TENDER SPECIFICATION
BHE/PW/PUR/KRSR-ESP/1526

FOR

Transportation of materials from Customer storage to site of work and carrying out Erection, Testing & commissioning, and Application of Insulation/cladding of Electrostatic Precipitators & Fans (ID, PA & SA Fans) for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), UNIT # 6 (210 MW) of MSPGCL, Koradi TPS.

AT

KORADI

Dist.: NAGPUR

MAHARASHTRA

BOOK –I

TECHNOCOMMERCIAL BID (Book I & II)

Book-I consists of

- **Volume-IA : Technical Conditions of Contract**

Book-II consists of

- **Volume-IB : Special conditions of Contract,**
- **Volume-IC : General conditions of Contract**
- **Volume-ID : Forms & Procedures**

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector – Western Region-SAS
345, Kingsway, Shreemohini complex, 5th floor -Nagpur- 440 001

TENDER DOC. CONTENTS			
Volume No	Description		Hosted in website bhel.com as files titled
NIL	Tender Specification Issue Details		(Part of **Vol-IA-1526**
NIL	Notice Inviting Tender		(Part of **Vol-IA-1526**
I-A	Technical Conditions of Contract		Vol-IA- **1526**
I-B	Special Conditions of Contract		Vol-IBCD-**1526**
I-C	General Conditions of Contract		(Part of Vol-IBCD- **1526**
I-D	Forms & Procedures		(Part of Vol-IBCD- **1526**
II	Price Bid Specification		Vol-II-**1526**

Tender Specification Issue Details

TENDER SPECIFICATION No.
BHE/PW/PUR/KRSR-ESP/1526

For

Transportation of materials from Customer storage to site of work and carrying out Erection, Testing & commissioning, and Application of Insulation/cladding of Electrostatic Precipitators & Fans (ID, PA & SA Fans) for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), UNIT # 6 (210 MW) of MSPGCL, Koradi TPS.

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date :

Ref: **BHE/PW/PUR/KRSR-ESP/1526** Date: 18/08/2015

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

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To ,

Dear Sir/Madam

Sub : NOTICE INVITING 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.

1.0 **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/KRSR-ESP/1526**	
ii	**Broad Scope of job**	**Transportation of materials from Customer storage to site of work and carrying out Erection, Testing & commissioning, and Application of Insulation/cladding of Electrostatic Precipitators & & Fans (ID, PA & SA Fans) for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), UNIT # 6 (210 MW) of MSPGCL, Koradi TPS.**	
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**	***1. Sale from BHEL PS Regional office at :***	*Applicable*

		Start : 18/08/2015 , ***Closes: 07/09/2015 ,*** ***Time : 16.00 Hrs*** **2. From BHEL website (**www.bhel.com**)** Tender documents will be available for downloading from website till due date of submission.	
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 08/09/2015, Time 15.00 Hrs*** ***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be submitted at dispatch section of PSWR HQ Office after making entry/registration at the reception. For any assistance on the matter kindly contact following officials: 1. Pratish Gee Varghese / Sr Engineer (Purchase 2. Shivkesh Meena / Engineer (Purchase) 3. NIRMAL PG /Asst Engineer (PUR)	*Applicable*
vi	**OPENING OF TENDER**	***1 hour after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	***Rs 2,00,000/- (Rupees Two Lakhs Only)***	*Applicable*
viii	**COST OF TENDER**	***Rs 2000/-***	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Date: Atleast 5 days before the due date of offer submission* *Along with soft version also, addressing to the following ids;* ***nirmalpg@bhelpswr.co.in*** ***pgv@bhelpswr.co.in*** ***svm@bhelpswr.co.in***	*Applicable*
x	**SCHEDULE OF Pre**	*Date : Not applicable.*	

	Bid Discussion (PBD)		*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		*Not applicable. Annexure III of NIT)*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be intimated by Fax/E-mail. Bidders to keep themselves updated with all such information	***A**pplicable*

2.0 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, duly signed & stamped on each page, as part of offer. 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.

3.0 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 Nagpur 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 Nagpur, Sundays and second/ last Saturdays

4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Nagpur. For other details and for 'One Time EMD' please refer General Conditions of Contract.

5.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of tender documents shall be retained by the bidder for their reference

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped)**

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/ Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this	

	Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender **OR** Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender 2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

	PART-II	
	PRICE BID consisting of the following shall be enclosed	
	ENVELOPE-III superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**	
i	Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I	
ii	Volume II – PRICE BID (Duly Filled in Schedule of Rates –	

	rate/price to be entered in words as well as figures)	

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING:**	
i	o Envelopes I o Envelopes II o Envelopes III	

SPECIAL NOTE : All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

7.0 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.

8.0 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).

9.0 **Assessment of Capacity of Bidders:**
Bidders 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 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load' shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

i). Total number of Packages

Total number of Packages in hand = P

Where

- 'P' is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on HOLD due to reasons not attributable to Bidder..

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (**under execution**/ executed during the 'Period of Assessment' in all the 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 the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

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) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$)

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 '**T_T**' for total similar Packages '**P_T**' for all Regions (i.e **T_T** = T_1 + T_2 + T_3 +T_4 + .. T_N)

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores (S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5},.... S_{1-N}) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \ldots S_{1-N}$). 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 '**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_{BEHL}' for the similar Package/Packages** (**under execution**/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL**:**

Aggregate of Performance scores for all similar packages in all the Regions

= ----------

Aggregate of months for each of the similar package 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 = **P_T** ie 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 Package (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
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' (**R_{BHEL}**) in case '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.
b) 12 months preceding the cut-off month
c) 24 months preceding the cut-off month
d) 36 months preceding 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 ≤ P_{Max}
(where P is calculated as per clause 9.I)

IV. **Explanatory note**:

a) Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or CI, 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, CI, 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 TabIe-1 below), the 'PERFORMANCE' part against sl no II above, needs to

be evaluated considering all the identified packages (ie Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above

b) Identified Packages (Unit wise)

Table-1

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

c) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 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 from BHEL.

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

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 'Capacity Evaluation of Bidders'.

d) 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.

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

i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries

ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)

iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.

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

f) 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

10.0 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.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, 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.

12.0 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.

13.0 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.

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

15.0 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 point (1) above.**

16.0 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.

17.0 In case BHEL decides on a `Public Opening', the date & time of opening of the sealed 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.

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

19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDs' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.

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

21.0 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.

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

23.0 Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.

23.2 'Stand alone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into

consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected.

23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR

23.4 Prime Bidder shall be as specified in the Pre Qualification Requirement, else the bidder who has the major share of work

23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0

23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'

23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified

23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.

23.9 Prime Bidder shall be responsible for the overall execution of the contract

23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats

23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.

23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.

23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also

24.0 The bidder shall submit 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.

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

26.0 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

It may please be noted that guidelines/rules in respect of suspension of business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed.

for BHARAT HEAVY ELECTRICALS LTD

AGM Pur

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Important Information.
03. Annexure-3: Check List.
05 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Transportation of materials from Customer storage to site of work and carrying out Erection, Testing & commissioning, and Application of Insulation/cladding of Electrostatic Precipitators & & Fans (ID, PA & SA Fans) for the work of Main Plant Package of Energy Efficient Renovation & Modernization (EE R&M), UNIT # 6 (210 MW) of MSPGCL, Koradi TPS.
Tender NO	**BHE/PW/PUR/KRSR-ESP/1526**

SL NO	**PRE QUALIFICATION CRITERIA**	**Bidders claim in respect of fulfilling the PQR Criteria**	
		Name and Description of qualifying criteria	Page no of supporting document. **Bidder must fill up this column as per applicability**
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium/Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	**APPLICABLE**	
B	Technical Bidder should satisfy any of the following criteria's (B1. Or B.2) in the last seven (7) years as on latest date of bid submission as below: **B.1** Executed E, T & C of one Boiler /ESP of one unit of 100 MW or above **B.2** Executed E,T & C of one STG of 190 MW or higher under direct order of BHEL.	**APPLICABLE**	
C-1	**Financial** **TURNOVER** Bidders must have achieved an average annual financial turnover (audited) of	**APPLICABLE**	

	Rs.120 Lakhs or more over last three Financial Years (FY) i.e. 2012-2013, 2013-14, 2014-15 OR 2011-2012, 2012-2013, 2013-14 if Annual Accounts for FY 2014-15 are not audited.		
C-2	**NETWORTH** (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive.	**APPLICABLE**	
C-3	**PROFIT** Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1 above based on latest Audited Accounts.	**APPLICABLE**	
D	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	**APPLICABLE**	By BHEL
E	Approval of Customer (if applicable) **Note:** Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.	**APPLICABLE**	BY BHEL
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		BY BHEL
F	Technical Tie up criteria (if applicable)	Not applicable	
	Explanatory Notes for the PQR (unless otherwise specified in the PQR): 1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures 2. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e total divided by three. 3. C-2:-NETWORTH : Shall be calculated based on the latest Audited		

Accounts as furnished for C-1 above. Net worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies)

4. C-3:- PROFIT : shall be NET profit (PAT + Non cash expenditure viz depreciation) earned during any one of the three financial years as in C-1 above
5. ~~'Additional' Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified :~~
   1. ~~Bidder should have executed similar work of any one of the following:~~
      a. ~~One (1) work of value not less than Rs XXX~~
      ~~OR~~
      b. ~~Two (2) works of not less than Rs YYY~~
      ~~OR~~
      c. ~~Three (3) works of not less than Rs ZZZ~~

   ~~(Value XXX, YYY, ZZZ shall be as indicated by BHEL~~
   2. ~~'Similar' work for criteria 5 above means~~
      a. ~~Civil or Structures or Civil & Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works~~
      b. ~~Electrical works in respect of 'ELECTRICAL'~~
      c. ~~CI works in respect of 'CI' Works~~
      d. ~~Material Handling and/or Management works in respect of 'MM' works~~

6. Time period for achievement of the 'Technical' criteria of PQR (as in 'B' above) will be the last 7 years ending on the 'latest date' of Bid submission
7. 'EXECUTED' means the Vendor should have achieved the criteria specified in the Technical criteria of PQR (as in 'B' above) even if the Contract has not been completed or closed, Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:

   1. "BOILER LIGHT UP" in respect of Boiler & Aux and ESP
   2. Term 'Commissioning' indicated in PQR refers to 'assistance to commissioning' / 'commissioning'
   3. "SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG
   4. "STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping
   5. "HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping
   6. ~~"CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears.~~
   7. ~~"Completion of RCC Shell and liner (steel or brick as per tendered scope) up to the HEIGHT specified using slip form" in case of RCC Chimney.~~

	~~8. Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works~~ ~~9. 'Readiness for coal Filling" in respect of Bunker Structure Work.~~ 8. Boiler means HRSG or WHRB or any other types of Steam Generator consisting of Boiler structure, Non pressure parts and pressure parts. 9. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines 10. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating in terms of MW shall be considered for evaluation. 11. ~~In case the experience/PO/WO certificate enclosed by bidders do not have separate break up prices for the E&C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply and erection of Electrical & CI and other works if any), then value of Erection and Commissioning for the Electrical & CI portion shall be considered as 15% of the supply & erection of Electrical & CI, unless otherwise specifically indicated in the PQR~~. ~~12. Scope for capital overhaul of STG shall cover Bearing Inspection work and overhauling of all cylinders of the Turbine unless otherwise specifically indicated in the PQR.~~ 13. In case the tendered scope is not a Pulverised Fuel Boiler, experience of Oil/Gas Fired Boilers also can be considered unless otherwise specifically indicated in the PQR 14. The value of work (Experience submitted against PQR B) shall be updated as per the PVC indices for "All India Avg. Consumer Price Index for Industrial Workers" with base month as date of execution (completion of contract/work) and indexed upto two months prior to bid opening month.

Bidder shall submit above pre-qualification criteria format, duly filled in, specifying respective Annexure Number against each criterion and furnish relevant document (Copies of Work order / LOI / LOA and work completion certificate) in the respective Annexure in their offer.

ANNEXURE-2

IMPORTANT INFORMATION

Sealed Tenders shall be submitted at following address to AGM /Purchase BHEL PSWR NAGPUR:
BHEL PSWR, SRIMOHINI COMPLEX, 345 KINGSWAY, NAGPUR 440001, INDIA

All correspondences regarding this tender shall be addressed to AGM / PURCHASE BHEL PSWR at above address. Bidders may also opt to correspond with following BHEL officials regarding this tender through email at following email ids . However please be informed that sealed tenders shall necessarily be submitted in original at above address:

AGM Purchase, Email id: rajeebc@bhelpswr.co.in. Ph: +91 – 712 – 3048633

Sr Engineer Purchase, Email: pgv@bhelpswr.co.in, Ph: +91 – 712 – 3048713
Engineer Purchase, Email id: svm@bhelpswr.co.in , Ph: +91 – 712 – 3048715
Asst. Engineer, Email: nirmalpg@bhelpswr.co.in, 0712-3048732

1. **The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site (www.bhel.com ---> Tender Notification -→ List of Banned Firms)**

2. **Refer Chapter XII of Volume IB Special Conditions of Contract regarding Suspension of Business Dealings: The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' has now been uploaded on www.bhel.com on "supplier registration page" at the following link: http://www.bhel.com/vender_registration/pdf/Suspension-of-Business-Dealings-with-Supplier-issued-Sept13_abridged.pdf**

3. **All Statutory Requirements as applicable for this project shall be complied with.**

4. **Please take note of following Revised Tender Clauses:**

   i. Notice Inviting Tender: Sl No 9

ii. General conditions of Contract: Clause No 1.15.13 (New), Clause No 2.8.3, 2.8.4 and 2.8.5

5. Following Notes are added to Form F- 15 of Volume I D 'Forms & procedures'

i. It is only indicative and shall be as per the online format issued by BHEL time to time.
ii. No request will be entertained after specified date of the current month w.r.t the changes requested in the scores of immediate previous month.

6. PRICE VARIATION CLAUSE

Revision in Price Variation Compensation Clause no. 2.17 of Vol I C GCC:

Clause No. 2.17.9 of Vol IC GCC is revised as below:-
PVC shall be applicable only during the extended period of contract (if any) after the schedule completion date for the portion of work delayed / backlog for the reasons not attributable to Contractor. However total quantum of Price Variation amount payable/recoverable shall be regulated as follows:

i. For the portion of backlog attributable to the contractor and for the portion of backlog due to force majeure condition during contract period, PVC shall not be paid.
ii. For the period of force Majeure during extended contract period, PVC will be as per the indices applicable at the beginning of the force majeure period.
iii. void
iv. The total amount of PVC shall not exceed 20% of the cumulatively executed contract value during the extended contract period. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works.

