. the contractor shall make the same good at his own expenses (of Which BHEL site Engineer's decision shall be final) failing which the site Engineer shall get the same rectified by other agencies at the risk and cost of the contractor and the same shall be deducted from the sums that may be due then or at any time thereafter become due to the contractor or even from his security deposit.
- 53.7 All the Riggers, Sarangs, etc engaged for the work should have adequate experience, which should be supported by documentary evidence, if called for.
- 53.8 Pre-assembly of equipment to be done at the pre-assembly yard for inspection and checking. It is to be noted that BHEL will provide only reasonably leveled open space for pre-assembly yard. The contractor has to arrange desired leveling of the area at their cost. Entire Pre-assembly area to be covered by P.C.C with 70% ash and this is to be done by the contractor within his quoted rate. The fixtures, steel structures required for temporary supporting for pre-assembly, checking, and welding for lifting and handling during pre-assembly and erection shall be arranged by the contractor at his own cost. Steel for such work if required shall be arranged by the contractor.
- 53.9 All the works such as cleaning, touch up painting, checking, aligning, assembling, temporary erection for alignment, dismantling of certain equipment for checking and cleaning, surface preparation, grinding, straightening, chamfering filing, chipping, drilling, reaming, rapping, shaping, filling up etc and other works, as may be applicable in such erection works which are treated as incidental to the erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work. All consumables including **Paints for touch up painting, as required, shall have to be supplied by the contractor at his cost.**
- 53.10 The contractor shall fabricate and install as part of the work, all platforms ladders, and approaches wherever required for facility of operation of equipment/instrument wherever required but not specifically shown in the drawings/bill of materials. However raw materials for the same shall be provided by BHEL.
- 53.11 Attachment welding of necessary seal boxes inspection windows. Instrument tapping points, etc., both for regular measurement and performance testing to be provided on ESP, covered within the scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be the contractor's responsibility, within their quoted rate even if:
- Product groups (PG) under which these items are released are not covered in the scope of this tender.
 - Items are supplied by an agency other than BHEL.
- 53.12 Fabrication of supports wherever required, shall also be carried out by the contractor without any extra cost. Any additional support if required for effective completion of work, as advised by BHEL engineer, shall be fabricated and erected by the contractor at no extra cost. However, the raw material required for such additional supports shall be supplied by BHEL.
- 53.13 **Approach platforms** for valves/gates/other areas for carrying out regular commissioning / O&M activities are to done by the contractor within the quoted price. In case, certain platforms are to be erected for above purpose & for which regular materials have not come from BHEL/Manufacturing Units, even then the contractor has to do it within the included scope treating it as normal scope of work without any extra payment. Any additional steel required to make such fabricated items shall be

- arranged by BHEL at free of cost. The contractor has to make necessary finish with painting for giving aesthetic look also. No extra payment shall be released by BHEL on this account to the vendor.
- 53.14 All rotating machineries and equipment under the scope shall be cleaned, lubricated, checked for their smooth rotation if necessary by dismantling and refitting before erection. If, in the opinion of the BHEL Engineer, the equipment is to be checked for clearances, tolerances at any stage of the work or during commissioning period, facilities for dismantling, cleaning, lubricating and refitting shall be provided by the contractor. All consumables required shall be supplied by the contractor at no extra cost.
- 53.15 All attachment, welding, fixing hooks, supports, anchors, studs, plates, angles and other steel components to support inner roof insulation only shall have to be carried out by the contractors as specified in the drawings and as per instructions of the Engineer. welding of supports shall be done by Qualified HT welders only.
- 53.16 In case of any class of work for which there is no such specification as laid down in the contract, such as welding of stainless steel parts such work shall be carried out including supply of consumables in accordance with the instructions and requirements of the Engineer at no extra cost.
- 53.17 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to other equipment and personnel. Test certificates and periodical calibration of lifting appliances from a recognised body are to be submitted to BHEL site office, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.
- 53.18 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior, approval of BHEL Engineer.
- 53.19 The contractor shall carry out the trial run of motors including checking of the direction of rotation in the uncoupled condition, checking alignment and re-coupling the motor to their respective driven equipment. Before starting the motor IR Value of the motor shall be recorded and if found necessary dry out operation shall be carried out by the contractor to make up the IR Value to normal, as per the advice of BHEL Engineer within the quoted rate.
- 53.20 Proper account of the packing wood and steel supports forming part of packing will be kept by the contractor and returned to BHEL stores from time to time.
- 53.21 Temporary blanking /restoration of ESP inlet / outlet and hopper flanges for commissioning, if required, has to be done by contractor free of cost. Further to above, any contingency arrangements required to carry out commissioning work is included as normal scope of work. This type of jobs include removal of temporary arrangements and restoration with the normal items on a later date is treated as normal scope of work. No additional payment shall be given by BHEL to the contractor on this account.
- 53.22 Non specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.
- 53.23 Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price.
- 53.24 ESP collecting electrode may require straightening and repair due to minor transportation damage before erection and spot heating in position to get correct alignment. Contractor shall carry out this within his quoted rate.
- 53.25 Layer of insulation mattress on roof top of ESP (inner roof) shall be applied before

- outer roof is placed.
- 53.26 Fixing of deflection plates in the inlet screen sheet of ESP as per flow model report drawing. However, adjustment / re-positioning of the plates may be required to be done by the contractor during gas distribution test within the quoted rate.
- 53.27 All the collecting and emitting electrode suspension frames are to be checked in dimension and pitches before erection. All the readings are to be logged. Straightening of frames distorted during transportation shall be carried out by the contractor within quoted price.
- 53.28 Erection of electrical equipment like high voltage rectifier transformer, heating elements, rapping gear motor, cabling, glanding of control panels, C&I, etc. are included in the scope of the contractor. Filtration of the Transformer oil also need to be done by the vendor within his quoted rate and for carrying out the same, **vendor must deploy TWO 500 LPM oil filtration unit as per site requirement**
- 53.29 Removal of all temporary supports, foreign materials, scraps, debris etc. from inside of the ESP and other erected components and thorough cleaning to achieve clearance / IR values between collecting and emitting system shall be done by the contractor.
- 53.30 For all plate welding , seal welding from inside and stitch welding from other side is to be followed as per drawing.
- 53.31 Roof top sheeting & side cladding over ESP pent house to be done by the vendor within his quoted price. Required corrugated sheets and fixing hardwares will be supplied by BHEL under regular supply. Minor consumables like bitumen washers, putty etc. need to be arranged by the vendor within his quoted price.
- 53.32 Minor straightening of plates of inner / outer roof, funnels, GD screen sheets, hopper panels damaged during transportation shall be carried out by the vendor within his quoted rate.
- 53.33 The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.
- 53.34 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of BHEL, BHEL's customer, customer's consultants and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.
- 53.35 All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory / local authorities are to be arranged by the contractor at his cost in time to ensure smooth progress of work.
- 53.36 BHEL reserves right to recover from the contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to contractor's lapse during any stage of work. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.
- 53.37 All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors / Engineers, consumables etc. except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the contractor. **All expenditure including taxes and incidentals in this connection will have to be borne by the contractor** unless otherwise specified in the relevant clauses. The contractor's quoted rates should be inclusive of all such contingencies.
- 53.38 During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc. may become necessary on account of feedback / revision of drawing. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc. promptly and expeditiously. Daily log sheets signed by BHEL Engineer and indicating the details of work carried out, man-hours etc. shall be maintained by the contractor for such reworks.

- 53.39 The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. However, necessary steel will be provided by BHEL free of charge from the scrap / surplus materials available at site.
- 53.40 Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas / site to enable other agencies to carry out their work or for any other reason, same shall be done by contractor most expeditiously. No claim for extra payment for such work will be entertained.
- 53.41 The details of equipments to be erected under this contract** is generally as per the schedule given in **Annexures – I & II**. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the erection documents which will be furnished in the course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.
- 53.42 Instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal / speed switches of motors etc. which are received in assembled condition as integral part of equipments ,shall be dismantled, calibrated and re-erected by Contractor as per requirement.
- 53.43 Actuators / drives of dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
- 53.44 Suspensions of ESP are to be tightened by Calibrated torque wrench.
- 53.45 During the course of erection, testing and commissioning certain rework/ modification/ rectification/ repair/ fabrication etc., will be necessary on account of feed back from various power station units already commissioned and/ or units under erection and commissioning and also on account of design discrepancies or manufacturing defects and site operation/ maintenance requirements. This will also include modifications/ re-works suggested by FES/ other inspection group etc. Contractor shall carry out such rework/ modification/ rectification/ fabrication/ repair etc., promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc. shall be maintained by the contractor.
- 53.46 Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and working on extended hours. Contractor's offer shall cover all such contingencies.
- 53.47 The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.
- 53.48 The contractor will make his own arrangement for his communication needs at his site office or residential area/labour colony.
- 53.49 All T&Ps, lifting tackles and pulling devices to be deployed by the contractor must bear valid/latest test certificates for their suitability and the documents shall be preserved at site. The contractor shall ensure deployment of reliable and calibrated instrument, measuring and test equipments (IMTE). The IMTE, as required for the job, shall have valid test /calibration certificate from authorised /Govt. approved agencies. The contractor shall also keep provision of alternate arrangement for such IMTE so that the work does not suffer when a particular IMTE is sent for calibration. Re-testing / re-calibration shall also to be arranged by the contractor at their own cost at regular interval during the period of use as advised by BHEL.
- 53.50 The contractor shall submit a list of various tools, plants, material handling equipment etc. being provided by them, to the Construction Manager, BHEL Barh site before

