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NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

Ref: BHEL/ NR/SCT/OBRA /ESP U-13/R&M /1098
Date: 20/05/2018

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NOTICE INVITING E-TENDER (NIT)
BIDDER TO SUBMIT OFFERS ON PORTAL
https://bhel.abcprocure.com

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To

Dear Sir/Madam

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1. **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	**BHEL/ NR/SCT/OBRA /ESP U-13/R&M /1098**	
ii	Broad Scope of job	**"RENOVATION AND RETROFITTING OF ESP FOR UNIT NO. 13 OF 200 MW AT OBRA TPS ,UPRVUNL ,UP"**	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	**From BHEL website (www.bhel.com) and** ***https://bhel.abcprocure.com*** Tender documents will be available at website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 31/05/2018 , Time :15:00 HRS*** ***Place : on https://bhel.abcprocure.com***	*Applicable*
vi	**OPENING OF TENDER**	***At due date / time*** ***Date : 31/05/2018 , Time :15:00 HRS*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the*	*Applicable*

		opening of tender. ***However it being an e-tender it shall be opened online***	
vii	**EMD AMOUNT**	*Rs 8,20,000/-*	*Applicable for all including MSE bidders*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable for all including MSE bidders*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	***Five days before bid submission due date.*** *Along with soft version also, addressing to contact address given below* *1) Name: R Chandra* *Designation:Dy. Mngr* *Deptt: SCT* *Address: 104,BHEL PSNR* *Phone: 0120-2416440* *Email :rmchandra@bhel.in* *Fax: 0120-2416528* *2) Name: Susmita Basu* *Designation:Sr. DGM* *Deptt: SCT* *Address: 104,BHEL PSNR* *Phone: 0120-2416262* *Email :susmitabasu@bhel.in* *Fax: 0120-2416528*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		*Not applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) & portal https://bhel.abcprocure.com **and not in the newspapers**. Bidders to keep themselves updated with all such information	
xiii	**Tender submission**	on portal https://bhel.abcprocure.com	

2. The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3. Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays.

As this tender is an E-Tender and no paper bids will be accepted therefore the scanned copy of the Demand Draft or the Cash Receipt issued by BHEL PSNR should be uploaded in the E procurement portal. Hard Copy of the demand draft should reach BHEL PSNR HQ Noida before the due date and time of bid submission. BHEL shall not be responsible for postal or any other delays in this regard.

4. Unless specifically stated otherwise, bidder shall deposit EMD through Cash Deposit (as permissible under the extant Income Tax Act) (before tender opening), Electronic Fund Transfer credited in BHEL account (before Tender Opening) or Banker's Cheque/ Demand Draft/ Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Noida (along with offer).

'One Time EMD' will not be considered for this tender. All the bidders who have 'One Time EMD' with BHEL and want to participate in this tender, would also submit the requisite amount of EMD as mentioned in Clause No. 1, Salient Features of NIT, Sl. No. (vii) above.
However, the One Time EMD can be adjusted against the EMD applicable against this tender on specific request of bidder.

For Electronic Fund Transfer the details are as below-:

a) **Name of the Beneficiary** -: Bharat Heavy Electricals Limited

b) Bank Particulars

i).	Bank Name -:	STATE BANK OF INDIA
ii).	Bank Telephone No.(with STD code)-:	011-23352180
iii).	Branch Address-:	CAG BRANCH, NEW DELHI
iv).	Bank Fax No. (with STD code) -:	011-23353101
v).	Branch Code -:	SBIN0009996
vi).	9 Digit MICR Code of the Bank Branch -:	110002201
vii).	Bank Account Number -:	10813608647
viii).	Bank Account Type -:	CASH CREDIT
ix).	11 Digit IFSC Code of Beneficiary Branch-:	SBIN0009996

(Note-: In case of E-Tenders, no paper bids shall be accepted, therefore, the scanned copy of the Banker's Cheque/ Demand Draft/ Pay Order/ Details of payment made through Electronic Fund Transfer should be uploaded in the E-Procurement Portal and hard copy of the same should reach BHEL-PSNR HQ Noida before the due date and time of bid submission. BHEL shall not be responsible for postal or any other delays in this regard.)

For other details please refer General Conditions of Contract.

5. **Procedure for Submission of Tenders**: This is an E-tender floated online through our E-Procurement Site ***https://bhel.abcprocure.com***. The bidder should respond by submitting their offer online only in our e-Procurement platform at ***https://bhel.abcprocure.com*** . Offers are invited in two-parts only.

Documents Comprising the e-Tender

The tender shall be submitted online ONLY EXCEPT TENDER FEE & EMD (in physical form) as mentioned below:

a. Technical Tender (UN priced Tender)

All Technical details (eg. Eligibility Criteria requested (as mentioned below)) should be attached in e-tendering module, failing which the tender stands invalid & may be REJECTED. Bidders shall furnish the following information along with technical tender (preferably in pdf format):

- **i.** Tender Cost and Earnest money Deposit (EMD) furnished in accordance with NIT Clause 3.0 & 4.0. Alternatively, documentary evidence for claiming exemption as per clause 28 of NIT
- **ii.** Technical Bid (without indicating any prices).

b. Price Bid:

i. Prices are to be quoted in the attached Price Bid format online on e-tender portal.
ii. The price should be quoted for the accounting unit indicated in the e-tender document.
iii. Note: It is the responsibility of tenderer to go through the Tender document to ensure furnishing all required documents in addition to above, if any. Any deviation would result in REJECTION of tender and would not be considered at a later stage at any cost by BHEL.
iv. A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrantee that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.
v. A tender, which does not fulfil any of the above requirements and/or gives evasive information/reply against any such requirement, shall be liable to be ignored and rejected.
vi. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, same shall not be considered.

DO NOT"S

Bidders are requested NOT to submit the hard copy of the Bid. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, the same shall not be considered. **Also, uploading of the price bid in prequalification bid or technical bid may RESULT IN REJECTION of the tender**.

Digital Signing of e-Tender

Tenders shall be uploaded with all relevant PDF/zip format. The relevant tender documents should be uploaded by an authorized person having Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION digital signature certificate (DSC).

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The Requirement:

1. A PC with Internet connectivity &
2. DSC (Digital Signature Certificate)(**Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION**)

BHEL has finalized the e-procurement service Provider-:

M/s AbcProcure, Ahmedabad

A-202/208, Wall Street-II, Opp. Orient Club, Nr. Gujarat College,

Ellis Bridge, Ahmedabad-380006

The contact details of the service provider are given below:

Name	Contact Nos.	e-mail ID	Role	Location
Swapnil Hamilton	+91 79 40270549	swapnil.h@eptl.in	Support Executive	HO – Ahmedabad
Hardik Oza	+91 79 40270560	Hardik.oza@eptl.in	Support Executive	HO – Ahmedabad
Ankur Bhatt	+91 79 40270590	ankur.bhatt@eptl.in	Support Executive	HO – Ahmedabad
Prashant Rajyaguru	+91 79 40270545 / 9016859416	prashant@eptl.in	Ast. Manager – Implementation & Support	HO – Ahmedabad
Dharam Rathod	+91 79 40270596 / 9374519754	dharam@eptl.in	Manager – Implementation & Support	HO – Ahmedabad
Pradip Parmar	+91 79 40270532 / 9328657215	pradip@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad
Devang Patel	+91 79 40270576 / 99983 05442	devang@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad

The process of utilizing e-procurement necessitates usage of **DSC (Digital Signature Certificate)(Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)** and you are requested to procure the same immediately, if not presently available with you. Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

1. The contact details of the DSC Certifying Authority as given below

1	**GNFC**	www.ncodesolutions.com
2	**e-Mudhra**	http://www.e-Mudhra.com
3	**Safescrypt**	www.safescrypt.com

Vendors are also requested to go through seller manual available on on https://bhel.abcprocure.com

6. **Not Used**

7. Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8. BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9. **Assessment of Capacity of Bidders:**

Bidder's capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -

(**Note:** For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

Where 'P' is the sum of all unit wise identified packages (refer table-1) under execution with BHEL Regions as on the cut off month defined above, including packages yet to be commenced, excepting packages which are on Long Hold.

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:

(**Note**: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table -1))

i). Calculation of Overall 'Performance Rating' for 'Similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) P_1, P_2, P_3, P_4, P_5 , …. P_N etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \ldots P_N$)

b) Number of Months 'T_1' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1. Similarly T_2 for package P_2,T_3 for package P_3, etc. for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + \ldots T_N$)

c) Sum 'S_1 'of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$…. $S_{1\text{-}T1}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e. $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}T1}$). Similarly, S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3 etc. for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. 'S_T '$= S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating 'R_{BHEL}' for the Similar Package/Packages** (under execution/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions}}$$

$$= \frac{S_T}{T_T}$$

e) Bidders to note that the risk of non-evaluation or non-availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder.

f) Table showing methodology for calculating 'a', 'b' and 'c' above

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No. of similar packages for all Regions = $\mathbf{P_T}$ i.e. Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	--------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

ii). Calculation of Overall 'Performance Rating' ($\mathbf{R_{BHEL}}$) in case at least 6 evaluation scores for 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. 'R_{BHEL}' shall be calculated subject to availability of 'performance scores' for at least 6 'package months' in the order of precedence below:

a) 'Period of Assessment' i.e. 6 months preceding and including the cut-off month
b) 12 months preceding and including the cut-off month
c) 24 months preceding and including the cut-off month
d) 36 months preceding and including the cut-off month

In case, R_{BHEL} cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'.

iii). Factor "L" assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions:

Sl. no.	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25
5	> 75 and < 80	0.2
6	≥ 80	NA

III. 'Assessment of Capacity of Bidder':

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages P_{Max}= (R_{BHEL} - 60) divided by corresponding value of 'L', i.e. (R_{BHEL}- 60)/L

Note:

i). In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number
ii). For R_{BHEL} = 60, P_{Max} = '1'
iii). For R_{BHEL} ≥ 80, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(Where P is calculated as per clause 'I' above)

IV. **Explanatory note**:

i). Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I etc. at the individual level irrespective of rating of Plant and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, C&I, Civil, Structure etc. is considered individual level of package. For example, in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e. the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl.no. II above, needs to be evaluated considering all the identified packages (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

Table-1

Civil	Electrical and C&I	Mechanical
i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). C&I iii). Others (Elect. and C&I)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). ESP iv). LP Piping v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material Management x). Others (Mechanical)

iii). Bidders who have not been evaluated for at least six package months in the last 36 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions.

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI/LOA from BHEL.

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendors has been tagged as First Timer or availability of 6 evaluation scores within last 36 months preceding and including the cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Assessment of Capacity of Bidders'.

iv). In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders' OR due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating** 'R_{BHEL}' only, starting from the upper band.

v). 'Under execution' shall mean works in progress as per the following:

a. Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages

b. Up to Steam Blowing in case of Boiler/ESP/Piping Packages

c. Up to Synchronization in all Balance Packages

Note: BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (a), (b) and (c) above, depending upon the balance scope of work to be completed.

vi). Contractor shall provide the latest contact details i.e. mail-ID and Correspondence Address to SCT Department, so that same can be entered in the Contractor Performance Evaluation System, and in case of any change/discrepancy same shall be informed immediately. Login Details for viewing scores in Contractor Performance Evaluation System shall be provided to the Contractor by SCT Department.

vii). Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site/ GM Project latest by 25th of Evaluation Month or 3 days after approval of score, whichever is later. However, acceptance/rejection of 'Review Request' solely depends on the discretion of GM Site/GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.

viii). Project on Hold due to reasons not attributable to bidder -

a. **Short hold:** Evaluation shall not be applicable for this period, however Loading will be considered.

b. **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation as well as Loading shall not be considered for this period.

ix). Performance evaluation in CL 9 above is applicable to prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work.