Clause No. 2.17.5 of is modified as below:-

Base date shall be the calendar month of the (schedule completion date of the contract). Schedule Completion date shall be the actual start date plus contract period as defined in Chapter VI 'Vol IA TCC'

7. <u>OVER RUN COMPENSATION</u>

Modification in Price Variation Compensation Clause no. 2.12 of Vol I C GCC:

Clause No. 2.12 of Vol IC GCC is Revised as below:-

IF THE CONTRACT IS EXTENDED BEYOND THE CONTRACT PERIOD FOR ANY REASON OTHER THAN THOSE ATTRIBUTABLE TO THE CONTRACTOR OR FORCE MAJEURE CONDITIONS, THE CONTRACTOR WILL BE COMPENSATED BY PAYMENT OF OVERRUN CHARGES AT THE RATE OF **RS.1,00,000/- (Rupees One Lakh Only)** PER MONTH. OVERRUN COMPENSATION WILL BE PAID FOR THE EXTENSION ATTRIBUTABLE TO BHEL ONLY. NO OVERRUN COMPENSATION WILL BE PAYABLE

FOR THE EXTENSION ON ACCOUNT OF REASONS ATTRIBUTABLE TO CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS. OVERRUN COMPENSATION FOR ELIGIBLE PERIOD SHALL BE IN PROPORTION TO THE PROGRESS ACHIEVED AGAINST THE PLAN FOR RESPECTIVE PERIOD.

8. Acceptance of Bank Guarantee (BG)

Revision in Acceptance of Bank Guarantee (BG) Clause no. 1.10.3 (V) of Vol I C GCC:

Clause No. 1.10.3 (V) of Vol IC GCC is revised as below:-

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below :

State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank
HDFC Bank Ltd.
The Hongkond and Shanghai Banking Corporation Ltd.
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that it is enforceable at Nagpur, Maharashtra

c. Any private sector banks, with a clause in the text of Bank Guarantee that it is enforceable by being presented at any branch of the bank

Note: "Bank Guarantees issued by Co-operative Banks are not acceptable".

9. **VOID**

10. Broad Terms & Conditions of Reverse Auction

In continuation to Clause 19.0 of NIT (Notice Inviting Tender) following are the broad terms and conditions of Reverse Auction is given in Annexure V of NIT:

10.1. Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

10.2. BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance 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 Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid" in the Reverse Auction. Non-submission of „online sealed bid" by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

10.3. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

10.4. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

10.5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

10.6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

10.7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

10.8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

10.9. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for noncompliance to BHEL standard Commercial terms & conditions)

for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

10.10. Reverse auction will be conducted on scheduled date & time.

10.11. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10.12. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

10.13. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL‟s standard practice.

10.14. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the "Business Rules of Reverse Auction", which will be communicated before the Reverse Auction.

10.15. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

10.16. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

10.17. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

ANNEXURE- 3

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	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Fax No:
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER

		APPLICABILITY	BIDDER REPLY
5	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
6	Whether Audited profit and Loss Account for the last three years submitted	Applicable	YES/NO
7	Whether Copy of PAN Card submitted	Applicable	YES/NO
8	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
9	Whether duly filed & Signed Integrity Pact (Annexure III of NIT) submitted	Applicable	YES/NO
10	Declaration by Authorised Signatory	Applicable	YES/NO
11	Whether No Deviation Certificate submitted	Applicable	YES/NO
12	Whether Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
13	Whether Declaration for relation in BHEL submitted	Applicable	YES/NO
14	Whether Non Disclosure Certificate submitted	Applicable	YES/NO
15	Whether Bank Account Details for E-Payment submitted	Applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Applicable	YES/NO
17	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	Not Applicable
18	Whether Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
19	Whether Analysis of Unit rates submitted	Applicable	YES/NO

NOTE : STRIKE OFF 'YES' OR 'NO', AS APPLICABLE

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

1526

VOLUME – IA
Part I & II
TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

CONTENTS

PROJECT INFORMATION

1. Purchaser / Owner : **MSPGCL**

2. Project Title : Koradi Thermal Power Station Unit # 6(210 MW)

LOCATION AND APPROACH :

1. Location :KORADI, DIST. :NAGPUR, MAHARASHTRA (INDIA)

2. Nearest City : The site is about 14 Km from Nagpur city.
3. Nearest Air Port : Nagpur
4. Railway Approach : Nearest Railway Station : Nagpur

The Bidder shall visit site and get acquainted himself with the conditions prevailing at site before submission of the bid. The information's given here in under are for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site data's/information's as may be necessary shall have to be obtained /collected by the Bidder.

SCOPE OF WORKS

2.0 INTRODUCTION

Unit # 6 of Koradi Thermal Power Station is a 210 MW Unit commissioned in 1982. The Boiler is of BHEL design.

The Electrostatic Precipitator originally supplied by BHEL is of size 2xFAA-5x36-2x9590-2 and is of four passes. Later two passes of ESP were retrofitted with Bag Filters. Now, as required by MAHAGENCO, the existing ESP and Bag filter is proposed to be replaced with new ESP of new state of art technology.

As per the proposal, the existing bag filters / ESPs are to be dismantled completely. Then the new ESP with new foundation / supporting structure is to be erected during the shutdown of the unit.

2.1 This tender is for Unit# 6 (210 MW) sets.

Transportation of materials from Customer storage to site of work and carrying out Erection, Testing & commissioning and Application of Insulation/cladding for the work of Retrofitting of existing Electrostatic Precipitators & Fans (ID-2 Nos, PA-2 Nos & SA-2 Nos).

The scope of work for ESP & Fan per boiler is limited to as follows.

2.1 Erection and commissioning of new ESPs including air-in leak test, Gas distribution test and commissioning of ESP controllers and IOS.

2.2 Erection and commissioning of new ID Fan (2 nos), PA Fan (2 nos), SA Fan (2 nos)

2.2 Detail scope for Erection of new ESP in Unit # 6 (210 MW)

This work involves Receipt of materials/components, loading and transportation of erection materials from storage yard to erection site, stacking, storage and preservation, pre assembly, erection, testing and commissioning, Trial operation and reliability operation of equipments of new ESP including Fans (ID-2 Nos, PA-2 Nos,SA-2 Nos). The work includes erection of electrical components like geared motors, Transformers, heaters etc. However, the commissioning of electrical equipment erected by tender will be carried out by electrical group to provide the required assistance during commissioning activities. The work scope includes application of thermal insulation and cladding. Scope also includes supply and application of final painting as required.

The following activities are based on technical offer of BAP/ Ranipet and tender specification.

2.2.1 Mechanical work:

1. Erection, Alignment, Welding and NDT of precipitator supporting structure consisting of pre-fabricated columns cross ties, foot plates and foundation bolts

2. Erection, Alignment, Welding and NDT of slide supports to take care of casing thermal expansions.

3. Erection, Alignment, Welding and NDT of ESP casings consisting of prefabricated wall and roof-panels fabricated steel plate of adequate thickness reinforced with vertical columns and intermediate stiffeners to withstand the negative pressure and earthquake. The casing is provided with access doors.

4. Erection, Alignment, Welding and NDT of ESP outer roof fabricated from chequered plate of adequate thickness forming an inspection floor on top of ESP casing.

5. Erection, Alignment, Welding and NDT of Insulators - each set consisting of four support insulators per bus of the field, one shaft insulator for each emitting rapping mechanism and one bushing insulator for direct connecting to the transformer/rectifier.

6. Erection, Alignment, Welding and NDT of Oil pan for TR set at roof.

7. Erection, Alignment, Welding and NDT of insulator housings complete with HT ducting for connecting transformer. The insulator compartments are of double walled construction with thermal insulation and are provided with access doors for inspection / service of support insulators.

8. Erection, Alignment, Welding and NDT of high voltage emitting system consisting of frame work supported from support insulators, emitting electrodes and rapping mechanism including rapping shafts, shaft insulators, angularly displaced tumbling hammers, drive arrangements and geared motor.

9. Erection, Alignment, Welding and NDT of collecting electrode system consisting of supporting arrangement, collecting electrodes fabricated from roll-formed sheets of steel, rapping mechanism including shock bar, rapping shafts, angularly displaced tumbling hammers, drive arrangement and geared motor.

10. Erection, Alignment, Welding and NDT of pyramidal ash collection hoppers fabricated from steel plate of adequate thickness, complete

with SS lining, high level ash level indicators, thermostatically controlled heating elements of adequate heating capacity, outlet flanges, poke holes, access doors and walkways beneath the hopper

11. Erection, Alignment, Welding and NDT of inlet and outlet funnels of steel plate of adequate thickness reinforced with beams and stiffeners and complete with splitters, guide vanes etc.

12. Erection, Alignment, Welding and NDT of gas distribution screens consisting of three perforated screen (primary, secondary & inlet funnel screens) arrangement at the inlet and a single plain screen arrangement at the outlet for each casing. Out of these the primary & secondary screens are provided with rapping system.

13. Thermal insulation for the precipitator walls, roof panels, hoppers and connecting funnels with suitable cladding material and other fixing materials like studs, retainers, etc.

14. Erection, Alignment, Welding and NDT of gas screening plates for casing and hoppers Access doors for casing & hoppers

15. Stairs and walkways for the precipitator.

16. Erection, Alignment, Welding and NDT of test connections of standard size for installation in ducts for the measurement of the velocity, temperature and dust concentration at the inlet and outlet of the precipitator.

17. Erection, Alignment, Welding and NDT of Water washing system consisting of pipes, valves and hoses.

18. Conduct of flow model study at our laboratory on the final ducting layout, starting from air heater outlet duct to ID fan inlet duct including ESP.

19. Conduct of CFD analysis.

20. Conducting Gas Distribution test at site as pre-commissioning activity

21. Conduct of performance guarantee test at site.

2.2.2 Electrical Works:

1. Erection and commissioning of transformer rectifier units of adequate voltage & current rating with associated control cubicles.

2. Erection and commissioning of electrically operated lifting and handling arrangement (of capacity 3MT) for the transformer rectifier sets mounted on the precipitator roof.
3. Erection and commissioning of High voltage bus duct connections between the transformer rectifier and the high voltage emitting system complete with bushing insulator and disconnecting switches.
4. Erection and commissioning of mechanical Interlock system consisting of key exchange boxes and interlocks for personnel protection arranged so that access to any high voltage equipment is prevented until the high voltage system is de-energized and grounded.

2.2.3 Assembly of Electrostatic Precipitator

2.2.3.1
Wherever called for, pre-assembly of supporting structures, casing walls, inlet outlet funnels, hoppers etc have to be done, on ground.

2.2.3.2
Loading of collecting electrodes either from top or bottom, to be decided suiting site conditions, shall be done with due care as per instructions.

2.2.3.3
Straightness of all collecting electrodes has to be checked on ground prior to loading in to the field.

2.2.3.4
Bundle of collecting electrodes should be handled only with special lifting beam and slings supplied for the purpose.

2.2.3.5
BHEL will supply Huck bolting M/c with necessary auxiliaries free of charges. However, electrical connections, operation etc shall be arranged by the Contractor.

2.2.3.6
Clearances as prescribed amongst collecting electrodes and with casing walls have to be maintained. Spot heating of collecting electrodes, wherever called for, shall be done as part of work to achieve the required clearances.

2.2.3.7

Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP are in the scope of work. However testing & commissioning will be done by other agency.

2.2.3.8
Installation of high voltage interlocks (excepting rotary switch interlock of switchgear panels) is in the scope of work.

2.2.3.9
Complete erection, alignment, testing, pre-commissioning and commission etc for drive motors of collecting electrodes and emitting electrode rapping mechanism is in the scope of work.

2.2.4 **AIR LEAK TEST**

After erection of ESP and before clearing for insulation, air leak test has to be carried out. Necessary equipment like, air blower, ventury and instrumentation etc. will be provided by BHEL free of charges. Handling at stores, transport, erection, commissioning and carrying out the leakage test, attending to the leakages till satisfactory sealing / leak profanes shall be in scope of the work. Contractor shall dismantle the test equipments and return to BHEL stores in good condition after due reconciliation, cleaning and servicing. No separate/ additional payment is envisaged for the above.

2.3.1: SCOPE OF WORK FOR PRIMARY AIR FAN (AP 2 – 17/12)

Two nos. PA fans, each consisting of the following items

- Rotor assembly consisting of shaft with bearing assy, impeller assy with blades and Servomotor
- Static parts consisting of suction box, impeller housing, diffuser, inspection doors, drains, lifting eyes
- Base plates and foundation fasteners
- Anti-friction bearings
- Coupling between fan & motor
- Forced oil lubricating system
- First fill of lubricants
- Silencer, bird screen & rain hood
- Fan bearing thermometers (MIST & RTD)

2.3.2: SCOPE OF WORK FOR INDUCED DRAFT FANS (with VFD) (NDZV 33)

Two nos. ID fans, each consisting of the following items

- Rotor assembly consisting of shaft and impeller
- Static parts consisting of suction box, spiral casing, inspection doors, drains, lifting eyes

- Base plates for fan casing
- Sleeve bearings
- Pedestals for fan bearings
- Foundation fasteners
- Guard for coupling
- Inlet Damper control
- Forced oil lubricating system
- First fill of lubricants
- Silencer, bird screen & rain hood
- Fan bearing thermometers (MIST & RTD)

2.3.3: SCOPE OF ERECTION WORK FOR SEAL AIR FANS (NDV 11.8)

Two nos. Seal air fans, each consisting of the following items

- Rotor assembly consisting of shaft and impeller
- Static parts consisting of suction box, spiral casing, inspection doors, drains, lifting eyes
- Anti-friction Bearings
- Base plates for fan casing
- Pedestal for fan bearings
- Foundation fasteners for fan
- Drive Motor with foundation fasteners (LT Type)
- Flexible coupling with guard
- First fill of lubricants
- Fan bearing thermometers (MIST)

2.3.4 General Scope for Erection of Rotating Machinery

a Specifications covered under the following para and also other relevant specifications contained in other paras elsewhere in this tender document will be applicable for rotating machines like ID / PA fans, Seal air fans, and other similar auxiliaries.

b All lubricants for testing, preservation and lubricants for Trial runs of the equipment shall be supplied by BHEL as free issue. All services including labour shall be provided by the Contractor for drawing these from BHEL / customer's stores, transporting, handling, filling, emptying, re-filling, accounting and return of surplus lubricants / empty containers / old & used lubricants after draining etc. Contractor should clean the spilled / leaking lubricants thoroughly; consumables for such cleaning will be in Contractor's scope.

c All rotating machinery and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and re-fitting before erection. Also, the equipment may have to be checked for clearances, tolerances at any stage of the work including during testing, commissioning etc. shaft of the rotating machines shall

be rotated periodically to avoid damages. All these shall be part of work.

d Trial run of the drives in un-coupled state and then coupled with equipment has to be done after necessary alignment.

e Forced lube oil systems including lube oil piping of drives, rotating equipment's etc. form part of the work under these specifications. Hydraulic test of oil coolers, oil piping etc. are in the scope of work. Where required cooler may have to be dismantled for hydraulic test and re-erected thereafter as part of work.

f Certain rotating machinery, after testing, pre-commissioning may have to be re-aligned/hot aligned and vital clearances re-set. This may necessitate disconnection of cabling, removal of certain instruments etc. and restoration thereafter.

g Protective lubricant coats / fill provided on / in the critical area of equipment have to be removed at appropriate stage and regular lubricants, after removal / cleaning of protective coat / fill, as per specifications should be filled / applied. Cleaning / flushing agents / oils will be provided by BHEL.

h Chemical cleaning, steam blowing and air drying of the connecting pipes for the lube oil system has to be carried out wherever required as per instruction manuals / drawings. Chemicals, suiting BHEL specification, for such chemical cleaning is in the scope of Contractor.

i Even though rotating machines may be grouted to foundation using non-shrink grout mix, blue matching of packer plates / shims with foundation / between packers / equipment base should be done as incidental to work wherever instructed by BHEL Engineer.

j) Skid mounted equipment may need checking, re-setting due to various reasons as incidental to work.

k) There are 8 nos of XRP 1043 Mills per Unit with Planetary Gear Box

The following fans are offered:

PA fan: AP-2 17/12

ID fan: NDZV 33

Seal Air fan: NDV 11.8

2.4: INSULATION & CLADDING:

100 % Insulation & cladding as per specification

2.5: PAINTING

The scope of work shall include supply and application of final painting for all the components.

