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T E N D E R S P E C I F I C A T I O N

TENDER NO. BHEL/ NR/SCT/UNCHAHAR/ELECTRICAL AND C&I/UNIT-6/1024

FOR

"Erection, Testing, Commissioning, Assistance in PG Test and Handing Over of all C&I Equipments, Station C&I and Electrical Equipments as per tender specification at Unit#6 of 1x500 MW: Unchahar TPP, Stage IV Dist- Raebareli- U.P".

PART I – TECHNICAL BID

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

ISO 9001, ISO 14001,
OHSAS 18001 & SA 8000
certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120- 2416275/2416262
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Email: eklavya@bhelpsnr.co.in/susmitabasu@bhelpsnr.co.in

TENDER NO. BHEL/ NR/SCT/UNCHAHAR/ELECTRICAL AND C&I/UNIT-6/1024

IMPORTANT NOTE

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

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

Rev 01
1st Jun
2012

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited

Ref:
Date: __/__/____

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NOTICE INVITING E-TENDER (NIT)
BIDDER TO SUBMIT OFFERS ON PORTAL
https://bheleps.buyjunction.in

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To

Dear Sir/Madam

Sub : NOTICE INVITING E-TENDER

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

1. **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	TENDER NUMBER	**BHEL/ NR/SCT/UNCHAHAR/ELECTRICAL AND C&I/UNIT-6/1024**	
ii	Broad Scope of job	**"Erection, Testing, Commissioning, Assistance In PG Test and Handing Over of all C&I Equipments, Station C&I and Electrical Equipments as per tender specification at Unit#6 Of 1x500 MW: Unchahar TPP, Stage IV Dist- Raebareli- U.P"**	
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. From BHEL website (www.bhel.com) and https://bheleps.buyjunction.in** Tender documents will be available at website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 20/02/2016 , Time : 1500 HRS*** ***Place : on https://bheleps.buyjunction.in***	*Applicable*
vi	**OPENING OF TENDER**	***Date : 20/02/2016 , Time : 1530 HRS*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get*	*Applicable*

		extended to the next working day. *(2) Bidder may depute representative to witness the opening of tender.* ***However it being an e-tender it shall be opened online***	
vii	**EMD AMOUNT**	*2,00,000/-*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	***Five days before bid submission due date.*** *Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		*Not applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) & portal https://bheleps.buyjunction.in **and not in the newspapers**. Bidders to keep themselves updated with all such information	
xiii	**Tender submission**	on portal https://bheleps.buyjunction.in	

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

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

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

4. Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Noida. As this tender is an E-Tender and no paper bids will be accepted therefore the scanned copy of the Demand Draft/Pay Order should be uploaded in the E procurement portal. Hard Copy of the Demand Draft/Pay Order should reach BHEL PSNR HQ Noida before the due date and time of bid submission. BHEL shall not be responsible for postal or any other delays in this regard. For other details and for 'One Time EMD' please refer General Conditions of Contract.

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

Documents Comprising the e-Tender

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

a. Technical Tender (UN priced Tender)

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

- **i.** Tender Cost and Earnest money Deposit (EMD) furnished in accordance with NIT Clause 3.0 & 4.0. Alternatively, documentary evidence for claiming exemption as per clause 29 of NIT
- **ii.** Technical Bid (without indicating any prices).

b. Price Bid:

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

DO NOT"S

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

Digital Signing of e-Tender

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

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The Requirement:

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

BHEL has finalized the e-procurement service Provider-:

M/s M Junction services Limited, Kolkata

Godrej Water Side, 3rd Floor, Tower-1, Plot-V, Block - DP
Sector - V, Salt Lake, Kolkata-700091, West Bengal, INDIA

The contact details of the service provider are given below:

1. **First level:**
   - MJ Helpdesk : 033-66011717, eps.customercare@mjunction.in

2. **Second Level:**
   - Bhaskar Chakraborty: 8584008205, bhaskar.chakraborty@mjunction.in, eps.customercare@mjunction.in
   - Santosh Kumar: 9717149600, santosh.kumar@mjunction.in

3. **Third Level:**
   - Rimi Ghosh: 9650044156, rimi.ghosh@mjunction.in

1. Customer care Help Desk of M/s MJUNCTION SERVICES LIMITED, Kolkata:
   Tel ~ 033 - 66011717 (From 9.30 am to 5.30 pm),
   Mob - 91633 48283 - 86/ 85840 08116 (From 5.30 pm to 8.30 pm)
   HELPDESK email: eps.customercare@mjunction.in,
   The process of utilizing e-procurement necessitates usage of **DSC (Digital Signature Certificate)(Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)** and you are requested to procure the same immediately, if not presently available with you. Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

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

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

Vendors are also requested to go through seller manual available on www.bheleps.buyjunction.in

6. **Not Used**

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

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

9. **Assessment of Capacity of Bidders:**
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) $P_1, P_2, P_3, P_4, P_5, \ldots P_N$ 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 '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + .. T_N$)

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,…. $S_{1\text{-}N}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). 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 '$\mathbf{P_T}$' for all Regions (i.e 'S_T '$= S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

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

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

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

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 = $\mathbf{P_T}$ 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 $R_{BHEL} \geq 80$, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(where P is calculated as per clause 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 Table-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 iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). 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 viii). 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/ LOA 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'.

In case assessment of "FIRST TIMER" cannot be done for 9 months due to ***completion of work in less than 9 months****, the "FIRST TIMER" tag will be removed and the vendor shall be considered as "NEW VENDOR" for any new*

tender/s, provided the average score for which Performance Evaluation has been done, is not less than 60%.

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

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

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

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

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

15. Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if**

applicable, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

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

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

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

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

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

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

23. **Consortium Bidding** (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 criteria "B1" of 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. The bidder shall upload documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

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

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

27.0 BHEL reserves the right to go for **Reverse Auction (RA**) instead of opening the 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 RA.

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."

Information and General Terms and Conditions governing RA shall form part of the RFQ/ Enquiry.

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

29.0 **Micro and Small Enterprises (MSE)**

Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer

Type under MSE	SC/ST owned	Others
Micro		
Small		

Note: - If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.

MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (format enclosed as Annexure – 4 where deemed validity of EM-II certificate of five years has expired) applicable for the relevant financial year (last audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer.

MSEs shall be exempted from payment of tender fee.

MSEs shall be exempted from payment of earnest money at the time of tender deposit. However, there is no exemption of security deposit submission.

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

31.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD
(SCT)

Enclosure:-

(i) Annexure-1: Pre Qualifying criteria.
(ii) Annexure-2: Check List.
(iii) Annexure-3: Modification / Deletions in Standard Clause of General Conditions of Contract (GCC) or Special Conditions of Contract (SCC)
(iv) Annexure-4: Chartered Accountant certificate for MSMED
(v) Annexure-5: General Terms and Conditions of Reverse Auction (RA)
(vi) Annexure-6: Authorization of representative who will participate in the online Reverse Auction Process
(vii) Annexure-7: Feedback form
(viii) Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	**"Erection, Testing, Commissioning, Assistance In PG Test and Handing Over of all C&I Equipments, Station C&I and Electrical Equipments as per tender specification at Unit#6 Of 1x500 MW: Unchahar TPP, Stage IV Dist-Raebareli- U.P"**
TENDER NO	**BHEL/ NR/SCT/UNCHAHAR/ELECTRICAL AND C&I/UNIT-6/1024**

SL. NO.	Name And Description Of Qualifying Criteria	Criteria Applicable/Not Applicable
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)	Not Applicable
B	**Technical** Bidders who wish to participate should have experience of having successfully EXECUTED during last seven years ending last day of the month previous to the one in which applications/bids are invited should be as per following::	Applicable
B.1	**B.1.1** Three similar executed works costing not less than the amount equal to **Rs 108.4 Lakhs**. **'OR'** **B.1.2** Two similar executed works costing not less than the amount equal to **Rs 135.5 Lakhs**. **'OR'** **B.1.3** One similar executed works costing not less than the amount equal to **Rs 216.8 Lakhs**.	
B.2	B.2.1 Executed C&I works for BTG/GT 'OR' C&I works consisting of DCS/DDC/Station C&I in one unit of at least 190 MW rating. **'OR'** B.2.2 Executed at least one contract of C&I works consisting of DCS/DDC/Station C&I in any Industry with its executed value of Rs 190 Lakhs or more.	
B.3	B.3.1 Executed Electrical works in a power plant consisting of: B3.1.1 ETC of Power transformer (120 MVA or more rating) B3.1.2 ETC of HT Bus Ducts **'OR'** B.3.2 Executed Electrical works in any industry consisting of criteria B3.1.1 & B3.1.2 above of value Rs 190 Lakhs or more.	
C	**FINANCIAL**	Applicable
C-1	**TURNOVER**	