10. Since the job shall be executed at site**,** bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

11. For any clarification on the tender document, the bidder may seek the same over e-procurement portal as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12. BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13. In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14. Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

15. Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at Clause No. 1, Salient Features of NIT, Sl. No. (xi) above.**

15a. **Integrity Pact (IP)**

i) IP is a tool to ensure that activities and transactions between the Company and its Bidders / Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification. Details of IEM for this tender is given at point 1 (xi) above.

ii) Please refer Section-8 of the IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender.

No routine correspondence shall be addressed to the IEM (phone / post / email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification / issues shall be addressed directly to the tender issuing (procurement) department.

For all clarifications/issues related to the tender, contact details are as per **Clause No. 1, Salient Features of NIT, Sl. No. (ix) above.**

16. The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

17. In case BHEL decides on a `Public Opening', the date & time of opening of the PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.

18. Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise

19. (a) BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

(b) Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

(c) The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. **The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.**

(d) If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again

defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).

(e) If reverse auction process is unsuccessful, sealed envelope price bids of all the techno-commercially qualified bidders shall be opened and the tender shall be processed accordingly. However, the envelope sealed bid(s) of techno-commercially acceptable bidder(s) who had agreed to participate in the RA and had failed to submit the online sealed bid shall not be opened.

20. On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

21. In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

22. The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

23. **Consortium Bidding** –Not Applicable

24. The bidder shall upload documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

25. The bidder may have to produce original document for verification if so decided by BHEL.

26. It may please be noted that guidelines/rules in respect of Suspension of Business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', milestone/ completion certificate, etc may undergo change from time to time and the latest one shall be followed. The abridge version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' is available on www.bhel.com on "**supplier registration page**".

27 The offers of the bidders who are on the banned/ hold list as also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com

27.1 Integrity commitment, performance of the contract and punitive action thereof:

27.1.1 **Commitment by BHEL:**
BHEL commits to take all measures necessary to prevent corruption in connection with the tender Process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

27.1.2 **Commitment by Bidder/ Supplier/ Contractor:**

(i) The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

(ii) The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

(iii) The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the prices or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extent guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

28.0 Not Applicable.

29.0 The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

30.0 Order of Precedence

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B
f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure:-

(i) Annexure-1: Pre Qualifying criteria.
(ii) Annexure-2: Check List.
(iii) Annexure-3: Authorization of representative who will participate in the online Reverse Auction Process
(iv) Annexure-4: Feedback form
(v) Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	**RENOVATION AND RETROFITTING OF ESP FOR UNIT NO. 13 OF 200 MW AT OBRA TPS ,UPRVUNL ,UP"**
TENDER NO	**BHEL/ NR/SCT/OBRA /ESP U-13/R&M /1098**

Sr. No.	Name and Description of qualifying criteria	Bidders claim in respect of fulfilling the PQR Criteria
A	**Submission of Integrity Pact duly signed.**	Not Applicable
B	**Assessment of Capacity of Bidder to execute the work as as per clause 9.0 of NIT**	Applicable
C	**TECHNICAL CRITERIA**	Applicable
C-1 C-2 C-3	Bidder who wish to participate should have 'Executed' works for any one of the following during last 7 years, ending on the "latest date of Bid Submission" of tender -: One Boiler (consisting of Structure and Pressure part of the same unit as standalone bidder)/ ESP of one unit of ≥ 100MW. Or One STG of ≥ 190MW, under direct order of BHEL. Or R&M/Retrofitting of one ESP of 100 MW or higher involving erection of minimum 800 Tonnes in single unit.	
D	**FINANCIAL CRITERIA**	Applicable
D-1	**TURNOVER** Tenderers should have an average annual turnover minimum of INR 123 Lakh of last three Financial Years (2014-2015, 2015-2016, 2016-2017). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this. In case audited Financial statements have not been submitted for all the three years as indicated above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant.	
D-2	**NETWORTH** Net Worth (Only in case of companies) of the bidder should be positive. Note-: Net worth shall be calculated based on the latest Audited Accounts as furnished for 'D-1' above. Net worth = Paid up share capital* + Reserves	

	(* : Share Capital OR Partnership Capital OR Proprietor Capital as the case may be)	
D-3	**PROFIT** Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'D-1' above. Note-: PROFIT shall be PBT earned during any one year of last three financial years as in 'D-1' above	
E	**APPROVAL OF CUSTOMER**	Applicable
F	**CONSORTIUM CRITERIA**	Not Applicable

Explanatory Notes for QR

1. For evaluation of PQR, the credentials of the bidder alone, and not that of the Group Company shall be considered.
2. For criteria 'C' , 'Executed' means the bidder should have achieved "BOILER LIGHT UP" in respect of Boiler/ESP and "SYNCHRONISATION" in respect of STG, even if the contract has not been completed or closed.
3. Boiler means HRSG or WHRB or any other types of Steam generator
4. In case audited financial statements have not been submitted for all the three years as indicated at D-1) above, then the applicable audited statements submitted by the bidders against the requisite 3 years, will be averaged by three.

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount:	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY(BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/~~Not Applicable~~	YES/NO
8	Copy of PAN Card	Applicable/~~Not Applicable~~	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable/~~Not Applicable~~	YES/NO
10	Integrity Pact	~~Applicable/~~Not Applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable/~~Not Applicable~~	YES/NO
12	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
14	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO
15	Non Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable/~~ Not Applicable	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3

Authorization of representative who will participate in the on line Reverse Auction Process;

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE – 4

Feedback Form: From where did you get information reg. this tender

1	NEWSPAPER ADVERTISEMENT (NAME)	
2	BHEL WEBISTE (TENDER NOTIFICATION)	
3	CENTRAL PUBLIC PROCUREMENT PORTAL OF GOVERNMENT OF INDIA (CPP PORTAL)	
4	EMAIL COMMUNICATION FROM BHEL	
5	ANY OTHER SOURCE	

Rev 01
1st June 2012

TECHNICAL CONDITION OF CONTRACT (TCC - I)

(Document No. PS: MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITION OF CONTRACT (TCC) VOL I

TENDER NO. BHEL/ NR/SCT/OBRA /ESP U-13/R&M /1098.

FOR
WORK OF DISMANTLINGOF DUCTS, DAMPERS, STRUCTURE AND ERECTION OF ESP, DUCTS, DAMPERS/GATES, STRUCTURES AND THEIR TESTING, COMMISSIONING, HANDING OVER OF UNIT NO. 13 (200 MW, OBRA TPS, UPRVUNL, U.P.)

PART-I OF TCC

Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)
Power Sector –Northern Region,
Plot No. 25, Sector-16 A,
Distt.GautamBudh Nagar, Noida-201301

Sl. No.	DESCRITION	Chapter No.	Pages
	Part-I : Contract Specific Details		
1.	PROJECT INFORMATION	Chapter-I	4
2.	PREAMBLE	Chapter-II	5
3.	BROAD SCOPE OF WORK	Chapter-III	6-14
4.	ERECTION OF ELECTROSTATIC PRECIPITATOR	Chapter-IV	15-17
5.	PRE–COMMISSIONING TESTS AND COMMISSIONING	Chapter-V	18-19
6.	BROAD SCOPE OF ELECTRICAL , C&I WORKS & MATERIAL HANDLING	Chapter-VI	20-21
7.	BRIEF DESCRIPTION OF ELECTRICAL AND C&I WORKS	Chapter-VII	22-29
8.	GENERALGUIDELINESFOR ERECTION AND STORAGE	Chapter-VIII	30-32
9.	FACILITY TO BE PROVIDED BY BHEL/CONTRACTOR	Chapter-IX	33
10.	TIME SCHEDULE	Chapter-X	34-35
11.	TERMS OF PAYMENT	Chapter- XI	36-37
12.	TAXES AND OTHER DUTIES	Chapter-XII	38-39
13.	DETAILS OF QUANTITIES	Chapter- XIII	40
14.	TENTATIVE WEIGHT SCHEDULE	Chapter-XIV	41-42
15.	LIST OF T&Ps & IMTEs BEING PROVIDED BY BHEL	Chapter- XV	43
16.	MAJOR T&P AND IMTE'S TO BE PROVIDED BY CONTRACTOR	Chapter-XVI	44-45
17.	TERMINAL POINTS & EXCLUSIONS	Chapter-XVII	46
18.	RATE SCHEDULE	Chapter-XVIII	47

TECHNICAL CONDITIONS OF CONTRACT (TCC - I)		
CHAPTER-I: PROJECT INFORMATION		
1.0	**Project information**	
Sl. No.	**Title**	**Description**
1.1	NAME OF THE OWNER	UTTAR PRADESH RAJYA VIDYUT UTPADAN NIGAM LTD (UPRVUNL)
1.2	ADDRESS	OBRA THERMAL POWER STATION P.O. OBRA DIST. -SONEBHADRA – 231219 UTTAR PRADESH
1.3	EXISTING	5x200 MW
1.4	NEAREST RAILWAY STATION	CHOPAN – 15KM APPROX MIRZAPUR – 120KM APPROX VARANASI / MUGAL SARAI – 125KM APPROX.
1.5	NEAREST ROAD	CHOPAN - VARANASI
1.6	NEAREST CITY	ROBERSTGANJ / SONEBHADRA
1.7	NEAREST AIRPORT	VARANASI (150 KM)
1.8	HIGHEST TEMPERATURE	48 deg C
1.9	LOWEST TEMPERATURE	2 deg C
1.10	ELEVATION	170meters

2.0	**PREAMBLE**
	UPRVUNL OBRA thermal power project located in Sonebhadra district in Uttar Pradesh consists of 5x200 MW and commissioned by BHEL. Originally the units were provided with ESPs of size 2xFAA-(36)4x36-9590-2. Due to deterioration in the coal quality & change in the operating condition of the boiler, the present level of emission is more than the specified norms by Pollution Control Board. Therefore now, UPRVUNL intends to take up renovation/modernization/replacement of existing ESPs to meet the latest environmental norms of UP state, to reduce the emission level less than 100 mg/Nm3. In the renovation and modernization work new ESP will be installed. There will be two ESP passes per boiler of size FAA-6X37.5MX108150-2 (400 mm pitch) having six fields in the direction of gas flow and two bus section perpendicular to gas flow direction in each pass . Accordingly the scope of work under this tender generally consists of: DISMANTLING(CERTAIN AREAS), HANDLING/ TRANSPORTATION OF EQUIPMENTS / MATERIALS FROM STORAGE YARD FOR INSTALLATION, PRE-ASSEMBLY, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTROSTATIC PRECIPITATORS, DUCTS FROM BOILER OUTLET FLANGE TO CHIMNEY, STRUCTURES, INSULATION, PAINTING ETC. FOR 200MW UNIT # 1**3 (**ONE UNIT**).** **Unit#13 is in shut down condition. Dismantling of ESP & construction of new ESP foundations & control room is in UPRVUNL scope.** **Contractor has to mobilize his resources within 15 days from the date of issue of letter of intentto start following below mentioned works at site:**
2.1	1. Transporting of material from BHEL storage and stacking nearby site. 2. Painting,checking of alignment, rectification/repair,fabrication and assembly of materials to the extent possible. 3. Dismantling & erection of duct,dampers& its supporting structures. 4. Erection, Testing & Commissioning of ESP (After completion and handingover of ESP foundations & control room by UPRVUNL) **No compensation except for PVC & ORC as applicable in the GCC on account of early/delay handingover of foundations & control room shall be claimed by contractor for entire period of contract.Agency has to deploy manpower, consumables & T&Ps as per avaiability of front. Total completion period shall be 16 month from the date of start of work.** Due to confined space, there may be most of the areas being non-approachable by crane. Agency has to use improvised methods for dismantling and assembly /erection of various equipment, components etc. to complete the work. These methods may include tying of ropes through existing structures /equipment such as chimney, conveyor structure and other available structures etc. At some locations, such structures are not available and crane also cannot approach. In such cases, derrick arrangement to be made for dismantling and erection. Bidders are strongly advised to visit the site to assess the possibility of using alternate arrangements apart from crane. No separate payment shall be made for any such arrangements used during the execution of the contract. All safety precautions have to be taken for such alternate arrangements and no damage should be caused to the existing equipment, structure, customer property etc.