2.5.1
All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.

2.5.2 Touch-up painting on damaged areas -

a)For coatings damaged up to metal surface

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

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

Tentative Painting scheme is enclosed for information. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents. Similarly, documents as provided progressively during the execution of work for all other products/ equipment etc. shall be applicable.

2.5.3
Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder.

(a.) clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
(b.)painting procedure to be followed as mentioned above for touch-up painting on damaged areas.

2.5.4
The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/customer engineer at site for the equipment/ components covered in these specifications.

2.5.5
All exposed metal parts of the equipment including piping, structures, hand railing, grating etc. shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanized wire brushing, scrapping, sand blasting etc and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.

2.5.6
In certain isolated instances where it is not possible to clean the equipment as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

2.5.7
Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The Contractor at his own cost shall provide all the consumables and application implements.

2.5.8
During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, Contractor shall repair the same free of cost to BHEL. BHEL will make available only the primer and paints free of any charge to Contractor.

2.5.9
Specified drying time shall be permitted from one to another coat.

2.5.10
This work requires working at higher altitudes from ground level to as high as 70 m and more. The work spread is also substantial involving

substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc. and climber used should be of standard quality for safe and smooth execution of work.

2.5.11
Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.

2.5.12
Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.

2.5.13
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc. will be carried out by brush painting. However, areas/equipment inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.

2.5.14
The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc. during execution of the work.

2.5.15
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

2.6 ESP Terminal points

1. Inlet flange of the inlet funnels of the Precipitator system.
2. Outlet flange of the outlet funnels of the Precipitator system.
3. Outlet flange of the pyramidal dust hoppers.
4. Base plate of the precipitator supporting columns.
5. Output terminal of NTIOS for DDCMIS feedback.

6. Input terminals ESP LTMSB panel.
7. Outlet of TR set oil drain valve at ESP ground level.
8. Terminal point for service supply near first row of ESP columns at 3.0m elevation for ESP washing for each boiler.

2.7 ESP Performance Guarantee

Performance test will be conducted at site to demonstrate the guaranteed values.

2.7: PG TEST TAPPING POINTS

Installation and welding of Tapping Points for taking performance test measurements shall be carried out by the contractor as part of this work for the equipments covered under this tender specification under the guidance of BHEL engineer. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

PG TEST:

1. Installation of temporary pipes line and its termination with isolating valves, nipples and fittings etc.
2. Installation of flow nozzle in condensate line, mounting of thermo wells as required.
3. Lying of compensating cables and lead wire with termination at input/output module and field.
4. Installation of instruments like pressure transmitter, thermocouples, RTDs and power meter etc.
5. Installation of data logger system for conducting PG Test.
6. Providing manpower for conducting PG Test.
7. Dismantling of all instruments after completion PG Test.

2.8 Collection efficiency

BHEL guarantees a minimum collection efficiency of 99.887 % corresponding to an outlet emission of 70 mg/Nm³ with first field in all passes (n-1 fields) out of operation while boiler is operating at TMCR-WC condition firing at following operating parameters.

1	Flue Gas flow rate (wet)	m³/s	429
2	Inlet Gas temperature	Deg C	152
3	Dust concentration at ESP inlet (wet)	gm/Nm³	62

2.8.1 Correction factors

At the time of guarantee testing, should the operating conditions deviate from the design conditions, the following corrections shall be applied on the measured efficiency to correct the same to the design conditions and compare to the guarantee values. The test value shall be corrected to guarantee conditions in the following manner

$Ec = 1 - e^{y}$

Where,

$$Y = \left[\frac{Vm}{Vg}\right]^{0.5} \times \left[\frac{1}{Ca.Cb}\right] \times Ln\ (\ 1 - E_m\ )$$

Vg = Guarantee point gas flow (429 m^3/sec)

Vm = Measured gas flow (m3/sec)

Em = Measured test efficiency

Ln = Logarithm to the base e

C_a = Correction factor for the variation in inlet flue gas temperature to ESP

C_b = Correction factor for variation in inlet dust concentration to ESP

The corrected emission at design condition = (1 – E_c) X Design inlet dust concentration i.e. 62.0 gm/Nm3

2.9 PRE-COMMISSIONING TESTS, COMMISSIONING AND POST COMMISSIONING

4.10.1 Commissioning of the ESP & Fan equipment with associated Aux. and other Equipment's with auxiliaries shall involve the following tests and activities of the equipment erected:

(a) Trial run of Fan and other various rotating machineries / pumps as per tender specification.
(b) Trial run of motors/ drives for various auxiliaries.
(c) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.
(d) Servicing of all valves (Hydraulic/Electrical/manually operated), and fittings.
(e) Contractor shall carry out disassembly and reassembly of vulnerable components like gauges, instruments etc. as instructed by BHEL during this process.
(f) Trial operation
(g) PG Test.

2.10 T&P, cranes, erection tools etc.

All the tools tackles, Cranes (except those being provided by BHEL), Derricks arrangements (Structural material for fabrication of Derik will be provided by BHEL on returnable basis) required for satisfactory and safe execution of work to be arranged by contractor at his cost. The quoted rate includes entire completion of work including arrangements for labour colony for their workers stay & their transportation.

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 erection of new ESP & retrofitting 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 erection.

Bidders are strongly advised to visit the site along with BHEL officials 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.

All the above activities included in the quoted rate. No separate amount will be paid for any work. The ESP R&M work completion means completion of work in all respects and takeover by customer. Any miscellaneous works arises for satisfactorily completion of work to be carried out by bidder without any extra amount.

SPECIAL NOTES:

1. Fuel for operation of the BHEL Cranes including loading, unloading, shifting, and assembly, dissembling arrangement to be provided by Bidder.

2. Bidders are strongly advised to visit the site to acquaint themselves with the working conditions and the project requirements for execution of the job.

Note:
FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT CHAPTERS IN THIS BOOK

2.11 METHOD STATEMENT FOR ESP R&M WORK

The Electrostatic Precipitator originally supplied by BHEL is of size 2xFAA-5x36-2x9590-2 and is of four passes. Later two passes of ESP were retrofitted with Bag Filters. Now, as required by MAHAGENCO, the existing ESP and Bag filter is proposed to be replaced with new ESP of new state of art technology.

As per the proposal, the new ESP with new foundation / supporting structure is to be erected during the shutdown of the unit.

Sl.No.	Activity Description	Method Statement	T&P and others Input Required
1	***Pre shutdown works***		
1.1	Site Mobilization		Approved BOM, Design and drawing documents.
1.2	Establishment of vendor office, arrangement for labor accommodation.	To prepare office and Labor colony, Obtaining labor license, insurance, PF accounts and Gate pass etc.	Open area space with facility of approach, drinking water, and power supply.
1.3	Readiness of fabrication yard with power connection point.	Leveling if required, Making pre assembly bed, installation of panel board switch, cable laying for power connection	Open area space near to working area, Approach, water, and power supply point.
1.4	Pre-assembly of slide supports intermediate structure for Pass A&B (Total 14 fields)	Pre-assembly of supports intermediate structure according to gas flow direction.	Materials, drgs, FQP, Hydra, cutting and welding accessories and transportation arrangements for shifting.
1.5	Pre-assembly of hoppers.	Pre-assembly of hoppers with fabricated supplied plate. required welding and kerosene test, DP test-(Total no of hoppers – 56)	Materials, drgs, FQP, Hydra, cutting and welding accessories and transportation arrangements for shifting.
1.6	Pre-assembly of Inlet and outlet funnels.	Pre-assembly of Inlet and outlet funnels of steel plate of adequate thickness reinforced with beams and stiffeners and complete with splitters, guide vanes etc.	Materials, drgs, FQP, Hydra, 75/100 T crane, cutting and welding accessories and transportation arrangements for shifting.
2	**Unit Shutdown Work**		
2.1	Taking over civil foundations.	As per log sheets	FQA, Drawings,
2.2	**ESP ERECTION WORK (Worked shall be done in two shift)**		
	Activity Description	**Method Statement**	**T&P and others Input Required**
2.2.1	Erection of supporting structure.	Erection of supporting structure consisting of pre-fabricated columns cross ties, foot plates and foundation bolts.	Tower crane/ Tire mounted telescopic crane, Hydra and other crane.
2.2.2	Erection of slide supports to take care of casing thermal expansions	SlideBearing alignment and then Erection of intermediate frame assembly from front to rear.	Tower crane/ Tire mounted telescopic crane round o'clock parallel in both passes.
2.2.3	Erection of ESP casings consisting of prefabricated wall.	Erection of ESP casings with the help of tower crane and the other side crane .Work to be parallel from the four corners.	Tower crane/ Tire mounted telescopic crane

2.2.4	Erection of emitting system.	Erection of emitting system consisting of frame work supported from support insulators. Four fields can be taken together for parallel work with the help of tire mounted crane outside of ESP and with the help of winches inside the fields.	Winches, Tower crane/ Tire mounted telescopic crane
2.2.5	Erection of collecting electrode system.	Erection of collecting electrode system consisting of supporting arrangement .Four fields can be taken together for parallel work, feeding can be done from top to bottom and bottom to top. Four side fronts to make available at the same time.	Winches, Huck Bolting M/c
2.2.6	Collecting Rapping mechanism.	Rapping mechanism including shock bar, rapping shafts, angularly displaced tumbling hammers, drive arrangement and geared motor. All available fields can be taken together in parallel work after loading of collecting electrode.	Materials, drgs, FQP, Huck Bolting M/c
2.2.7	Erection of emitting electrodes and rapping mechanism.	Emitting electrodes and rapping mechanism including rapping shafts, shaft insulators, angularly displaced tumbling hammers, drive arrangements and geared motor. All available fields can be taken together in parallel work, it will be depends on fast fronts availability after gauge checking and alignment of fields.	Stretching Tools, Materials, drgs, FQP
2.2.8	Erection of gas distribution screens.	Erection of gas distribution screens consisting of three perforated screen (primary, secondary & inlet funnel screens) arrangement at the inlet and a single plain screen arrangement at the outlet for each casing. Out of these the primary & secondary screens are provided with rapping system.	Materials, drgs, FQP
2.2.9	Erection of Roof-panels and Insulators.	Insulators - each set consisting of four support insulators per bus of the field, one shaft	Winches, Tower crane/ Tire mounted telescopic crane

		insulator for each emitting rapping mechanism and one bushing insulator for direct connecting to the transformer/rectifier.	
2.2.10	Erection of Insulator housings.	Erection of Insulator housings complete with HT ducting for connecting transformer. The insulator compartments are of double walled construction with thermal insulation and are provided with access doors for inspection / service of support insulators.	Winches, Tower crane/ Tire mounted telescopic crane
2.2.11	Erection of ESP outer roof.	Erection of ESP outer roof fabricated from chequered plate forming an inspection floor on top of ESP casing. It can be placed after rain water test and insulation on the top of inner roof.	Tower crane/ Tire mounted telescopic crane
2.2.12	Erection of inlet and outlet funnels	Inlet and outlet funnels can be erected any time after GD Screen erection. To take care of the load of pre-assembled funnels during erection.	Winches, Tower crane/ Tire mounted telescopic crane
2.2.13	Electrically operated lifting and handling arrangement.	Electrically operated lifting and handling arrangement (of capacity 3MT) for the transformer rectifier sets will be mounted on the precipitator roof after completion of outer roof.	Winches, Tower crane/ Tire mounted telescopic crane
2.2.14	Erection of transformer rectifier units.	Erection of transformer rectifier units with associated control cubicles. Each transformer rectifier set is installed with one number of the latest version of Microprocessor based Areca Controller. The transformer rectifier units are designed for outdoor application.	Winches, Tower crane/ Tire mounted telescopic crane
2.2.15	Erection of Oil pan.	Erection of Oil pan for TR set at roof	
2.2.16	Erection of High voltage bus duct connections.	High voltage bus duct connections between the transformer rectifier and the	Winches, crane

		high voltage emitting system complete with bushing insulator and disconnecting switches.	
2.2.17	Provision of Mechanical Interlock system.	Mechanical Interlock system consisting of key exchange boxes and interlocks for personnel protection arranged so that access to any high voltage equipment is prevented until the high voltage system is de-energized and grounded.	Materials
2.2.18	Erection of hoppers (Total no of hoppers – 56).	Wherever collecting electrode will be loaded from top then it will be erected advance in time, either it can be erected after erection of collecting electrode system consisting of supporting arrangement, Rapping mechanism including shock bar.	Winches
2.2.19	Hoppers, complete with SS lining, high level ash level indicators, and thermostatically controlled heating elements, outlet flanges, and poke holes.	Parallel work can be done just after completion of hopper erection, welding and alignment.	Materials
2.2.20	Erection of gas screening plates.	Gas screening plates for casing and hoppers. Access doors for casing & hoppers to be completed before application of insulation.	Materials
2.2.21	Water washing system.	Provision of Water washing system consisting of pipes, valves and hoses.	Materials
2.2.22	Erection of access doors and walkways beneath the hopper.	Completion just after erection, welding and alignment of hoppers.	Materials
2.2.23	Stairs and walkways for the precipitator.	This work will be completed after casing wall erection.	Materials
2.2.24	Arranging the air in leakage test materials, test instruments	Erection of test connections of standard size for installation in ducts for the measurement of the velocity, temperature and dust concentration at the inlet and outlet of the precipitator.	
2.2.25	Air in leakage test.		Blower and venture

2.2.26	Application of Thermal insulation.	Application of Thermal insulation for the precipitator walls, roof panels, hoppers and connecting funnels with suitable cladding material and other fixing materials like studs, retainers, etc. Started just after air leak test or in advance after kerosene test for particular area.	Clearance of fronts
2.3	Commissioning of new ESPs including air-in leak test, Gas distribution test and commissioning of ESP controllers and IOS		
2.4	Charging of ESP and putting into system.		
2.5	**Supply and application of paints as required.**		

FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

Sl.No	Description	Scope to be taken care by		Remarks
	PART I	**BHEL**	**Bidder**	
1.1	**ESTABLISHMENT**			
1.1.1	FOR CONSTRUCTION PURPOSE:			
A	Open space for office	Yes		
B	Open space for storage	Yes		
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
D	Firefighting equipment like buckets, extinguishers etc.		Yes	
1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
A	Open space		Yes	
B	Living accommodation		Yes	
1.2	**ELECTRICITY**			
1.2.1	Electricity For construction purposes (to be specified whether chargeable or free)			
1.2.2	Single point source	Yes		Free for construction purpose. Chargeable for labor colony etc
1.2.3	Further distribution for the work to be done which include supply of materials and execution		Yes	
1.2.4	Electricity for the office, stores, canteen etc. of the bidder which include:		Yes	
1.2.4.1	Distribution from single point including supply of materials and service		Yes	

Sl.No	Description	Scope to be taken care by		Remarks
	PART I	**BHEL**	**Bidder**	
1.2.4.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
1.2.4.3	Duties and deposits including statutory clearances for the above		Yes	
1.2.4.4	Living facilities for office use including charges		Yes	
1.2.4.5	Demobilization of the facilities after completion of works		Yes	
1.2.4.6	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3	**WATER SUPPLY**			
	For construction purposes:			
1.3.1	Making the water available at single point	**YES**		
1.3.1.1	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.2	Water supply for bidder's office, stores, canteen etc.		Yes	
1.4	**LIGHTING**			
	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site /area		Yes	
1.5	**COMMUNICATION FACILITIES for site operations of the bidder**	**-**		
	Telephone, Fax, internet, intranet, email etc.		Yes	

Sl.No	Description PART I	Scope to be taken care by		Remarks
		BHEL	Bidder	
1.6	**COMPRESSED AIR SUPPLY**			
1.6.1	Supply of Compressor and all other equipment required for compressor & compressed air system including pipes, valves, storage systems etc.	Yes		
1.6.1.1	Installation of above system and operation & maintenance of the same	-	Yes	
1.6.1.2	Supply of the all the consumables for the above system during the contract period		Yes	

Sl.No	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
2.1	**ERECTION FACILITIES**			
2.1.1	**Engineering works for construction**			
2.1.1.1	Providing the erection drawings for all the equipment covered under this scope	Yes		
2.1.1.2	Drawings for construction methods		Yes	In consultation with BHEL
2.1.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	,,
2.1.1.4	Shipping lists etc. for reference and planning the activities	Yes		”
2.1.1.5	Preparation of site erection schedules and other input requirements		Yes	”
2.1.1.6	Review of performance and revision	**Yes**	Yes	

Sl.No	Description PART II	Scope to be taken care by		Remarks
		BHEL	Bidder	
	of site erection schedules in order to achieve the end dates and other commitments			
2.1.1.7	Weekly erection schedules		Yes	
2.1.1.8	Daily erection / work plan based		Yes	For daily monitoring meeting at site
2.1.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
2.1.1.10	Preparation of preassembly bay		Yes	

3.1 OPEN SPACE

Open space for building of temporary office shed, contractor's stores shed(s) will be provided free of hire charges. Contractor has to make his own arrangements for labor colony.

3.2 ELECTRICITY:

3.2.1 The contractor shall be provided with free supply of Electricity for the purpose of execution of work at single point only at work site. For further distribution contractor shall make his own arrangements. Electricity for all other services if required will be provided on **chargeable basis** as per norms.

a) Consumption charges as per norms
b) Any dispute regarding consumption, BHEL engineer's decision is final.

3.2.2 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards contractor's office shed also all such expenditure shall be borne by the contractor.

3.2.3 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tendered / contractor.

3.2.4 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

VOLUME-IA PART – I CHAPTER – IV

T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

The following minimum major Tools & Plants shall be deployed by the contractor:

Sl. No	DESCRIPTION OF EQUIPMENT	CAPACITY	MINIMUM QUANTITY	REMARKS
01	Tyre Mounted Telescopic Crane	100 T	01	TO BE DEPLOYED FROM BEGINNING FOR START OF WORK TILL COMPLETION
02	PICK AND CARRY CRANE	12 T	02	TO BE DEPLOYED FROM BEGINNING FOR START OF WORK TILL COMPLETION
03	SELF DRILLING CUM TAPPING MACHINE FOR SCREWS OF FLOOR GRILL & ROOF SHEETING	AS REQUIRED	02	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
04	3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWING CONSTRUCTION POWER, FITTED WITH ENERGY METER	AS Required	As required	AS REQUIRED AND AS PER INSTRUCTION OF BHEL ENGINEER
05	WELDING GENERATOR (ELECTRIC & DIESEL)	300 AMPS	AS REQUIRED	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
06	ELECTRIC WINCH	1 TON / 2 TON / 3 Tons / 5TON	10 (TOTAL)	TO BE DEPLOYED PROGRESSIVELY AS PER INSTRUCTION OF BHEL ENGINEER
07	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED FROM BEGINNING OF START OF MATERIAL HANDLING TILL COMPLETION
08	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	AS REQUIRED	AS REQUIRED	TO BE DEPLOYED AT APPROPRIATE STAGE OF WORK AS PER INSTRUCTION OF BHEL ENGINEER
09	TRAILER WITH PRIME MOVER	ADEQUATE CAPACITY	AS REQUIRED	WHILE FURNISHING THE DEPLOYMENT PLANS FOR THESE ITEMS, THE NEED FOR TRANSPORT OF MATERIAL RECD ON GODOWN DELIVERY BASIS

				IS TO BE KEPT IN VIEW. VEHICLES DEPLOYED SHOULD HAVE VALID STATUTORY DOCUMENTS AT ALL TIMES
10	TRUCK	9 MT	1 NO	
11	SLINGS, 'D'-SHACKLES, HYDRAULIC JACKS, ETC.	AS REQUIRED	AS REQUIRED	WITH TEST REPORTS

4.2: MEASURING AND MONITORING DEVISES (MMD)

01. Taper gauge, slip gauge set, depth gauge and depth micrometer.
02. Feeler gauge sets, feeler strips of 0.03 to 0.10 mm size.
03. One set of 2 meter long feeler gauge strips (0.05 to 1.0 mm).
04. Dial indicators with magnetic bases (at least 2 dials of diameter 40 mm travel – 5 mm).
05. Micrometers (inside and outside up to 300 mm, 450mm, 600mm & 1000mm).
06. Telescopic gauge (2 sets). Bevel protractor and combination sets.
07. Try square.
08. Set of parallel blocks/ V blocks.
09. Vernier calipers, (150 and 500 mm), measuring steel tapes and 5 meters steel rulers.
10. Precision spirit level (with micro head).
11. 2 sets of D.E. and Ring spanners (6-36mm).
12. 2 sets of ox spanners (6 to 20mm and 22-50mm).
13. Allen keys of various sizes (from 2mm. onwards).
14. D.P.Test Kit (with consumables).
15. Crowbars tin cutters, pliers (cutting plier, nose plier grip plier circlip-outside and inside).
16. Screw drivers and sledge hammers – 10 lbs – 1 lbs.
17. Adjustable wrenches, pipe wrenches and heck saws.
18. Single ended spanners (36 Mm and above).
19. Flat, half round, triangular bearing scrappers-8", to 12".
20. Files flat round, half round and square, rough and smooth (sizes 6", 9" and 12").
21. Bench Grinders, straight grinders GQ4 and GQ6, Angle grinders.
22. Reamers up to 30 mm. Taper reamers.
23. Drilling machine with magnetic stand up to –30 mm with drill bits.
24. Flexible grinders with grinding stones and cutters of different Shapes and sizes, Angles Grinders and Sander machine.

25. Number punch, letter punch, center punch and hole punches etc.
26. Steel wire brushes, wire brush wheels, nylon wire brushes and Painting bushes.
27. Reamers and honing tools with proper jigs and fixtures for carrying out coupling hole Reaming /honing.
28. Lifting devices eye bolts, D-shackles, slings of various sizes Guide rods etc.
29. Chain pulley blocks up to 5 tons, 2 tons pull/lift.
30. Copper/Brass rods dia. ½" to 1 ½"X450 mm.
31. Tap and die sets 6 to 36 mm.
32. Surface plate 450 X 450 mm.
33. Torch light/hand lamps with cables, 230/24 V transformer.
34. Torque wrench and torque multiplier.
35. Wooden mallet, Nylon Mallet.
36. Hand glover-asbestos, Manila rope, asbestos cloth leather and Rubber gloves.
37. Set of needle files.
38. Air blower – electric.
39. Electric drills – ¼", ½", and 5/8".
40. Ball pen hammer of various sizes.
41. Gas cutting and heating set with torches regulators, hoses and cylinder minimum two sets).
42. Arc welding generator/rectiformers with regulator, cables, Electrode holders and shields, TIG welding holders.
43. Pneumatic – grinders.
44. Hose pipes for compressed air.
45. Bench vices.
46. Hydraulic jacks 5, 10, 25, 50 & 150 tons capacity and screw jacks-5 to 10 tons.
47. Electric switchboards and flood light arrangements with fuse boxes and isolating switches, Plugs and sockets.
48. In addition to above T and P, contractor will be required to fabricate fixtures such as pullers etc. for removal of any other equipment related to the scope of work.
49. Pedestal fans/air coolers.
50. Wooden sleepers.
51. Wooden Planks.
52. Magnifying glass.
53. Plastic helmets, Fiber helmet.
54. Gas cutting/welding goggles, grinding goggles.
55. Bearing pullers.

56. Tarpaulin.
57. Insulation testers and Meggers 500 V and 1000 V at least 1 No. each.
58. Any other T and P as per requirement and as per our General and special conditions of Contracts.
59. Digital Multimeter
60. Analogue multimeter of Motwane make
61. Scaffolding materials

4.3 Following Testing/Commissioning Equipments are required for Electrical systems.

1. SILICON OIL FILTERING MACHINE FOR ESP RECTIFIER TRANSFORMERS (Rated@95KV)
2. TRANSFORMER OIL PURIFICATION PLANT WITH VACUUM PUMP FOR EVACUATION OF TRANSFORMER ALONGWITH ACCESSORIES & HOSES [For 2 MVA Service Transformers]
3. TRANSFORMER OIL TRANSFER/STORAGE TANK WITHSTANDING FULL VACUUM
4. CONTAINER FOR TRANSFORMER OIL SAMPLING

4.4 ITEM TO BE ARRANGED BY THE CONTRACTOR:-

The following items will be arranged by the contractor and no additional payment over and above the quoted rate will be made to him on account of these items.

1.All consumable like cotton, waste, cloth, kerosene, diesel, petrol, rustling etc.

2.All consumable items required for effective cleaning of Boiler equipment, spares, heating surfaces, such as soft wire brushes, jute ropes, gunny bags, ordinary cleaning brushes, brooms, water and air hoses and fittings.

3.Surface, primer, synthetic enamel paint Epoxy paint /Primer, spry guns, brushes and other accessories required for painting.

4.All materials for erecting scaffolding including scaffolding piping clamps, wooden planks, cup lock etc.

5.All normal T&P like welding sets, grinders, safety belts hand tools, winch, pulleys, pull & lift machines, cutting & brazing torches, safety appliances, tig welding equipment with consumable etc.

6.Shifting of material and scrap is be done by the contractor at his own cost.

7.Firm will be totally responsible for safety and security of man & materials.

8.CONTRACTOR SHALL ARRANGE ADEQUATE FLOODLIGHTS, HAND LAMPS AND AREA LIGHTING. CONTRACTOR SHALL USE HIS OWN

MATERIALS LIKE CABLES, FUSES, SWITCH-BOARDS ETC. BHEL/CLIENT WILL NOT PROVIDE ANYTHING IN THIS REGARD.

9.The above conditions may be read with the General Instruction to the Bidder and General Terms and Conditions of Purchase as stipulated in the booklet of tender specification for compliance.

The above list is tentative. The contractor has to provide required type and capacity of T&P, cranes/lifting tools for satisfactory completion of work.

NOTE:

1. As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction site due to inherent power shortage in state; it shall be the responsibility of the contractor to have minimum numbers of diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by the bidders at their cost. No separate payment shall be made for this contingency.

2. Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work

3. All the T&Ps required for this scope of work, except the T&Ps provided by BHEL are to be arranged by the contractor within the quoted rates.

4. ALL THE TOOLS AND PLANTS REQUIRED FOR THIS SCOPE OF WORK, EXCEPT THE TOOLS & PLANTS PROVIDED BY BHEL ARE TO BE ARRANGED BY CONTRACTOR WITHIN THE QUOTED RATES. THE LIST IS SUGGESTIVE IN NATURE. ANY ADDITIONAL T&P REQUIRED TO BE ARRANGED BY THE CONTRACTOR.

5. IF ABOVE MENTIONED T & P ARE NOT DEPLOYED IN SPECIFIED TIME BHEL WILL CHARGE TO CONTRACTOR CURRENT MARKET RATE + 30 % OVERHEADS FOR NON AVAILABILITY T&P OR LEVY A DAY WISE PENALTY FOR NON DEPLOYMENT OR DELAYED DEPLOYMENT.

6. IF THE WORKS GET DELAYED DUE TO NON-AVAILABILITY OF T&P, BHEL RESERVES THE RIGHT TO GET THE WORK DONE AT THE RISK AND COST OF CONTRACTOR WITHIN PREJUDICE TO RIGHTS OF BHEL AS IN GCC.\

7. THE MANUFACTURING YEAR OF ALL MAJOR T&PS DEPLOYED BY THE CONTRACTOR (75 MT CRANE, 18 MT MOBILE CRANE AND 12/10 MT PICK & CARRY CRANE) SHOULD NOT BE MORE THAN 10 YEARS AS ON THE DATE OF DEPLOYMENT. IF AT ANY MOMENT OF TIME DURING THE EXECUTION OF WORK, ANY CRANE IS FOUND TO BE NOT IN A GOOD WORKING CONDITION AND NON-PERFORMING AT DESIRED MINIMUM CAPACITY, AS CERTIFIED BY

BHEL ENGINEER, THE CONTRACTOR SHALL DEPLOY ANOTHER CRANE IN GOOD WORKING CONDITION WITH MINIMUM DESIRED CAPACITY. IF CONTRACTOR FAILS TO DEPLOY THE SAME WITH IN 10 DAYS, BHEL WILL RECOVER NON-REFUNDABLE PENALTY PER DAY OF DELAY IN THE FOLLOWING MANNER -

1. IN RESPECT OF 75 MT CRANE: @ RS. 5,000 / -
2. IN RESPECT OF 18 MT CRANE: @ RS. 3,000 / -
3. IN RESPECT OF 12 MT CRANE: @ RS. 1,000 / -

4.5 PENALTY / LIQUIDATE DAMAGE:

Penalty / Liquidate Damage shall be applicable for delay in completion of works as per BHEL RM recommendations.