	Bidder should have achieved an average annual financial turnover (Audited) of Rs 81.3 Lakhs or more over the last three Financial years (FY) i.e. (2012-13, 2013-14, 2014-15). Bidder shall submit audited annual accounts (balance sheets and profit & loss account) in support of this. In case audited financial statements have not been submitted for all the three years as indicated above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e. total divided by three. If financial statements are not required to be audited statutorily, then instead of audited financial statement, financial statements are required to be certified by Chartered Accountant.	Applicable
C-2	**NET WORTH** Net worth of bidders based on the latest audited accounts, as furnished for C-1 above, should be positive. Net worth = Paid up share capital* + Reserves. (*Share capital or partnership capital or proprietor capital as the case may be)	Applicable
C-3	**PROFIT** Bidder must have earned cash profit in any one of the three financial years as applicable in last three years defined in C-1 above based on latest Audited accounts. 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.	Applicable
D	**Assessment of capacity of Bidder to execute the work as per Sl no 9 of NIT**	Applicable
E	**Approval of customer**	Not Applicable
F	**Consortium Criteria** F.1 Clause no. 23.3 of NIT shall be read as- Maximum 02 nos. of partners is permitted for consortium bidding. F.2 Clauseno.23.4 of NIT shall be read as-Vendor qualifying the criteria B2 above shall be treated as prime bidder. F.3 Clause no. 23.6 of NIT shall be read as- Prime bidder shall comply with criteria B1 above.	Applicable

Explanatory Notes for PQR above:

1. For B1 & B2, 'Executed' means **the bidder should have achieved the criteria specified in the QRs even if the Contract has not been completed or closed.**

2. For B3, 'Executed' means **the bidder should have achieved the criteria of "Charging" for Power transformer & Bus Ducts.**

3. **'Similar Works' means 'C&I and Electrical Works'.**

4. For QR 'B' value of work is to be updated as per the PVC formula of GCC with Indices for "All India Avg. Consumer Price Index for Industrial Workers" with base month as date of execution and indexed up to two months prior to the bid opening month.

5. If the qualifying work is completed in the Seven (7) years period specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.

6. Bidder to submit Audited Balance Sheet and Profit and Loss Account as per C1 for the respective years as given above along with all annexure.

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

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3.a	Details of Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
3.b	Details of alternate Contact person for this Tender	Name : Mr/Ms Designation: Telephone No: Mobile No: Email ID: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE	
		APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/~~Not Applicable~~	YES/NO
8	Copy of PAN Card	Applicable/~~Not Applicable~~	YES/NO
9	Not used		
10	Integrity Pact	~~Applicable~~/Not Applicable	
11	Declaration by Authorised Signatory	Applicable/~~Not Applicable~~	YES/NO
12	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
14	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO
15	Non Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	

19	Not used		
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Annexure-3

Modification / Deletions in Standard Clause of General Conditions of Contract (GCC) or Special Conditions of Contract (SCC)

I. Clause No. 2.17.5 of GCC shall be 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 delivery period as defined in clause no 6.0 of TCC.**

II. Clause No. 2.17.9 shall be modified as:-

PVC shall be applicable only **for the extended period of contract (if any) after the schedule completion date.** However, total Quantum of PV amount payable/recoverable shall be regulated as follows:

(1) For the portion of backlog attributable to the contractor, **no PVC shall be paid.**
(2) For the period of Force Majeure, the PVC (if applicable) will be limited to the indices applicable at the beginning of the force majeure period.
(3) For the portion of backlog attributable to BHEL, PVC will be as per the indices applicable for the respective months.
(4) The total amount of PVC shall not exceed 20% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/ Additional Item and Extra works.

ANNEXURE - 4

Certificate by Chartered Accountant on letter head

This is to Certify that M/S ..... , (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part—II) ..... dtd:..... , Category: ..... (Micro/Small)). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O.1722(E) dated October 5, 2006:
   Rs.....Lacs

2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the **MSMED** Act, 2006:
   Rs.....Lacs

(Strike off which is not applicable)

The above investment of Rs.....Lacs is within permissible limit of Rs.....Lacs for ..... Micro / Small **(Strike off which is not applicable)**

Category under MSMED Act 2006.

Or

The company has been graduated from its original category (Micro/Small) (Strike off which is not applicable) and the date of graduation of such enterprise from its original category is ..... (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

ANNEXURE - 5

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

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).

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

2. 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 actionby BHEL as per extant guidelines in vogue.

3. 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.

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

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

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

7. 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 non-compliance 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.

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

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

10. 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, as provided on case-to-case basis to Service provider within two working days of Auction without fail.

11. 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.

12. 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.

13. 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.

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

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

ANNEXURE – 6

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

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

ANNEXURE – 7

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

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

TECHINICAL CONDITIONS OF CONTRACT (TCC)

"COLLECTION OF MATERIALS FROM STORES/STORAGE YARD, TRANSPORTATION TO SITE, ERECTION, TESTING, COMMISSIONING, ASSISTANCE IN PG TEST AND HANDING OVER OF C&I, STATION C&I AND ELECTRICAL EQUIPMENTS AS PER TENDER SPECIFICATIONAT Unit#6 of 1X500 MW: UNCHAHAR TPP, STAGE IV DIST- RAEBARELLI-U.P"

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

CHAPTER I- PROJECT INFORMATION

Name of the Owner	:	**NATIONAL THERMAL POWER CORPORATION LTD.(NTPC)**
Name of Customer	**:**	**NTPC BHEL POWER PROJECTS PVT. LTD. (NBPPL)**
Address	:	NTPC Unchahar Thermal Power Plant Village: Mustafabad, Tehsil - Unchahar District– Raebareli, Uttar Pradesh
New Installation	:	UNIT#6, STAGE IV-1 x 500 MW
Nearest Railway station (1 Km from site)	:	Unchahar Railway Station on Kanpur-Allahabad line
Nearest Road	:	Unchahar Lucknow-Allahabad Road (115 Km from Lucknow)
Nearest City	:	Raebareli
Nearest Airport	:	Lucknow-115 KM Allahabad- 85 KM
Highest Temperature	:	45 deg C
Lowest Temperature	:	1 deg C
Elevation	:	354.77 metres

Chapter - 2: SCOPE OF WORKS

2.0 Scope Of Work

2.0.1 Scope of these specifications cover complete work of handling, identification, transportation of materials from Project storage yard / stores/Place of unloading to erection site / place of erection , storage at erection site, preservation, watch and ward, dressing, chipping and leveling of foundations, cleaning , checking, testing, pre-assembly, erection, calibration, alignment, welding, wherever required, preservative/ touch-up painting including supply of paints etc, including electronic earthing and other activities required for erection, testing, commissioning, post commissioning, trial operations ,PG Test assistance & handing over of BTG C&I, station C&I and Electrical equipments including DAVR,VFD system, Power Transformers and IP Bus-ducts for **Unit#6** of **1X500 MW: UNCHAHAR TPP, STAGE IV DIST- RAEBARELLI- U.P** as indicated in the BOM schedule covered within the scope of these specifications for this tender.

2.1 Scope of work forC&I, station C&I equipment and Electrical equipments including Transformers and IP Bus-ducts for Unit#6 of 1X500 MW: UNCHAHAR TPP, STAGE IV Dist-Raebareli- U.P in general:

The Scope of **C&I, station C&I and Electrical equipments including Power Transformers and Bus-ducts**covered in the above packages shall be as follows:

1. Erection, Testingand commissioning of Control/DCS panels of SG, TG and station C&I.

2. Erection, Testing and commissioning of GRP,STRP, Link, transducer and AVT cubicles, IPR panels, Electrical Control Panels.

3. Erection, Testingand commissioning of All Types of Field Instruments like Temperature, Pressure and Flow instruments (local & remote) and special instruments like EWLI, SWAS System, Flue Gas analyser ,steam leak detection system etc.