3.0 BROAD SCOPE OF WORK

3.1 Service Portion (ESP)

BHEL has been awarded Renovation &Modernization (R&M) work of 5x200 MW Sets at Obra Thermal Power Station OBRA, Distt. Sonebhadra by UPRVUN Limited. The R&M work covers of boiler, Electro-static precipitator, fans, milling systems, steam turbines, generators, boilers feed pumps, piping along with the associated auxiliaries, Pumps and Accessories, Electrical System Equipment, Cables and Cable support System, Control and Instrumentation System Equipment. These materials will be supplied from our manufacturing units located all over the country as well as our vendors located both in the country and abroad.

The project has 5x 200 MW, 3x100MW and 5x50 MW thermal sets installed.

The scope of work under this tender generally consists of:

DISMANTLING (CERTAIN AREAS), HANDLING/ TRANSPORTATION OF EQUIPMENTS / MATERIALS FROM STORAGE YARD FOR INSTALLATION, PRE-ASSEMBLY, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTROSTATIC PRECIPITATORS, DUCTS FROM BOILER OUTLET FLANGE TO CHIMNEY, STRUCTURES, INSULATION, PAINTING ETC. FOR 200MW UNIT # 13(ONE **UNIT).**

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, painting,safe keeping, watch and wardat site.
- Checking, dressing, chipping and leveling of foundations.
- Pre-assembly, erection, alignment of various equipment machining and grouting.
- Welding wherever required
- Gas/Air tightness test, clean air flow test and other pre commissioning tests and commissioning.
- Dismantling & re-erection wherever required/indicated.
- Disposal of Dismantled materials as per instruction of BHEL.
- Installation, testing, other pre commissioning tests and commissioning of all items and assistance during PG test of the unit.
- Insulation and finish painting including supply of paints etc.,
- Unit trial operation, resolving any deficiencies observed and handing over.
- Disposal of scrap/garbage/ insulation/ refractory & area cleaning.

The work to be carried out under the scope of this specification covers work of dismantling (Certain areas), handling/ transportation at site, temporary storage prior to erection, cleaning, preservative painting, erection, re-erection, alignment, welding, leveling, adjustment, chipping & leveling of foundation, welding of hooks, plates, insulation of all mechanical equipment, works of all electrical, 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 UPRVUNL OBRA TPS Unit- 1**3** up to handing over of the unit to BHEL/their customer including PG test of the unit. The work shall confirm 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

Items dismantled have to be removed, transported and deposited in specified areas within the plant boundary as per instruction of BHEL Engineer.

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, Structures, Insulation, Painting etc of Unit-1**3**at UPRVUNL Obra (One UNIT).

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

	limited to the following:
3.2	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 adjustments of foundation level, dressing & chipping of foundation surfaces for achieving the required elevation of the base of columns, enlarging the pocket of foundation etc., as may be required for the erection of equipment/ plants shall be carried by the contractor within quoted price. 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 own cost. A necessary arrangement along with watering till complete curing has to be arranged by the vendor.
3.3	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 Chapter XV will be provided by BHEL free of cost on time-sharing basis. Fuel and consumables as required for the operation of BHEL/UPRVUNL provided cranes shall be provided by Contractor**. Operators for BHEL cranes like 135T shall be arranged by contractor at his cost from BHEL Approved vendor.**
3.4	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.
3.5	All hardware such as rails, sleepers, and maxpuller etc., required for dragging or for any other connected works shall be arranged by the contractor at his own cost.
3.6	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.
3.7	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.
3.8	All the Riggers, Sarangs, etc engaged for the work should have adequate experience, which should be supported by documentary evidence, if called for.
3.9	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. 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.
3.10	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.

3.11	The contractor shall fabricate and install as part of the work, all platforms ladders, and approaches wherever required in boiler, boiler auxiliaries etc in addition to ESP for facility of operation of equipment/instrument wherever required as per BHEL requirement but not specifically shown in the drawings/bill of materials. However raw materials for the same shall be arranged by the contractor from old dismantled ESP & duct supporting structure without any extra cost as per direction of BHEL. Erection work of approach platform & staircase for opacity monitor of unit#13 shall be carried out.
3.12	Instrument tapping points, etc., both for regular measurement and performance testing to be providedon to ESP, covered within the scope of this tender, will also be the responsibility of the contractorand 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.
3.13	Modification Works: A) Modification of duct supporting structures of ducting between boiler and EP inlet, EP Outlet to ID Fan inlet, and ID fan outlet to chimney, to maintain elevation of duct. Additional columns, if required, would be erected by contractor. Materials, required would be arranged by BHEL. B) Internal bracing, provided in duct piece which is erected just after ID fan diffuser casing, fouls with the door of diffuser casing of ID fan. Suitable modification of duct bracing pipes is to be carried out. Cutting and welding works would be carried out by contractor per the instructions of BHEL Engineer(s). C) Some of holes, provided in Shock Bar Angles of collecting electrodes, have wrongly been drilled. New holes will have to be drilled in shock bar angles at correct locations, intimated by BHEL Engineers. Contractor will be required to carry out his modification work by making necessary arrangements, providing necessary drill machines and experience operator. Maximum quantity of shock bar angles required to be rectified would be 660 nos.
3.14	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 arranged by the contractor from old dismantled ESP & duct supporting structure without any extra cost as per direction of BHEL.
3.15	Approach platforms for gates/opacity monitor & other areas for carrying out regular commissioning / O&M activities are to done by the contractor in ESP 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 the contractor from old dismantled ESP & duct supporting structure. 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.
3.16	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.
3.17	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.
3.18	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 recognized 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.
3.19	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. It is the responsibility of the contractor to collect usable materials like channels, beams, angles, plates, staircase, floor grills etc from dismantled old ESP & duct supporting structure & should stacked

	separately as per direction of BHEL engineer without any extra cost. The material should be used in making platform, approaches, temporary arrangement wherever is required.
3.20	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.
3.21	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.
3.22	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 includes 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.
3.23	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.
3.24	Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price
3.25	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.
3.26	Layer of insulation mattress on roof top of ESP (inner roof) shall be applied before outer roof is placed.
3.27	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.
3.28	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.
3.29	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 contractor within his quoted rate and for carrying out the same, **contractor must deploy one 500 LPH oil filtration unit at his own cost.**
3.30	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.
3.31	For all plate welding, seal welding from inside and stitch welding from other side as per instruction/Drg.
3.32	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. Consumables like stitch rivet, self tapping screw and its gun, bitumen washers, putty etc. need to be arranged by the vendor within his quoted price.
3.33	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.
3.34	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.
3.35	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.
3.36	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.
3.37	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.
3.38	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.
3.39	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.
3.40	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.
3.41	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.
3.42	The details of equipments to be erected under this contract are generally as per the schedule given in Chapter XIII & XIV. These details are approximate and meant only to give a general idea 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.
3.43	Actuators / drives of gates etc. have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
3.44	Suspensions of ESP are to be tightened by Calibrated torque wrench.
3.45	During the course of erection, testing and commissioning certain rework/ modification/ rectification/ repair/ fabrication etc., will be necessary on account of feedback 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.
3.46	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.
3.47	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.
3.48	The contractor will make his own arrangement for his communication needs at his site office or residential area/labour colony.
3.49	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 authorized /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.
3.50	The contractor shall submit a list of various tools, plants, material handling equipment etc. being provided by them, to the Construction Manager, BHEL 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 Site.
3.51	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.

3.52	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.
3.53	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.
3.54	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.
3.55	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.
3.56	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.
3.57	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.
3.58	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.
3.59	If the materials/equipments belonging to the contractor are stored in areas other then 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.
3.60	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.
3.61	All the contractor's employees shall carry identification cards/gate passes while working at site.
3.62	The contractor, during execution of the work under scope, shall take utmost care in preserving the identification marks/tags as available on the materials.
3.63	The PG wise break up is tentative as indicated under Chapter XIV. 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 Chapter XVII. Painting and insulation shall be covered in the scope of this contract. Approx. weight to be erected for the ESP, DUCTING, STRUCTUTRES ETC. is as indicated in Chapter XIV. 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 equipments 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.
3.64	**In order to give phillip to Pradhan Mantri Kaushal Vlkas Yojna:** The contractor shall, at all stages of work deploy skilled/semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/ Industrial Training Institute/ National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/ semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part

	of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs. 100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding.
3.65	**MAN POWER FOR EXCLUSIVE USE OF BHEL** The contractor under this contract shall also deploy the following manpower exclusively for use of BHEL. ➢ **Qualified computer operators for office work. (16 man months)** ➢ **Skilled workers for working in site, store, office and colony. (32 man months)** ➢ **Unskilled workers for working in store, office and colony. (32 man months)** Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed. In case contractor fails to provide the above mentioned services, BHEL shall have the right to hire these services from other agencies and @ of Rs 10000/- per man month will be deducted from contractors running bills.
3.66	The customer M/S UPRVUNL 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
3.67	Health, Safety & Environment (HSE): 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. ➢ Nobody 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/ Videographer 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 subcontractors) 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 Housekeeping. 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.

	➢ 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.
3.68	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 ambulance.scanning & 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. ➢ Ambulance The ambulance required will be arranged and maintained at site for entire contract period for subject work by the successful bidder against this tender. This ambulance will be shared by BHEL and its other contractors working at same project at no extra cost to BHEL **Contractor may avail the medical facilities available with the UPRVUNL at the rates applicable including medicines.**
3.69	Contractor shall make necessary arrangements to ensure following: ➢ Contractor shall ensure deployment of qualified Engineer for Welding / NDT services at site as per requirement of work. ➢ Contractor shall ensure deployment of Qualified & Experienced Safety Engineer / Officer at site. ➢ Contractor shall ensure that all the T & Ps deployed by them, including cranes, are regularly ➢ Certified by approved testing agency & the relevant certificates to this effect are to be given to BHEL for records.
3.70	The contractor shall comply with following towards Social Accountability(SA); The contractor shall not employ any employee less than 18 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. The contractor shall not engage Forced/Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976. The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour(Regulation & Abolition) Act,1970. The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Discrimation/Corporal punishment for failure in meeting with relevant requirements. The Contractor shall abide the requirement of Contract Labour(Regulation & Abolition) Act,1970 for working hours. The Contractor shall abide by the statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936. The Contractor shall arrange potable drinking water to its employees & workers. It may be noted that non-compliance to HSE & SA requirements will result in penal action as may be decided by the competent authority of BHEL. The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries. It may be noted that non-compliance to HSE requirements will result in penal action. In case of violations of Safety and SA requirements, the Contractor shall be liable for a penalty of Rs. 1000/- for the first violation and Rs. 5000/- for the subsequent violations. For serious lapses, as decided by BHEL Engineer, fines upto Rs. 10000/- 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.
3.71	**SUBMISSION OF PERIODICAL REPORTS**
3.72	Contractor shall submit periodical reports in respect of following aspects of operation: Consumption of consumables like welding electrodes gases and paints. Consumption of construction power. Availability and utilization of BHEL's tools & plants. Availability and utilization of contractor's tools & plants Daily manpower reports Daily progress reports of activities & incidents Test / Calibration reports Records of wages, EPF payment. BHEL/client may specify any other report/record as required. Record of Protocol/Log sheet
3.73	**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, lab our 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.