Shutdown period will be 240 Days for Unit-6 shall be provided by MAHAGENCO for facilitating the total R&M work. Entire ESP erection and testing work must be completed within six month (180 Days).

4.5.1:- PENALTY FOR DELAYED DEPLOYMENT OF MAJOR T&P

BHEL SHALL LEVY NON-REFUNDABLE PENALTY IN THE FOLLOWING MANNER IF THE CONTRACTOR DELAYS DEPLOYMENT OF MAJOR T&P SUCH AS CRANES, CONSTRUCTION ELEVATOR, HUCK INSTALLATION TOOLS & HUCK HOSE ASSY VIS-A-VIS THE SCHEDULE AS PER THE ADVICE OF BHEL BASED ON PROJECT REQUIREMENTS. TENTATIVE SCHEDULE GIVEN IN RELEVANT APPENDIX IS FOR GUIDANCE PURPOSE.

a) IN RESPECT OF 8 / 10 MT CAPACITY PICK AND CARRY MOBILE CRANE: @ RS. 1,000/- PER DAY OF DELAY, PER CRANE.

b) IN RESPECT OF 18 / 20 / 25 MT CAPACITY CRANE: @ RS. 5,000/- PER DAY OF DELAY, PER CRANE.

c) IN RESPECT OF 40 MT CAPACITY CRANE: @ RS. 10,000/- PER DAY OF DELAY, PER CRANE

IN CASE SUCH DELAY IS ATTRIBUTABLE TO EITHER BHEL OR FORCE MAJEURE CONDITIONS, NO SUCH PENALTY SHALL BE APPLICABLE.

WHEREVER TENTATTIVE SCHEDULES ARE NOT INDICATED, THE DECISION OF BHEL SHALL BE FINAL.

VOLUME-IA PART – I CHAPTER – V

T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

5.0 List of T&P's to be made available by BHEL to contractor free of hire charges on sharable basis.

1	Tower Crane/Tyre Mounted Telescopic Crane along with Luffing Fly Jib	Tower Cr-10 T OR Tyre Mounted Crane-150 T	AS REQUIRED	IT MAY BE USED ON REQUIREMENT BASE
2	Huck bolting machine with required Gun sets & hoses	AS REQUIRED	AS REQUIRED	
3	AIR LEAK TEST EQUIPMENTS WITH ALL AUXILIARIES		01 SET	FOR AIR LEAK TEST OF ESP AND DUCTING ETC.

BHEL WILL MAKE AVAILABLE T&P LISTED IN THE RELEVANT APPENDIX FREE OF CHARGE. FURTHER DETAILS ARE AS UNDER:

5.1 CRANES TO BE PROVIDED BY BHEL

5.1.1
BHEL WILL MAKE AVAILABLE THE CRANES (AS PER RELEVANT APPENDIX) FREE OF CHARGE TO THE CONTRACTOR ON SHARING BASIS MAINLY FOR THE PURPOSES ENUMERATED VIDE NOTES IN THE ABOVE REFERRED APPENDIX. BHEL CRANES HAVE TO BE SHARED WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR.

5.1.2
CONTRACTOR SHALL LAY NECESSARY SLEEPER BEDS, BACKFILLING OF APPROACHES WHEREVER NECESSARY FOR SAFE MOVEMENT OF THE CRANES AS DIRECTED BY BHEL. CONTRACTOR SHALL TRANSPORT THE EQUIPMENTS AND COMPONENTS/SUB ASSEMBLIES/ATTACHMENTS OF BHEL EQUIPMENTS TO & FRO BETWEEN BHEL STORES AND SITE.

5.1.3
CRANES, INCLUDING THE CRANES HIRED BY BHEL, WILL BE INITIALLY ISSUED IN BASIC ASSEMBLED CONDITION. ANY ALTERATION/ADDITION LIKE BOOM REDUCTION/EXTENSION, ASSEMBLY OF COMPONENTS/SUB-ASSEMBLIES NEEDED FOR MODULATING THE CAPACITY/REACH/OTHER FEATURES OF CRANES AND RESTORATION TO THE STATE AS DIRECTED BY BHEL SHALL BE

THE CONTRACTOR'S RESPONSIBILITY. ALSO REFER SECTION-5 IN THIS REGARD.

5.1.4
THE DAY-TO-DAY UPKEEP AND RUNNING MAINTENANCE LIKE FILLING / TOPPING UP OF LUBRICANTS, CHANGING FILTERS ETC, OF BHEL CRANES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. SPARES IF ANY, REQUIRED IN NORMAL COURSE WILL BE PROVIDED BY BHEL. MAJOR BREAKDOWNS WILL BE ATTENDED TO BY BHEL. FOR HIRED CRANES THESE RESPONSIBILITIES WILL BE IN THE SCOPE OF CRANE HIRING AGENCY. THE CRANES PROVIDED BY BHEL (INCLUDING THE HIRED CRANES) WILL BE WITHDRAWN FOR REGULAR AND CAPITAL MAINTENANCE AS PER THE RESPECTIVE SCHEDULE OF MAINTENANCE. AS FAR AS POSSIBLE SUCH SCHEDULES WILL BE INTIMATED TO THE CONTRACTOR IN ADVANCE AND MAY BE ADJUSTED DEPENDING ON THE WORK REQUIREMENTS AT SITE. HOWEVER NO CLAIM WHATSOEVER WILL BE ENTERTAINED ON ACCOUNT OF NON-AVAILABILITY OF CRANE(S).

5.1.5
CONTRACTOR SHALL PROVIDE FUEL FOR THE CRANES PROVIDED BY BHEL FOR HIS USE. OPERATOR FOR HIRED CRANES WILL BE PROVIDED BY THE CRANE HIRING AGENCY OF BHEL.

5.1.6
WHERE THE SERVICES OF THE CRANES PROVIDED BY BHEL ARE TO BE SHARED BY OTHER AGENCIES/ CONTRACTORS OF BHEL, THE CONTRACTOR'S RESPONSIBILITIES DEFINED ABOVE WILL ALSO BE APPORTIONED ACCORDINGLY TO THE BENEFICIARY AGENCY. WORKING ARRANGEMENTS IN THIS REGARD WILL BE DONE AT SITE BY BHEL ENGINEER AND IN ANY CASE HIS DECISION SHALL BE FINAL AND BINDING.

5.2 OTHER T&P

5.2.1
THE RESPONSIBILITIES OF CONTRACTOR DEFINED ABOVE FOR BHEL CRANES SHALL ALSO BE APPLICABLE, MUTATIS – MUTANDIS, IN RESPECT OF OTHER TOOL & PLANTS PROVIDED BY BHEL.

5.2.2
SPECIAL TOOLS WHICH ARE SUPPLIED BY BHEL AS PART OF MAINTENANCE TOOLS TO BE HANDED OVER TO CUSTOMER UNDER REGULAR DU / DESS NUMBERS IN VARIOUS PRODUCT GROUPS MAY BE ISSUED TO THE CONTRACTOR FREE OF CHARGES FOR SPECIFIC ACTIVITIES, AT THE DISCRETION OF BHEL. CONTRACTOR SHALL RETURN THEM AFTER THE COMPLETION OF THE SPECIFIC ACTIVITY FOR WHICH THE TOOLS WERE SPARED, IN GOOD WORKING ORDER.

5.2.3
LUBRICANTS LIKE ENGINE OIL, CARDIUM COMPOUND, HYDRAULIC OIL, GEAR OIL, AND GREASE ETC FOR HIRED CRANES WILL BE PROVIDED BY THE CRANE

HIRING AGENCY. SIMILARLY FILTERS FOR HIRED CRANES WILL BE PROVIDED BY THE CRANE HIRING AGENCY.

5.2.4

THE CONTRACTOR MUST NOT USE THESE EQUIPMENTS FOR ANY PURPOSE OTHER THAN WHAT THEY ARE INTENDED FOR.

5.2.5

IF THE ABOVE ITEMS ISSUED TO CONTRACTOR ARE FOUND NOT UTILISED / NOT MAINTAINED TO THE SATISFACTION OF BHEL ENGINEER OR MISUSED, THESE WILL BE WITHDRAWN AND NO REPLACEMENT WILL BE DONE FOR SUCH ITEMS.

TIME SCHEDULE

6.1 TIME SCHEDULE

6.1.1 The entire work of Erection, Testing and Commissioning of Electrostatic Precipitator and Fans including Supply and Application of Final Painting for Unit-6 of 210 MW at MSPGCL - Koradi Thermal Power Station-Koradi, Maharashtra as detailed in the Tender Specification shall be completed within **6 (SIX) months** from the date of commencement of work at site.

6.1.2 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

6.1.3 The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding of the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

6.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy the decision of BHEL engineer is final.

6.3 MOBILISATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for erection, testing etc shall be started as per directions of BHEL Engineer. The contractor has to augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

Expected Erection start for work: **01 Nov ’2015**

In order to meet above schedule in general, and any other intermediate targets set, to meet customer / project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

In case any requirement is there to compress the schedule of activities to achieve project completion, then the additional expenses if any incurred will be discussed mutually and settled. BHEL decision in this regard is final and the issue is not arbitral.

6.4 CONTRACT PERIOD

The contract period for completion of entire work of ESP shall be 6 **(Six) months** from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier.

6.5 GUARANTEE PERIOD FOR EACH UNIT

Shall be applicable as per GCC conditions.

TERMS OF PAYMENT

7.0 Terms of payment:

7.1
The contractor shall submit his monthly RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month. However, first RA Bill shall be released only after signing of Contract Agreement.

7.2
Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
The 5% thus remaining shall be on account of workmanship guarantee of work executed. The same will be released after completion of the guarantee period in line with conditions of GCC.

However, on specific request of vendor, this amount may be released on pro rata basis for the value of work executed and accepted by BHEL, along with any RA Bill and onwards, subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format. The BG shall be kept valid till completion of such guarantee period and an additional six months claim period. This is also subject to the condition that the contractor has started the work and also furnished/remitted the initial Security Deposit as per contract.

7.3
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

7.4
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number
6. Account type

7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

BHEL may also choose to release payment by other alternative modes as suitable.

7.5

Progressive Payment against monthly running bills will be made on Pro-rata basis and payments against stage / milestones events shall be as per the following table.

7.5.1: ERECTION WORK OF ESP AND FANS:

Cl No:	**Description**	ESP Rate Schedule
	PRO RATA PAYMENTS (85%)	**%**
7.5.1.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	15
7.5.1.2	PLACEMENT IN POSITION	20
7.5.1.3	ALIGNMENT/BOLTING/FIXING	30
7.5.1.4	WELDING	15
	Painting	**5**
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	**85**
	STAGE/MILESTONE PAYMENTS	
7.5.1.5	AIR & GAS TIGHTNESS TEST	3
7.5.1.6	GAS DISTRIBUTION TEST	2
7.5.1.7	CHARGING OF ESP FIELDS	2
7.5.1.8	PG Test completion	2
7.5.1.9	Trial Operation of Unit	2
7.5.1.10	Area cleaning, temporary structures cutting/removal and return of scrap	2
7.5.1.11	Punch List points/pending points liquidation	1
7.5.1.12	Material Reconciliation	1
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	**15**
	TOTAL I + II	**100**

7.5.2 APPLICATION OF INSULATION WORK:

Cl No:	Description	ESP Rate Schedule
	PRO RATA PAYMENTS (95%)	%
7.5.2.1	On application of insulation materials	90
	STAGE/MILESTONE PAYMENTS	
7.5.2..2	PG Test completion	2
7.5.2.3	Trial Operation of Unit	2
7.5.2.4	Area cleaning, temporary structures cutting/removal and return of scrap	2
7.5.2.5	Punch List points/pending points liquidation	2
7.5.2.6	Material Reconciliation	2
	TOTAL FOR STAGE/MILESTONE PAYMENTS	10
	TOTAL I + II	100

Note:

1. In case any requirement is there to compress the schedule of activities to achieve project completion, then the additional expenses if any incurred will be discussed mutually and settled. BHEL decision in this regard is final and the issue is not arbitral.
2. RA bill payments as per Chapter-X of SCC
3. Payment for the first running bill will be released only on production of the following.
   i. PF Regn. No.
   ii. Labor License No.
   iii. Workmen Insurance Policy No.
   iv. Unqualified Acceptance for Detailed L.O.A.
   v. Initial 50% Security Deposit.
   VI. SIGNED CONTRACT AGREEMENT.

TAXES AND OTHER DUTIES

8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 05 dated 13/08/2015)

8.1. For All types of works excepting works covered under sl no 8.2

8.1.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

8.1.2 Service Tax & Cess on Service Tax

Contractor's price/rates shall be exclusive of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 12.36 %) on the admitted bill value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

1. **The name, address and the registration number of the contractor,**
2. **The name and address of the party receiving taxable service,**
3. **Description, classification and value of taxable service provided and,**
4. **The service tax payable thereon.**

All the Four conditions shall be fulfilled in the invoice before release of service tax payment.

Wherever, more than one route/option are available for discharge of service tax liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT)/CST on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be inclusive of the same and in no case input or output VAT/CST will be reimbursed extra.

In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with

the first RA bill. Contractor will submit all the details of VAT/CST paid for the contract in the prescribed format of the respective state VAT laws. Also, the contractor will issue the tax Invoices to BHEL as per the Tax laws of respective state on monthly basis. Contractor shall also be required to furnish to BHEL necessary proof of VAT remittance on monthly basis.

Deduction of tax at source shall be made as per the provisions of law and is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made.

Further, if BHEL, at the instance of customer or otherwise adopts the specific route for discharging output VAT liability itself, benefit of the reduction in liability of the contractor will be passed on to BHEL.

In case, BHEL is forced to pay any VAT liability on behalf of contractor, the same will be recovered from contractor's bill or otherwise as deemed fit

8.2 'Enabling Works'

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit. **(i.e. rates quoted by bidder shall be inclusive of Service Tax, VAT/WCT and all other taxes and duties)**

However, Since the proposed work is in the nature of 'Works Contract service' as per Service tax law, Hence, For non-corporate contractors being Individual, HUF, Proprietary Firm, Partnership Firm or Association of Persons (AOP), BHEL shall recover the applicable Service Tax under reverse charge mechanism from the contractor and remit the same with the Government as per the provisions of Law. Necessary advice/confirmation of remittance shall be issued to the contractor. The contractor shall not be eligible for any refund/reimbursement of such service tax from BHEL. It shall be the responsibility of the contractor to submit proper invoice giving all the requisite details as per Service Tax Law for the determination of the service tax liability of BHEL under reverse charge mechanism. BHEL reserves the right to determine such liability based on the invoice submitted by the contractor or otherwise independently and remittance of the same with the Government.

8.3 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, 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.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8.4 BOCW Cess

If BOCW cess is applicable for the subject work then the quoted rates shall be exclusive of the BOCW Cess which shall be paid extra by BHEL against Documentary evidence. However, the applicability of the BOCW Cess shall be got confirmed from BHEL in writing, before remitting such Cess/tax.