- taking up the work in hand. The above items shall be deployed by the contractor after taking prior approval of the Construction Manager with respect to their suitability and quality. These equipments shall not be removed from site without the written permission of the Construction Manager, BHEL - Barh Site.
- 53.51 In event of any failure on the part of the contractor in providing necessary T&P etc BHEL may at its discretion also terminate the contract on this ground and take out any or whole amount of the contract from the scope of the contractor or impose penalty as per panel rates of BHEL. Decision of BHEL in this regard will be final and binding on the contractor.
- 53.52 The contractor at his own cost shall provide all consumables required for the work excepting those, specified in other clauses shall be provided by BHEL. The consumables supplied by the contractor shall be subject to prior approval of BHEL.
- 53.53 During the period of contract the contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish debris etc. to entire satisfaction of BHEL. The contractor shall provide proper sanitary arrangement in the work area & office.
- 53.54 The contractor shall have total responsibility for all materials in his custody, and shall ensure protection of all materials from theft, fire, pilferage and any other damage and loss. The contractor shall make suitable security arrangement to ensure the above.
- 53.55 The contractor shall be responsible to ensure that none of the personnel move beyond the areas marked out for his operation. In case of a need for the contractor's personnel to move beyond the area marked for him, the same shall be done with a written permission of the construction manager.
- 53.56 Contractor shall be responsible for examining all the shipment and notify the BHEL engineer immediately of any damage, shortage, discrepancies etc. for the purpose of engineer's information only. The contractor shall submit to the engineer a report detailing all the receipts after actual receipts of consignments. However, the contractor shall be solely responsible for any shortage or damage after giving a clear receipt to railway/transport companies, and for shortages/damages during transit from material receipt /unloading point to stores/storage yard/work site.
- 53.57 The contractor shall maintain an accurate and exhaustive record detailing out the list of all materials/equipment received by him and keep such records both in hard copies and also in soft copies ready for the inspection of the engineer at any time.
- 53.58 The materials/equipment which are stored in the open or dusty location and required to be covered must be covered with suitable weatherproof and flameproof covering materials wherever applicable at any number of times at no additional cost. Such weatherproof/flameproof covering which gets worn out from uses should be replaced periodically as per instruction of BHEL Engineer at no additional cost. In no occasion, this work can be linked with preservation. All materials /Equipment shall be handled very carefully to prevent any damage/loss. No bare wire ropes/slings etc shall be used without the specific approval of BHEL.
- 53.59 If the materials/equipments belonging to the contractor are stored in areas other than those earmarked for him, the engineer will have the right to get it shifted to the area earmarked for the contractor at the contractor's cost.
- 53.60 For completion of work, the contractor may have to work in one or more shifts. He will not be eligible for any extra charges on account of this.
- 53.61 All the contractor's employees shall carry identification cards/gate passes while working at site.
- 53.62 The contractor, during execution of the work under scope, shall take utmost care in preserving the identification marks/tags as available on the materials.
- 53.63 Although all tools and plants of suitable capacities required for timely and safe completion of work under the specification shall be provided by the contractor at his own cost, based on contractor's demand (depending upon load to be lifted or approach availability at site), BHEL will provide free of cost as per Annex-III (including operator as available) suitable crane on shared basis for erection & material handling. However, such requirement shall be intimated in writing by vendor suitably to the construction manager. Daily routine maintenance, monthly servicing of crane etc. of BHEL, will be under the scope of BHEL. Provision of T&Ps by BHEL shall be subject

to following-

- a) Actual use of T&P including marching as per entry in log-book duly certified by BHEL Engineer shall be considered for calculation of overtime charges.
- b) The contractor shall be responsible for the safe and proper use of T&P issued to him. Any loss/damage to any part of the above T&P, for reason attributable to the contractor shall be to his account. In case contractor fails to make good the loss, and expenditures on these account will be recovered from contractor's bills. BHEL's decision in this regard shall be final and binding on the contractor.
- c) The contractor shall have to return the above T&Ps at the earliest in good working condition, subject to normal wear & tear.
- d) T&P issued shall be used only for the designated scope of work under specification.
- e) If at any time, it is noticed that contractor is not using any of the T&Ps properly according to the instruction of BHEL, BHEL will have the right to withdraw any and all such T&P and any cost due to this shall be to contractor's account. The contractor shall also submit to BHEL for approval a list of T&P, tackle etc., prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

53.64 The PG wise break up is tentative as indicated under ANNEXURE-I. PGs have been indicated to have faster systems readiness. In case of dispute 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.

The terminal points are indicated in enclosed annexure.

Painting and insulation shall be covered in the scope of this contract.

Approx. weight to be erected for each ESP, DUCTING, STRUCTURES ETC. shall be 11980 MT/UNIT as indicated in Annexure-II. 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 the following provision:**

"The actual 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 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

53.65 The contractor under this contract shall also provide **free of cost services** of following persons for following services for a total period of **168 Man-months** by the contractor for contract of **for units 1-3** exclusively for use by BHEL.

- Qualified computer operators for office work. (28 man months)
- Skilled workers for working in site, store, office and colony. (56 manmonths)
- Unskilled workers for working in store, office and colony. (84 manmonths)

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 the above mentioned services, BHEL shall have the right to hire these services from other agencies at the risk and cost of the contractor along with overheads. In case these services are not utilized for any reason whatsoever, fully or partly, recovery at the rate of the prevailing minimum wages at JHAJJAR for the categories given plus 10% will be made from the final bill of the contractor.

53.66 **The scope of work will also include providing free of cost services of qualified Supervisors by contractors for direct supervision of various works other than the scope covered under this tender. These qualified Supervisors shall be provided for fifty six (56) man-months by contractor as per site conditions.** The supervisors shall possess a minimum qualification of a mechanical / electrical engineering 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 manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the manmonths as per above provision, fully or partly, recovery at the rate of Rs.10000/- against each Supervisor's man-months will be made from the final bill of the contractor

53.67 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

53.68 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.

53.69

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, ambulance & other ultra modern medical facilities required during emergency.
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 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.

In addition to above, BHEL has arranged ambulance at work site for emergency purpose, which can be utilized by contractor in case of emergency. In case, under unavoidable circumstances, if the ambulance is not available, the contractor will have to arrange for the same as under clause 53.69.1

53.70 The contractor shall comply with following towards Social Accountability;

- (a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
- (b) The contractor shall not engage Forced/Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
- (c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.
- (d) The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Discrimination/Corporal punishment for failure in meeting with relevant requirements.
- (e) The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
- (f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
- (g) The Contractor shall arrange potable drinking water to its employees & workers.

53.71 Contractor shall make necessary arrangements to ensure following:

- 1. Contractor shall ensure deployment of qualified Engineer for Welding / NDT services at site as per requirement of work.**
- 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-IV) **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 & SA requirements will result in penal action. **In case of violations of safety/SA 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.

53.71 SUBMISSION OF PERIODICAL REPORTS

Contractor shall submit periodical reports in respect of following aspects of operation:

- 1) Consumption of consumables like welding electrodes, gases and paints.
- 2) Consumption of construction power
- 3) Availability and utilization of BHEL 's tools & plants
- 4) Availability and utilization of contractor's tools & plants
- 5) Daily manpower reports
- 6) Daily progress reports of activities & incidents
- 7) Test / Calibration reports
- 8) Records of wages , EPF payment.
- 9) BHEL/client may specify any other report/record as required.
- 10) Record of Protocol/Logsheet

53.72 STATUTORY INSPECTION OF WORK

The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work to statutory authorities to comply with applicable regulations.

The work related statutory inspections, though not limited to, are as under:

Factory inspector, labour commissioner, electrical inspector PF commissioner and other authority connected to this project work.

The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHEL engineer's instructions, submitting co-related inspection reports, documents etc. and following up the matter with them. Contractor shall also make all arrangements for offering the products / systems for inspection at location, as applicable, to the concerned authority.

It shall be contractor's responsibility to obtain approval of statutory authorities, whenever applicable, for the conducting of any work which comes under the purview of these authorities. Any cost arising from this shall be contractor's account.

54 ERECTION

54.1 The details of equipments to be erected under this work are generally as per the weight schedule given in Annexure II. these details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved, actual quantum and type of equipments will be based on the erection documents, which will be furnished in the course of erection.

54.2 Wherever called for, pre-assembly of supporting structures, casing walls have to be done on ground.

54.3 All site welds for casing, inlet & outlet duct connections have to be kerosene tested for establishing leak proof-ness.

54.4 Loading of collecting electrodes either from top or bottom, to be decided suiting site conditions, shall be done with due care as per BHEL's instructions.

- 54.5 Straightness of all collecting electrodes has to be checked on ground prior to loading in to the field. Straightening of the collecting electrodes, if necessary, shall be done by the contractor within the quoted price as per instruction of BHEL engineer.
- 54.6 Bundle of collecting electrodes should be handled only with special fixture supplied for the purpose as regular DU.
- 54.7 BHEL will provide huck-bolting m/c with necessary auxiliaries free of charges. However, the contractor shall arrange electrical connections, operation etc. Vendor shall also arrange for minor maintenance of the Huck-bolting machine, including changing of some frequent worn-out spares. Required Jaws, spares and Hydraulic oil of the Machine only will be supplied by BHEL free of any charges.
- 54.8 Clearances as prescribed between collecting electrodes and with casing wall / emitting electrodes have to be maintained. Spot heating of collecting electrodes wherever called for, shall be done as part of work.
- 54.9 Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP is in the scope of work.
- 54.10 Installation of interlocks is in the scope of work.
- 54.11 Complete erection, alignment, testing, pre-commissioning and commissioning etc for drive motors of collecting electrodes and emitting electrode rapping mechanism is in the scope of work.
- 54.12 Contractor has to fabricate and erect canopies for motors, actuators etc. as per instruction of BHEL if the same is not indicated in the drawings. However, the contractor will be paid for this work on accepted extra work rate for ESP. BHEL will supply the material required for platforms/canopies in random lengths & sizes.
- 54.13 It shall be the responsibility of the contractor to provide temporary ladders on columns for initial works, if required, till permanent ladder/ stairways are completed.. Material and fabrication of temporary ladders is in the scope of contractor. All temporary ladders are to be of bolting type and no welding on to permanent members will be permitted.
- 54.14 Following installation jobs are also to carried out by the contractor within his quoted price.
- A) Matching flanges along with all bolts, nuts, gaskets, and all the expansion joints etc. as required to be connected to the ESPs to the duct wall.
 - B) Flue gas inlet distribution system complete with perforated plates, turning vanes, deflector plates, flow splitters, guide vanes and all necessary gas flow control devices in the inlet and outlet cones and duct warranted by the results of flow model test, complete duct stiffening devices, interior bracings, slide plates, access doors, brackets, supporting structures, hangers, sampling connections, etc.
 - C) Rapping system complete with structural supporting frame, drives, and automatic rapping control, etc.
 - D) Ash hoppers complete with panel type heaters, level monitors and indicators, outlet flanges, jointing material, poke holes, access doors and walkways beneath the hoppers.
 - E) Opacity monitors complete with all accessories at the outlet of each gas stream of each ESP but upstream of the ID Fan i.e four (4) nos. per set of ESP serving one steam generator.
 - F) Safety devices, safety barriers, etc.
 - G) Monorails with electrically operated hoists on the roof for handling transformer rectifiers. Water washing system for the precipitator and hoppers along with all piping, valves and nozzles etc.
- 54.15 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL, will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting /chiseling / grinding/machining and de-burr the same. However, machining of the packers wherever necessary shall be arranged by the contractor.
- 54.16 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor

- to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to equipment and personnel. Calibration/fitness testing certificates from recognized agency are to be submitted to BHEL site office for equipment/instrument/appliances to be used, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.
- 54.17 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior approval of BHEL Engineer.
- 54.18 Proper account of the packing wood and steel supports forming part of packing will be kept by the contractor and returned to BHEL / Customer designated stores /areas from time to time.
- 54.19 Temporary blanking of ESP inlet / outlet for commissioning , if required , has to be done by contractor free of cost.
- 54.20 Non-specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.
- 54.21 Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price.
- 54.22 Fixing of deflection plates in the inlet screen sheet of ESP as per flow model report, drawing ,to be provided by BHEL. However, adjustment / re-positioning of the plates may be required to be done by the contractor during gas distribution test within the quoted rate.
- 54.23 All the collecting and emitting frames are to be checked in dimension and pitches before erection. All the readings are to be logged.
- 54.24 Erection, testing & commissioning, trial operation and handing over of electrical equipment like high voltage rectifier transformer sets alongwith cable trays & cabling JBs(filled with non-inflammable silicon fluid having flash point higher than 300 deg centigrade),control panels complete with bus-sections, electronic controllers, grounding switches , controls ,leveling wheels etc., drive motors and actuators ,couplings and coupling guards for all rotating auxiliaries etc., heating elements, ,rapping gear motor are included in the scope of the contractor. Erection of Insulators along with heating and ventilation system for insulator compartments ,complete with fans ,heaters and necessary controls are also in the scope of the contractor.
- 54.25 Welding of high tensile structural steel shall be done by using certified welders, who posses requisite certificate and who are approved by BHEL Engineer/customer.
- 54.26 All welders shall be tested and approved by BHEL Engineer/ customer before they are actually engaged on the work even though they may posses the requisite certificates. BHEL reserves the right to reject any welder without assigning any reasons. The contractor will be responsible for the periodic renewal, re-testing of the welders as demanded by BHEL/statutory requirements.
- 54.27 BHEL Engineer/ customer may stop any contractor's welders from his work if his work is unsatisfactory for any technical reason or in the opinion of BHEL Engineer, will adversely affect the quality of welding. Even though the welder has earlier passed the tests it does not relieve the contractor from his contractual obligations, to check the performance of the welders.
- 54.28 All charges for testing of welders including destructive and non destructive tests, if conducted by BHEL or by the inspecting authority shall have to be borne by the contractor. All testing facility shall be made available by contractor.
- 54.29 Approved list of welding electrodes are given with the specification. It is mandatory on part of the vendor to use welding electrodes strictly in conformance of the list. For use of any alternative brand in case of necessity,, necessary written permission from BHEL / Customer need to be obtained.

- 54.34 Baking and holding of welding consumables shall be as per BHEL Welding Manual. Electrodes shall be baked and dried in Thermostat controlled oven before they are used in erection work, and all welders shall have a portable electrode drying oven at the work spot.
- 54.35 The contractor shall also be equipped for carrying out NDT, like liquid penetrant inspection, magnetic particle inspection, etc as & when required for work within the quoted rates.
- 55 PRE-COMMISSIONING TESTS AND COMMISSIONING**
- 55.1 Gas tightness test of ESP and ducts by kerosene test / soap solution test with own consumables, labour , scaffolding and other items , if any.
- 55.2 Gas distribution test / flow test with own consumables, labour , scaffolding and other items , if any.
- 55.3 Trial run of collecting rapping , emitting rapping and GD rapping mechanism as per instruction of BHEL engineer.
- 55.4 Checking IR value of the ESP fields.
- 55.5 Air load test of ESP along with all fields.
- 55.6 Charging of ESP with flue gas during light-up / synchronization / coal firing.
- 55.7 All the rapping motors, if necessary, shall be stripped open , thoroughly serviced with proper care and re-assembled before erection. During servicing if any deficiency in noticed, the same should be brought to the notice of BHEL without any delay.
- 55.8 All the shafts of the equipment shall have to be properly aligned to that of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid over-heating of bearings or other conditions, which may tend to shorten the life of the equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and lubricated as per recommendations of BHEL engineer.
- 55.9 In case any defect is detected during tests / trial runs, 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 re-adjustment and re-alignment are necessary, the same shall be done as per BHEL Engineer's instruction. This exercise may have to be repeated as per the site requirement and shall be treated as normal scope of work within the quoted rate and no additional/extra payment shall be released by BHEL to the vendor in this account.
- 55.10 Contractor has to provide all categories of labourers including necessary tools, measuring instruments, consumables , supervision and other inputs as required during the entire period of commissioning of ESP till handing over.
- 55.11 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL commissioning Engineers and hence any over time payment may be involved. The contractor's quoted rate shall be inclusive of all these factors also. Exclusive Commissioning engineer(s)/supervisor(s) have to be engaged by the contractor for carrying out commissioning activities round the clock during normal working days/holidays and two exclusive electricians are also required to be maintained as per the instructions of BHEL engineers .This is treated as normal scope with no extra cost.
- 55.12 During commissioning changing of gaskets , tightening of bolts, realigning of rotating and other equipment, attending to leakage and minor adjustments of erected equipment may arise. The quoted rate of contractor shall be inclusive of all such works.
- 55.13 Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil. Topping up of lubricants during running of the set till handing over to be done by the vendor. Required lubricants both for first filling and topping up are to be supplied by BHEL free of cost. The empty containers of the lubricating oils should be returned to BHEL stores/place indicated by BHEL from time to time.
- 55.14 In case, any rework is required because of contractor's faulty erection which is noticed during commissioning, the same has to be rectified by the contractor at his cost. If during commissioning any improvement or rectification due to design

requirements is involved, the same shall be paid as extra. For this purpose, daily labour report indicating therein, nature of work carried out, consumables used etc, shall be maintained by the contractor and got signed by BHEL Engineers every day.

55.15

NA.

55.16

Gas tightness test/ flow test of ESP and ducts by kerosene test / soap solution test with own consumables , labour , scaffoldings and other items if any.

55.17

Trial run of collecting rapping , emitting rapping and GD rapping mechanism as per instruction of BHEL Engineer.

55.18

Checking I. R . value of ESP fields.

55.19

Air load test of ESP along with all fields .

55.20

Charging of ESP with flue gas during light up / synchronization / coal gas firing.

55.21

All the rapping motors if necessary shall be stripped open thoroughly serviced with proper care and reassembled properly before erection by the contractor. During servicing if any deficiency is noticed the same should be taken up with BHEL Engineer at site without any delay.

55.22

The instruction of the motor manufacturer regarding storage of the motors and re conservation must be strictly followed without any deviation.

55.23

All the shaft equipment shall have to be properly aligned to those of matching equipment to perfection , accuracy as required and the equipment shall be free from excessive vibrations so as to avoid over heating of bearings or other conditions , which may tend to shorten the life of the equipment . All bearings , shafts and other rotating parts shall be thoroughly cleaned and lubricated as per the recommendations of BHEL Engineer before starting.

55.24

All the bearings , gear boxes etc of the equipment and electrical motors to be erected are provided with protective grease only. Contractor shall arrange for cleaning the bearings , gears etc. with kerosene or some agent , as and when required by BHEL Engineer, by dismantling some of the parts of the equipment during erection and shall arrange for re - greasing / lubricating them with recommended lubricants ,which will be supplied by BHEL free of cost.

55.25

Lubricating oil units of the rotating machines are to be cleaned thoroughly before pouring of final lubricating oil.

55.26

The various categories of workman required for assistance in pre - commissioning, commissioning and post commissioning activities not limited but may be as follows:

Electrician .

Mill Wright fitter.

Fitters for ESP internal work .

Welders.

Riggers.

Helpers.

Supervisors.

The above group of workers may be required to work round the clock during testing & Commissioning of ESP including the rotating machines covered under this package.

55.27

In case of any defect is detected during tests/trial runs such as looseness , undue noise or vibration , strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any re-adjustment and re- alignment are necessary , the same shall be done as per BHEL Engineers instruction at no extra cost.

55.28

In case any rework is required because of contractor's faulty erection which is noticed during any stage of erection/commissioning , the same has to be rectified by the contractor at his cost . If during commissioning, any improvement or rectification due to design requirements is involved , the same shall be paid at extra rate. For this purpose , daily report indicating therein nature of work carried out , workmen deployed, consumables used etc. shall be maintained by the contractor and got signed by BHEL Engineers every day.

55.29

Roof top sheeting & side cladding over ESP pent house to be done by the

vendor within his quoted price. Required corrugated sheets and fixing hardware will be supplied by BHEL under regular supply. Minor consumables / hardware like bitumen washers, putty etc. need to be arranged by the vendor within his quoted price.

56 BROAD SCOPE OF ELECTRICAL AND C&I WORKS

- 56.1 Scope of work involving Erection, Testing, Commissioning, Calibration and Stabilization of the Electrical package is elaborated in detail hereunder.
- 56.1.1 The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship, engineering and construction management. The contractor should ensure timely completion of work. The contractor must have adequate quantity of tools, measuring instruments, calibrating equipment etc. in his possession. He must also have on his rolls adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor should match requirement of sophistication.
- 56.1.2 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 56.1.3 All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.
- 56.1.4 The services, tests and support to be provided by the agency for the work mentioned in the various sections of this tender are indicative and not exhaustive, but not limited to these for the completion of the work in all respects.
- 56.1.5 Contractor shall calibrate, erect, commission all the equipments, cabinets/panels, instruments and cabling etc. as per sequence prescribed by BHEL at site. The sequence of erection / commissioning methodology will be decided by the BHEL engineers depending upon the availability of materials/work fronts etc. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection / commissioning adopted in erection / commissioning of similar jobs or for any reasons whatsoever.
- 56.1.6 The work to be carried out under the scope of this specification covers the complete work of arranging issue of materials, loading, handling, transporting, unloading, preassembly, erection, calibration, testing, air flushing, pre-commissioning tests, commissioning of systems, trial run of various auxiliaries & Unit as a whole, instrumentation work during performance Guarantee test (PG test) achieving various activities till handing over of the unit to BHEL's customer, providing maintenance team to cater to guarantee responsibilities. The work shall conform to dimensions and tolerances specified in various drawings, QP that will be provided during the erection. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be done by engaging other agencies or departmentally by BHEL and recoveries will be effected from contractor's bills towards expenditure incurred including 30% departmental charges.
- 56.1.7 The terminal points as decided by BHEL shall be final and binding on the contractor.
- 56.1.8 The technical description of the various packages is available in ANNEXURE to give general idea to tenderer about the type of equipment to be erected, calibrated, tested and commissioned.
- 56.1.9 During the course of erection, testing and commissioning of the electrical work of ESP Unit, certain rework/ modification/ rectification/ repairs/ fabrication etc. will be necessary on account of feed back from various thermal power stations or units already commissioned and/or units under erection and commissioning and also on

account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework / modification / rectification / fabrication repairs etc. promptly and expeditiously. These works shall be in the scope of this contract within the awarded price.