CHAPTER-IV: **ERECTION OF ELECTROSTATIC PRECIPITATOR**

4.0	**ERECTION OF ELECTROSTATIC PRECIPITATOR**
4.1	The details of equipments to be erected under this work are generally as per the weight schedule given in chapter XIV. 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.
4.2	Wherever called for, pre-assembly of supporting structures, casing walls have to be done on ground.
4.3	**Materials available may vary as per drawing in duct area, contractor has to modify (cutting, welding etc) and erect as per instruction of BHEL engineer within quoted price. For connection of ESP inlet duct to boiler (APH outlet) duct, boiler side platform/ supporting structure has to be lowered as per instruction of Bhel site engineer within quoted price.**All site welds for casing, inlet & outlet duct connections have to be kerosene tested/DP test for establishing leak proofness.
4.4	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.
4.5	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.
4.6	Bundle of collecting electrodes should be handled only with special fixture supplied for the purpose.
4.7	The contractor shall arrange **Huck-bolting machine** including electrical connections, operation, maintenance etc. Required Jaws, spares and Hydraulic oil of the Machine will also to be arranged by the contractor as required within quoted price. All huck bolts and collars would have to be cleaned, if required.
4.8	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.
4.9	Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP are in the scope of work.
4.10	Installation of interlocks is in the scope of work.
4.11	Complete erection, alignment, testing, pre-commissioning and commissioning etc for drive motors of collecting electrodes and emitting electrode rapping mechanism with all electrical equipment is in the scope of work.
4.12	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, BHEL will supply the material required for platforms/canopies in random lengths & sizes.
4.13	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.
4.14	Following installation, erection and modifications jobs are also to be carried out by the contractor within his quoted price. A) Erection of duct and supporting structures from BOF/ APH O/L flange to EP inlet is covered in cope of this contract. Welding of EP duct to BOF of APH o/l flange is covered in present scope. Though duct supporting structure materials have been supplied and will be issued to contractor, the contractor would be required to carry out modifications in supporting structures to maintain elevation of duct. B) Erection of duct and supporting structures from EP outlet to ID fan is covered in cope of this contract. Though duct supporting structure materials have been supplied and will be issued to contractor, the contractor would be required to carry out modifications in supporting structures to maintain elevation of duct. C) Erection of ducting from ID fan outlet to chimney. Internal bracing, provided in duct piece which is erected just after ID fan diffuser casing, fouls with the door of diffuser casing of ID fan. Suitable modification of duct bracing pipes is to be carried out and this modification work also forms an essential part of the ducting scope. Though duct supporting structure materials have been supplied and will be issued to contractor, the contractor would be required to carry out modifications in supporting structures to maintain elevation of duct. D) Some of holes, provided in Shock Bar Angles of collecting electrodes, have wrongly been drilled. New holes will have to be drilled in shock bar angles at correct locations, intimated by BHEL Engineers. Contractor will be required to carry out his modification work by making necessary arrangements, providing necessary drill machines and experience operator. E) 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. F) 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. G) Rapping system complete with structural supporting frame, drives, and automatic rapping control, etc. H) Ash hoppers complete with panel type heaters, level monitors and indicators, outlet flanges, jointing material, poke holes, access doors and walkways beneath the hoppers. I) Erection of actuators & opacity monitors along with their approach platforms as per BHEL instruction with complete 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. J) Safety devices, safety barriers, etc. K) 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. L) Adjustment/modification if required for proper erection & alignment of LR & TR beams such as rectification of cleats, holes or other such works etc as per direction of BHEL engineer. M) Adjustment/modification of gusset plates if required for proper erection & alignment of bracings (diagonal & horizontal bracing) in casing support columns as per direction of BHEL engineer. N) Adjustment/modification in bracket if required for proper erection & alignment of collecting rapping shaft as per direction of BHEL engineer. O) Strengthening of duct supporting structure as per requirement and as per direction of BHEL engineer. P) Any other modification works, if required, will be carried out by carried out by contractor per the instruction of BHEL Engineer(s). Q) Cleaning, checking & servicing of all the electrical & C&I equipments before erection/installation.
4.15	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.
4.16	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.
4.17	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.
4.18	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.
4.19	Temporary blanking of ESP inlet / outlet for commissioning, if required , has to be done by contractor free of cost.
4.20	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
4.21	Instrument tapping coming on the ESP to be welded/fitted by the contractor within the quoted price.
4.22	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.
4.23	All the collecting and emitting frames are to be checked in dimension and pitches before erection. All the readings are to be logged
4.24	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.
4.25	Welding of high tensile structural steel shall be done by using certified welders, who possess requisite certificate and who are approved by BHEL Engineer/customer.
4.26	All welders shall be tested and approved by BHEL Engineer/ customer before they are actually engaged on the work even though they may possess 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
4.27	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. 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.
4.28	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.
4.29	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.
4.30	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.

CHAPTER-V: **PRE–COMMISSIONING TESTS AND COMMISSIONING**

5.0	**PRE–COMMISSIONING TESTS AND COMMISSIONING**
5.1	Gas tightness test of ESP and ducts by kerosene test / soap solution test with own consumables, labour, scaffolding and other items , if any.
5.2	Gas distribution test / flow test with own consumables, labour, scaffolding and other items, if any.
5.3	Trial run of collecting rapping, emitting rapping and GD rapping mechanism as per instruction of BHEL engineer.
5.4	Checking IR value of the ESP fields.
5.5	Air load test & Gas load test of ESP along with all fields.
5.6	Charging of ESP with flue gas during light-up / synchronization / coal firing.
5.7	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.
5.8	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.
5.9	Contractor has to provide all categories of labors including necessary tools, measuring instruments, consumables, supervision and other inputs as required during the entire period of commissioning of ESP till handing over.
5.10	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.
5.11	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.
5.12	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.
5.13	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.
5.14	Trial run of collecting rapping , emitting rapping and GD rapping mechanism as per instruction of BHEL Engineer.
5.15	Checking I. R. Value of ESP fields.
5.16	Air load test of ESP along with all fields.
5.17	Charging of ESP with flue gas during light up / synchronization / coal gas firing.
5.18	All the rapping motors shall be checked, serviced including greasing of bearings and then erected by the contractor.
5.19	The instruction of the motor manufacturer regarding storage of the motors and re conservation must be strictly followed without any deviation.
5.20	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, 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.
5.21	The various categories of workman required for assistance in pre - commissioning, commissioning and post commissioning activities not limited but may be as follows: (a) Electrician (b) Welders.

	(c) Riggers. (d) Helpers. (e) 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.
5.22	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
5.23	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.
5.24	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.

CHAPTER-VI:BROAD SCOPE OF ELECTRICAL , C&I WORKS& MATERIAL HANDLING

6.0	**BROAD SCOPE OF ELECTRICAL AND C&I WORKS**
6.1	Scope of work involving Erection, Testing, Commissioning, Calibration and Stabilization of the Electrical package is elaborated in detail hereunder.
6.2	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.
6.3	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.
6.4	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.
6.5	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.
6.6	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.
6.7	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.
6.8	The terminal points as decided by BHEL shall be final and binding on the contractor
6.9	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 feedback 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.
6.10	**All tools, tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables, Copper washers, small LEDs, ferrule, Cu tube dia. 38"x20 SWG-2250 copper round lug(120sqmm, 35 sq mm,) copper pin type and U type lug (1.5 sqmm, 2.5 sqmm), tie belts, 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.
6.11	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 are to be prepared by the subcontractor;all necessary stationary shall be supplied by the contractor.
6.12	Equipments /instruments required to be erected for this work, though not limited to but are generally as per BOQ cum rate 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.
6.13	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
6.14	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.
6a.0	**MATERIALS HANDLING**
6a.1	Loading 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.
6a.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.
6a.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.
6a.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.
6a.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.
6a.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 he 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.
6a.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.
6a.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.
6a.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
6a.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
6a.11	Housekeeping 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.

CHAPTER-VII: **BRIEF DESCRIPTION OF ELECTRICAL AND C&I WORKS**

7.0	**BRIEF DESCRIPTION OF ELECTRICAL AND C&I WORKS**
7.1.0	**INSTALLATION OF PANELS**
7.1.1	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.
7.1.2	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. Covering the gap between the EC panels by appropriate metallic plate as instructor BHEL Engineer. In certain case where canopies are not supplied but have to be fabricated out of MS/Aluminum sheets provided by BHEL, payment will be done on weight basis, the subcontractor to indicate the rate.
7.1.3	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. Panels have to be erected in the ESP control room etc.
7.1.4	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.
7.1.5	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.
7.1.6	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.
7.1.7	No separate payment shall be made for replacement of any devices like electronic modules, relays, conductors, terminal block, push buttons, small LEDs, contactors and other small equipments etc. which are found defective during pre-commissioning/ post-commissioning of the panels.
7.1.8	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.
7.1.9	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.
7.2	**FABRICATION AND INSTALLATION OF STRUCTURAL STEEL**
7.2.1	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.
7.2.2	This shall include cutting into size, conducting 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.
7.2.3	All the fabricated supports/frames shall be applied with one coat of primer red oxide paint before installation and two coat of synthetic enamel of prescribed shade of final paint,. If required, BHEL shall prescribe time gap between first and second coat of final paint.

7.2.4	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.
7.2.5	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.
7.2.6	Gas cutting of tray/impulse pipe support and gas cut holes in frame shall not be allowed. Only drilled hole shall be permitted in frame etc.
7.3.0	**CABLE TRAYS/ CABLE DUCTS**
7.3.1	Various types of sheet metal, galvanized 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.
7.3.2	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 galvanizing paint on weld joints including supply of paint is in the scope of contractor. Fabrication & erection of supports for laying of cable tray from ESP to ESP control room.
7.3.3	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.
7.3.4	Cable trays/ducts have to be routed from ESP to ESP control room, underground in cable trench, over head on structure, valves, floors etc. for various applications such as cable laying, copper tubes, conduits, thermocouple, temperature gauge capillary etc. Cables trays wherever erected shall be preferably in vertical conditions
7.4.0	**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)**
7.4.1	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 supports of ISMC/ISMB/ISA for laying cable tray from ESP to ESP control room, PVC numerical/alphabetical / printed ferrules, termination by using crimp type copper tinned/aluminum lugs, insulated/un-insulated, termination (crimp, soldering, etc.), plug-in connections with insert type crimping, providing identification cable tags, PVC/aluminum at both the ends and at appropriate interval throughout the route length, continuity checking, insulation resistance checking, high voltage test on HT cables.
7.4.2	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.
7.4.3	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
7.4.4	Supply of all types lugs including copper tinned lugs of various types (pin, ring, fork, snap-on) of different sizes as required, 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.
7.4.5	All care should be taken to avoid abrasion, tension, twisting, kinking, stretching of cables during installation.
7.4.6	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 ear thing.
7.4.7	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.
7.4.8	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.
7.4.9	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
7.4.10	Contractor shall carefully plan the cutting schedule of each cable drum in consultation with site engineer such that wastage are minimized. **The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed the following limits:** HT Cables 1% LT cables above 70 mm square 1% LT cables up to 70 mm square 2% Control & special cables 3% Fire survival cables 1% Steel materials 1% by weight (for cable trays/tray support installation/supplied by vendor)
7.4.11	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.
7.5.0	**PUSH BUTTONS, STARTER, FUSE BOARD ETC.**
7.5.1	The above items shall require to be mounted on wall / column / floor.
7.5.2	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.
7.5.3	Checking of components, removal & reinstallation of internal component and re-wining, testing and commissioning shall be under the scope of the contractor.
7.5.4	The types of cable terminations are as detailed below: All field cables are crimp type of different sizes.
7.5.5	All JBs are both side screw type.
7.6.0	**FIELD INSTRUMENTATION**
7.6.1	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.
7.6.2	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 up to 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.
7.6.3	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.
7.6.4	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.
7.6.5	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.
7.6.6	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.
7.6.7	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.