8.5 GST: As and when GST becomes applicable to this contract, the net differential (negative or positive) financial liability of the bidder to the Authorities (as compared to such liability prior to applicability of GST), if any, shall be to the account of BHEL. For this purpose, all available options under the GST shall be explored, and the decision of BHEL in this regard shall be final and binding on the bidder.

WEIGHT SCHEDULE

9.1 WEIGHT SCHEDULE

Description	Size	Approx. Weight (MT)
ESP		**3041**
ID Fan Motor	4400 X 3500X 2200	15.5
PA Fan Motor	2900 X 2600 X 1650	9.5
ID Fan	2 Nos	92
PA Fan	2 Nos	57
SA Fan	2 Nos	7
	Total	**181**

9.2 **Koradi-6 (R4F5)EE R& M package - PGMA wt details (tentative)**

		ESP	
Cust	**PGMA**	**Description**	**wt**
R4F5	78601	ROLL/SLIDE SUPPORTS	9800
R4F5	78605	ESP-SUB-DELIVERY COMPO	300
R4F5	78606	INSULATOR HOUSING AS	21300
R4F5	78608	GAS DIST. ASSY	45400
R4F5	78609	GD_RAPPING MECHANISM	8250
R4F5	78610	GD_DRIVE ARRANGEMENT	450
R4F5	78611	GAS SCREEN-EP	1100
R4F5	78613	EMIT SYST SUSPENSION	7800
R4F5	78614	SUPPORT INSULATORS	3400
R4F5	78615	EMITTING ELECTRODES	12400
R4F5	78616	EMIT ELECT RAPP MECH	19800
R4F5	78617	DRIVE ARGT. FOR EMIT.	14800
R4F5	78619	COL ELEC SUSPENSION	59500
R4F5	78620	COLLECTING ELECTRODE	583000
R4F5	78621	EMIT SYS FRAME-TOP	74200
R4F5	78622	EMIT SYS FRAME BOTOM	86100
R4F5	78623	INSPECTION DOORS	6100
R4F5	78624	SHOCK BARS	47600
R4F5	78625	COLL ELECT RAPP MECH	49400
R4F5	78626	COLL ELEC RAPP DRIVE	3300
R4F5	78628	ESP ROOF PANELS	83100
R4F5	78630	ELECTRICAL SD COMPTS	6500

R4F5	78631	GEARED MOTORS FOR RAPP	10700
R4F5	78632	EMIT SYS FRAME-MIDLE	85200
R4F5	78637	JUNCTION BOX & PUSH BU	900
R4F5	78642	OUTER ROOF-EP	127700
R4F5	78646	INSULATOR SUPP PANEL	56100
R4F5	78647	ROOF PANEL ASSY	65800
R4F5	78650	INLET-OUTLET FUNNEL	86000
R4F5	78656	RECTIFIER HANDL SYST	12500
R4F5	78657	SPLITTER&GUIDE VANES	13900
R4F5	78659	CONTROL ROOM-INSERTS	27000
R4F5	78660	CABLE-CABLE RACKS	65000
R4F5	78661	EP PERF TEST EQUIPT	300
R4F5	78662	EARTHING,CABLE TRAYS,S	63300
R4F5	78663	ASH LEVEL INDICATOR	500
R4F5	78667	MIN WOOL FOR ESP INSULATION	78000
R4F5	78668	FIXING COMP. FOR ESP INSULATION	38000
R4F5	78672	INTERLOCKS-EP	900
R4F5	78673	ELECTRICALLY OPERTD HO	3600
R4F5	78690	HEATING ELEMENTS	1800
R4F5	78692	AUXILIARY CONTROL PANE	14000
R4F5	89611	ESP ROOF HANDRAILS	5000
R4F5	89615	INSULATION CLADDING SH FOR	40000
		95KVp 1000mA HVR Trfr	37600
		95KVp 1200mA HVR Trfr	16080
		ESP Internal Total	**1993480**
R4F5	78643	HOPPER RIDGES	32800
R4F5	78644	HOPPER UPPER PART	138400
R4F5	78645	HOP MLD&LOWER PART	177400
R4F5	78648	CASING STRUCTURE	129000
R4F5	78649	CASING SHELL/PANEL	231400
R4F5	78665	APP PLATFORM-HOPPER	40500
R4F5	78666	WATER WASHING SYSTEM	4000
R4F5	78680	FOUNDATION MATLS FOR E	5700
R4F5	78681	SUPPOTING STRUCTURES F	210500
R4F5	89610	EP GALLERIES&STAIRS	30000
R4F5	89612	FLOOR GRILL & STEP TREAD	20000
R4F5	89613	FLOOR GRILL & MOBILE LAD	28000
		ESP Structural and Outer Casing wall	**1047700**
		Complete ESP Total	**3041180**
		FANS	
R4F5	56021	ID FAN FOUNDATION MATERIAL	2700
R4F5	56225	ID FAN NDZV 33	85000
R4F5	56920	ID LOS (20LPM/5BAR)	4500

R4F5	55334	PA FAN AP2-17/12	23500
R4F5	55830	PA FAN COUPLING	1000
R4F5	55930	PA FAN FOLS (80LPM/12BAR)	4500
R4F5	55931	PA SILENCER	28000
		SA Fan	7000
		ID Fan Motor	15500
		PA Fan Motor	9500
		Fans Total	**181200**

NOTE FOR WEIGHT SCHEDULE:

1. The weights given are only approximate and for general guidance and they are subject to variation as per site requirement for design consideration for erection.
2. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete the systems in all respects.
3. Any other systems / Components which are integral to ESP & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.
4. Erection & dismantling of air blowers and connecting pipes , ducts and cables, providing blanks/ dummies at the required locations and conducting gas-tightness test is in the scope contract and shall be carried out within the quoted price.

GENERAL

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

1.10.1 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.

1.10.2 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

1.10.3 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account contractor only. BHEL engineer, depending upon the availability of materials, fronts etc, will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.

1.10.4 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

1.10.5 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe/tubes, and handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

1.10.6 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be affected for such excess drawls at the rate prescribed by manufacturing units.

1.10.7 No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

1.10.8 Contractors shall ensure that all their Staff/Employees are exposed to periodical training program conducted by qualified agencies/ personnel on ISO 9001 – 2000 Standards.

1.10.9 For other agencies, such as piping, cabling, instrumentation, insulation etc., to commence their work from/on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence/continue the work so as to keep the overall project schedule.

1.10.10 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

1.10.11 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

1.10.12 On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

1.10.13 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

1.10.14 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

1.10.15 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

1.10.16 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

1.10.17 **SITE INSPECTION**

The owner/employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner/employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

1.10.18 **UTILITY POINTS**

Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N2) etc., shall be indicated in the P & I diagram. The utility points shall be located at convenient point to handle. Contractor has to locate the utility points as advised by site engineer.

1.10.19 **Safety**

Adherences to safety are upper most during execution of work, 100% safety norms to be strictly followed. Tendered should appoint qualified safety officer tom implement safety. He should interact with BHEL and customer for day to day activities. As the work is to be executed in the running plant, all work forces to undergo for a safety classes and obtain the certificate from customer. No person will be allowed without safety training.

Trained and certified safety supervisors to be appointed for every 50 work men. The safety officer, supervisors are not allowed to assigning any work other than safety. Heavy penalty will be levied if any un-safe practices are found during execution of work.

1.10.20 **Penalty**

a) Fatal injury or accident causing death:
Penalty @ Rs.5,00,000 per person .
b)Major injuries of permanent disablement
Penalty @ Rs.1,00,000 per person.

1.10.21 **Insurance**

In addition to the conditions covered under the GCC & SCC, following provisions will also apply:

1. Comprehensive Automobile Insurance

Insurance shall be in such a form to protect the Contractor against all claims for injuries ,disability , disease and death to members of public including the Owner's men and damage to the property of others arising from the use of motor vehicles during on or off the site operations ,, irrespective of the ownership of such vehicles ..
The liability covered shall be as herein indicated.

Fatal Injury
Rs. *1,00;000/-* each person
Rs. *2,00,000/-* each occurrence
Property Damage
Rs.1,00,000/- each occurrence.

2. Comprehensive General Liability Insurance

The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act of omission on the part of the Contractor, his agents, his employees, his representatives and Sub-contractors or from_ riots, strikes and civil connation.
This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled "Defence of Suits" in Section GCC, Conditions of Contract.

1.10.22 **Quality:**

Qualified and certified quality engineer to be posted at site for quality assurance. The quality person should maintain all records and reports to be generated as per BHEL quality standards. He should interact with customer and BHEL and all the stage wise protocols to be prepared after joint inspection and get is signed by BHEL and customer. All the record to be maintained and he is responsible for quality audit carried out by BHEL and customer.

FOUNDATIONS AND GROUTING

1.11.1 Foundation for the equipments to be erected shall be provided by BHEL/ clients of BHEL. The dimension of the foundation and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments plants shall be carried out by the contractor.

1.11.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form/shuttering work are within the scope this work.

1.11.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates/shims, and may be required for the erection of the equipment/plants will have to be carried out by the contractor without extra cost.

1.11.4 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments

1.11.5 Foundation pockets are to be cleaned thoroughly before placing the columns/equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. , if required cleaning of the threads to be done with proper dies.

1.11.6 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched by Prussian Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.

1.11.7 The certificates of the grout is to be submitted BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc to be arranged by the contractor including the fine aggregates.

1.11.8 All the materials required for grouting including special cements like Conbextra GPI,GP2, ACC- Shrinkkomb-N20, Sika Anckor, NSG/ NSG -1, CICO Excem GP, or its equivalent as approved by BHEL and other materials like Portland cement, sand etc., are to be arranged by the contractor at his cost.It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.

1.11.9 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates/sheets at site by the contractor to meet site requirement. However machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.

PROCEDURE FOR GROUTING

Contractor has to carry out the grouting as per the work instructions for grouting available at site (As per FQP).

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

2.11.1
Building foundations and other necessary civil works for supporting structures, equipment etc. will be provided by BHEL / Customer. The checking of dimensional accuracy, axes, elevation, levels etc. with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the Contractor. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.

2.11.2
Minor adjustment of foundation level, dressing and chipping of foundation surfaces and blue-matching (wherever required) for of all the equipment should be done by the Contractor as per BHEL Engineers instructions, as part of the work. Contractor/BHEL shall prepare protocols before taking

over the foundations. Dressing and chipping of foundations up to 35mm for achieving proper levels will be within the scope of work/specification.

2.11.3
All temporary foundations and anchor points required for installing erection Equipment's and winches, foundations for pumps, tanks etc. are in the scope of Contractor. All building materials like cement, steel including re-enforcement bars, grits cements etc. for such temporary foundations shall have to be arranged by the Contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.

2.11.4
Contractor shall carry out scrapping and blue matching of embedded plates/ packers of rotating equipment. Chipping and the leveling of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact between the two surfaces.

2.11.5
BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiseling / grinding and de-burr the same. However, machining of the packers wherever necessary, shall be arranged by contractor.

2.11.6
Complete grouting of structures equipment, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable, is included in the scope of Contractor. Arranging all labour, building materials including cement, ordinary Portland as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra gp1/gp2), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods are within the scope of this specification/ work.

2.11.7
After the grouting has finally set and cured, alignment of equipment involved shall be checked again to verify for any disturbance or any other

reason. If required, de-coupling of equipment has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work.

TECHNICAL WRITE UP

1.12.1: ESP Design Parameters

The following design criteria form the basis for the selection and performance guarantees of the Electrostatic precipitator.

Sl. No	**Description**	**Unit**	TMCR-WC (GP)	DESIGN POINT
1.	Coal ash content	%	39.41	39.41
2.	Flue Gas flow rate (wet)	m^3/s	429	445
		Nm^3/s	276.0	286.0
3.	Inlet Gas temperature	Deg C	152	152
4.	Dust concentration at ESP inlet	Gm/Nm^3	62.0	62.0
5.	Flue Gas Moisture	%(Vol)	6.0	6.0
6.	Required emission as per tender	Mg/Nm^3	70	70
7.	Number of fields out of service as per tender	No	One (First field)	Nil
8.	Collection Efficiency	%	99.887	99.887

1.12.2: ESP Performance data sheet @ TMCR-WC firing Condition

Sl.No.	Parameter description	Value	Unit
1.	Proposed ESP size	FAA-5X37.5M2-2x45M2-2X116150-2	
2.	Number of ESP per boiler	2	No.
3.	Number of isolatable gas paths per boiler	2	No.
4.	Number of fields in series along gas flow	7	No.
5.	Pitch of collecting electrode	400	mm
6.	Nominal height of electrodes	15	m
7.	Nominal length of field along gas flow	3.75 & 4.5	m
8.	Collection area per boiler with one field off	83520	m^2
9.	Specific collecting area (SCA) with one field off	194.68	$m^2/m^3/sec$
10.	Gas velocity inside ESP	0.62	m/sec
11.	Treatment time	38.7	sec
12.	Predicted Pressure drop across ESP (flange to flange)	25	mmWC

1.12.3: ESP Technical specification

1.12.3.1 Mechanical

Ash density	**Structural:** 1350 kg/m3 **volume:** 750 kg/m3 **Ash accumulation pattern:** Hopper full
Standard for structural design	**seismic zone:** IS 1893 **wind speed:** IS 875
Casing design pressure	**Normal:** -250 mmWC **Exceptional:** 500 mmWC @ 90 % yield strength of material.
Casing design Temperature	**Normal:** 200°C **Exceptional:**300°C for 30 min
Plate Material	**Casing, inner roof & Funnel, mm:** 5 **Hopper, mm** : 5 **Outer roof chequered plate, mm** : 5
Emitting electrode	**Material:** Stainless steel **Type & dia:** Spiral, 2.7mm
Collecting electrode	**Material:**, Mild steel **Type & Thickness:** G profile, 1.25mm
ESP hopper	**Total no of hoppers per boiler:** 56 **Storage capacity :** 8.8 hrs **Valley angle:** 60 deg min **Hopper flange level (HFL):** 6000 mm **Lining, thickness & height:** SS 409**,** 1.0 mm& 1.5m from HFL.
Hopper heater	**Type:** Tubular **Capacity of heating:** 6Kw per hopper
Stairs and Platform(width)	900 mm & 1200 mm
Floor grill	**Shape:** Diamond **Type:** Galvanized

Handrail	**Size:** Φ32mm **Type:** Galvanized
Thermal insulation (casing & hopper)	**Material :** LRB mineral wool **Thickness and Density:** 60 mm & 100 kg/m^3
Thermal Cladding	**Material & thickness:** 1.0 mm thick plain Aluminium

1.12.4 List of special tools and tackles for ESP

Sl. No.	Data	Unit	Quantity per boiler
1	Stretching device for mounting emitting electrode	No	1
2	Alignment jig for support insulator replacement	No	1
3	Lifting tool for support insulator replacement	No	4
4	Form tool for correcting collecting electrode profile	No	1
5	Shaft insulator removal tool	No	1

1.12.5 PRIMARY AIR FAN(AP2 17/12)

The fan offered for PA application is two stage axial reaction type - a major portion of static pressure is developed in the impeller. The angle of incidence of the blades can be adjusted during operation. The pressure volume characteristic curves of the fan may be changed in a long range without considerable change in efficiency. The fan can thus be easily adopted to changing operating conditions.
The fan consists of the following main components

- Impeller with blades and adjusting mechanism
- Shaft with bearing assembly with thermometers
- Suction box, impeller housing and diffuser
- Coupling

- Forced oil lubrication system

Impellers are made from fine grain steel and are machined precisely to accommodate a set of replaceable aerofoil blades on blade shafts. The blades are of Aluminum alloy having hardness of min. BHN 75. The blade shafts are placed in combined radial and axial anti-friction bearings which are sealed to the outside.