- 56.1.10 The contractor's scope of work is further described in the clauses hereafter.
- 56.1.11 All tools, tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables, Copper washers, Teflon tube, electrodes including oxygen, acetylene argon etc gases, paints etc. required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies. Electrodes shall be baked / dried in the electrode drying oven (range 375 – 425 deg C) to the temperature and period specified by BHEL Engineer before their use. Necessary drying oven / portable oven shall be provided by the contractor at his cost.
- 56.1.12 The scope of work under this tender specification covers transportation, calibration, erection, testing, commissioning, Trial operation, PG test, substantial completion and stabilization. Protocols/Log sheets/As built drgs (at least 6 copies) - to be prepared by the subcontractor, all necessary stationary shall be supplied by the contractor.
- 56.1.13 Equipments /instruments required to be erected for this work, though not limited to but are generally as per weight schedule. For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However the payment of these items/class of work shall be regulated on the basis of mutually agreed rate arrived at by either of the following methods, which should be done prior to undertaking the work.
- 56.1.13.1 Based on rate of identical/similar items in the rate schedule.
- 56.1.13.2 Based on the rate arrived from nearby items in the rate schedule.
- 56.1.13.3 Wherever any item rate for similar type of work or nearby item rate is not existing in the rate schedule, rate will be worked out on the basis of work element or from fundamentals of estimation or existing rates in other job.
- 56.1.14 Contractor shall provide necessary resources for completion of such work within the stipulated time schedule. Value of such work shall be included while computing the total value of work finally executed for all contractual purposes, particularly for contract variation purpose.

57 MATERIALS HANDLING

- 57.1 Loading/unloading at storage yard, transport to site, unloading at site/working area, preassembly of equipments at the preassembly yard or at working areas for inspection, checking, erection, calibration, testing and commissioning.
- 57.2 All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments/ components for checking and cleaning, fabrication of tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing of cut outs/openings for mounting of console inserts, modules, indicators, recorders, drilling of holes for gland entries, reaming, scrapping, cable laying, dressing, fitting up etc. as may be applicable in such erection works are treated as incidentals to erection work and are necessary to complete the work satisfactorily shall be carried out by the contractor as part of the work.
- 57.3 Overhauling, cleaning, repairing, servicing of equipments / instruments, valves etc. during erection and commissioning stages will be arranged by the contractor. However, gaskets /packing for replacement will be provided by BHEL free of cost. All equipments shall be preserved and protected before and after erection as per the advice of BHEL engineer.
- 57.4 The contractor should take all reasonable care to protect equipment and materials under his custody either in his stores or at site. Copper tubing, brass fittings, brass

valves etc. forming an integral part of equipment or system are liable to greater damages / pilferages / theft / losses. It will be responsibility of contractor to arrange for adequate security round the clock for protection from such damages / pilferages / theft / losses.

- 57.5 All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/or handling of the equipments without the specific written permission of the engineer. The equipment from the storage yard shall be moved to the actual site of erection/location at the appropriate time as per the direction of BHEL engineer so as to avoid damage/loss of such equipment at site.
- 57.6 The contractor shall collect all scrap materials periodically from various levels of power house, working area of the power station, auxiliary and piping around power station and collect the same at one place earmarked for the same. Loads of scraps are to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.
- 57.7 All the surplus, damaged, unused materials, package materials, containers, special transporting frames, gunny bags etc. shall be returned to the BHEL stores/customer's stores by the contractor.
- 57.8 All pipes and tubes, equipments, instruments issued to contractor and kept at site for erection shall be covered with plastic caps/steel caps or shall be closed with suitable plugs by the contractor.
- 57.9 The contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before these equipments are erected in position.
- 57.10 Contractor shall plan and transport equipments/components from storage yard/sheds to erection site and erect them in such a manner and in a sequence that material accumulation at site should not lead to congestion. Materials shall be stacked neatly, preserved and stored in the contractor's shed and work areas in an orderly manner. It may be specifically noted that the space available for putting up the thermal power plant is limited and accumulation of material may lead to the necessity of shifting and restacking the materials to enable other agencies to carry on with their work or to comply with customer's requirements. If required, the contractor shall arrange shifting of surplus material expeditiously failing which the same will be arranged by BHEL and all charges together with departmental charges at 30% will be recovered from his bills.
- 57.11 House keeping in the erection and preassembly area is as important as the well-planned and orderly work is to be done. The access to site for inspection, approaches by BHEL and customer engineers and leading of the material shall be made available by the contractor at all times. The shifting and re-shifting of erection materials, tools and plants and clearance of restrictions, filling of ditches, undulation near the preassembly and boiler area is the responsibility of the contractor. Contractor should visit the site and acquaint himself with all restrictions and difficulties that he may encounter during erection/commissioning stages.

58 BRIEF DESCRIPTION OF ELECTRICAL AND C&I WORKS

58.1 INSTALLATION OF PANELS

- 58.1.1 Electrical control panels, electronic control panels, etc., are normally supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose supplied. These panels may have to be installed as stand alone or in group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.
- 58.1.2 Installation of panel shall include fixing of base frame, fabrication of base frame if

required, leveling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware, bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates and sealing of cable entries. In certain case where canopies are not supplied but have to be fabricated out of MS/Aluminium sheets provided by BHEL, payment will be done on weight basis, the subcontractor to indicate the rate.

- 58.1.3 Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panel have to be erected in the ESP control room etc.
- 58.1.4 Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.
- 58.1.5 Wherever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication, installation rates shall be applicable.
- 58.1.6 Normally the panels shall be supplied with instrument, relay, meters, electronic modules etc. mounted and pre-wired. However, if these are supplied loose / separately for safety in transit, contractor shall mount/wire such devices and made additional openings in the panels if required as part of the panel installation work and no separate rates shall be applicable unless otherwise specially listed in the rate schedule.
- 58.1.7 No separate payment shall be made for replacement of any devices like electronic modules, relays, conductors, terminal block, push buttons etc. which are found defective during pre-commissioning/ post-commissioning of the panels.
- 58.1.8 For troubleshooting and tuning/fine tuning C&I items to match machine commissioning/ operation process, several removal, recalibration, replacements will be required. This shall be considered as normal work & no separate payments shall be made for such rework.
- 58.1.9 Minor civil works like drilling, chipping, punching holes and opening in concrete floors, slabs and brick walls, grouting, related to Rack, support installation, minor civil works required for installation of control panels, Junction boxes etc., shall be included in the erection cost of such items. Also all miscellaneous civil works like chipping away and making good as necessary in floor slab/wall for cabling / earthing etc., as required are included in the scope for which no separate payment is applicable. The scope also includes supply of grouting/fixing material, if any.
- 58.2 **FABRICATION AND INSTALLATION OF STRUCTURAL STEEL**
- 58.2.1 Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and same shall be used for fabrication of panel base frame, cable tray supports, canopies, instrument and junction box frames, impulse pipe/instrument air pipe supports and instruments etc.
- 58.2.2 This shall include cutting into size, conduiting of end connections, if required, welding, grinding of excess weld deposits, drilling of holes for mounting of device/instrument, installation at location, leveling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.
- 58.2.3 All the fabricated supports/frames shall be applied with one coat of primer red oxide paint before installation and two coat of synthetic approved quality of prescribed shade of final paint,. If required, BHEL shall prescribe time gap between first and second coat of final paint.
- 58.2.4 Frame installation/cable tray accessories' installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor.

- 58.2.5 In certain packages, galvanized members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/welding. The installation rate as quoted shall include the assembling of the frames.
- 58.2.6 Gas cutting of tray/impulse pipe support and gas cut holes in frame shall be avoided. Only drilled hole shall be permitted in frame etc.
- 58.3 **LAYING OF PIPES AND TUBES (IMPULSE PIPES & INSTRUMENT AIR PIPES)**
- 58.3.1 Root valves are generally provided on process pipe line by other agencies. Prior to starting impulse pipe, contractor to identify the process point with respect to PIDs.
- 58.3.2 Installation of impulse pipe of CS/AS/SS material shall include cleaning, air flushing, cutting to length from the running meter, edge preparation, cold bending, welding of sockets /reducers/tee/cross/isolating valves/union nut and nipples/tail pieces etc., mounting of SS/CS valve manifolds and compression fittings, providing supports, clamping, conducting leak test/hydraulic pressure test and painting and other accessories as per instrument hook-up diagram. Piping works shall involve either arc or TIG welding.
- 58.3.3 Liquid penetration and/or Magnetic particle testing of welded joints in impulse piping will have to be done by the contractor. However, for impulse pipes in high-pressure lines (viz., Main Steam, BFP Discharge, Feedwater system, S/H and R/H Spray lines, CRH, HRH, HP/LP bypass, etc.) 10% of the weld joints are to be tested. For the low-pressure lines, 2% of the joints are to be thus tested. The contractor must arrange for necessary equipments/consumables at his own cost. All impulse line to be hydrotested to 1.5 times the working pressure.
- 58.3.4 IBR certified welders shall be deployed for welding of impulse pipes, welding of thermowell and contractor shall take approval for welder and welding consumables from BHEL site engineer.
- 58.3.5 Laying of GI pipe for instrument air line shall include air blowing, cutting from the running meter length, threading, installation of elbows/tee/reducer /moisture traps/auto drain pot/check valves/isolating valves, supporting clamping, conducting leak test and seal welding of threaded joints.
- 58.3.6 Threaded joints of air line shall be made leak proof by using Teflon tapes, Copper washers or other sealing compound. All consumables shall be in the scope of contractor.
- 58.3.7 All fittings and accessories for impulse pipe and air line shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings and no separate rates are envisaged.
- 58.3.8 Contractor shall provide GI "U" clamps for impulse pipe and GI pipes within the quoted rates for installation of the same.
- 58.3.9 Impulse pipes shall be applied with one coat of primer red oxide paint and two coats of synthetic approved quality of prescribed shade of final paint. BHEL may prescribe a time gap between first coat and second coat of final paint.
- 58.4 **CABLE TRAYS/ CABLE DUCTS**
- 58.4.1 Various types of sheet metal, galvanised cable tray, i.e. Perforated, ladder type, seal metal duct, solid bottom tray, shall be provided in a standard length along with accessories like hardware, bends, reducers, coupler plate, tray covers and tray clamps etc.
- 58.4.2 Installation of cable tray/cable duct shall include cutting, laying, jointing, supporting, drilling holes in the support, providing tees/reducers/bends/clamps as per tray route layout. Fabrication of bends/tees/reducers from straight length, fixing of tray covers, welding of tray on support, cleaning and application of cold galvanising paint on weld joints including supply of paint is in the scope of contractor. Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.