7.6.8	The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.
7.6.9	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.
7.6.10	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.
7.6.11	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).
7.7.0	**FINAL PAINTING**
7.7.1	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 synthetic enamel 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.
7.7.2	Other equipments like JBs, Panels etc., shall be painted with two coats of synthetic enamel paint. The quoted rates should be inclusive of application of two final coats of synthetic enamel 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.
7.7.3	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.
7.8.0	**MISC OTHER INSTRUMENT/ EQUIPMENT ERECTION, CALIBRATION AND COMMISSIONING**
7.8.1	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.
7.8.2	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.
7.8.3	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 arranged by contractor within the quoted rates and the contractor has to make necessary holes/adjust the available holes in the JB for fixing these. The quality of material shall be got approved from BHEL engineer prior to their use on job. 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.
7.8.4	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.
7.9.0	**PRE-COMMISSIONING/ COMMISSIONING AND POST COMMISSIONING ACTIVITIES**
7.9.1	The work is also inclusive of 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.

7.9.2	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.
7.9.3	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.
7.9.4	The pre-commissioning activities will start prior to light up of boiler and various trials, commissioning operations shall continue till the ESP units are handed over to customer. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted.
7.9.5	The mobilization 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.
7.9.6	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.
7.9.7	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.
7.9.8	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.
7.9.9	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.
7.9.10	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. Engineer (electrical, instrumentation). Electrician (ITI). Instrument technician (ITI). Helper/fitter/welder
7.9.11	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
7.9.12	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.
7.9.13	For electrical works, 415 volts and above, the contractor has to bring qualified electricians.
7.9.14	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.
7.10	**Calibration**
7.10.1	Verification after drawing of material of various types, range of the field devices with respect to instrument schedule, data sheet or system document.
7.10.2	Calibration of instruments as per system tag numbers.
7.10.3	Calibration / adjustment of instrument as per system requirement / set values.
7.10.4	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.
7.10.5	Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.
7.10.6	Checking and ensuring the proper function of instrument.
7.10.7	All the recorders shall be made functional with proper chart movement and ink marking.
7.10.8	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.
7.10.9	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.
7.10.10	For commissioning of Relays of various panels, as required, services of OEM (Original Equipment Manufacturer) are to be arranged by the contractor at his own cost.
7.10.11	For commissioning of any other system, if required, services of OEM (Original Equipment Manufacturer) shall be arranged by BHEL free of cost.
7.10.12	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.
7.10.13	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.
7.11	**Erection**
7.11.1	Issue and drawl of material from store, verification, inspection as per shipping list, drawings and documents.
7.11.2	Preservation, up keeping, safe custody of the erected equipments till handing over to the customer.
7.11.3	Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc
7.11.4	Continuity check and IR value check of cables.
7.11.5	Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule.
7.11.6	Checking ear thing of the equipments and cable shield wire continuity.
7.11.7	Energizing the functional group control panels and field devices.
7.11.8	All cable glands/piping/tubing to be fixed as per installation requirement before commissioning.

7.12.0	**PANELS**
	• Checks after erection: checks shall be carried out not limited to following details. • Arrangement of various shipping sections as per GA drawings. • Front, rear side and top clearances • Proper positioning of ends of main bus bars in adjoining sections • Tightness of bus bars joints between adjoining sections and its shrouding. • Alignment of panels. • Welding of base channels to embedded plates / bolting with foundation bolts. • Adequacy of supporting channels and its arrangement. • Free closing and opening of door, tight closing of door. • Free movement of draw out modules and proper alignment of fixed and moving contacts, including terminals.
7.13.0	**PUSH BUTTON STATION / LOCAL STARTERS**
7.13.1	**General arrangement of fixing** • Tightness of nuts & bolts • Tightness of door closing • Mechanical operation of push button switches
7.13.2	**General Checks on switchboards, transfer panels & push button stations.** • Check of control wiring • General check for cleanliness inside the switch board. • Operation of mechanical parts of relays, switches, pushes buttons etc. • IR check of power & control circuits. • Verification of switch development. • Alignment of contracts with vertical bus bars and contact pressure • Verification of components like fuse, links and their ratings etc. • Connection to ear thing points
7.13.3	**Special checks for motor starter panels** • Primary / secondary injection test for bimetal / other relays. • Verification of operation of control circuit in selected starter modules of different categories. • Operation of panel space heaters / thermostats.
7.13.4	**Special check for bus duct** • Cleanliness of bus bar, supports etc. • Earth & insulation resistance • Measurement of contact resistance • HV test.
7.13.5	**Testing, Commissioning & Trial Operation** • Power cable connection for tightness & phase sequence test • Energisation by closing I/C breaker • Control circuit operation of each starter module • Verification of timer settings • Verification of bus transfer & auto re-closing. • 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. • 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. • Contractor shall prepare calibration/testing report/protocols. • 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. • 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. • Observe the proper functioning of sub-group/sub-loop control. • Check the operation of various control in manual/auto mode for smooth functioning. • Clearing of all bad / invalid signals noticed during commissioning. • Providing necessary assistance for Trial Operation of the unit is in scope of this specification. Contractor shall provide adequate number of skilled manpower and T&P for this purpose. • 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.
7.13.6	**Post-commissioning.** • Contractor shall rectify the defect observed/informed by customer during the trial run • After trial run/handing over of the equipment, if due to unforeseen reasons, certain works crop up, the contractor shall provide all the assistance. • PG Test Assistance • For PG test assistance shall be provided 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. • 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.

CHAPTER-VIII: **GENERALGUIDELINES FOR ERECTION AND STORAGE**

8.0 GUIDELINES FOR ERECTION

- 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 proper glands will be provided 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.
- All electrical connections shall be tested for polarity and proper connections.
- Insulation test of the various circuits shall be done.
- The checking of operation of individual equipment and instruments to which the cabling/wiring connected shall also be done by the contractor.
- Wherever supplied, GI cable trays shall be of bolted construction only with fixing screws and coupler plates.
- To the extent possible, all the trays shall be fixed in vertical orientation
- Sharp bends of cable trays shall be avoided in all type of cable trays.
- 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.
- Ladder perforated type able trays shall be used in cable trenches and vertical risers.
- 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.
- Where power and control cables are to be laid in the same route, suitable barriers to segregate them physically shall be employed.
- Space equal to the diameter of cable shall be provided between power cables of six over 50 mm in diameter.
- When cables pass through floors, walls etc., it shall be passed through a pipe for mechanical protection and the pipe ends sealed suitably.
- 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.
- The minimum radius of formed bend of an insulated cable shall be 12d for un-armored cables and 15d for armored cables where‘d’ is the overall diameter of the cables.
- No cable shall be laid in ducts or trenches where other services such as oil pipes, steam or water pipes are laid.
- Where cabling passes through brickwork or concrete work, the contractor shall provide suitable local protection against mechanical damage wherever necessary.
- The layout of all cables shall be arranged to give adequate clearance from other services and cables shall be routed to avoid hot zones.
- 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.
- The cable schedules indicating cable sizes, tentative cables routing information will be furnished by BHEL at site to the contractor during execution.
- Ear thing installations: All instruments/panels, cable trays, JBs etc. are to be earthed as

	per standard Ear thing procedures/practices. • All equipments shall be earthed by two separate and distinct connections. Ear thing terminals will be available in all equipment supplied by BHEL. • The ear thing conductors shall be of mild steel/GI strip/ wires. All connections from equipment to main ear thing conductors shall be made as illustrated in ear thing drawing. A copy of ear thing drawing shall be provided to the contractor at site during execution. • A continuous ear thing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous ear thing system. When two or more trays supporting power cables run in parallel, a continuous ear thing conductor shall be provided on trays only with tap offs to the control cable trays. All rapping motors will be earthed to this conductor. • All joints in the ear thing system shall be welded type. Ear thing connections to all equipments including motors shall be bolted type. • Ear thing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint. • Metallic sheaths, screens/shields and amour of all multicore cables shall be bonded and earthed. • Ear thing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm. • Welded joints on GI ear thing 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 areexposed 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.
8.1	**GUIDELINES FOR HANDLING AND STORAGE OF ELECTRONIC CUBICLES/ SUBASSEMBLIES/ LOOSE ITEMS**
	• 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 slided 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. • 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. • 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. • After opening the case, all supports provided for transport are to be removed with due care. • 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.
8.2	**STORAGE**
	• 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 • The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damps, sinking into around 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. • The packing material shall be retained if the cubicle is to be repacked after inspection.
8.3	**SUB-ASSEMBLIES**
	• All subassemblies should be kept in a separate place where it is easily accessible. • 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. • Subassemblies should not be stacked one above the other.
8.4	**LOOSE ITEMS**
	• 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. • Guidelines for handling of electronic modules • All the modules shall be handled by qualified persons only. • Electronic modules should only be touched when it is absolutely essential to do so. • 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. • The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton. • The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched. • The electronic modules should not be placed close to television sets or CRT units. • Soldering irons and any other tools used must be grounded. • 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.

CHAPTER IX: FACILITIES TO BE PROVIDED BY BHEL/ CONTRACTOR

9.0	**FACILITIES TO BE PROVIDED BY BHEL/ CONTRACTOR**
9.1	BHEL/UPRVUNL 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. **Raw Water will be provided at one point by BHEL/UPRVUNL** from the water pipe line / source at UPRVUNL premises / plant. **FreeElectricity for office and workshop will be provided at one point as decided by BHEL/UPRVUNL**. Further distribution will have to be made by the contractors at their own cost. Accordingly, required energy meter, all cables, fuses, distribution boards, switches, switchboards, bus bars, ear thing 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 their being put to use or as may be specified, shall be the responsibility of the contractor. **All safety regulations are to be followed by the contractor.** It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. Licensed and experienced electrician shall do the installation and maintenance of this. In case of non-availability of customer supplied power, it is the responsibility of the contractor to make alternative arrangements. Contractor shall be adequately equipped to arrange standby diesel welding generators in the event of construction power failure. Essential welding jobs shall not be stopped on account of main construction power failure. Contractor shall make all arrangements himself for the supply & distribution of construction water as well as potable water for lab our and other personnel at work site /colony. Taxes, duties, levies, charges, if any, shall be borne by the contractor.
9.2	Contractor shall arrange adequate floodlights, hand lamps and area lighting within finally accepted rates at the site of construction, contractor's material storage area etc. Provision of distribution lines for lighting from the single point to the required place with proper distribution boards with his own materials like cables, fuses, switchboards etc, observing the safety rules laid down by the electrical authorities ofUNL.
9.3	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.
9.4	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.
9.5	The contractor should follow below points.while drawing construction power supply from Dist. Board ➢ All electrical installations should be as per Indian Electricity rules. ➢ All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc. ➢ Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral. ➢ Contractors have to make their own arrangement for their equipment/ DB earthing ➢ 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. ➢ All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points. ➢ Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs. ➢ 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.
9.6	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.
9.7	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.
9.8	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.

CHAPTER-X: **TIME SCHEDULE**

10.0	**TIME SCHEDULE**
10.1	The contractor is required **to commence the work within 15 days from the date of issue of letter of intent** as unit no. 13 is already under shutdown for R&M works.
10.2	**Total completion period shall be 16 months from actual date of start of work till synchronization/stabilization of Unit#13.** **Break up of activities/milestones shall be as per Clause 10.3 mentioned below.** **<u>Contractor has to adopt strictly round the clock working at site since the work has to be completed within the tight time schedule.</u>** Contractor has to mobilize adequate resources accordingly 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**.
10.3	The various mile stone dates to be achieved, for ESP UNIT# 13 as per the current status of contract are as below:

MILE STONES	MONTH
Start of Work	The contractor is required to commence the work within 15 days from the date of issue of letter of intent or intimation from BHEL Construction Manager. Start of Dismantling work activity at site shall be considered as "start of contract period".Site mobilization will not be considered as start of contract period. The contractor has to subsequently augment his resources in such a manner that major milestones of erection & commissioning are achieved on specified schedules:
Dismantling,erection of Duct & duct supporting structures and pre assembly works.	03 Months
Erection of ESP & Duct, Testing & Commissioning	06 months will be given for erection of both passes after receipt of foundations by UNL, 01 month testing & commissioning, field charging of unit. Total completion period shall be 07 months after receipt of foundations till synchronization of Unit#13.
Full loading/Stabilization and PG test	03 months
Handing over of Unit	3 months

Note:

1. Work of dismantling of ducts etc will commence within 15 days after receipt letter of indent. Work of erection and subsequent activities shall commence after dismantling of ducts etc (by bidder) and of ESP after dismantling of ESP and readiness of foundation (by customer).