4. Erection, Testingand commissioning Man Machine Interface & Data Acquisition System consists of Operator Workstations (max Station), Engineering station (common for SG/TG), Computers / PLC based Equipment, Laser printers (B/W or Color-A3etc), Ethernet Switches.

5. Erection,Testing and commissioning of all types of Control room mounted instruments like Recorders, Indicators, Microprocessor based panels, DCS system and its accessories like system panels, PC, printers, furniture etc in Equipment room /Control room as per drawing.

6. Erection & Testing of all types of control/instrumentation/Power cables etc which are in BHEL PSNR scope of work.

7. Erection of all types of Hardware like impulse pipes, cable trays & tray supports etc. which are in BHEL PSNR scope of work.

8. Fabrication and installation of steel supports, wherever required to route cables through cable trays or panel erection and other Misc activities.

9. Commissioning of all Types of Control valves/ Pneumatic operated Valves/Actuators/ Controllers and Relief Valves in BTG area and wherever same is in BHEL PSNR Scope.

10. Supply and application of adequate quantity of touch up paints as required for items covered in scope of works.

11. Erection, Testing and commissioning of UPS, ACDB, battery system, charger, Data Concentrator etc.

12. Erection, testing and commissioning of furnace flame viewing system, network panels, VMS for STG, TDBFP etc.

13. Erection, testing and commissioning of Condenservacuum pump system, pyrometer system for Boilers,JBs, Positioner cabinets for LPBP,LIRs, and LIEs.

14. Erection, Testing and commissioning of Generator Transformer (Specification & quantity as per BOQ).

15. Erection, Testing and commissioning of Unit Transformers (Specification & quantity as per BOQ).

16. Erection, Testing and commissioning of Unit auxiliary transformer (Specification & quantity as per BOQ).

17. Erection, Testing and commissioning of Start-up/stand by transformer (Specification & quantity as per BOQ).

18. Erection, Testing and commissioning of VFD Panels and transformers. (Specification & quantity as per BOQ).

19. Erection, Testing and commissioning of Generator Bus Duct (Isolated Phase) and associated equipment like LA &VT cubicle, NG cubicle, Current transformers and associated systems.

20. Erection, Testing and commissioning of Digital automatic voltage regulator panel.

21. **The contractor should have following valid certificates.**

A) Contractor Electrical License for Extra High Voltage System installation work.

B) Supervisory Competency Certificate to deal with Electrical High Voltage equipments for their erection, testing & commissioning. During the execution of work, minimum two persons should be posted at site that has valid Supervisory Competency Certificate. The contractor shall have valid ELECTRICAL LICENSE to carry out the electrical works. All necessary certificates and licenses required to carry out this work are to be arranged by the contractor expeditiously at his cost.

22. PG test assistance in C&I and Electrical as per scope in tender specification scope and for overall equipments.

2.2 The scope of specification covers the installation, testing and commissioning of the all equipment, hardware along with accessories as detailed in Bill of Materials given in Chapter X

2.3 -Detailed BOM with specification are given in the CHAPTER-X. Contractor shall go through the detailed BOM and specification before filling the rate in the rate schedule given in Chapter-XI.

2.4 GENERAL

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

2.4.1 Identification of equipment at storage yard, technical assistance for checking and making the shortage/damage reports, taking delivery from storage yard/ stores and calibration, erection, aligning, fastening, supporting, cleaning, checking, testing, commissioning, troubleshooting and carrying out statutory tests as required, trial operation, up to the time of completion of commissioning activities and commercial operation of the unit and handing over to customer or till completion of contract period whichever is earlier, along with the supply of all consumables, tools and tackles and testing instruments.

2.4.2It is not the intent to specify herein all details of material. Item related to this work not covered, but necessary to complete the system will be deemed to have been included in the scope of the work.

2.4.3All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

2.4.4Contractor shall erect all items/materials etc. as per sequence prescribed by BHEL Engineer-In charge at site. BHEL engineer- in charge, depending upon the availability of materials/work fronts etc will decide the sequence of erection/commissioning methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection/commissioning adopted in erection/commissioning of similar job or for any reasons whatsoever.

2.4.5Site testing wherever required shall be carried out for all items/materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's or customer recommendations.

2.4.6The contractor shall co-ordinate and provide assistance for satisfactory testing, pre-commissioning, commissioning and trial run of the connected equipment under overall guidance of BHEL and shall locate any cause of malfunction and rectify the same for proper operation. Testing shall also include any additional tests, which the Engineer-in- charge feels necessary because of site conditions and also to meet system specification.

2.4.7The work shall be executed under the usual conditions without affecting power plant construction and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole. Contractor shall follow all PTW and other procedures required to execute work at site as per BHEL engineer-in-charge instruction.

2.4.8The contractor shall take delivery of item, materials, from the storage yard / stores/ sheds of BHEL / customer which are within plant premises. He shall also make arrangements for, safe custody, watch and ward of equipment after it has been handed over to him till they are fully erected, tested and commissioned till the contract period. The contractor shall note that items/materials shall be transported to erection site / assembly yard etc. by the prescribed route without disturbing and causing damage to other works in the most professional manner. All items, Hardware, etc. shall be stored in appropriate manner as per BHEL's instructions.

2.4.9The contractor shall take delivery of items/materials, and consumables from the stores/ storage area / sheds of BHEL / customer after getting approval of engineer / customer in the prescribed indent forms of BHEL / customer.

2.4.10 After completing all the works, contractor shall hand over all remaining extra materials with proper identification tags in packed condition to BHEL stores. In case of any use over actual design requirements, BHEL reserves the right to recover the cost of material used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

2.4.11Contractor shall, transport all materials to site and unload at site / working area, or pre-assembly yard for inspection and checking. All material handling equipment required shall be arranged by the contractor.

2.4.12Contractor shall retain all T&P/Testing instrument/Material handling equipment etc at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from Engineer in charge/Construction Manager and Customer.

2.4.13Contractor shall remove all scrap materials periodically generated from his working area in and around power station and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect. All the package materials, including special transporting frames, etc. shall be returned to the BHEL stores / customer's stores by the contractor.

2.4.14The contractor at his cost shall arrange necessary security measures for adequate protection of issued BHEL and its own machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor’s custodian construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.

2.4.15The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor’s site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in- Charge.

2.4.16The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances.

2.4.17Scope of work covered under this specification requires quality workmanship,engineering and construction management. The contractor shall ensure timely completion of work. The contractor shall have adequate tools, measuring instruments, calibrating equipment etc. in his possession. He shall also have adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployed by contractor shall match with above scope of works.

2.4.18All the surplus, damaged, unused materials, package materials, containers, special transporting frames, etc. shall be returned to the BHEL stores / customer's stores by the contractor.

2.4.19Any wrong erection shall be undone and re-erected promptly to comply withthe design requirements to the satisfaction of Site Engineer.

2.4.20BHEL may provide vendor's technical support and IMTE's and T&P or any other equipment (as considered necessary by BHEL's Engineer In-charge)required for commissioning of various proprietary type special instruments/systems like Analysers, Vibration Monitoring System, Microprocessor based relays, Flame Scanners , DAVR ,GRP, STRP, Battery System, UPS, etc. The contractor shall carry out the works as per instructions of BHEL/ Vendor Engineer.

2.4.21 Assistance in PG test of main equipment along with all auxiliaries, completion of punch points and assistance for handing over of units to customer including additional work of temporary cable laying or equipment fixing or any shall be in the scope of contractor ,installing of Temp and Pressure gauge Sensors, Mounting of thermo-wells etc. Within the quoted rate.

2.5 SITE VISIT

Contractor should visit site and acquire full knowledge & information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in & around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.

2.6 SITE ORGANISATION & ERECTION SCHEDULE

2.6.1 The contractor shall provide adequate staffing in the following areas in additionto the staffingrequirements of execution as instructed/informed by BHEL:

1. Planning, monitoring & control.
2. Quality control and quality assurance.
3. Materials management.
4. Safety, fire & security.
5. Industrial relations and fulfillment of labor laws and other statutory obligations.

2.6.2 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.

2.6.3 On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.

2.6.4 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

2.6.5 The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen.

ERECTION SCHEDULE

2.6.6 Contractor shall submit within 30 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to Construction Manager UNCHAHAR site/ Project Manager at PSNR HQ-Noida without fail. L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilization plan over the period of time of the contract matching with the performance targets.