- 58.4.3 In case cable trays are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instance.
- 58.4.4 Cable trays/ducts have to be routed underground in cable trench, over head on structure, valves, floors etc. for various application such as cable laying, copper tubes, conduits, thermocouple, temperature gauge capillary etc. Cables trays wherever erected shall be preferably in vertical conditions.
- 58.5 **CABLE LAYING (POWER/ CONTROL/ INSTRUMENTATION SHIELDED/ UNSHIELDED CABLES/ PLUG-IN CABLES/ COAXIAL/ UTP/ STP/ DATA HIGHWAY, ARMoured/ UN-ARMoured, SINGLE/ MULTI-CORE, PVC/ HR PVC/ FRLS/ TEFLON/ XLP INSULATION)**
- 58.5.1 Cable laying include cutting to the required length, laying in overhead/underground cable trench/through pipes/flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, providing PVC numerical/alphabetical / printed ferrules, termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, termination (crimp, soldering, etc.), plug-in connections with insert type crimping, providing identification cable tags, PVC/aluminium at both the ends and at appropriate interval throughout the route length, continuity checking, insulation resistance checking, high voltage test on HT cables.
- 58.5.2 Entry to the panels and JBs may be at top, sides or bottom. All cables are required to be properly supported and clamped near to the JB/panel.
- 58.5.3 Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, prefab plug-in cables, etc., for such cases cables may have to be lifted inside the panel by either making cut-out in gland plate and providing rubber profile for sharp edge protection or alternatively, providing 4" or 6" PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rates.
- 58.5.4 **Supply of, PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metallic, clamping and dressing material with hardware, PVC sleeves etc. shall be supplied by the contractor within the quoted rates for cable laying. The quality of material shall be got approved from BHEL engineer prior to their use on job. Required lugs will be supplied by BHEL**
- 58.5.5 All care should be taken to avoid abrasion, tension, twisting, kinking, stretching of cables during installation.
- 58.5.6 Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and grounded at panel end only. While terminating the shield wire either in panel or JBs, PVC sleeves are to be used to avoid two-point earthing.
- 58.5.7 Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, electrical actuators etc., are also required to be sealed. The required material for doing so shall be deemed to have been included by contractor in the cable laying.
- 58.5.8 Many of the cable trays and cables have to be laid in cable trenches. For this purpose, the cover of the trenches have to be opened for working in site and whenever the cables are to be laid in existing cable tray, all safety precautions have to be observed. After completing the work, the trenches have to be cleaned and covers put back into position. Contractor shall also carry out de-watering from the trenches if required and arrange pumps etc., at his cost.
- 58.5.9 Looping wire at terminal block of panels and electrical motors/actuator as shown in the inter-connection diagrams or as required is to be done by contractor at no extra

- cost.
- 58.5.10 Contractor shall carefully plan the cutting schedule of each cable drum in consultation with site engineer such that wastage are minimised.
- 58.5.11 The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed the following limits:
- % Wastage on issued Qty**
- | | | |
|-----------|------------------------------|--|
| 58.5.11.1 | HT Cables | 1% |
| 58.5.11.2 | LT cables above 70 mm square | 1% |
| 58.5.11.3 | LT cables upto 70 mm square | 2% |
| 58.5.11.4 | Control & special cables | 3% |
| 58.5.11.5 | Fire survival cables | 1% |
| 58.5.11.6 | Steel materials | 1% by weight (for cable trays/tray support installation) |
- 58.5.12 If the actual wastage be more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.
- 58.6 **PUSH BUTTONS, STARTER, FUSE BOARD ETC.**
- 58.6.1 The above items shall require to be mounted on wall / column / floor.
- 58.6.2 For mounting of above items the required structural steel, like ISMC, ISA and Flat shall be supplied by BHEL free of cost. In case BHEL could not supply the same, it will be supplied by the Contractor and payment shall be made as per applicable item of Rate schedule. However, Rowl plug and necessary fixing hard-wares is to be supplied by the contractor at his cost and will be deemed to be included in the rate of erection of the item.
- 58.6.3 Checking of components, removal & reinstallation of internal component and re-wiring, testing and commissioning shall be under the scope of the contractor.
- 58.6.4 Terminal Connections:
- 58.6.5 The types of cable terminations are as detailed below:
- 58.6.5.1 All field cables are crimp type of different sizes.
- 58.6.5.2 All JB's are both side screw type.
- 58.7 **FIELD INSTRUMENTATION**
- 58.7.1 Various type of primary/secondary indicating/recording instrument for pressure, temperature, flow, level and analytical measurement shall be supplied either loose or mounted along with the equipment.
- 58.7.2 Scope of work under erection/calibration/testing/commissioning shall include calibration, setting, adjustment, writing instrument tag number with paint, report making, installation, servicing, minor repairs/servicing, putting instrument into service, signal checking from field upto the functional group panels and remote indicating instrument, functional checks, interlock and protection/alarm/loop checks by simulating the field devices, providing assistance for trouble shooting during pre-commissioning/post-commissioning till system is handed over to the customer.
- 58.7.3 It is the responsibility of contractor to make erection, calibration/testing protocols for various measuring equipments/devices and they should get duly certified by customer/BHEL engineer and should be submitted to BHEL engineer regularly. However, sample formats will be given by BHEL and have to be printed by contractor in adequate numbers.
- 58.7.4 Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from recognized agencies and calibration report of the same to be submitted prior to start of calibration of the field instruments/devices.
- 58.7.5 Installation of instrument shall also include drilling of holes and tapping for mounting of instrument and local instrument frames/panels and supply of hardware for

- mounting of the instrument.
- 58.7.6 Some devices may need removal, calibration/testing, re-fixing, adjustment, etc., and commissioning. Separate payment shall not be made for this. The rates quoted for the commissioning of these equipments should take care of the above. Also, the contractor shall remove such devices prior to erection either at site or at store to avoid damages/pilferages and keeping in safe custody and the same shall be installed prior to commissioning of such equipment.
- 58.7.7 It shall be the responsibility of the contractor to ensure that the calibrated instruments show correct reading while installed in the system. However, recalibration may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be decided and certified by concerned BHEL site engineers.
- 58.7.8 The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.
- 58.7.9 For the very few cases where required, the contractor shall carry out re-orientation of bottom/top entry arrangement for process connection if needed due to site condition in existing instrument rack/enclosure/JB and re-location of existing instrument including removing of the existing tubing and re-installation of the same at appropriate location due to any change in grouping of the instrument and no extra payment shall be applicable.
- 58.7.10 In certain cases instruments / devices are supplied on equipment or drawn by other agencies as part of mechanical package. The same are to be received or to be collected from other agencies for keeping in safe custody to avoid damages. The same are to be erected back after calibration for which unit rate shall be applicable for erection and calibration. Contractor shall maintain record of such instrument duly certified by BHEL engineer. However for removal of such instrument, no separate rate/payment shall be applicable.
- 58.7.11 The entire work of erection, testing, commissioning of the connected devices/equipments as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site).
- 58.8 **FINAL PAINTING**
- 58.8.1 **All the fabricated frames, instrument racks, Junction box frame, trays, supports, panel base frame, impulse pipes, etc., wherever applicable shall be first painted with one coat of primer paint (metal red oxide) and then two coats of approved quality paint of approved shade by BHEL Engineer after thoroughly cleaning the surface of dust, rust, scale, grease, oil, etc., by wire brushing, scrapping or any other suitable method. The quoted rates should be inclusive of all these including supply of paints and consumables.**
- 58.8.2 Other equipments like JBs, Panels etc., shall be painted with two coats of synthetic approved quality paint. The quoted rates should be inclusive of application of two final coats of synthetic approved quality paint. All the consumables such as wire brush, other cleaning materials, painting implements, etc., is to be arranged by the contractor at his own cost. All equipment painting will be done by spray painting.
- 58.8.3 All the weld joints of GI cable trays and GI structural members shall be applied with a coat of cold galvanizing zinc paint and paint shall be arranged by contractor at his cost.
- 58.9 **MISC OTHER INSTRUMENT/ EQUIPMENT ERECTION, CALIBRATION AND COMMISSIONING**
- 58.9.1 Dimension and weight as mentioned against control panels, MCCs, etc. in the BOQ cum rate schedule are only approximate and there may be changes in dimension and weight in actual supply of the equipment and no rate variation shall be applicable

- on this account.
- 58.9.2 Wherever brief description of the system is given under various sub-heads, it is only for the understanding system requirements. It does not indicate the total specification of work. For such system, other clauses are also applicable wherein work details are specified.
- 58.9.3 Normally, cable glands on junction boxes side are received in mounted condition. While terminating the cables as per drawings, the cable glands are to be removed and fixed. Wherever cable glands are not received along with junction boxes, the cable glands as per the requirement will be provided by BHEL and the contractor has to make necessary holes/adjust the available holes in the JB for fixing these. No separate payment will be made for drilling of holes and fixing the cable glands to the junction boxes. Nameplates for JBs will be supplied separately. These are to be suitably written and fixed onto the JBs. Separate payment will not be made for this.
- 58.9.4 The push buttons and indicators in the systems are provided as loose with different type of connectors. The fixing of connectors and their wiring from push buttons to indicators shall be the responsibility of contractor. No separate payment will be made for fixing of connectors. The cable laying and termination charges will be paid as per applicable rate schedule.
- 58.10 **PRE-COMMISSIONING/ COMMISSIONING AND POST COMMISSIONING ACTIVITIES**
- 58.10.1 The work is also inclusive of assistance/coordination during various commissioning activities of the boiler and turbine package along with its auxiliaries and station package. The various activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of customer/consultant/ statutory authorities like boiler inspector, electrical inspector etc.
- 58.10.2 In case any malfunctioning and/or defects are found during tests, trial runs such as loose components, undue noise or vibration, strain on connected equipments etc., the contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment and realignment is necessary, the same shall be done as per BHEL engineer's instructions without any cost implication to BHEL.
- 58.10.3 During each stage of commissioning, if any part of the instrument needs repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim, if any, for such repair/rectification/rework/replacement etc. for reasons not attributable to contractor will be governed by clause on extra works of the special conditions of contract. The parts to be replaced shall however be provided by BHEL free of cost..
- 58.10.4 The pre-commissioning activities will start prior to light up of boiler and various trials, commissioning operations shall continue till the 660 MW ESP units are handed over to customer. Simultaneous commissioning activities will be in progress in various areas, checking of equipments erected, making ready for trial runs, alkali flushing, chemical cleaning, mass flushing etc. All these works need specialised gangs including electricians/instrument mechanics in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted.
- 58.10.5 The mobilisation of these commissioning gangs shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools and tackles with BHEL engineer and arrange for the same. If at any time the requisite manpower, consumables, T&P are not arranged then BHEL shall make alternate arrangements and necessary recoveries with overhead cost will be made from the bills of the contractor.
- 58.10.6 Contractor shall cut open works if needed as per BHEL engineer's instructions during