2. 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.

10.4	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.
10.5	

	SN	MAJOR MILESTONE	COMPLETION
M1	**1**	Erection of ESP & Duct, Testing & Commissioning	07th monthafter receipt of foundations
M2	**2**	Full loading/Stabilization and PG test	13th month from start of contract period.

All dates in above schedule are from start of contract period (zero date) and just for an idea to bidder. Detail schedule shall be prepared by successful bidder after discussion with BHEL.

There is provision of penalty in case of slippage of intermediate milestones as following:-

a. Activity mentioned above at Sr No 1 is termed as M1 and at Sr No 2 is termed at M2 for making provisions of penalty in case of slippage of these milestones for unit 1&2.

b. In case of slippage of these intermediate millstones (M1, M2), delay analysis shall be carried out on achievement of each of above milestones.

c. In case delay in achieving M1 milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 2% of executable contract value, will be withheld.

d. In case delay in achieving M2 milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 3% of executable contract value, will be withheld.

e. Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 milestone.

f. Amount required to be withheld on account of slippage of milestone M1, and M2 shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @ 10% of RA bill amount form subsequent RA Bills.

g. Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion/closure of contract. Withheld amount, if any due to slippage of milestone M1, M2, shall be adjusted against LD or released as the case may be.

h. In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of milestone M1, M2 shall not be released and be converted into recovery.

Executable Contract Value* means - Value of work for which inputs/fronts were made available to contractor, and which were scheduled for execution till the date of achievement of respective milestone.

11.0 TERMS OF PAYMENT:

11.1 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.

11.2 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.

11.3 Subject to any deduction that BHEL may be authorized to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained here Under.

11.4

PROGRESSIVE PAYMENT on pro-rata basis

A **PRO RATA PAYMENTS (85%)**
(**Applicable for SL. No. 18.2.a of rate schedule**)

1.	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	15
2.	PLACEMENT IN POSITION	**20**
3.	ALIGNMENT	**15**
4.	WELDING/BOLTING/FIXING	**20**
5.	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC	5
6.	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC	5
7.	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES	5
	Total	**85**

11.5

PROGRESSIVE PAYMENT on pro-rata basis
(100% of unit rates)
(Applicable for DISMANTLING work for SL. No.18.2(b) of rate schedule)

(A) 25% of the applicable contract unit rate on completion of total dismantling of duct and insulation from BOF to ESP. Billing for dismantling to be done after completion of total dismantling of unit.

(B) 5% of the applicable contract unit rate on completion of total dismantling of duct supporting structure from BOF to ESP. Billing for dismantling to be done after completion of total dismantling of unit.

(C) 20% of the applicable contract unit rate on completion of total dismantling of duct and insulation from ESP to ID fan. Billing for dismantling to be done after completion of total dismantling of unit .

(D) 5% of the applicable contract unit rate on completion of total dismantling of duct supporting structure from ESP to ID fan. Billing for dismantling to be done after completion of total dismantling of unit.

(E) 25% of the applicable contract unit rate on completion of total dismantling of duct and insulation from ID fan to chimney. Billing for dismantling to be done after completion of total dismantling of unit.

(F) 5% of the applicable contract unit rate on completion of total dismantling of duct supporting structure from ID fan to chimney. Billing for dismantling to be done after completion of total dismantling of unit.

(G) 15% of the applicable contract unit rate payable on WORK completion and area cleaning of unit.

11.6	**Progressive Payment on Prorata Basis** **(100% of total value at Sr. N0.18.2(c) of rate Schedule)** Modification Works: A) 40% on completion of modification of duct supporting structures of ducting between boiler and EP inlet, EP Outlet to ID Fan inlet, and ID fan outlet to chimney, to maintain elevation of duct. Additional columns, if required, would be erected by contractor. Materials, required would be arranged by BHEL. B) 30% on completion of internal bracing, provided in duct piece which is erected just after ID fan diffuser casing, fouls with the door of diffuser casing of ID fan. Suitable modification of duct bracing pipes is to be carried out. Cutting and welding works would be carried out by contractor per the instructions of BHEL Engineer(s). C) 30% on completion of following works: Some of holes, provided in Shock Bar Angles of collecting electrodes, have wrongly been drilled. New holes will have to be drilled in shock bar angles at correct locations, intimated by BHEL Engineers. Contractor will be required to carry out his modification work by making necessary arrangements, providing necessary drill machines and experience operator. Maximum quantity of shock bar angles required to be rectified would be 660 nos.
11.7	**MILESTONE PAYMENTS** **(15% of Sl. No. 18.2.a of rate schedule)** 1 AIR & GAS TIGHTNESS TEST **1** 2 GAS DISTRIBUTION TEST **1** 3 CHARGING OF ESP FIELDS **4** 4 Coal Firing **2** 5 Trial Operation of Unit **1** 6 Painting **2** 7 Area cleaning, temporary structures cutting/removal and return of scrap **1** 8 Punch List points/pending points liquidation **1** 9 Material Reconciliation **1** 10 Completion of Contractual Obligation **1** **TOTAL 15**

TECHNICAL CONDITIONS OF CONTRACT (TCC - I)	
CHAPTER-XII: TAXES & DUTIES	
12.0	**TAXES & DUTIES (SERVICE PORTION-ESP)**
12.1	Price quoted should be inclusive of all applicable Taxes/charges **Excluding GST.** The Contractor shall pay all other taxes, fees, royalty, commission etc. which may be levied on the contractor in executing the contract. In case BHEL is forced to pay any of such taxes, it shall be recovered from Contactor's bills or otherwise as deemed fit. **GST Shall be payable extra as per following :**
12.2	Vendor has to issue correct HSN/SAC code wise bill indicating therein description, value, rate, due tax and other particulars in compliance with the provisions of relevant GST Act and Rules.
12.3	Vendor has to submit GST compliant invoice within 7 days from the due date of invoice as per GST Law.
12.4	GST portion of invoice shall be released only when all the following conditions are satisfied by the Contractor: - A. Supply of goods and services have been received by BHEL. B. Original Tax Invoice has been submitted to BHEL. C. Contractor has declared such invoice in his applicable GST return. D. Documentary evidence or undertaking regarding discharge of GST liability in respect of supplies made by vendor has been furnished.
12.5	For the purposes of claiming GST from BHEL, invoice issued by contractor should be in line with provisions of GST Act & Rules. Special care should be taken in case of month end transactions.
12.6	The taxes and duties referred in this chapter or elsewhere in the NIT/contract is limited to direct transactions between BHEL & its Sub-Contractor. BHEL is not responsible for any liability that may arise due to any transaction beyond the direct transaction between BHEL & its Sub-Contractor.
12.7	**Variation in Taxes & Duties**: Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract. In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contactor only and within the contractual delivery period only. In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
12.8	**Modalities of Tax Incidence on BHEL:** Where GST law permits more than one option or methodology for discharging liability of tax/ levy/ duty; the contractor shall approach BHEL before choosing any option to discharge his tax liability. BHEL shall have the right to direct the contractor to adopt the appropriate option considering the amount of tax liability on BHEL as well as procedural simplicity with regard to assessment of the liability.

	The option chosen by BHEL shall be binding on the contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.
12.9	Any loss to BHEL due to non-compliance of above noted clauses and/or provisions of the GST Act and/or Rules by the contractor shall be to his account.
12.10	**BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.**
12.10.1	In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-
12.10.2	It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.
12.10.3	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on gross payment made for value of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.
12.10.4	It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.
12.10.5	It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.
12.10.6	The contractor shall, however ensure before deposit of any BOCW Cess, that customer is not depositing the same in order to avoid excess deposit of cess.
12.10.7	The contractor shall bear cost of BOCW cess either by way of deposit or through recovery by BHEL in case the same is deposited by the customer.
12.10.8	In case of failure in above mentioned compliances, BOCW Cess @ 1% as well as applicable penalty as specified in BOCW Act/Rules shall be deducted from the contractor.

CHAPTER-XIII: **DETAILS OF QUANTITIES**

13.0 DETAILS OF QUANTITIES

13.1

ESTIMATED WEIGHT OF VARIOUS PRODUCT GROUPS FOR UNITNO. -13

PRODUCT GROUP (PG)	DESCRIPTION OF PG	DESIGN WEIGHT (MT)
77,89	ESP, GALLERIES & RAILS AS PER CHAPTER XIV	2415
39	COLUMNS & STRUCTURES AS PER CHAPTER XIV	184
48 *	DUCTS &DUCT SUPPORTS AS PER CHAPTER XIV	239
57	GATES & ACTUATORS	55
32* & 33*	INSULATION & FITTINGS OTHER THAN ESP AS PER ANNEXURE II	57
	APPROACH PLATFORM FOR OPACITY MONITOR	20
	TOTAL WEIGHT (MT)	**2970**

13.2

*** Most of Items of this PG is to be dismantled. The quantity in scope of dismantling is approximately 200 MT for Unit#13. The quantity for dismantling mentioned is based on the technical assessment made and may vary to some extent. The rates for dismantling to be quoted should be on lump sum basis**

NOTES:

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.
3. The weights indicated in above schedule are approximate only and are liable to variations and alternations.

CHAPTER-XIV: **TENTATIVE WEIGHT SCHEDULE**

14.1

SL. NO	PG	MA	DESCRIPTION	DESIGN WEIGHT(KG)
1	77	101	SLIDE SUPPORTS	6904.000
2	77	105	ESP SUB-DELY COMPONENTS	703.564
3	77	106	INSULATOR HOUSING ASSEMBLY	18462.490
4	77	108	GAS DISTRIBUTOR ASSY	44597.920
5	77	109	GD RAPPING MECHANISM	7897.012
6	77	110	GD DRIVE ARRANGEMENT	429.108
7	77	111	GAS SCREEN	12683.848
8	77	113	EMITTING SYSTEM SUSPENSION	6610.888
9	77	114	SUPPORT INSULATORS	2880.000
10	77	115	EMITTING ELECTRODES	9672.300
11	77	116	EMITTING ELECTRODE RAPPING MECHANISM	14856.528
12	77	117	EMITTING DRIVE ARRANGEMENT	12449.412
13	77	119	COLLECTING ELECTRODE SUSPENSION	43620.240
14	77	120	COLLECTING ELECTRODE	443942.176
15	77	121	EMITTING FRAME - TOP	57975.238
16	77	122	EMITTING FRAME - BOTTOM	63805.494
17	77	123	INDPECTION DOORS	5307.412
18	77	124	SHOCK BARS	36354.041
19	77	125	COLLECTING ELECTRODE RAPPING MECHANISM	39568.644
20	77	126	COLLECTING DRIVE ARRANGEMENT	2574.648
21	77	128	ESP ROOF PANELS	61012.480
22	77	130	ELECTRICAL SUB-DELY COMPONENTS	5527.680
23	77	131	GEARED MOTORS	9282.6
24	77	132	EMITTING FRAME - MIDDLE	56935.760
25	77	137	JUNCTIN BOX & PUSH BUTTON	750.000
26	77	142	OUTER ROOF	95652.840
27	77	143	HOPPER RIDGES	27981.730
28	77	144	HOPPER UPPER PART	106962.512
29	77	145	HOPPER MIDDLE & LOWER PART	144141.168
30	77	146	INSULATOR SUPPORT PANELS	36506.928
31	77	147	ROOF PANEL ASSY	42249.206
32	77	148	CASING STRUCTURE	153122.576
33	77	149	CASING SHELL	181147.232
34	77	150	EP FUNNELS	94269.840
35	77	155	PENT HOUSE	85755.564
36	77	157	SPLITTERS & GUIDE VANES	12964.408
37	77	160	EP ELECTRICALS	39220.000
38	77	161	ADOPTERS	492.912
39	77	162	EP CABLE TRAYS	32259
40	77	163	ASH LEVEL INDICATOR	635.520
41	77	165	HOPPER APPROACH PLATFORM	55752.403
42	77	167	MINERAL WOOL	53360.000
43	77	168	FIXING COMPONENTS	46055.150
44	77	172	INTERLOCKS	485.400
45	77	176	RECTIFIERS & CONTROLS	43200.000
46	77	178	BAPCON & ACCESSORIES	294.500
47	77	180	FOUNDATION MATERIALS	6304.464
48	77	181	SUPPORTING STRUCTURE	143302.300
49	77	190	HEATING ELEMENTS	1478.000
50	77	192	AUXILIARY CONTROL PANEL	10835.000
51	77	193	RAPPER CONTROL PANELS	402.500
52	77	988	COMMISSIONING SPARES	21.203
53	89	610	EP GALLERIES & STAIRS	33169.705
54	89	611	ESP ROOF HANDRAILS	2604.285
			TOTAL WEIGHT	**2415429.829**