2.6.7 The program would be jointly finalized by the site in-charge of the contractor with BHEL/Customer's project coordinator as well as the site planning representative. The erection program will also identify the sequential erectable item.

2.6.8 The work under this scope being quite sophisticated and also quite extensive, for proper planning, monitoring, reporting, etc of ongoing works, the contractor shall establish his own computer(s) and printer(s) at his site office, along with suitable operator(s), consumables, etc

BHEL may use its own software for total store and material management or others for total project execution and billing. The contractor shall also provide adequate and suitable manpower for updating / entries into the systems in BHEL computers at site.

2.6.9 The scope of work will also include providing free of cost services of experienced and qualified Supervisors, electrician and helper by contractor for direct supervision of various works of power plant preferably works other than the scope covered under this tender. The qualification and experience of the supervisors, electrician shall be acceptable to the Construction Manager BHEL UNCHAHAR site.

This manpower indicated below shall be provided as per site conditions:

Supervisor- 14 man months
Electrician- 14 man months
Helper- 14 man months

Provision of supervisors by contractor as above shall be for direct supervision of various Works of power plant preferably works other than the scope covered under this tender. The qualification and experience of the supervisors shall be acceptable to the Construction Manager BHEL site. The Supervisors shall possess a minimum qualification of Diploma in concerned branch and working experience in power plants. They shall be deployed in all areas covered under various specifications as well as other related areas as may be deemed essential based upon work requirements, though not specified. They shall be guided by BHEL Engineers to ensure smooth work progress as and when /where required /deployed. No separate payment shall be paid for providing the services as per this clause.
The contractor shall provide these free of cost services within the quoted rates as per Rate Schedule.
In case contractor fails to provide above-mentioned man month against supervisor as desired by BHEL, BHEL shall have the right to hire such services from other agencies at the

risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, fully or partly a lump sum of Rs. 25,000/- (Rupees twenty five thousands only) per man month for the unutilised man months will be recovered from the bills of the contractor.

Free of cost services of Electrician along with helper as above shall be required with tools for maintenance/house keeping for Electrical panels, Lighting & power supply system for BHEL office, Store, Store yard & site.

Also maintain the records of power consumed by BHEL's contractor Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

In case contractor fails to provide Electrician and Helper as above as desired by BHEL, BHEL shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages plus 25.08% (for statutory payments) at UNCHAHAR for the workers categories stated above plus 10% will be made from the final bill of the contractor.

2.7 Contractor shall ensure following:

2.7.1 Contractor has to maintain contact with local hospital having ambulance facility, scanning & other ultra modern medical facilities required during emergency.

2.7.2 Contractor has to ensure pre employment medical check for all staff & workers.

2.7.3Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following:

- Male nurse (in shifts)
- Oxygen set up
- Breathing apparatus
- Eye wash facility
- Stretcher
- Trauma blanket
- Medicines.
-

In addition to above, BHEL (through its other contractor) has arranged ambulance at work site for emergency purpose, which can be utilized by the contractor in case of emergency. The charges for the same will be decided mutually at site. In case, under unavoidable circumstances, if the ambulance is not available / being used elsewhere, the contractor will have to arrange for the same.

2.7.1 The contractor shall comply with following towards Social Accountability;

a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labor were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.

b) The contractor shall not engage Forced/ Bonded Labor and shall abide by abolition of Bonded Labor System (Abolition) Act, 1976.

c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labor (Regulation & Abolition) Act, 1970.

d) The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimation/ Corporal Punishment for failure in meeting with relevant requirements.

e) The Contractor shall abide the requirement of Contract Labor (Regulation & Abolition) Act, 1970 for working hours.

f) The Contractor shall abide by the statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936 and BOCW act as applicable in state.

g) The Contractor shall arrange potable drinking water to its employees & workers.

2.7.2 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least 50 trees or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers-in –charge.

2.8 **The contractor's scope of work is further detailed in the clauses hereafter:**

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

2.8.1 CONTROL PANELS(max DNA based/C&I /DCS panel/ECP/GCP/DDCMIS Panelsetc)

1. Panels to be installed are microprocessor based max DNA control,ECP etc supplied in suit of either one or more or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

2. Installation of panel shall include checking of foundation, chipping of floor, fixing of base frame, fixing of anti-vibration pads, levelling, alignment, bolting with base frame/ welding of base frame with floor inserts and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries.

3. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Proper sealing of all the holes and cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope.

4. Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. This shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc.

5. Checking, testing, mounting/fixing in the panel all loose supplied items modules, relays, switches, lamps, push buttons, meters and all other items.

6. Checking and testing of internal wiring/components and associated relays (including specialised numerical relays).

7. Mounting of microprocessor based amplifier chassis in MAXDNA FSSS panel (to be supplied by different MUs).

8. Interconnection among panels, engineering control, diagnostic, plant monitoring system, control desk and field equipment/instruments.

9. Charging the system, checking and testing functional operation, simulation testing, checking of signal flow.

10. Software/hardware setting of parameters, logic etc.

11. Software programming, erasing, calibration etc.

12. Commissioning of all auto control loops.

13. All the panels and JBs shall be electrically earthed to the nearest earth grid by means of GI wire/Flats as per the instructions of BHEL engineer

14. The contractor shall prepare all erection/ commissioning log sheets, protocols / test certificates as per field quality plan, get it signed by the concerned BHEL / NBPPL Engineer and submit the same to BHEL Engineer as per his instruction.

15. The charged and commissioned equipment shall be maintained by the contractor till the same is taken over by M/s NBPPL.

16. Any items like lamps, lens, fuse / relays / instruments missed form the custody if the contractor shall be replaced by the contractor at free of cost.

17. The contractor shall close unused opening at the panel bottom plate with suitable material in consultation with Site Engineer at free of cost.

18. If any removal / Re-fixing of contactors / relays becomes necessary for the completion of the system, the same shall be done by the contractor at free of cost.

19. Scope of work shall also cover drilling of bottom gland plates for cable entry as required.

20. The contractor shall calibrate and commission all panel mounted instruments, protection relays, transducers, Recorders, Indicators, energy meters etc.

21. Scope for DAVR-System comprises of DAVR panel which is connected by Input cable from DAVR to main exciter, mounting of local instruments, enclosure winding resistance &IR value of main exciter etc. Checking of healthiness of all diodes, thyristers, earth fault brush checking and dummy load test of exciter, checking of control desk and field related i/ps and o/ps to commission the excitation system fully operational. Contractor shall deploysuitable manpower having knowledge of system for specialized system like DAVR.

*Contractor shall deploy specialized manpower for Special systems like AVR, relay testing,GRP testing, VFD etc. having experience in working in such kind of system.

2.8.2 UPS, BATTERY AND BATTERY CHARGER

1. The batteries are of heavy duty type capable of providing normal and emergency DC loads. The cells will be mounted on insulators carried on suitable wooden stands. The chargers are thyristor based system and shall comprise of Silicon Controlled Rectifier with transformer, switchgear and automatic regulation. The float and boost chargers will be housed in separate cubicles and mounted side by side.

2. Lump sum shall be quoted for Erection and commissioning of UPS and Battery. No additional payment shall be made for any variation in the number of cells. The unit rate quoted for erection of UPS and battery will include the following works.

2.8.2.1 SCOPE OF WORK FOR BATTERY

1. Collecting the batteries and all the accessories from stores and assembling on the wooden racks and fixing of all loose items supplied with the battery charger as per drawings and making any minor modifications or changes in wiring, if required, without any extra cost.

2. Filling the shells with loose supplied alkali/acid- if applicable.

3. Arranging for suitable load for charging and discharging during charging anddischarging cycles.

4. Arranging manpower in shift during charging and discharging cycles which isto be carried out round the clock as per the code of practice and conductingother routine test as per the IS under the supervision of the BHEL engineer.

5. Arranging necessary tools, T&P, Testing & calibration instruments required forerection and commissioning of the above equipment/panel.

2.8.3 CABLE TRAYS/CABLE DUCTS

1. Various types of sheet metal, galvanized cable tray, i.e. perforated, ladder type, sheet metal duct, solid bottom trays, pre-fabricated structural trays etc., will be supplied in standard lengths along with accessories and hardware viz; coupler plate, tray covers and tray clamps etc.