- commissioning for inspection, checking and make good the works after inspection is over without any extra payment.
- 58.10.7 In case any rework / repair / rectification / modification / fabrication etc. is required because of contractor's faulty erection which is noticed during commissioning or at any stage, the same has to be rectified by the contractor at his cost. If any improvement /repair /rework/rectification/ fabrication/ modification due to design improvement/ requirement is involved, the same shall be carried out by the contractor promptly and expeditiously. Claims if any, for such works from the contractor shall be governed by relevant section of Special Conditions of Contract.
- 58.10.8 It is the responsibility of contractor to provide for necessary labour, tools and tackles and consumables till the completion of work under these specifications even in case erection, testing and commissioning of this work is delayed due to reasons not attributable to the contractor.
- 58.10.9 During commissioning activities and carrying out various tests, minor items like gauges, manometers, etc., have to be temporarily erected and put in service to suit the commissioning activities. BHEL will provide the necessary gauges and equipment. Contractor has to carry out the erection, calibration, dismantling of the same. After completion of activities the temporary systems have to be removed and returned to stores. No extra charges will be payable towards these.
- 58.10.10 Commissioning Assistance
- 58.10.11 During pre-commissioning, commissioning, post commissioning and trial operation stages of various systems, certain category of manpower assistance with T&P and consumables will have to be provided to BHEL commissioning engineers exclusively at their disposal. It shall be the responsibility of the contractor to provide following category of minimum manpower assistance including necessary consumables, hand tools, calibration equipment etc. The quoted rates shall include this.
- 58.10.11.1 Engineer (electrical, instrumentation).
- 58.10.11.2 Electrician (ITI).
- 58.10.11.3 Instrument technician (ITI).
- 58.10.11.4 Helper/fitter/welder.
- 58.10.12 The above figures indicative for one unit shows only minimum required personnel over and above manpower required to complete works. Contractor has to augment the manpower as and when required as per work demand and necessity at site.
- 58.10.13 It shall be specifically noted that above employees of the contractor may have to work round the clock and hence considerable overtime payment may be involved. No additional compensation by for the same shall be payable, irrespective of number of hours per day.
- 58.10.14 For electrical works, 415 volts and above, the contractor has to bring qualified electricians.
- 58.10.15 Calibration, Testing & Commissioning
- 58.10.16 Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipments, devices, systems etc. are broadly classified below. However, there may be some overlapping between the activities (erection, calibration and testing, commissioning.) The classification of activity is only a guideline for understanding the total volume of work in each activity. The contractor shall have no claim for performing or providing manpower assistance for such overlapping work, which is also within the scope of the work.
- 58.11 **Calibration**
- 58.11.1 Verification after drawing of material of various types, range of the field devices with respect to instrument schedule, data sheet or system document.
- 58.11.1.1 - Codification of instruments as per system tag numbers
- 58.11.1.2 - Calibration / adjustment of instrument as per system requirement / set values.

- 58.11.1.3 - Providing head correction in case of pressure measurement as per calculated values or actual measured value for the instrument, which are used for interlock protections / monitoring.
- 58.11.1.4 - Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.
- 58.11.1.5 - Checking and ensuring the proper function of instrument.
- 58.11.1.6 - All the recorders shall be made functional with proper chart movement and ink marking.
- 58.11.2 Site testing shall be required for all electrical equipment installed by contractor to ensure proper installations, setting, connection and functioning in accordance with drawings, specification, manufacturer's recommendations and approved quality plan for installation, testing & commissioning.
- 58.11.3 The contractor shall take full responsibility for satisfactory testing, pre-commissioning, commissioning and trial run of the connected equipment under overall guidance of BHEL and shall locate any cause of malfunction and shall make the necessary minor wiring changes or cable connections to obtain the intended operation. Testing shall also include any additional tests which the engineer deems necessary because of site conditions to determine that equipment, material and system meets requirement of the specification. The following are some of the major site tests. Checking shall be done on all circuits & modules and not as a typical checking in sample basis.
- 58.11.4 For commissioning of Relays of various panels, as required, services of OEM (Original Equipment Manufacturer) is to be arranged by the contractor at his own cost.
- 58.11.5 For commissioning of any other system, if required, services of OEM (Original Equipment Manufacturer) shall be arranged by BHEL free of cost.
- 58.11.6 The contractor shall deploy special commissioning manpower for commissioning of the Equipments / Systems under the scope of this contract. The contractor will be responsible for mobilizing all T&P etc. as required for successful commissioning of the Equipments / Systems under the scope of this contract and shall carry out all necessary pre-commissioning and commissioning checks / tests. Contractor shall obtain prior approval on such agency from BHEL site before deployment. No separate amount will be paid for such deployment. The quoted rate shall be deemed to be inclusive of this cost.
- 58.11.7 The contractor has to provide manpower for commissioning viz. Engineer/ Supervisor having experience in commissioning of the Electrical Equipments / Systems under the scope of this contract.
- 58.12 **Erection**
- 58.12.1 Issue and drawal of material from store, verification, inspection as per shipping list, drawings and documents.
- 58.12.2 Preservation, up keeping, safe custody of the erected equipments till handing over to the customer.
- 58.12.3 Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc.
- 58.12.4 Continuity check and IR value check of cables.
- 58.12.5 Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule.
- 58.12.6 Checking earthing of the equipments and cable shield wire continuity.
- 58.12.7 Energizing the functional group control panels and field devices.
- 58.12.8 All cable glands/piping/tubing to be fixed as per installation requirement before commissioning.
- 58.13 **Checks after erection : checks shall be carried out not limited to following details.**
- 58.13.1 **PANELS**

- 58.13.1.1 Arrangement of various shipping sections as per GA drawings.
- 58.13.1.2 Front, rear side and top clearances
- 58.13.1.3 Proper positioning of ends of main bus bars in adjoining sections.
- 58.13.1.4 Tightness of bus bars joints between adjoining sections and its shrouding.
- 58.13.1.5 Alignment of panels
- 58.13.1.6 Welding of base channels to embedded plates / bolting with foundation bolts.
- 58.13.1.7 Adequacy of supporting channels 3rd its arrangement.
- 58.13.1.8 Free closing and opening of door, tight closing of door.
- 58.13.1.9 Free movement of drawout modules and proper alignment of fixed and moving contacts, including terminals.

- 58.13.2 **PUSH BUTTON STATION / LOCAL STARTERS**
 - 58.13.2.1 General arrangement of fixing
 - 58.13.2.2 Tightness of nuts & bolts
 - 58.13.2.3 Tightness of door closing
 - 58.13.2.4 Mechanical operation of push button switches
 - 58.13.3 General Checks on switchboards, transfer panels & push button stations.
 - 58.13.3.1 Check of control wiring
 - 58.13.3.2 General check for cleanliness inside the switch board.
 - 58.13.3.3 Operation of mechanical parts of relays, switches, push buttons etc.
 - 58.13.3.4 IR check of power & control circuits.
 - 58.13.3.5 Verification of switch development.
 - 58.13.3.6 Alignment of contracts with vertical busbars and contact pressure
 - 58.13.3.7 Verification of components like fuse, links and their ratings etc.
 - 58.13.3.8 Connection to earthing points
 - 58.13.4 Special checks for motor starter panels
 - 58.13.4.1 Primary / secondary injection test for bimetal / other relays.
 - 58.13.4.2 Verification of operation of control circuit in selected starter modules of different categories.
 - 58.13.4.3 Operation of panel space heaters / thermostats.
- 58.13.5 Special check for busduct
 - 58.13.5.1 Cleanliness of busbar, supports etc.
 - 58.13.5.2 Earth & insulation resistance
 - 58.13.5.3 Measurement of contact resistance
 - 58.13.5.4 HV test.
- 58.13.6 Testing, Commissioning & Trial Operation
 - 58.13.6.1 Power cable connection for tightness & phase sequence test
 - 58.13.6.2 Energisation by closing I/C breaker
 - 58.13.6.3 Control circuit operation of each starter module
 - 58.13.6.4 Verification of timer settings
 - 58.13.6.5 Verification of bus transfer & auto re-closing.
 - 58.13.6.6 Energisation of power circuit of each module & operating motors on no load Checking operation from local push button station, and remote (CR), with and without all interlocks.
 - 58.13.6.7 Motor IR value measurement, bearing/winding RTD checking, drying out of motor, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.
 - 58.13.6.8 Contractor shall prepare calibration/testing report/protocols.

- 58.13.6.9 During trial run of various systems, if the performance of any instrument is found erratic, un-satisfactory and requires re-adjustment, re-calibration etc., the defect shall be attended by contractor.
- 58.13.6.10 Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same should be attended properly.
- 58.13.6.11 Observe the proper functioning of sub-group/sub-loop control.
- 58.13.6.12 Check the operation of various control in manual/auto mode for smooth functioning.
- 58.13.6.13 Clearing of all bad / invalid signals noticed during commissioning.
- 58.13.6.14 Providing necessary assistance for Trial Operation of the unit is in scope of this specification. Trial Operation shall be considered successful on completion of operation of the respective units for a continuous period of 720 hours at maximum available load. Out of this period, 72 hours shall be at full rated load of the unit. Smooth operation and availability of all instrument/controls of the systems installed under the scope herein, shall be ensured by the contractor. Contractor shall provide adequate number of skilled manpower and T&P for this purpose. Interruption in Trial Operation for reasons attributable to the Contractor shall result in re-start of the Trial Operation all over again, consequential extension in Time Schedule / Contract Period shall be to the contractor's account.
- 58.13.6.15 If any small wiring correction or minor modification in control panel wiring is noticed during the commissioning, it shall be carried out as a part of commissioning activity.
- 58.13.7 **Post-commissioning.**
- 58.13.7.1 Contractor shall rectify the defect observed/informed by customer during the trial run.
- 58.13.7.2 Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL engineer.
- 58.13.7.3 After trial run/handing over of the equipment, if due to unforeseen reasons, certain works crop up, the contractor shall provide all the assistance.
- 58.13.8 PG Test Assistance
- 58.13.8.1 For PG test assistance, laying of impulse pipes, cables, etc. and installation of instrument tapping points shall be done by the contractor. These activities may be carried out at any point of time before or after Completion of Facilities. Payments will be made as per item rates of comparable similar or identical items in the rate schedule. Such temporary installations shall have to be dismantled after the completion of PG Test for which no separate payment is admissible.
- 58.13.8.2 The list of above tests to be carried out by the contractor is not exhaustive and they may have to carry out separate tests which may be necessary for satisfactory completion of the job, at no extra cost.
- 58.14 **GUIDELINES FOR ERECTION**
- 58.14.1 Electrical cabling /wiring: All the cables will be properly laid in cable trays, dressed and clamped with aluminium flats. The cable will be terminated at both ends with suitable lugs and printed ferrules and will be glanded properly. Suitable equipment and consumables for ferrule printing has to be arranged by the contractor at his own cost. For cable identification, the contractor shall provide at his cost aluminium tags at regular intervals through one run of the cable.
- 58.14.2 All electrical connections shall be tested for polarity and proper connections.
- 58.14.3 Insulation test of the various circuits shall be done.
- 58.14.4 The checking of operation of individual equipment and instruments to which the cabling/wiring connected shall also be done by the contractor.
- 58.14.5 Wherever supplied, GI cable trays shall be of bolted construction only with fixing screws and coupler plates.
- 58.14.6 To the extent possible, all the trays shall be fixed in vertical orientation