14.2	LIST OF MATERIALS TO BE ERECTED FOR DUCTING STRUCTURE			
SL. NO	**PG**	**MA**	**DESCRIPTION**	**DESIGN WEIGHT(KG)**
1	39	12	FOUNDATION MATERIAL ID DUCT SUPPORT	1741.000
2	39	100	DUCT SUP.STR.BEF.ESP	56837.000
3	39	140	FRAMES AFTER ESP.	85146.535
4	39	300	DUCT. SOPP.BEAMS	12647.830
5	39	301	FAN PLATFORMS	10932.197
6	39	303	FAN HANDLING STRUCT.	5000.000
7	39	810	FLOORGRILL &GUARD PL	6628.795
8	39	820	STAIRS AND LADDERS	1559.000
9	39	850	HAND RAILS & POSTS	3211.936
10	48	993	ERECTION MATERIALS	5932.100
11	48	462	SQ.DUCT BLROUTFL-EP	49281.320
12	48	700	BULK BPS COMPONENTS	2048.500
13	48	464	EXP JTS BOF-EP	15695.888
14	48	465	SUPPORT-BOF TO EP	9390.960
15	48	466	PLATFORM & LADDER-GATE	5000.000
16	48	482	SQ. DUCT EP-ID FAN	48384.300
17	48	484	EXPNPCS EP/MP IDFAN	8346.248
18	48	485	SUPPORT EP ID FAN	5551.242
19	48	492	SQ.DUCT IDFAN-CHIMNY	79470.420
20	48	494	EXP JTS ID-STACK	8160.920
21	48	495	SUPPORTS-IDFANCHIMNY	1720.360
22	57		GATES & ACTUATORS	55454.140
23	32	510	FIXING COMPONENTS FOR ID DUCTS	27786.450
24	33	521	MINERAL WOOL FOR ID DUCTS	29250.000
25			APPROACH PLATFORM FOR OPACITY MONITOR	20000.000
TOTAL WEIGHT				**555177.141**

14.3

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. 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.

14.4 **Modification Works**

A) Modification of duct supporting structures of ducting between boiler and EP inlet, EP Outlet to ID Fan inlet, and ID fan outlet to chimney, to maintain elevation of duct. Additional columns, if required, would be erected by contractor. Materials, required would be arranged by BHEL.

B) Internal bracing, provided in duct piece which is erected just after ID fan diffuser casing, fouls with the door of diffuser casing of ID fan. Suitable modification of duct bracing pipes is to be carried out. Cutting and welding works would be carried out by contractor per the instructions of BHEL Engineer(s).

C) Some of holes, provided in Shock Bar Angles of collecting electrodes, have wrongly been drilled. New holes will have to be drilled in shock bar angles at correct locations, intimated by BHEL Engineers. Contractor will be required to carry out his modification work by making necessary arrangements, providing necessary drill machines and experience operator. Maximum quantity of shock bar angles required to be rectified would be 660 nos.

CHAPTER-XV: **LIST OF T&Ps & IMTEs BEING PROVIDED BY BHEL**

15.0	**LIST OF T&Ps & IMTEs BEING PROVIDED BY BHEL FOR USE OF CONTRACTOR FREE OF HIRE CHARGES ON SHARING BASIS AS PER REQUIREMENT**		
15.1	1.	135MTCrane	01 No.
15.2	The operation and maintenance of135T, maintenance, crew, helper, fuel and other consumable shall be provided by contractor within the final accepted rates. However, BHEL entirely at its dissertation can allow use of this crane in other areas / works also on the same terms and conditions.		
15.3	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 135 T crane for each contract on sharing basis.		
15.4	Other terms and conditions regarding above items shall be as per Clause for T&P/IMTE's.		

CHAPTER-XVI: **MAJOR T&P AND IMTE'S TO BE PROVIDED BY CONTRACTOR**

16.0 **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.TOOL & PLANTS**

16.1 **LIST OF T & Ps TO BE ARRANGED BY CONTRACTOR**

Sl. No.	Description	Capacity	Quantity
1	Oil Filtering Machine	500 LPH	1 no.
2	Hydra Crane	14 T	3 nos.
3	Huck Bolting Machine		2 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 Millimetres	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.
10	Tractor trailors	10/15 Ton	As per requirement
11	Fire fighting equipments	Suitable capacity	As per requirement
12	Welding sets with accessories	Suitable capacity	30 nos
13	Electric Winches	1 Ton 2 Ton 3 Ton	2 nos 10 nos 5 nos
14	Rope Line	Wire Ropes	As per requirement

16.2 **NOTES:**

1. Above are major Tools & Plants and MMDs to be deployed by the contractor
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 quantities of above T&Ps/ 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. MEASURING AND MONITORING DEVICES (MMD): As per requirement to be finalized at site
4. The above list is only indicative and these T&Ps may not be required for entire contract period but contractor will ensure that these T & Ps are provided as per need. Contractor will assess actual quantity and period of requirement based on his experience. **Contractor has to mobilize / maintain adequate numbers of T& P for meeting the work schedule and intermediate milestones as notified by BHEL**

	Engineer. 5. If any one of T&P mentioned above is not needed for proper execution of scope of work, provided contractor has not utilized BHEL free issued T&P for completing such work, no recovery from contractor shall be applicable. 6. Any additional item required in addition to above mentioned T&P for proper execution of scope of work, contractor has to arrange such T&P within quoted rate on the instruction of BHEL in writing in a reasonable period within two weeks from the written instruction from BHEL. 7. In case deployment of T&P w.r.t requirement, is delayed or deployed for a shorter period or abnormal down time of T&P or in case T&P w.r.t requirement was not deployed by the contractor as per instruction of BHEL and BHEL had to deploy either its own T&P or from outside, the recovery shall be done from the contractor as under: a. In case BHEL had to deploy its own T&P, hire charges of T&P applicable for outside agencies as per extant guidelines for **"Hire Charges on issue of Capital Tools & Plants"** shall be recovered. b. In case BHEL had to deploy the T&P from outside, actual hiring cost plus applicable overheads shall be recovered. 8. Other terms and conditions regarding T&Ps / MMEs please also refer clause for T&Ps & MMEs in SCC. 9. All the tools and plants required for this scope of work are to be arranged by the contractor within the quoted rates. The list is suggestive in nature. Any additional T&Ps required to be arranged by the contractor. If work gets delayed due to non-availability of T&Ps, BHEL reserves the right to get the work done at the risk and cost of contractor without prejudice to rights of BHEL as in GCC.

CHAPTER-XVII: **TERMINAL POINTS & EXCLUSIONS**

17.0	**TERMINAL POINTS**.
	BOILER outlet flanges, ID Inlet and ID outlet and CHIMNEY (matching flanges included in contractor's scope) **Welding required for connection of Boiler APH to ESP inlet duct, ID inlet duct to ID fan flange and ID outlet flange to outlet works shall be carried out by contractor at his cost.**
17.1	**EXCLUSIONS**:
	The following are excluded from the subcontractor's scope:- • ESP column foundation, equipment foundation, paving and ash trenches below ESP
17.2	**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.

CHAPTER-XVIII: **RATE SCHEDULE**

18.0 **RATE SCHEDULE ESP (UNIT NO.13)**

	A	DESCRIPTION OF WORK	TOTAL VALUES IN RUPEES (In figures and words)
18.1	18.1.1	TOTAL PRICE IN RUPEES for entire SOW, DISMANTLING (CERTAIN AREAS), HANDLING/ TRANSPORTATION OF EQUIPMENTS / MATERIALS FROM STORAGE YARD FOR INSTALLATION, PRE-ASSEMBLY, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTROSTATIC PRECIPITATORS, DUCTS FROM BOILER OUTLET FLANGE TO CHIMNEY, STRUCTURES, INSULATION, PAINTING ETC. FOR 200MW UNIT # 1**3**). (For works as detailed in chapter XIV) as per tender specifications. (**Approx. tonnage involved is 2970 MT for unit no. 13 as per chapter XIV)**	
	18.1.2	Extra work rate on per man-hour basis (inclusive of supervision, T&P, consumables and all other costs)	Rs. 60 ONLY

18.2	DESCRIPTION OF WORK	%	TOTAL VALUE IN RUPEES	QTY. (MT)	Rate in Rupees/MT
a	Rate in Rupees per MT for (HANDLING/ TRANSPORTATION OF EQUIPMENTS / MATERIALS FROM STORAGE YARD FOR INSTALLATION, PRE-ASSEMBLY, ERECTION, TESTING, COMMISSIONING AND HANDING OVER OF ELECTROSTATIC PRECIPITATORS, DUCTS FROM BOILER OUTLET FLANGE TO CHIMNEY, STRUCTURES, INSULATION, PAINTING ETC. FOR 200MW UNIT # 1**3**). (for works as detailed in Chapter XIV) as per tender specifications. (Approx. tonnage involved is 2970 MT)	92% of Total value at SL.NO-18.1.1	********	2970	********
b	Lumps Rate in Rupees per MT for dismantling items of duct and duct supporting structures Approx tonnage involved is 200 MT as in Chapter XIII.	5.0% of Total value at SL NO.-18.1.1	******** Lumpsum	200	********
c	Modification work as per list 14.4 of Chapter XIV	3.0% of total value at SL.No. 18.1.1	LUMPSUM		
18.3	NOTES: The quantities indicated against each item above are tentative and these are liable to vary depending upon the site requirement. The contractor has to handle / erect / commission all items indicated by BHEL Engineer for achieving unit wise milestone and completion of work.				

Rev 01
1st June 2012

TECHNICAL CONDITION OF CONTRACT (TCC - II)

(Document No. PS: MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITION OF CONTRACT (TCC) VOL II

TENDER NO. BHEL/ NR/SCT/OBRA /ESP U-13/R&M /1098.

FOR
WORK OF DISMANTLINGOF DUCTS, DAMPERS, STRUCTURE AND ERECTION OF ESP, DUCTS, DAMPERS/GATES, STRUCTURES AND THEIR TESTING, COMMISSIONING, HANDING OVER OF UNIT NO. 13 (200 MW, OBRA TPS, UPRVUNL, U.P.)