2. **Erection of cable tray/cable duct shall include cutting, laying, jointing, fixing tee/reducers/ bends/clamps, fixing of tray covers, hardware, fabrication & welding of tray supports as per tray route layout etc.**

2. Fabrication of bends/tee/ reducers from straight length of tray is within the scope of work and rate quoted shall be inclusive in unit rate (in running meter). All site welds of cable trays shall be painted with approved primer and cold galvanizing paint, which shall be arranged by the contractor.

3. **I**n case structural cable trays, bends, tees, reducers etc., are required to befabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

4. Cable trays/duct etc may have to be routed underground in cable trench, over head on structure, along the walls, floors etc.

5. ***Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable. Any minor modification in tray work as per site requirement, stipulated to be done as per drawing shall be done without any cost implications to BHEL.***

2.8.3.1 CABLELAYING (POWER/CONTROL / INSTRUMENTATION/COMPENSATING/FIBRE OPTIC/ETHERNET SHIELDED/ UNSHIELDED CABLES / PLUG-IN CABLES / Coaxial / UTP / STP /DATA HIGHWAY, ARMOURED / UN-ARMOURED, SINGLE / MULTI-CORE, PVC / HR PVC / FRLS / TEFLON / XLP INSULATION)

1. Cable laying includes cutting to the required length, laying in overhead Cable racks / underground cable trenches, pipes, flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, providing printed ferrules (ferrule printing machines to be provided by contractor for printing necessary cross ferruling details) / PVC numerical / alphabetical ferrules (where printed ferrules not possible at all) machine engraved ferrules sleeve/ ferrule,termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, crimp and soldered termination, plug-in connections with insert type crimping, providing identification cable tags of PVC/aluminium at both the ends and at appropriate interval (Approx. 30meters) throughout the route length, continuity checking, insulation resistance checking. Contractor to arrange adequate numbers of his own ferrule printing machines as per requirement of Engineer-in-charge.

2. Entry to the panels, JB's may be at top, side or bottom. All cable are required be supported and clamped near to the panel.

3. PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metal as per site requirement, clamping and dressing material such as suitable cable ties/ clamps etc with hardware, PVC sleeves etc. shall be supplied by contractor within the quoted rate for cable laying. Only Cable Lugs & Glands Shall Be Issued By BHEL As Free Issue Item.

4. All care should be taken to avoid abrasion, tension, twisting, kinking and stretchingof cables during installation. Any damage to cables on account of mishandling, cost of same shall be deducted from contractors RA bill.

5. Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally, shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and earthed at panel end only. While terminating the shield wire in either panel or JBs, PVC sleeves are to be used to avoid two-point earthing.

6. Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, actuators etc., are also required to be sealed. The required material for doing so shall be included by contractor in the cabling

7. Contractor shall carefully plan the cutting schedule of each cable drum in consultation with BHEL site engineer such that wastages are minimized. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.

2.8.3.2 CABLE TERMINATION

1. The Cost Of Cable Laying as Per BOQ Cum Rate Schedule Shall Also Include The Cost Of Termination With Suitable Crimping Type Lugs& Ferrules.

2. Only Cable Lugs & Glands Shall Be Issued By BHEL as Free Issue Item. Drilling of holes in gland plates of control panels, JBs etc as per requirement shall also be part of cabling at no extra cost to BHEL.

3. The contractor shall carryout insulation testing, simulation testing etc. as per the instructions of Engineer at site and/or Customer requirement.

4. Screen of signal cables shall run in insulated sleeve (to be arranged by contractor at no extra cost) and shall be terminated as per the instructions of the BHEL Engineer.

2.8.4 SCOPE OF WORK FOR FIELD INSTRUMENTS

Various types of instruments to be erected and commissioned shall be as detailed below:

1. All types of transmitters like temperature, pressure, flow, level transmitters etc. Local mounted pressure gauges, DP gauges, thermocouples, RTDs, temperature gauges, temperature switches, pressure switches, DP switches, flow switches and limit switches and flow indicator level switches etc.

2. Air filter regulators, Air lock off valves etc.

3. Panels / Control desk mounted Instruments like indicators, recorder, console and electronic modules etc.

4. I / P converters and local controllers.

5. Pneumatic operated control valves, trip valves, solenoid valves, power cylinders, etc. and electrically operated valves.
6. Special instruments like vibration sensors, electronic water level indicator, Gas analyser, PC based instruments, etc.

7. Prior to installation, all the local & remote Instruments, thermocouples/RTDs, I/P converters, etc. shall be calibrated. Similarly, limit switches, flow switches, level switches, solenoid valves, air filter regulator, purge meters, etc. shall be checked for proper operation.

8. The scope of work for each instrument shall include calibration, installation, loop checking, commissioning and troubleshooting until satisfactory performance as per operational and system requirement and maintenance till the end of contract period or trial operation whichever is earlier.

9. **In case any instrument requires recalibration to achieve the expected performance, the same shall be carried out at no extra cost.** If any re-calibration or replacement of instruments and rechecking of cable termination is found necessary during commissioning, the same shall be done at free of cost.

10. If any instrument is to be relocated for satisfactory performance, the same shall be carried out by the contractor.

11. Fabrication and installation of racks and supports for instruments, wherever required, shall be carried out by the contractor. Steel materials required for fabrication shall be supplied by BHEL.

12. The scope shall also include marking Tag numbers on the instruments or racks, either by paint or a separate tag plate as per BHEL Engineer's directive.

13. For field mounted instruments, pre-fabricated canopies shall be provided by BHEL. Mounting of canopies shall be done by the contractor as part of scope.

14. The scope of work for pressure/differential pressure transmitters, gauges, switches, shall include fixing the instruments on the racks / supports along with manifolds, and associated fittings and clamps.

15. The scope of work for Temperature transmitters, I/P converters, Air filter/Air lock off valves, Purge meters, Rotameters, position transmitter, probes etc shall include fixing the instruments on the racks / supports along with associated fittings and clamps.

16. The scope of work for control room mounted instruments shall cover mounting of instruments on panels / desk wiring, minor grinding on the cut out of panels for proper fixing.

17. The scope of work for erection of Casing temperature thermocouple of turbine/ metal temperature thermocouple (MTM) shall cover laying, dressing and clamping, supply and fixing of tag plates, etc.

18. The scope of work for erection and checking of thermocouple, RTD etc. shall include cleaning of thermo well stubs threads using tap sets, fixing of thermo wells, seal welding of thermo well, wherever required as per BHEL directive of site engineers.

19. The scope of work for temperature switches, gauges shall include providing suitable support for capillary type temperature Gauges/switches besides the works covered above for RTD & T/C.

20. The scope of work for erection and commissioning of float type Level switches includes fixing of switches on float chambers and fixing of float chambers on stand pipe, any minor modification required to match Float chamber with tapping point, providing supports wherever required etc.

21. The scope of work for Electronic type Level switches includes fixing of Electrode standpipe, Electrodes, Electronic unit, any minor modification required to match Float chamber/ Electrode standpipe with tapping point, integration of all loose supplied items etc .

22. The scope of work for special instruments like, Electronic water level indicator, Flue Gas analysers, SWAS Analyser, etc. shall include installation of all loose items which are not explicitly mentioned, but comes as part of the system, integration of total system and commissioning. The quantities of loose supplied items are approximate only. No extra payment will be applicable for any variation in quantity or for any additional items supplied as part of equipment.

23. For Special Instruments like, Analysers, SWAS System, DCS/PLC vendor support shall be provided by BHEL for commissioning. The contractor shall provide necessary assistance for commissioning activities.

24. All instruments are generally covered in the BOM. However, if any instruments not covered, but requires being erected/commissioned, same shall be carried out by the contractor.

25. In case of Instruments that are mounted and supplied along with main equipment, the contractor shall carry out removal, calibration, re-fixing and commissioning of same, as per requirement.

2.8.5 RIGID & FLEXIBLE CONDUITS

1. Cables shall normally be laid on cable trays. However, in case of shorter routes where trays are not possible, suitable GI pipe/flexible conduits shall be used.

2. The scope of works for flexible conduit includes drilling of the holes on the plates, fixing of the end connectors, providing suitable supports and fixing tag marks wherever specified as required by BHEL. The supply of suitable clamps, fasteners and tag plates are in contractor's scope.