- 58.14.7 Sharp bends of cable trays shall be avoided in all type of cable trays.
- 58.14.8 Installation of cable racks and supports structure shall be carried out in all the required areas. Steel embedments shall be provided in the cable trenches, ceiling slabs and concrete blocks for installing the cable racks and support structures.
- 58.14.8.1 Ladder perforated type cable trays shall be used in cable trenches and vertical risers.
- 58.14.8.2 Perforated cable trays shall be used in higher elevations in boiler and TG area.
- 58.14.9 Cable racks in the trenches and control room are to be shared with other contractors installing cables in different areas wherever required. Contractor shall cooperate with the other contractors in sharing the cable trays and proper dressing and clamping the cables.
- 58.14.10 Where power and control cables are to be laid in the same route, suitable barriers to segregate them physically shall be employed.
- 58.14.11 Space equal to the diameter of cable shall be provided between power cables of six over 50 mm in diameter.
- 58.14.12 When cables pass through floors, walls etc., it shall be passed through a pipe for mechanical protection and the pipe ends sealed suitably.
- 58.14.13 Care shall be taken to avoid short bending and kinking of conductor damaging insulation and stressing the cable beyond pulling force recommended by the manufacturer. Cable shall be protected at all times from mechanical damage.
- 58.14.14 The minimum radius of formed bend of an insulated cable shall be 12d for un-armoured cables and 15d for armoured cables where 'd' is the overall diameter of the cables.
- 58.14.15 No cable shall be laid in ducts or trenches where other services such as oil pipes, steam or water pipes are laid.
- 58.14.16 Where cabling passes through brickwork or concrete work, the contractor shall provide suitable local protection against mechanical damage wherever necessary.
- 58.14.17 The lay out of all cables shall be arranged to give adequate clearance from other services and cables shall be routed to avoid hot zones.
- 58.14.18 Jointing of cables shall be avoided as far as practicable. However, jointing if at all necessary shall be done by crimping type cable joints after getting approval of BHEL engineer.
- 58.14.19 The cable schedules indicating cable sizes, tentative cables routing information will be furnished by BHEL at site to the contractor during execution.
- 58.14.20 Earthing installations: All instruments/panels, cable trays, JBs etc. are to be earthed as per standard Earthing procedures/practices.
- 58.14.21 All equipments shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL.
- 58.14.22 The earthing conductors shall be of mild steel/GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing. A copy of earthing drawing shall be provided to the contractor at site during execution.
- 58.14.23 A continuous earthing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run in parallel, a continuous earthing conductor shall be provided on trays only with tap offs to the control cable trays. All rapping motors will be earthed to this conductor.
- 58.14.24 All joints in the earthing system shall be welded type. Earthing connections to all equipments including motors shall be bolted type.
- 58.14.25 Earthing connections shall be free from tinning scale paint, approved quality, grease, rust or dirt at the time of making joint.
- 58.14.26 Metallic sheaths, screens/shields and armour of all multicore cables shall be bonded and earthed.

- 58.14.27 Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm.
- 58.14.28 Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/wires which are exposed these are required to be painted with one coat of cold galvanizing zinc paint. Contractor to arrange the required paint and other items at his cost.
- 58.15 **GUIDELINES FOR HANDLING AND STORAGE OF ELECTRONIC CUBICLES/ SUBASSEMBLIES/ LOOSE ITEMS**
- 58.15.1 Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipments may get damaged due to vibration and shock.
- 58.15.2 After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site engineer.
- 58.15.3 Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.
- 58.15.4 After opening the case, all supports provided for transport are to be removed with due care.
- 58.15.5 Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.
- 58.16 **STORAGE**
- 58.16.1 The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL engineer. The equipment should be best protected in its cases. It should be arranged away from walls.
- 58.16.2 The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damp, sinking into ground and All the equipments, materials and goods kept in the store room should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site engineer.
- 58.16.3 The packing material shall be retained if the cubicle is to be repacked after inspection.
- 58.17 **SUB-ASSEMBLIES**
- 58.17.1 All subassemblies should be kept in a separate place where it is easily accessible.
- 58.17.2 Subassemblies should have a protective cover in case it is stored without wooden packing/case to prevent accumulation of dust. Silica gel packets should also be kept along with it.
- 58.17.3 Subassemblies should not be stacked one above the other.
- 58.18 **LOOSE ITEMS**
- 58.18.1 The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other

- display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorized and stored separately.
- 58.18.2 Guidelines for handling of electronic modules
- 58.18.3 All the modules shall be handled by qualified persons only.
- 58.18.4 Electronic modules should only be touched when it is absolutely essential to do so.
- 58.18.5 Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.
- 58.18.6 The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.
- 58.18.7 The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched.
- 58.18.8 The electronic modules should not be placed close to television sets or CRT units.
- 58.18.9 Soldering irons and any other tools used must be grounded.
- 58.18.10 All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.

59.0 FACILITIES TO BE PROVIDED BY BHEL/ CONTRACTOR

- 59.1** BHEL shall provide limited open space for office and store/ workshop at site free of rental charge. It is the responsibility of the contractor to construct sheds, provide all utilities like electricity, drinking water etc., as a part of his scope of work within the accepted rates. Electricity for office and workshop will be provided on free of cost basis at one point as decided by BHEL. Further distribution will have to be made by the contractor at their own cost. Meter for electricity will have to be provided by the Contractor at his own cost. **The Contractor will have to arrange for construction and potable water at his cost**

- 59.2** BHEL shall provide limited open space for labour colony near the plant free of rental charge. Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

Electricity will be provided at one point on chargeable basis. The Contractor will have to arrange for construction and potable water at his cost. Meter for electricity will have to be provided by the Contractor at his own cost.

- 59.3** On completion of work or as and when required by BHEL, all the temporary buildings, structures etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, it will be got done at his risk and cost, and expenses incurred shall be re-covered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.

- 59.4** Electricity source (415/ 440 V) for utilizing **construction power** will be provided free of charge at a single point (approximately 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:

- The contractor will be provided construction power free of charge.
- 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 .

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.

59.5 NTPC/ BHEL shall supply electricity free of charge for construction, operation of EOT cranes, plant start-up, pre-commissioning, commissioning activities including testing. Electricity for construction power and light will be brought by NTPC / BHEL at one point. Contractor shall arrange further distribution of water for construction purposes.

59.6 Contractor shall arrange adequate floodlights, hand lamps and area lighting. Provision of distribution lines for lighting from the single point 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. Contractor shall use his own materials like cables, fuses, switchboards etc.

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.

59.7 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.

59.8 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 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. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

59.9 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.

- 59.10** 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.
- 59.11** 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.
- 59.13** 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.
- 59.16** Compressed air if 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
- 59.18** **Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE**

60.0 TIME SCHEDULE

- 60.1** 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.
- 60.2** Entire scope of work as detailed in tender specification **shall be completed in 28 months** from the scheduled date of start of work as per the programs / milestones indicated by BHEL from time to time.
- FOR UNIT – 1:- 22 Months . Unit 2 & 3 will follow with a lag of 3 and 6 months repectively .**

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.

- 60.3** The various mile stone dates to be achieved, for ESP UNIT # 1, as per the current status of contract are as below:

MILE STONES	MONTH
Start of Erection	15 days from issue of LOI
Erection readiness for BLU requirement	14 th Month
Testing & Commissioning for BLU	16 th Month
Readiness for Coal Firing	18 th Month
Trial Operation & Handing over	22 th Month

Note: 1. Depending upon front and material availability above milestones will be required to be preponed by one month. Contractor is required to mobilize additional resources to meet above requirement within their quoted price.

- 60.4** 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.

61.0 OVER RUN

- 61.1** 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** of contract after the contractual completion date. In case the scheduled completion time gets **extended beyond grace periods** as stated above, the contractor shall be considered for payment of fixed over run charges,

1. **@ Rs. 1,00, 000/- per month (Rupees One Hundred thousand only)**

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.

- 61.2** 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.

- 61.3** 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.

62.0 TERMS OF PAYMENT

- 62.1** 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.

- 62.2** 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.

- 62.3** 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.

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.

I.A PROGRESSIVE PAYMENT on pro-rata basis

I-AA 3 X 0.25% of the awarded contract value on start of pre assembly work by deploying at least one number of 75 T crane and one number 14/12 T Hydra crane in working condition at site.

I-AB 3 X 0.25 % of the awarded contract value on start of erection work of ESP column after checking its trueness on certification by BHEL Engineer.

I.B PROGRESSIVE PAYMENT on pro-rata basis

(80% of unit rates)

(Applicable for installation of all items except Insulation work for sl. No. 1 of main rate)

1 15% of the applicable contract unit rate on pro-rata basis on completion of pre assembly wherever required and 15% of the applicable contract unit rate on pro-rata basis on placement in position and rough alignment.

OR

30% 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.

I.C PROGRESSIVE PAYMENT on pro-rata basis

(80% of unit rates)

(Applicable for INSULATION AND REFRACTORY work for sl. No. 1 of main rate)

1 65% 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 15% of the applicable contract unit rate payable on system completion and area

cleaning.

NOTE: BHEL site incharge, at his discretion can split / re-group above payments schedule, to facilitate site operations.

I.D An amount limited to 1.0 % of the awarded 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 respective ESPs (Charging of Flow passes) for UNIT 5 & 6.

II.A MILESTONE PAYMENTS FOR PART-A (10 .5 % of CV)

- 1** 3 x 4 x 0.25 % of CV on successful completion of mechanical work of each pass of ESP
- 2** 3 x 4 x 0.25 % of CV on successful completion of electrical work of each pass of ESP
- 3** 3 x 0.25 % of CV on successful completion of Gas tightness test of each ESP.
- 4** 3 x 0.25 % of CV on successful completion of Gas distribution test of ESP
- 5** 3 x 0.25% of CV on successful completion of Commissioning of collecting rapping system.
- 6** 3 x 0.25 % of CV on successful completion of Commissioning of emitting rapping system.
- 7** 3 x 0.50 % of CV value on successful completion of Charging of all fields of each ESP & Completion of Commissioning.