PART-II OF TCC

Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)
Power Sector –Northern Region,
Plot No. 25, Sector-16 A,
Distt.GautamBudh Nagar, Noida-201301

TECHNICAL CONDITIONS OF CONTRACT VOL-II

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CHAPTER-I GENERAL GUIDELINES

1.0	**GENERAL GUIDELINES**
1.1	**BHEL-Power Sector(NR) is ISO 9001-2000, ISO 14001-1996, OHSAS 18001-1999, ISO 27001 and SA-8000 certified company. Quality of work, to customer's satisfaction and system requirements is the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, tools, plant, inspection, measuring and testing equipments etc. as per instructions of BHEL engineer**. **The contractor shall also comply with applicable legislation and regulations with regards to Health, Safety and Environmental aspects for minimizing risk arising from occupational health & safety hazards, controlling pollution and wastage. The Contractor will be responsible for Health, Safety & Environment management (HSE) at site for the construction activities to be carried out by them in accordance with requirements given under section I (a) of GCC and elsewhere in this tender document. The contractor, who is awarded the work, shall have to sign an MOU w.r.t implementation of HSE conditions with BHEL (Safe Work Practices).**
1.2	The contractor shall carry out the work in accordance with standard practices / codes / instructions / drawings / documents / specification supplied by BHEL from time to time.
1.3	In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least **100 trees** or equivalent in the vicinity of the project as per the available space and as per the advice 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. In case, trees are not planted or other equivalent environment related project is not taken up by the contractor for any reason whatsoever, recovery at the rate of Rs. 200/- (Rupees Two Hundred Only) per tree will be made from the final bill of the contractor.

CHAPTER-II **CIVIL WORKS, FOUNDATIONS AND GROUTING**

2.0	**CIVIL WORKS, FOUNDATIONS AND GROUTING**
2.1	Foundation and other necessary civil works for supporting structures, equipment etc, will be provided by UPRVUNL. 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 adjustments of foundation level, dressing & chipping of foundation surfaces for achieving the required elevation of the base of columns, enlarging the pocket of foundation etc., as may be required for the erection of equipment/ plants shall be carried by the contractor within quoted price. The foundation pockets shall be cleaned by using compressed air.
2.2	The contractor for their scope shall check the dimensions, level 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.
2.3	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.
2.4	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.

CHAPTER-III: **TOOLS AND PLANTS / IMTE's**

3.**0**	**TOOLS AND PLANTS / IMTE's**
3.1	T&P / IMTE's being provided by BHEL, as per TCC-I chapter XV, 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.
3.2	Besides the T&P and IMTEs being made available to contractor free of hire charges by BHEL (refer TCC-I chapter XV) , 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 TCC-I chapter XVI. 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.
3.3	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.
3.4	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.
3.5	The operation of all BHEL's/UPRVUNL T&P being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange at his own cost trained operators from BHEL approved vendors, fuel and other consumables for their operation. (Operators, fuel and other consumable for BHEL 135 MT cranes, as per availability of crane is being used by contractor along with helpers shall be provided by contractor within the final accepted rates). All lubricants for these cranes & other BHEL T&Ps such as Mobil oil, gear oil, brake oil, hydraulic oil, torque converter oil & grease etc have to provide by contractor, as required during the work.
3.6	The day to day maintenance of BHEL's T&Ps (135 MT) 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. It will be responsibility of the contractor to attend breakdowns of BHEL & UPRVUNL cranes and other BHEL T&Ps, including arranging spares & hire charges of specialist supervision as required.
3.7	The contractor shall arrange at his cost all spares needed for upkeep of 135 MT crane supplied by BHEL. For cranes, replacement of filter and repair of batteries, self, dynamo shall be the responsibility of the contractor.
3.8	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. Contract shall be responsible for marching of 135 MT crane provided by BHEL from Store/rest position to workplace and return the same after completion of job to store as per instruction of BHEL site engineer. During marching of crane, any obstruction in path like materials, pipelines etc shall be removed and restore the pipeline by contractor within quoted price.
3.9	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.
3.10	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 TCC-I chapter XVI. BHEL will provide the services of their T & Ps listed as per TCC-I chapter XV, free of charge, on sharing basis.
3.11	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.

3.12	Contractor shall provide all the necessary scaffolding materials, temporary structures, as may be required and necessary safety devices etc.
3.13	Contractor's responsibilities with regard to operator, fuel, lubricants and daily upkeep of T & P s provided by BHEL are further detailed in relevant section.
3.14	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.
3.15	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.
3.16	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 occur 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 material stacking near work site failing which BHEL may get the same done at their risk & cost.
3.17	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
3.18	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
3.19	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.
3.20	Any loss / damage to any part of BHEL T&Ps 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.
3.21	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.
3.22	The contractor shall return BHEL T&Ps 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 , 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.
3.23	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.
3.24	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
3.25	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.
3.26	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.
3.27	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.
3.28	Provision of T&Ps by BHEL shall be subject to following ; ➢ 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. ➢ 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. ➢ The contractor shall have to return the above T&Ps at the earliest in good working condition, subject to normal wear & tear. ➢ T&P issued shall be used only for the designated scope of work under specification. ➢ 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.
3.29	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.

4.0	**ERECTION**
4.1	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.
4.2	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.
4.3	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.
4.4	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.
4.5	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
4.6	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
4.7	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.
4.8	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.
4.9	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.
4.10	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.
4.11	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.
4.12	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.
4.13	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.
4.14	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.

4.15	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
4.16	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.
4.17	Whenever required the contractor shall arrange for pre-qualification of process task performers.
4.18	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 including covering of trenches. For cabling job as included in above in the scope, contractor shall supply all types of cable lugs of different sizes free of cost, bidder shall supply necessary copper-tinned cable lugs, 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.
4.19	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.
4.20	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.
4.21	The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.
4.22	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.
4.23	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.
4.24	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.
4.25	All the dampers, actuators etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre- commissioning also.
4.26	The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.
4.27	The sub-contractor shall carry out Dismantling, Removal, Shifting of any obstructing structures, pipe lines, **cables & cable trays, trench pipes, trenches, equipments,** facilities etc. as required including **restoration of the same on completion of work**. Any re routing of pipelines, cables and cable trays, trench pipes, trenches, equipments facilities etc, if required, shall be carried out by subcontractor free of cost.
4.28	All Necessary Preparation, Development, Barricading and Marking of the Area has to be made by the sub-contractor for Storage, Fabrication, and Pre Assembly & Erection of the Materials.
4.30	**WELDING**
4.30.1	Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason. The welder's is having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

4.30.2	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.
4.30.3	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.
4.30.4	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.
4.30.5	Only BHEL/CUSTOMER 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.

CHAPTER-V: APPLICATION OF INSULATION

5.0	**APPLICATION OF REFRACTORY AND INSULATION**
5.1	All attachment welding, including welding of hooks / supports as per pitch both on equipment 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.
5.2	Contractor has to supply and apply heat resistant primer on welded portions before application of insulation.
5.3	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.
5.4	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.
5.5	The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.
5.6	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.
5.7	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 occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.
5.8	Sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets 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 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
5.9	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.
5.10	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.
5.11	Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowances for the material issued are as below: 1. Wool / LRB mattresses and cladding sheets… 2% 2. Insulation bricks and mortar…….. 2% 3. Cast able refractory…… 1%
5.12	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.
5.13	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.
5.14	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.
5.15	Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.
5.16	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.

5.17	Insulation of expansion joints, dampers, etc shall be carried out after NDT / gas tightness test is completed.
5.18	Special type of Insulation wool used in pent house shall not be cut indiscriminately.
5.19	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.

CHAPTER-VI: **TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST- COMMISSIONING.**

6.0	**TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST- COMMISSIONING.**
6.1	The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. 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. 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. 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***. Contractor has to rectify all post commissioning defects in ESP and associated Ducting for a period of 01 year from date of 1st unit synchronization*****.**
6.2	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.
6.3	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.
6.4	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.
6.5	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.
6.6	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.
6.7	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.
6.8	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

CHAPTER-VII: FINAL PAINTING

7.0	**FINISH PAINTING**
7.1	The following Indian Standards may be referred to for carrying out the painting job: IS - 1303, 2379, 1477, 2524, 2395, 2338, 6278, 3140, 158, 2074, 104, and 2932.
7.2	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.
7.3	Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during long storage and handling, the same may get peeled off / deteriorate. Before erecting the material it is essential that 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 color. 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.
7.4	After the surface is prepared, one coat of Zinc Phosphate primer conforming to IS: 2074 shall be applied. After first coat is dried up completely, second coat of red oxide primer shall be applied by brushing to ensure continuous film. The **dry film thickness** of each coat shall be **minimum 25 microns**.
7.5	Synthetic enamel paint conforming to IS: 2932 shall be used for finish coats. The color/ shade shall be as approved by the customer. After cleaning the dust on the dried up primer, first coat of synthetic enamel shall be applied. After this first coat dries up hard, the surface should be wet scrubbed cutting down to smooth finish and ensuring that at no place the first coat is completely removed. After applying second coat, allowing the water to get evaporated completely, third finish coat of painting shall be applied.
7.6	Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting.
7.7	Painting and Marking/Labeling of the materials erected. Arrangement of paints is included in the Scope of Work of the Contractor within quoted rate.
7.8	After applying the primer paints, wherever required, all structure / equipment / items, shall be finish painted paints as specified by BHEL engineer. The number of coats / paint thickness shall be as indicted in drawing / documents. However at least two coats of finish painting is to be applied. In case proper finish is obtained in two coats, the contractor shall apply additional coat (s) till proper finish / paint thickness achieved. Certain equipment / Items are required to be painted with approved quality heat resistant pai primer. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.
7.9	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 color scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work
17.10	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.
7.11	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.
7.12	The painters have to undergo test and only qualified painters will be allowed to work.

MEMO for imposition of penalty against non-compliances in Quality area

The Lapse as tick marked below has been observed in your area and penalty is being imposed as per the details mentioned at the bottom of this memo:-

S. No	Nature of non- compliance	Penalty (in Rs.)	Remarks
1.	Non availability of required no. of Quality Engineers/NDT certified person as per contract	1000	Per Person per day
Calibration:-			
2.	Use of IMTEs without having valid calibration certificate	1000	Per equipment per instance
3.	Use of NDT equipment, welding equipment's without having valid calibration certificate, condition not as per requirement	1000	Per equipment per instance
Welding & NDT area:-			
4.	Unqualified Welder carrying out weld/ tack weld	1000	Per welder per instance
5.	Not using portable oven	500	Per welder per instance
6.	Not using electrodes pre- baked in master oven/ approved make of electrodes/correct electrodes as per EWS/ WPS	500	Per instance
7.	Non- removal of slag and spatters after welding	200	Per Joint
8.	Not using NDT equipment as prescribed in the manual/ contract/ guidelines	1000	Per equipment per instance
9.	Welder doing welding without job card	500	Per instance
10.	Discrepancy observed in the RT taken of weld joints vs. RT offered	2000	Per joint
Material management:-			
11.	Mismatch of location of material in store area wrt in Stock register	200	Per instance
12.	Non-compliance of preservation of material as per storage & preservation manual	1000	Per equipment
13.	Non verification of material within stipulated time as per contract	500	Per instance
Other Areas:-			
14.	Painting without surface cleaning	500	Per instance
15.	Not attending Quality meeting by the nominated member	1000	Per meeting

Details of non- compliance (Name of Sub contractors, persons, description of deficiency, etc.)

_____

_____

Penalty imposed:-

1, Rate as per above chart_____

2. No. of Persons/ equipment/ instance/ Joint/ welder/meeting. _____

3. Total Penalty= 1. X 2. =_____

Signature

(Witnessed by Sub- Contractor representative) (Witnessed by PSNR Personnel)

Name_____ Name_____

Distribution: 1. Sub- contractor 2. Head (Quality & Safety)/ BHEL PSNR