3. Fixing end connectors shall be part of scope of flexible conduit lying.

2.8.6 JUNCTION BOXES/CJCBs/IP55-65 FRCP JB/PUSH BUTTON BOXES

Different type of Junction boxes/CJCBs/Bush button boxes shall besupplied by BHEL. The scope of installation of Junction boxes/Bush button boxesshall be as follows:

1. The unit rate quoted for erection of junction boxes/push button boxes shall include providing necessary supports, drilling of bottom gland plates for cable glands as required, Painting the tag No of JB or fixing a separate tag plate as required on junction boxes/push button boxes, minor chipping, grouting as required for mounting the JBs/PB and supply of all bolts and nuts (Fasteners) including grouting bolts as required for mounting the junction box/push button.

2. Fabrication and fixing of supports shall be on tonnage basis.

3. The contractor shall close all unused holes on the gland plates using suitable material in consultation with Site Engineer at free of cost.

4. All bolts and nuts (Fasteners) required for mounting the junction boxshall be arranged by the contractor.

2.8.7 SCOPE OF WORK FOR IMPULSE PIPES

1. Fabrication and erection of channel / angle / slotted angle supports, cleaning impulse pipe with wire brush and compressed air, edge preparation, cold bending, laying to the required slopes, clamping, welding of isolation / drain valves and fittings by butt / socket welding / lock joints. Servicing of valves, connecting with the process end and to the instruments, NDT, Hydraulic testing the impulse lines, and painting the lines as per requirement of BHEL engineer.

2. The impulse line may have to be cleaned chemically for removing grease / rusting. Proper tagging of valves and impulse lines on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of Impulse / draft pipe lines due to site requirement in general.

2.8.7.1 SCOPE OF WORK FOR COPPER/ SS TUBES

1. Fabrication and erection of single angle supports / tray supports for single multi run tube. Laying tubes in the angles / trays from the panel to the equipment, instrument to instrument, air supply line to drive / instrument, air line connections, clamping properly as per standard ferruling and termination at both ends. This includes all fittings and needle valves, stop valves etc. also. Proper tagging of valves and pneumatic tubes on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of pneumatic tubes / draft pipe lines due to site requirement in general.

2.8.8 SCOPE OF WORK FOR PRE-FABRICATED/ SEMI-FABRICATED LIR/ LIE/ GAUGE BOARDS

1. If the frame or rack is supplied as a pre-fabricated item like LIR, same shall be erected, grouted and painted as per site requirement.

2. If any frame or support or rack supplied as semi-fabricated item, same shall be assembled at site either by welding or bolting and erected, grouted and painted as per site requirement.

3. Unit rate quoted for such pre-fabricated /semi-fabricated items like LIE/LIR and enclosure shall be on Number basis. Unit rate shall cover installation, grouting, painting and supply of nuts, bolts, anchor fasteners, grouting materials such as cement, sand etc as required. Unit rate shall also include full painting of impulse line fitted and supplied along with LIR/LIE/LGB.

4. Wherever LIR/LGB/LIE are supplied with instruments mounted on them, the rate quoted for LIR/LGB/LIE shall include calibration of all the instruments mounted on them as detailed in the BOQ. However if the instruments supplied as loose items, the instruments shall be calibrated and mounted on the LIR/LGB/LIE and separate calibration/erection /commissioning charges shall be applicable in line with other instruments erection

2.8.9 SCOPE OF WORK FOR ELECTRIC &PNEUMATIC ACTUATORS

1. Pneumatic actuators shall be calibrated at site

2. For calibration of any Pneumatic Actuator at field, temporary air supply, ifrequired, shall be arranged by the contractor.

3. All calibration instruments required for calibration of actuators shall be arranged by the contractor.

4. For all actuators of the valves, functioning, setting and performance of limit switches/torque switches of various positions shall be checked before and after installation of the actuators. The position transmitters for inching applications shall also be calibrated.

5. For actuators commissioning contractor shall preferably engage specialised party to complete the work on time within the quoted rates

2.8.10 SCOPE OF WORK FOR THE INSTRUMENTS MOUNTED AND SUPPLIEDALONG WITH EQUIPMENT/ SKIDS

1. Scope of work covers removal, re-calibration, re-fixing, re-termination of cables, checking the continuity, replacing any defective parts or replacing the total instrument, if required.

2. The scope also covers collecting the replacement instruments/parts fromBHEL/customer stores, stockyard etc.

2.8.11 STRUCTURAL FABRICATION AND INSTALLATION

INSTRUMENT/ JUNCTION BOX FRAME/ PANEL BASE FRAME / CABLETRAY & MISC STRUCTURES FABRICATION

1. Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for misc fabrication if required and the same shall be used for fabrication of panel base frame, cable tray supports, Canopies for instruments/panels/ drives/JB's/Push Buttons etc., Instrument/Junction box frames, Impulse Pipe/Instrument Air Pipe supports andinstruments etc.

2. This shall include cutting to size, contouring of ends for connections if required, welding, grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, levelling, alignment, providing bracingsand painting etc. No gas cut holes will be permitted.

3. All the fabricated supports/frames for instruments, trays, pipes, equipments, etc., shall be painted after thoroughly cleaned by wire brush, scrapping or any other method as per requirement of BHEL/NBPPL. Paints andother associated items are in the scope of the contractor.

4. Frame installation at site may involve mounting either on concrete floor by grouting / using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, contractor shall arrange all the required material including cement / grout mix, shuttering etc., necessary labour and meet all other requirements as part of work.

5. If there is requirement of cable routing from one structure to another as per drawing/requirement same shall be done by contractor as per rate schedule.

6. In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.

7. In certain packages, members of frames/rack for mounting of junction boxes/
Instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.

8. **Gas cutting of tray/impulse pipe support and holes in frame is not permitted. Only hacksaw cutting/ drilled hole shall be permitted.**

2.8.12 POWER CYLINDER ERECTION

Platforms on which Power Cylinders are to be mounted are usually provided by the Civil Contractor / other agency. However minor structure work required shall form a part of the work within the quoted rate of the respective cylinder. Fabrication / erection of stands for mounting of the cylinders The work also includes

minor rectifications/alterationin the tubing , servicing of accessories , setting of limit switches , calibration of actuators and feedback position transmitters.

2.8.13 TRANSFORMER (GT/UAT/UT/Stand by Transformers/VFD Service transformer etc.)

Different types of transformers like oil immersed or dry type shall be supplied as indicated below. Generator Transformer, Unit Transformer, UAT and Standby Transformer will be located near to the powerhouse building in the transformer yard. VFD transformers will be located adjacent to their respective location/Service building.

The scope of work under this head is defined as below.

1. Transformers shall be transported from storage yard in a suitable trailer, unload at their respective locations/foundations and install as per the installation drawing. The contractor will unload the transformers on rails, turn the wheels/rollers if necessary for changing over at right angles on rails, roll the transformers to their respective locations and put them on the foundation. The necessary sleepers, winches, jacks etc. required for this operation will be arranged by the contractor at his cost. The other transformers will be shifted with suitable material handling equipment to the respective location.

2. The transformers shall be handled in such a manner so that no jerk is transferred to the core, winding and internals of the transformer.

3. Transformers are generally supplied in partly assembled condition either filled with oil up to the core level / winding level or gas filled. Accessories, like radiators, conservator tank, pipes, fittings, hardware, gaskets, buchholz relay, marshalling box, relief vent, valves, pumps, cooling fans, cables, bushings, radiator headers/fans, rollers, tap changer drive unit, cables of various sizes for interconnection from marshalling control box to field devices, bushing turrets and oil in 205/210/other liters, barrels shall be supplied loose.

4. Cable trays (for transformer local cabling, if not supplied along with transformer) shall be issued separately by BHEL site and the installation charges is inclusive in rate schedule for Transformer and no extra charge shall be paid on this account.

5. All the accessories should be thoroughly cleaned prior to installation and same shall be assembled/mounted as per OGA drawings.

6. Placement on plinth, alignment with respect to the foundation and lay out drawings.

7. Internal inspection to verify the intactness of core and winding, tap changer leads, off-load switch/on load tap changer, measurement of core and core bolt insulation.