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 consumerate completion and recoding reason.

III Providing and applying PAINTING-Payment on Prorata basis

3 x 1.0 % of awarded Contract Value

IV 3 x 0.5 % of contract value will be payable on handing over of the ESP's 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.

V 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:

1. Payments at IV & V shall be released after adjustment of the CV based on actual work carried out.

ANNEXURE – I**DETAILS OF QUANTITIES****TETATIVE WEIGHT OF VARIOUS PRODUCT GROUPS FOR EACH UNIT**

PRODUCT GROUP (PG)	DESCRIPTION OF PG	DESIGN WEIGHT (MT)
ESP		
78	ESP AS PER ANNEXURE-II	9155
89	GALLERIES & RAILS	145
39	COLUMNS & STRUCTURES	1035
48	DUCTS & DAMPERS	1646
	TOTAL	11981

NOTES:

- Besides product groups indicated herein, there is likelihood of addition of new product groups by BHEL's unit for release of some items, integral to this work. Tenderers' quoted unit rates shall be applicable for such product groups also.
- BHEL's decision with regard to classification of a particular product group is binding on the contractor.
- Besides the above, weight of all temporary piping, valves, pumps, tanks and other miscellaneous equipments etc. for carrying out hydraulic test, chemical cleaning, steam blowing and other tests, as stated elsewhere will get added. Those will be categorized as NPP and payment will be made for erection & commissioning only(as rate / MT)and no payment will be made for dismantling and return to site to site store. The tonnage calculated by BHEL engineer is final and binding to the contractor.
- The weights indicated in above schedule are approximate only and are liable to variations and alternations.

ANNEXURE – II**TENTATIVE WEIGHT SCHEDULE OF ESP [FOR EACH UNIT]**

TENTATIVE WEIGHT OF VARIOUS PRODUCT GROUPS FOR EACH UNIT
WEIGHT PER UNIT = 11 , 980 MT

PGMA	Description	Weight in Kgs
220	Collecting Electrode	876000
89610	Galleries & Railings	135500
89611	Roof Handrail	10000
X01	Support bearing	40000
X05	Sub delivery components	700
X06	Insulator housing assy	58000
X08	GD Screen	80000
X09	GD Rapp mechanism	12000
X10	GD Rapp Drive	850
X11	Deflection Plate assy	4000
X13	Emitting System Suspn	22000
X14	Support Insulator	9600
X15	Emitting Electrode	38500
X16	Emitt Rapp Mechanism	50000
X17	Emitt Rapp drive	41000
X19	Collecting Suspn Arrgt	173000
X20	Collecting Electrode	880000
X21	Emitting frame top	145000
X22	Emitting frame bottom	217000
X23	Inspection door	23600
X24	Shock bar	154000
X25	Coll Rapp Mechanisam	124000
X30	Electrical SD components	18400
X31	Geared motor for Rapp Mech	18000
X32	Emitting frame middle	316000
X37	Junction box	2300
X42	Outer Roof assy	282000
X43	Hopper Ridges	95000
X44	Hopper wall upper	425000
X45	Hopper wall lower	523000
X46	Inner roof assy	111000
X47	Roof panels & support	176000
X48	Casing Structure	430000
X49	Casing shell	730000
X50	Funnel assy	160000

X55	Pent house	253000
X57	Splitter & Guide vanes	28000
X59	Control Room Inserts	10000
X60	Cables & Racks	264000
X61	Perf test equipment	1000
X62	Cable Trays	187000
X63	Ash level Indicator	2500
X65	Hopper Approach platform	200000
X66	Water Washing System	5000
X72	Interlock	2000
X73	EOH	6000
X74	Opacity Monitor	700
X78	BAPCON Accessories	800
X81	Columns	869000
X90	Heating elements	1500
X91	Panel type heater	34000
X92	Aux control panels	40000
X93	Rapper control panel	2400
X94	Statcon panel	1200
X95	IOS Panel	300
79-180	Foundation Materials for ESP	24000
7X X26	Coll Rapp mechanism	8500
7X X28	Roof Beams	204000
X67	Mineral wool	415000
X68	Fixing Components for insulation	358000
X96	Tools & Tackles	200
X98	Commisioning Spares	450
57490	Gate-ID Fan to Chimney	58200
57480	Gate-ID Fan inlet	103000
57460	Gate-ESP inlet	43500
39102	FOUNDATION MATERIALS	22500
39101	COLUMNS FRAMES BEFOR	157000
39102	COLUMNS FRAMES BEFOR	313500
39141	COLS FRAMES NEAR ID	156000
39142	COLS FRAMES NEAR ID	313500
39150	COL FRAMES BETN I.D.	73000
48462	SQDUCT BLROUTFL-EP	326000
48465	SUPPORT BLR OUTFL-EP	5000
48468	SQ DUCT,BOF-EP,RIGHT	110000
48482	SQ.DUCT-EP/MP-IDFAN	340000

48485	SUPPORT EP/MP-IDFAN	40000
48492	SQ.DUCT IDFAN-CHIMNY	350000
48494	EXPNPCS IDFAN-CHIMNY	200000
48495	SUPPORT IDFAN-CHIMNEY	70000
	TOTAL	11,981,200

NOTE :

1. Besides product groups indicated herein, there is likelihood of addition of new product groups by BHEL's unit for release of some items, integral to this work. Tenderers' quoted unit rates shall be applicable for such product groups also.
2. BHEL's decision with regard to classification of a particular product group is binding on the contractor.

ANNEXURE – III

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

Sl. No.	Description	Quantity	Remarks
1	100 T Crane	02 Nos.	On SHARING basis as per note below . Note - iii
2	HUCK –BOLTING MACHINE	03 No	On SHARING basis

Note :

- i. 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.
- ii. The **operation** of all BHEL's cranes (**for 100 MT and below cranes**) being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange, at his own cost, trained operators and fuel and other minor consumables (i. e. cotton cloth / cotton waste etc.) for their operation. **Further, Helpers and 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 well in advance
- iii. These cranes will be provided on sharing basis on specific the instruction of the Engineer as per the work requirement . It is solely at the discretion of Construction Manager/ BHEL at different stages of the contract execution to facilitate sharing / resource augmentation or to meet any exigency of work may allow use of 100 T / 200 T crane on sharing basis.
- iv. 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.
- v. Other terms and conditions regarding above items shall be as per Clause for T&P/IMTE's.

ANNEXURE – IV**★ 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.	Description	Capacity	Quantity PER ESP
1	Oil Filtering Machine	500 LPM	1 no.
2	Hydra Crane	14 T / 12 T	2 no.
3	Crawler Crane	75 T	1 no.
4	Hand Operated Megger 500 / 1000 V	As per requirement	As per requirement
5	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy.	As per requirement	As per requirement
6	Digital and Analogue Millimeters	As per requirement	As per requirement
7	U Tube Manometer 0-2000 mm Water Column	As per requirement	As per requirement
8	Inclined Manometer 0-50 mm Water Column	As per requirement	As per requirement
9	Digital Clamp Meter - 226	2000 Amp – 1000 Volt	1 no.

NOTE:

1. Above are major Tools & Plants and MMDs to be deployed by the contractor for each unit
2. 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 welding machines, ovens, jacks, cutting M/cs, grinding M/cs, hand tools, crimping tools, D shackles, slings, rails, sleepers (minimum 1000 nos), hydraulic / mechanical jacks and main switches for tapping construction power etc. which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate / price.
3. Other terms and conditions regarding above items shall be as per applicable clause of contract for Tools & Plants / IMTE.

B: MEASURING AND MONITORING DEVICES (MMD):

As per requirement to be finalized at site.

ANNEXURE – V

TERMINAL POINTS & EXCLUSIONS

TERMINAL POINTS.

- 1) BOILER outlet flanges to CHIMNEY (matching flanges included in contractor's scope)

EXCLUSIONS:

The following are excluded from the subcontractor's scope:-

ESP column foundation, equipment foundation, paving and ash trenches below ESP excepting chipping & leveling/dressing , ID Fans with drives,etc.

Note:

The aforesaid exclusions should not be construed as exhaustive. They are meant for general guideline. BHEL reserves the right to include or exclude any item which is required for completing the job as per rates indicated in rate schedule. Contractor should carry out all such jobs as per the instructions of BHEL engineer.

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.....

ANNEXURE-VIII**GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)**

Against this NIT for the subject work, BHEL may resort to "REVERSE AUCTION PROCESS" i.e., **ON LINE BIDDING ON INTERNET**. The General Terms and Conditions of the RA shall be as follows;

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
3. BHEL will inform to the vendor in writing, in case of reverse auction along with the details of Service Provider to enable them to contact & get trained.
4. '**Business rules**' like event date, time, Start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to Participate in the event.
6. BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL".
7. Reverse auction will be conducted on scheduled date & time.
8. At the end of Reverse Auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to Fax the duly signed Filled-in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.
10. During Reverse Auction, if no bid is received within the specified time, BHEL at its discretion, may decide to revise opening price/scrap the reverse auction process/proceed with conventional mode of tendering.
11. **Sealed bid Reverse Auction:** The opening bid (In the initial auction) of the bidders shall be same as that quoted in their Final Sealed price submitted to BHEL. **The bidders shall confirm in writing to BHEL that their opening bid (In both cases) shall be same as that quoted in their final sealed price bids submitted to BHEL against this NIT along with Technical Bid (Part-I).**
12. BHEL reserves the right to cancel Reverse Auction (RA) without assigning any reasons and resort to considering the sealed bids submitted by vendor for processing and finalizing the tender.
13. Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.
14. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.
15. Bids-given by the bidders during the Reverse Auction process will be taken as an offer to execute the work. Bids once made by the bidder, can not be cancelled/withdrawn and bidders shall be bound to execute the work as mentioned above at the final bid price. Should be bidder (Lowest) back out and not execute the contract as per the rates quoted, BHEL shall take action as appropriate.

ANNEXUR-IX**RATE SCHEDULE****I. Rates For Erection Testing & Commissioning Of ESP & Associated Ducting etc for Unit –1,2 & 3 at IGSTPP , Jhajjar ,**

SI. 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 ESP and associated Ducting of Unit 1-3 at 3x500 MW Boiler, Rotating Machines, auxiliaries and insulation etc as per tender specifications. (Approx. tonnage involved is 35,940 MT as per Annexure- I)	/	/

NOTES:

1. The quantities indicated above is tentative and is 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.
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.

(Seal and Signature of Tenderer)