The centrifugal and adjusting forces of the blade shall be taken up by the blade bearings.

The rotor shall be supported on a set of antifriction bearings housed in a compact bearing housing. Bearings can take up both the radial and axial thrust loadings. Bearing housings are fitted with separate thermometers for local indication and remote indication of bearing temperatures. Provisions are made available to fix the vibration pickups for vibration monitoring. The impeller support is of overhang design.

Fan rotor shall be balanced to precise values to help replacement of blades. Shaft is a solid shaft made from forged steel and fully machined. Fan rotor critical speed shall be well above the operating speed of the fan.

The suction box, impeller housing with outlet guide vane and diffuser shall be fabricated from sheet steel with adequate stiffeners. The fixed outlet guide vanes are housed in the housing and shall be located immediately after the impeller to guide the flow to the diffuser. Suitable splits are provided to help easy handling and maintenance.

Spacer type coupling shall be provided, between motor and fan shaft.

Forced oil lubrication system shall be provided for supplying oil for actuating the hydraulic servomotor and also for fan bearing lubrication. This system shall be provided with oil tank, pumps, coolers, filters and necessary instrumentation.

The design, manufacture, and quality of the fan shall confirm to the BHEL practices and general guidelines.

1.12.6 INDUCED DRAFT FAN(NDZV 33)

The fan offered for Induced Draft application is of double suction radial type. The rotor of this fan is of simply supported design i.e. the impeller is positioned in between bearing. Each fan consists of the following components.

CASING

The casing consists of suction box and spiral casing. The casing is manufactured from carbon steel (IS 2062) material, adequately stiffened

to prevent vibration. The casing shall have flanged inlet and outlet connections. The casing is split in such a way that a portion can be removed for easy dismantling of rotor for maintenance purposes. Inspection doors and drain shall be fitted to the casing at convenient locations. The lower part of the casing rests on the supporting brackets on the foundations. Labyrinth seals are provided at the shaft passages of the casing.

IMPELLER

The impeller has backward curved plate blades giving a stable pressure – volume characteristics. The impeller is welded design. The impeller is made of high strength steel plates. Blades of the impeller are provided with renewable wear liners. The impeller members are selected with adequate factor of safety, to withstand the stresses. After fabrication and before final machining, the impeller is stress relived. The impeller is balanced dynamically according to ISO 1940.

SHAFT

The shaft is designed with two forged end pins fitted to a hollow tube. The shaft is machined and the bearing locations are given a high surface finish with close tolerances. The impeller is fastened to a flange, which is welded to the shaft. The shaft is extended at one end and key-wayed to take driven half coupling. The shaft is designed so that the first critical speed is well above the operating speed. The shaft is also balanced according to ISO 1940.

BEARINGS

The fans are provided with water cooled sleeve bearings with circulating oil lubrication. The locating bearing is near the drive end and is designed to absorb axial forces. Bearing housings are fitted with thermometers for local and remote indication of fan bearing temperatures. Provisions are made available to fix the vibration pickups for vibration monitoring.

INLET DAMPER CONTROL

The Damper includes a number of blades, which in partially closed position impart a swirl to given an improved performance. Damper blades are controlled by means of operating a single control lever from an external actuator.

FORCED OIL LUBRICATING SYSTEM

Forced oil lubrication system shall be provided for supplying oil for fan bearing lubrication. This system shall be provided with oil tank, pumps, coolers, filters and necessary instrumentation.

The design, manufacture, and quality of the fan shall confirm to the BHEL practices and general guidelines

1.12.7 SEAL AIR FAN(NDV 11.8)

The fan offered for seal air fan application is of single suction radial type. The rotor of this fan is of simply supported design i.e. the impeller is positioned in between bearing. Each fan consists of the following components.
Casing, Inlet damper control, impeller, Shaft and Bearings

CASING
The casing consists of suction box and spiral casing. The casing is manufactured from carbon steel (IS 2062) material, adequately stiffened to prevent vibration. The casing shall have flanged inlet and outlet connections. The casing is split in such a way that a portion can be removed for easy dismantling of rotor for maintenance purposes. Inspection doors and drain shall be fitted to the casing at convenient locations. The lower part of the casing rests on the supporting brackets on the foundations. Labyrinth seals are provided at the shaft passages of the casing.

IMPELLER
The impeller has backward curved plate blades giving a stable pressure – volume characteristics. The impeller is welded design. The impeller is made of high strength steel plates. The impeller members are selected with adequate factor of safety, to withstand the stresses. After fabrication and before final machining, the impeller is stress relived. The impeller is balanced dynamically according to ISO 1940.

SHAFT
The shaft is a solid one. The shaft is machined and the bearing locations are given a high surface finish with close tolerances. The impeller is fastened to a hub, which is keyed to the shaft. The shaft is extended at one end and key-wayed to take driven half coupling. The shaft is designed so that the first critical speed is well above the operating speed. The shaft is also balanced according to ISO 1940.

BEARINGS
The fans are provided with anti-friction bearings with sump oil lubrication. The locating bearing is near the drive end and is designed to absorb axial forces. Bearing housings are fitted with thermometers for local indication of fan bearing temperatures.

INLET DAMPER CONTROL
The Damper includes a number of blades, which in partially closed position impart a swirl to given an improved performance. Damper blades are controlled by means of operating a single control lever from a manual operator.

COUPLING
Flexible type coupling shall be provided between motor and fan shaft.

The design, manufacture, and quality of the fan shall confirm to the BHEL practices and general guidelines.

1.12.8 COOLING WATER REQUIREMENT:

Description	No. of Items / Fan	No. of Working / Stand-by	Cooling water (36 Deg C with 4–5 bar pressure)				Remarks
			Quantity / Item Cu.m /Hr.	Quantity /Boiler Cu.m /Hr.	Pressure Drop kg/sq.cm	Temp. Rise Deg. C	
FD fan FOLS cooler	2	1 / 1	16	32	1	5	Continuous
ID fan FOLS cooler	2	1 / 1	8	16	1	5	Continuous
ID fan Bearings(Radial)	2	2 / 0	3	6	1	5	Continuous
PA fan FOLS cooler	2	1 / 1	16	32	1	5	Continuous

1.12.9 AUXILIARY POWER REQUIREMENT:

DESCRIPTION	PUMP	TANK HEATER
FD fan FOLS	5.5 KW	3 KW
ID fan FOLS	1.1 KW	3 KW
PA fan FOLS	5.5 KW	3 KW

1.12.10 RECOMMENDED SPARES:

1.12.10.1 PA FAN: (AP2 17/12)

Sl.No	DESCRIPTION	QTY/PROJECT
1	Fan rotor consisting of shaft with bearing assy and impeller assy and servomotor(without blades)	1 No
2	Fan main bearings without bearing housing	1 Set
3	Fan blades with connecting fasteners	2 Sets
4	Spares for blade bearing assy.	
4.1	All bearings with bearing rework	3 Sets
4.2	All 'O' Rings	3 Sets
4.3	Support ring, pressing ring, plate spring ring, inner ring	3 Sets
4.4	Bush	3 Sets
4.5	Circlips	3 Sets
4.6	Keys	3 Sets
5	Hydraulic servomotor	2 Nos
6	Coupling between fan & motor	1 No
7	Lub. oil system	
7.1	Pump assy.	1 No
7.2	Motor	1 No of each
7.3	Pressure regulator	2 Nos
7.4	Filters	6 Nos
7.5	Coupling between oil pump & motor	2 Nos

1 set refers to 1 fan requirement

1.12.10.2 ID FAN: (NDZV 33)

Sl.No	DESCRIPTION	QTY/PROJECT
1	Fan Rotor Including Impeller, Shaft And Connecting Fasteners	1 No
2	Impeller Blade Liners	1 Set
3	Casing Liners	1 Set
4	Fan Bearings Without Bearing Housing	2 Sets
5	Seal, 'O' Rings, Oil Rings For Both The Fan Bearings	6 Sets
6	Damper Rod End Assy.	1 Set
7	Lub. Oil System	
7.1	Pump Assy.	1 No
7.2	Motor	1 No of each
7.3	Pressure Regulator	2 Nos
7.4	Filters	6 Nos
7.5	Coupling between oil pump & motor	2 Nos

1 set refers to 1 fan requirement

1.12.10.3 Seal Air Fan: (NDV 11.8)

Sl.No	DESCRIPTION	QTY/PROJECT
1	Fan rotor including impeller, shaft and connecting fasteners	1 No
2	Fan bearings without bearing housing	2 Sets
3	Seal, 'O' rings, Oil rings for both the fan bearings	6 Sets
4	Coupling between fan and motor	1 No

1.12.11 MANDATORY SPARES:

1.12.11.1 ID FAN: (NDZV 33)

Sl.No	DESCRIPTION	QTY/PROJECT
1.1	Fan impeller	1 No.
1.2	Fan main shaft	1 No.
1.3	Coupling between the fan and motor (In scope of	1 No.
1.4	Fan bearings and fan motor	2 sets each
1.5	Impeller liners	2 sets
1.6	Cooling element for the lubricating oil cooler	1 set
1.7	Spares for inlet damper assembly	
	Damper Rod End Assy.	1 Set
1.10	Pumpand motor for forced lubricating oil system	1 set

1 set refers to 1 fan requirement

1.12.11.2 Seal Air Fan:

Sl.No	DESCRIPTION	QTY/PROJECT
1	Impeller with shaft	1 No.
2	Bearings and seals	2 sets
3	Motor bearings	2 sets

1 set refers to 1 fan requirement

1.12.12 COMMISSIONING SPARES:

1.12.12.1 ID FAN: (NDZV 33)

Sl. No	DESCRIPTION	QTY/BOILER
1	Sleeve bearing cooling water hose	8 Nos
2	Lub oil system filter elements	2 Sets