8. Auxiliary Service transformers shall be bolted to the adopter panel/bus duct on the LT sides and the bus bars shall be connected together. The contractor shall carry out any modification required to match the bus bar or bus duct connection

9. In case transformers are supplied partly oil filled/gas filled, after internal inspection, the transformer shall be kept under vacuum (for a period to be decided by site engineer) and treated oil to be filled up to required level.

10. Each drums of oil to be tested for BDV. After getting BDV/ withstand value, this treated oil to be filled in the transformers and auxiliaries.

11. Contractor shall arrange filtering & storage tank of suitable capacity, internally sand blasted and with one coat of oil resistance paint. Oil from drums to be transferred in storage tank and filtration to be carried out to achieve the required BDV/ withstand value. This treated oil to be filled in the transformers and auxiliaries. However, for low capacity transformer, a separate storage tank for filtration may not be required.

12. Drying out of transformer and filtration of oil in cooling bank, pipeline, diverter tank of tap changer etc. to be done with ultra vacuum filtering machine of adequate capacity (760 mm HG). Drying out process shall be carried out round-the-clock and contractor shall deploy trained manpower for this purpose.

13. During dry out process, contractor has to plot the curve for insulation resistance value/time/oil temperature. Hourly reading to be recorded till completion of the dry out.

14. The criteria for deciding completion of drying out shall be breakdown value of oil, PPM value of contaminants in oil, resistively of oil, insulation resistance value and polarisation index.

15.Filter machine capacity if found to be inadequate, or in case of failure of an existing machine, alternative arrangement is required to be made to meet the required result and time schedule. It is to be particularly noted that that as per exigencies of site working, contractor will have to arrange more oil filtration machines as per site requirement.

16. Contractor shall discuss and finalise installation and testing activity procedure with BHEL/NTPC/NBPPL prior to starting the work.

17. Tests are required to be conducted on Current Transformer, Potential Transformer & prior to / after installation. Contractor shall also carryout oil processing / filtration to achieve the desired results before charging and handing over of the entire system.

18. Contractor shall arrange required testing equipment for carrying out electrical test like voltage ratio, turn ratio, vector group, magnetic balance, winding resistance measurements, BDV value of oil, tan delta measurement of bushings & winding, insulation resistance, measurement of oil PPM, Acidity, Resistively and Tan Delta and DGA test. The contractor shall arrange oil sample testing for PPM / resistively or any other tests applicable for oil sample at approved testing laboratory/BHEL Bhopal/Jhansi at his own cost including all incidental expenses.

19. Contractor should have valid electrical contractor license to carry out installation of high voltage equipment.

2.8.14 ISOLATED PHASE BUS DUCT, 21KV, 19000A (main run) and 11000 A (Delta run), CONTINUOUS AIR COOLED

Details of Isolated Phase Bus-ducts:

Delta Run 21kV, 11000A
Enclosure Size: Round,OD1000 mm Thk 8 mm
Conductor size: Round, OD 450 mm, Thk. 15 mm
Phase to phase distance:1800 mm
Approx. length per unit 100 Mtr.

Main run 21kV, 19000 A
Enclosure Size: Round,OD1500 mm Thk 8 mm
Conductor size: Round, OD 800 mm, Thk. 16 mm
Phase to phase distance:1750 mm
Approx. length per unit 190 Mtr.

Tap-off 21kV, 3000A
Enclosure Size: Round ,780x4.78 mm
Conductor size: Box formation 2 channel, OD 2x203.2 mm, Thk. 11.8 mm
Phase to phase distance:1000mm
Approx. length per unit 115 Mtr.

SP and VT Cubicle – 03 Nos.
Each cubicles consists of :
Epoxy cast dry type VT – 09 Nos.,
Surge Capacitor –03 Nos, etc
Weight of Cubicle approx. 3.5 MT,
Dimension 2200 x 2500 x 800 mm

LA and VT Cubicle -03 Nos.
Each cubicle consists of :
Epoxy cast dry type VT – 03 Nos.,
Lighting arrestor –03 Nos, etc
Weight of Cubicle approx. 1.5 MT,
Dimension 1450 x 1750 x 800 mm

Neutral Grounding Cubicle(NGR-NGT) consist of
a) Dry type epoxy cast NG transformer
b) NG Resistor
c) Dimensions 2500x 2500 x2000 mm

Supporting structural steel approx. 80 MT

1. Generator isolated bus duct is connected to low voltage side of three phase generator transformer & generator. The bus consists of cylindrical conductor made of Aluminium alloy supported on post insulators. Flexible connections and expansions joints are provided at terminal and intermediate points to alleviate stresses due to expansion and to arrest vibration. All the CTs will be mounted inside the bus ducts.

2. Isolated phase bus duct shall have tap off connection for potential transformer, VT, surge protection SP cubicles, unit transformers. Each phase of protection equipment and potential transformers shall be housed in metal clad cubicles. Delta formation of GT is carried out externally through Delta bus duct.

3. A totally enclosed neutral grounding cubicle is provided to connect the Generator neutral point. The neutral grounding cubicle houses neutral grounding transformer & resistors. All the generator-isolated bus ducts are supplied with one set of Air pressurization equipment unit.

4. Bus duct enclosure /conductor is a continuous welded type. Conductor, enclosure, makeup pieces, shunts pieces etc have to be welded at site.

5. The scope for Isolated Phase Bus Duct shall include Transportation of material from stores/ storage yard, preparatory work such as erection of supporting structure, placement of sub assemblies / equipments, alignment, edge preparation of conductor / enclosure, welding of conductor / enclosure, welding of shunt pieces & make up pieces, installation of seal of bushing & wall frame assemblies, shorting links, earthing, LA & VT cubicle, VT & SP cubicle, copper flexible, copper rubber bellows, wieldable/ bolted flexible, installation of air pressurising unit and its associated piping work and cable etc, testing and commissioning.

6. Pre-fabricated G.I. supporting members shall be supplied in loose condition and are to be erected as per lay out drawing. Foundation pockets and embedded plate inserts shall be provided as per lay out drawing (on floor for bottom support and on bottom of concrete slabs).Contractor shall weld the supports on insert plate and shall carry out grouting including supply of grout materials after complete alignment/bolting of structural members. If any modification required in supporting structure due to site conditions, the same shall be carried out without any extra cost. All welded joints shall be applied cold galvanizing zinc paint. Supply of Paints, primers etc are in the scope of the supplier, within the quoted rates.

7. Required aluminium welding of conductor, enclosures, shunt, make up pieces, aluminium flexible etc as detailed in drawings has to be carried out by contactor. MIG/ TIG welding shall be applicable. Contactor shall arrange necessary welding equipment/ accessory in sufficient number, filler wire, argon gas and other required consumables at his cost.

8. During erection of bus duct/enclosure, makeup pieces and shunts, if any modifications needed to match the alignment shall be part of work and no extra payment shall be made.

9. All bolted joints and flanges shall be tightened with torque wrench to the approved torque. Wherever there are bolted joints, the same shall be cleaned and a layer of anti-oxidation paints shall be applied. Necessary paints etc to be arranged by contractor within the quoted rates.

10. Top chamber/adapter box for line and neutral side, hood assembly at UT hood assembly at excitation transformer and at LA & VT cubicle end shall have drilled hole in flange. If there is any mismatch of the hole in above with respect to the counter flange/welded studs provided on UAT, LAVT and excitation cubicle, the contractor shall drill new holes if required.

11. Proper sequence shall be followed during erection to avoid any mismatch and alignment problem.

12. Prior to installation of bus duct assemblies in position, various components like conductor, insulator shall be inspected and cleaned and insulation resistance to be measured and recorded. If any insulator is found damaged, the same shall be replaced.

13. Electrical test on current transformers and potential transformers shall have to be carried out prior to installation & during pre-commissioning. The tests are insulation resistance measurement, winding resistance, magnetisation characteristic, ratio test water ingress and air leak test on assembled bus ducts.

14. Minor civil work such as chipping, levelling of foundation, providing pockets, drilling/enlargement of holes in structure, bus bar etc. Which are incidental to the erection of bus duct shall not be treated as extra.

15. All miscellaneous items such as disconnecting links, flexible, shorting bars, hardwares, conduit for wiring, marshalling box, CTs and PTs wiring through conduit, earthing materials, bus bar fish plates etc. are part of bus duct installation. Hence separate breakup quantity is not given in BOQ.

16. Round makeup pieces for main and tee off duct shall be supplied in two halves and it involves but circumferential and horizontal welding at parting plain.