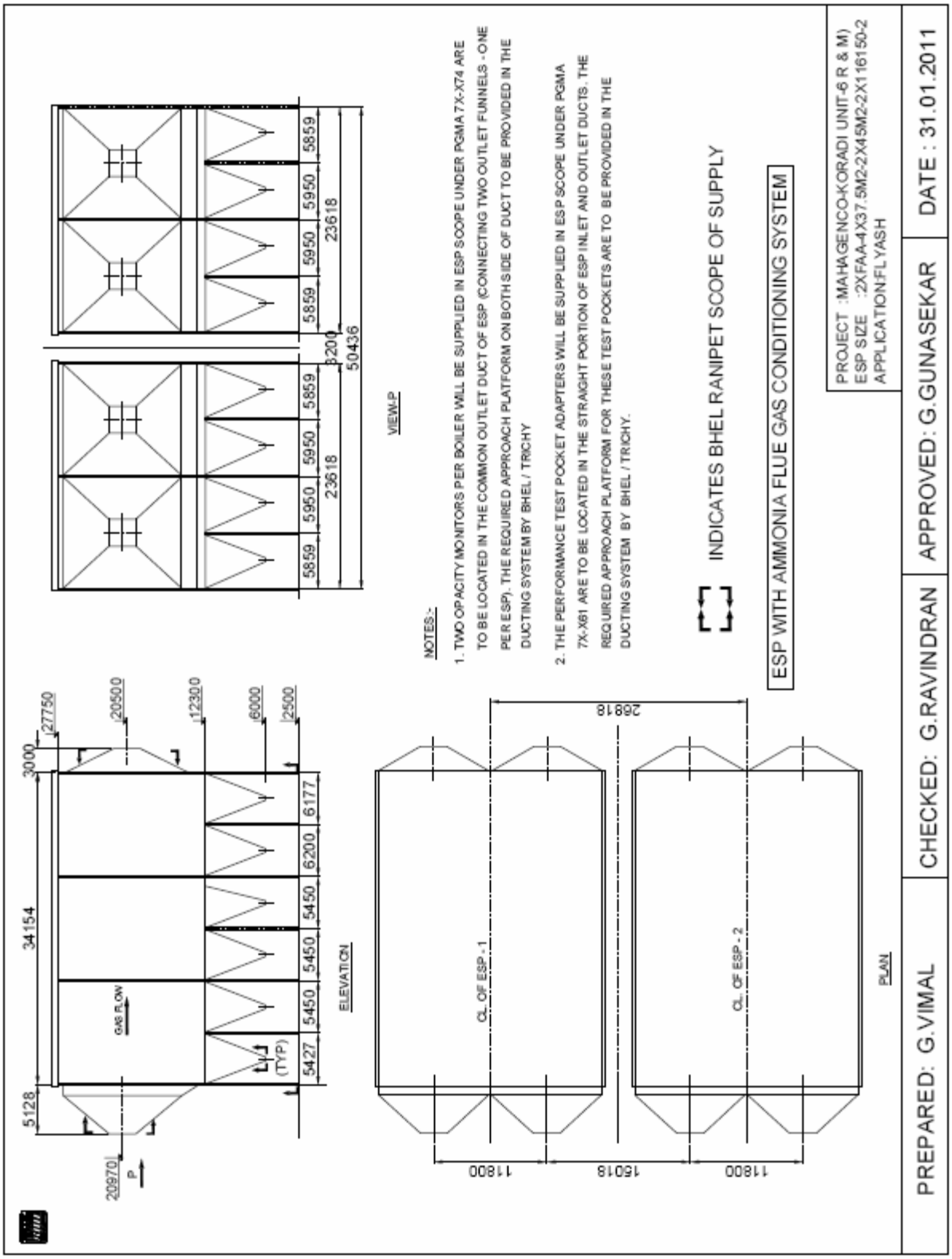
1 set refers to 1 fan requirement

1.12.12.2 PA FAN: (AP 2 17/12)

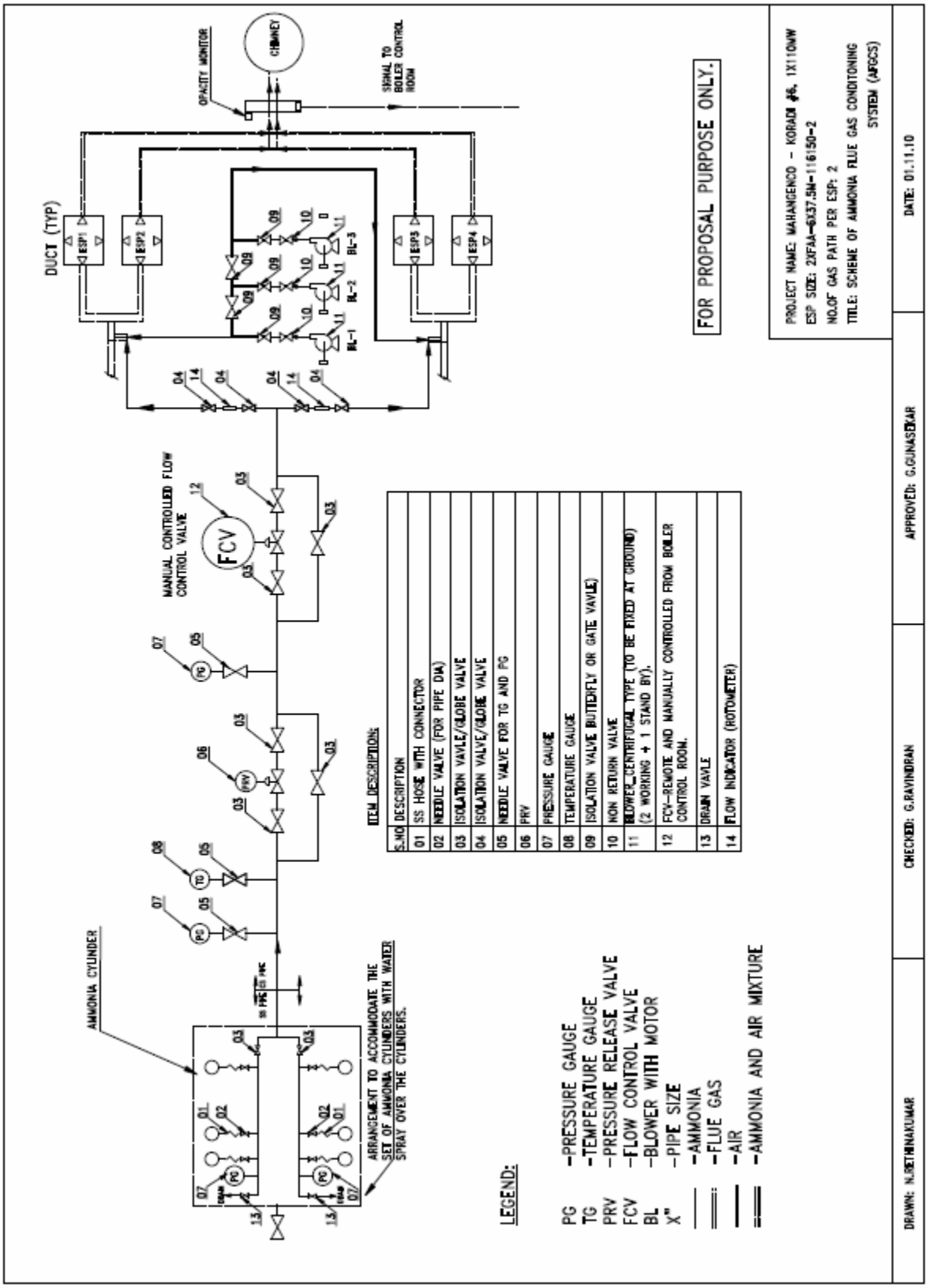
Sl.No	DESCRIPTION	QTY/BOILER
1	Main shaft with bearing assy.	
1.1	Simmer ring	2 Sets
1.2	'O' Ring	2 Sets
2	Servomotor	
2.1	Simmer ring	1 Set
2.2	'O' Ring	2 Sets
2.3	INA Ring	1 Set
2.4	Gasket	1 Set
3	Lub oil system filter elements	2 Sets
4	Flexible hose(LOS)	3 Nos
5	Ermoto coupling(Servomotor)	3 Nos

1 set refers to 1 fan requirement

1.12.13 ESP GA SKETCH



1.12.14 SCHEME OF AMMONIA FLUE GAS CONDITIONING SYSTEM



ERECTION

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

1.13.1 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection.

1.13.2 All the dampers, valves, lifting equipment, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning in the equipment, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.

1.13.3 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints at no extra cost.

1.13.4 Any other systems / Components which are integral to ESP & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.

1.13.5 **Insulation & cladding:** With respect to insulation and cladding it shall be for the complete ESP including inner roof of ESP.

1.13.6 The Erection, Alignment testing and commissioning of HV Rectifier transformer are in the scope of Mechanical contract.

1.13.7 Erection & dismantling of air blowers and connecting pipes & ducts, providing blanks/ dummies at the required locations and conducting gas-tightness test is in the scope contract and shall be carried out within the quoted rate.

1.13.8 Fine fittings and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

1.13.9 All welded joints should be painted with anti-corrosive paint, once NDE works are over.

1.13.10 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.

1.13.11 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.

1.13.12 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.

1.13.13 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain are reliable and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).

1.13.14 HSFG Bolts are to be tightened by turn of nut method/Torque Wrench, as per the instruction of BHEL Engineer. The bolted joints shall be jointly checked by BHEL/Customer and contractors personnel for the required tightness and retightened wherever necessary. The tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.

1.13.15 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL 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.

1.13.16 D.S.L / equivalent system for hoisting equipment are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians is to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of the above electrical hoist. Required loads will be provided by BHEL free of cost.

1.13.17 The temporary structures/items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to be made good by the contractor at his cost.

1.13.18 Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.

1.13.19 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed/attended as per BHEL engineer. Fixing, welding of necessary instrumentation tapping points, to be provided on auxiliaries covered within the scope of this specification will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The fixing / welding of all the above items will be contractor's responsibility even if the

i) Product groups under which these items are not specifically indicated in the Tender Specification.

ii) Items are supplied by an agency other than BHEL

1.13.20 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.

1.13.21 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

1.13.22 All the equipment /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect.

The contractor shall clean, wherever necessary and paint inside surfaces of the equipment like coolers, oil tanks, Rubber expansion joints assemble and other components as per instruction of BHEL Engineer during erection at the quoted rate.

1.13.23 Wherever equipment are supplied in pre-fabricated assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.

1.13.24 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing/gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing/lubricating them with recommended lubricants and assembling back.

1.13.25 Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipment. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

1.13.26 Attachment, welding of necessary instrumentation tapping points, to be provided on E.S.P / its auxiliaries or pipelines covered within the scope of this tender will also be the responsibility of the contractor and the same will be done as per the instruction of BHEL Engineer.

1.13.27 All the motors/pumps shall be stripped opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor. During servicing, pre-commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.

1.13.28 All site-fabricated pipes will be issued in running meters as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for

welding stubs shall also be done at site by the contractor. Fittings like bends, tees, elbow, mitre bends, reducers, flanges etc., will be supplied as loose items.

1.13.29 ESP collecting Electrodes may require straightening and repair due to minor transport damages before erection and spot heating in position to get correct alignment which shall be done by contractor within the quoted price.

1.13.30 Additional platforms of permanent nature for approaching different equipment, as per site requirement which may not be indicated in drawings shall be fabricated and installed by the contractor. However the contractor will be paid for this work on accepted tonnage rate for erection. The material required for platform will be supplied by BHEL free of cost.

1.13.31 One layer of insulation mattress on roof top of E.S.P roof (inner) shall be applied before outer roof is placed. The scope shall also include the above work even though the materials are supplied under some other product group and the erected materials shall be paid at the accepted tonnage rate for ESP.

1.13.32 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.

1.13.33 Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points are in the scope of work.

PROGRESS OF WORK

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

1.14.1 Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

1.14.2 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

1.14.3 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer as per the format enclosed with this tender document.

1.14.4 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

1.14.5 The monthly report ending on 24th of every month shall be submitted as a booklet and shall contain the following details :-

a) Colour Progress photographs to accompany the report should be submitted.

b) Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.

c) Site Organization chart of engineers & supervisors as on 24th of the month with further mobilization plan

d) Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations and helpers. Data will be split up under the work area of Boiler

e) Consumables report giving consumption of all types of gases and electrodes during the previous month.

f) Availability report of cranes

g) Safety implementation report in the format

h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

1.14.6 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

1.14.7 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

WELDING

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

1.15.1 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification AND performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

1.15.2 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

1.15.3 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.

1.15.4 All expenses for testing of contractor's welders including destructive and Non- destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.

1.15.5 Only BHEL approved electrodes and filler wire will be used. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot.

1.15.6 The contractor shall also be equipped for carrying out other NDT like LPI /MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates.

TESTING AND COMMISSIONING

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

1.16 TESTING , PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

(All the works mentioned hereunder shall be carried out within the quoted and accepted rate)

1.16.1 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer.

1.16.2 The contractor shall carry out all the required tests on the equipment erected such as gas tightness test for ESPs & ducts, kerosene leak test, air flow test, etc., using contractor's own consumables, labor and scaffoldings.

1.16.3 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable within the quoted price to carry out the Gas Distribution test of ESP.

1.16.4 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. All the tests should be repeated till all the equipment's satisfy the requirement / obligation of BHEL to their customer. All the repairs (shop welded or site welded) arising out of the failures during testing shall be done by the contractor as part of the work.

1.16.5 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work within the quoted rate and BHEL will provide only the required materials, like Blowers venture meter and dummies free of hire charges for conducting the test. Agency to arrange required cable for power supply for the Blowers.

1.16.6 Fixing dummy plates at required locations for conducting tightness test and normalizing after the test is over, is also covered in the scope of contract and shall be carried out within the quoted rate. BHEL will provide raw materials for the dummy plates.

1.16.7 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

1.16.8 The ESP rectifier transformers are to be only erected by the Mechanical group.

1.16.9 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part are required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

1.16.10 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.

1.16.11 Commissioning of the equipment's will involve, trial runs of all the equipment erected, blowing through the lines, flushing of all the lines by air, oil or steam as the case may be, trial run of the equipment and any other works incidental to commissioning.

1.16.12 In case any erection defect is detected during various tests / operations trial runs such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost if insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

1.16.13 The contractor shall carry out cleaning and servicing of valves and dampers / gates actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and actuators are left un-serviced.

1.16.14 Replacing / Cleaning and servicing of all the filters of the erected equipment during pre-commissioning / commissioning stages shall be done by the contractor within the accepted price.

1.16.15 Contractor may have to replace old/damaged gaskets / packing etc. in the erected equipment and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.

1.16.16 In case any erection defect is detected during various tests / operations trial runs, such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

1.16.17 In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.

1.16.18 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance.

1.16.19 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

1.16.20 It shall be specifically noted that the contractor and employees of the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers / customer officials. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.

1.16.21 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

1.16.22 Contractor shall lay all necessary electric cables and switches etc. required for the tests and maintain the system till the tests are completed satisfactorily.

1.16.23 All lubricants and chemicals required for pre-commissioning, commissioning, testing and lubricants for trial runs of the equipment shall be supplied by BHEL / BHEL's client **at free of charges**. All services including labour and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. The consumption of lubricants / chemicals shall be properly accounted for. Surplus material if any shall be properly stacked / tagged and returned to BHEL / Customer stores at no extra cost to BHEL. BHEL reserves the right to recover costs for wastage by the contractor**.**

1.16.24 Transportation of oil drums from customer's / BHEL's stores. Filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly transport of chemicals for various pre-commissioning, commissioning activities and related processes and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

1.16.25 The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition checking aligning and coupling the motor to the respective driven equipment. Before starting the motor, IR values of insulation shall be recorded and if found necessary the contractor shall dry out to improve the IR value at no extra cost.

1.16.26 Necessary scaffolding and approaches for conducting the tests shall also be within the scope of the contract.

1.16.27 Assistance for calibrating / testing the power cylinders / actuators / valves, gauges, instruments, etc. and setting to actuators shall be provided by contractor within the quoted rates.

PAINTING

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

1.17.0 FINAL PAINTING

1.17.1 The scope of work shall also include supply and application of final painting of all the erected equipment as required and specified for the components of ESP and its auxiliaries.

1.17.2 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.

1.17.3 All the exposed metal parts of the equipment including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as indicated in the Painting Specification in TCC which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL/Customer official.

1.17.4 Paint shall be applied by brushing or by spray painting as per the instruction of BHEL Engineer. Spray painting gun and compressed air arrangement has to be made by the contractor himself. It shall be ensured that brush marks are minimum.

1.17.5 Before applying the subsequent coats the thickness of each coat shall be measured and recorded with BHEL / Customer.

1.17.6 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturer's instructions shall be followed in method of application, handling, drying time etc.,

1.17.7 The scope of painting includes application of color bands, lettering the names of the systems equipment; tag Nos. of valves, marking the directions of flow and other data required by BHEL within the quoted rate.

1.17.8 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated

spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.

1.17.9 Finish coat paint, No of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document/ customer's specifications. The painting specification which is forming part of this tender as in TCC shall be used as guidelines to be followed.

1.17.10 The actual colour to be applied shall be approved by the customer before starting of actual painting work.

1.17.11 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the **BHEL / Customer approved agencies** only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities.

1.17.12 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.

1.17.13 If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates.

1.17.14 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.

1.17.15 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL/ Customer.

1.17.16 PRESERVATION / TOUCH UP PAINTING

1.17.16.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipment under this tender specification right from pre- assembly stage to till the equipment is cleared for final painting.

1.17.16.2 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of red oxide primer wherever

the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.

1.17.16.3 Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final color.

1.17.17 Painting Scheme for ESP and Gates & Dampers

Manufacturing Painting Scheme:

1) Painting Scheme for ESP Components:
Surface Preparation: Power Tool Cleaning to St3

a. Surface exposed to atmosphere:
Primer: One coat of red oxide Zinc phosphate primer to IS: 12744 to DFT of 30 µm (min)
Finish Paint: Two coats of synthetic of enamel to IS 2932 smoke grey (shade No. 692 of IS 5)
DFT of 2X20 = 40 µm (min)
Total DFT = 70 µm (min)

Surfaces (Insulated & Flue Gas Path)

Primer: Two coat of rod oxide Zinc phosphate primer to IS: 12744 to DFT of 2X30 = 60 µm (min)
Emitting Electrode Hook, Machined components and foundation bolts are applied with rust preventive fluid and min DFT = 20 µm.

Stainless Steel, Aluminium and Galvanized Items are not painted.

2) Painting Scheme for Gates and Damper:

Surface exposed to atmosphere
Surface Preparation: Power Tool Cleaning
Primer: One coat of red oxide Zinc Phosphate primer to IS 12744, DFT = 30 µm (min)
Finish Paint: Two coat synthetic of enamel to IS 2932 smoke gray shade no 692 IS 5 to a DFT of 40 µm

Total DFT – 70 µm (min)

Surface under insulation and flue gas path (including Gate frame)

Primer: Two coat red oxide Zinc Phosphate primer to IS 12744, DFT = 60 µm (min)

Machined components and gate blades are protected with temporary rust preventive application.