17. Air tightness and water tightness test have to be carried out on completion of bus duct installation. In case of any leakages, contractor has to rectify and bring to the required level of air tightness/water tightness without any extra cost.

18. High voltage test of bus duct is to be carried out as per the instruction of BHEL engineer. Contractor shall arrange necessary test equipment / instrument for conducting various electrical tests at his own cost.

19. Contractor has to carry out final painting as per standard colour code recommended by BHEL. Paints and consumables shall be in contractor's scope.

20. Shunt pieces shall be supplied in two halves and to be welded between twophase bus ducts at transformer end. The shunt pieces to be welded on both the side on matching plain and bus duct circumference and horizontal plain

21. Contractor shall conduct 10 % radiography and 100% NDT test on welded joints or any mutually agreed ratioat site with BHEL Engineer-In-charge/FQP.

22. One end of the enclosure to be earthed to the station earth at shunt location where all three-phase enclosure is shorted. Wherever shunts are not provided, each phase should be earthed separately.

23. In case of bolted bus ducts, phase split covers, rubber bellows, aclamping earth straps to be connected to maintain the electrical continuity and in turn enclosure gets earthed at one point.

24. All other equipment such as VT & SP cubicles, LA & VT cubicles, NG cubicle, air pressurisation, CT chambers, junction boxes, etc to be earthed at two points to the earth grid.

2.8.165VARIABLE FREQUENCY DRIVE (VFD) FOR I.D. FANS

VFD system for each ID fan consists of Power Transformers, Circuit Breaker D.C. Series Reactor, Control panels, Load Converter / Inverter panels, Adapter Panel and associated accessories. For

detail work scope refer other relevant clause for panels. VFD reactor enclosures may be supplied loose. Assembly of the same at site is to be carried out within the quoted rates.

2.8.16 DIGITAL AUTOMATIC VOLTAGE REGULATOR

System comprises of DAVR Panel which is connected by Input cable from DAVR to PMG, DAVR to Main Exciter, DAVR to axis coil, Mounting of Local Instrument Enclosure, Winding resistance & IR value of PMG, Main Exciter, Q axis coil, Diode wheel, Checking healthiness of diodes / Fuses, Commissioning of stroboscope, Exciter Heater / Blower, Rotor earth fault brush checking / setting, Lighting inside exciter enclosure, Flap actuator commissioning (If provided). Any other work inside exciter enclosure, Mounting of loose components supplied for Brushless exciter system, Dummy load test of DAVR, Checking from Control desk & Field related inputs/ outputs to commission the excitation system fully operational.

No separate item rate is applicable. Rate quoted by contractor shall be inclusive of all above related to Excitation system.

2.9 SCOPE OF CIVIL WORKS

1. The scope of civil works covers minor civil works like drilling, chipping and punching & opening in concrete floors, slabs, brick walls, grouting of foundation bus duct columns, base frame of panels, Transformer etc. Scope of civil works also covers minor civil works required for installation of push button stations, Junction Boxes.
2. Scope of civil works includes supply of grouting materials like cement, sand, etc., and cleaning of all debris at free of cost.

2.10 WELDING, NON-DESTRUCTIVE TESTING ETC.

1. Installation of equipment involves good quality welding, NDE checks etc.

2. Welder deployed for aluminium welding shall have experienced and approved by BHEL and BHEL's Customer after due qualification process/testing.

3. Welding of all structural steel & aluminium shall be done only by the qualified and approved welders.

4. All the welders shall be tested and approved by BHEL engineer/ Customer's quality engineer before they are actually engaged on work though they may possess IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.

5. The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.

6. Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.

7. Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.

2.11 MEASUREMENTS & WASTAGE & CUTTING ALLOWANCES

1. For all payment purposes, measurement shall be made on the basis of the actual execution of work in line with drawings/documents/site requirements. Physical measurements shall be made by the contractor in the presence of the Engineer.

2. The measurement for cable, impulse pipes/tubes, GI pipe, conduits, flexible conduits, trays etc., shall be made on the basis of length actually laid.

3. All the surplus, scrap and serviceable materials, out of the quantity issued to the contractor shall be returned to BHEL in good condition and as directed by the engineer.

4. All materials returned to stores should carry aluminium tag indicating the size and type. Cables more than 15 meters length is termed as serviceable material and shall be returned size wise and category wise to the owner's stores/yard. Cable of serviceable length being returned to the stores in drums shall have their free ends sealed and the balance lengths on the drum(s) shall be noted and certified by the Engineer-in-charge. This shall be applicable only for the purpose of accounting the cables issued for installation.

5. **While carrying out material reconciliation with contractor, all the above points will be taken into account. All serviceable material returned by the contractor shall be deducted from the quantities issued for the respective sizes and categories and the balance quantity (ies) will be taken as the net quantity (ies) issued to the contractor. Material reconciliation shall be done and allowable scrap quantity calculated as per wastage allowance percentage specified above. Any scrap/wastage generated by the contractor in excess of the allowable percentage shall be charged at the rates decided by the Engineer whose decision shall be final and binding on the contractor**.

6. For all site-fabricated steel items such as supports, racks, frame, Canopy etc. physical measurement shall be made and then converted to tonnage. For steel material supplied to the contractor, all scrap shall be returned to BHEL stores with due accounting.

7. Every month the contractor shall submit an account for all the materials issued to him by BHEL in the standard Performa prescribed for this purpose by the site in charge.

8. The erection contractor shall make every effort to minimize wastage during erection work. Cutting and wastage allowance shall be computed on length, weight of material actually used, measured and accepted. In any case, the wastage shall not exceed the following limits;

S.No.	Item	Wastage on issued Qty(in %)
01.	Each iron/steel section	2
02.	Each size of control / shielded cable	2
03.	Each size of power cables	1
04.	Impulse pipe/tubes/GI pipes/copper tube	1
05.	Transformer Oil	2

9. If the actual wastage is more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.

10. The cable take off from drums shall be planned strategically such that jointing in the run of cables and wastage are avoided. For this purpose the exact route length between various equipment/panels as per the cable schedule shall be measured and the route length recorded before laying of the cables. Depending upon the route length and the type of cable required for

various destinations, the cable drums shall be suitably selected for cable laying. Any jointing shall have to be approved by BHEL engineer. All the cut pieces/bits of cables, which are not used, shall be returned to the purchaser for accounting towards wastage. The cables damaged by the contractor shall have to be replaced by the contractor at his own cost.

2.12 FINAL PAINTING

The contractor shall provide all the primer, paint, and other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is in contractor's scope. Painting shall be carried out as per colour scheme approved by BHEL Engineer-in charge/ NBPPL.

1. All metal parts of the equipment including supports, structures, etc., as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping etc; as specified in relevant erection documents. The above parts shall then be painted with specified two coats of specified paint over the shop primer/paint.

2. Also, where the shop primer/paint has peeled off, the affected area shall be cleaned thoroughly by the specified method and then primer coat applied. Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification. The colour, shade etc. shall be as per specification.

3. Paint and other materials so purchased shall be ISI marked and as per drawing, documents and specifications and painting should be as per colour scheme and quality approved / specified by Engineer. Painting schedule will be furnished at site. Valid Test certificate for the paint so supplied shall be made available before use of the same on work.

4. In order to have consistency in painting system, it is preferable that all the supplies are sourced from one single manufacturer.

5. All the fabricated frames, racks, supports, panel base frame etc. wherever applicable shall be painted with two coats of primer and followed by two coats of paint as specified earlier herein. In case of G I Structure, The cold galvanizing paint to be applied as touch up where ever needed. This is to be done as per instruction of BHEL engineer. The Paint required for this purpose is in scope of Contractor

6. The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work.

7. The contractor shall ensure availability of Ford Cup-4 to measure consistency of paint, Automatic magnetic gauge to measure the dry film thickness and SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

8. Touch-up painting of Control Panels or any other equipment /devices wherever necessary.

9. The primer shall be compatible with the final coat paint schedule.

10. Colour Banding, Legend and Identification Marking, Direction marking etc. shall be in scope of the contractor. Letter writing shall be done in Hindi / English or in both languages. The painters have to undergo test and only qualified painters will be allowed to work.

2.13 TESTING, PRE-COMMISSIONING, AND POST COMMISSIONING

The scope of commissioning work covers commissioning of all instruments/equipment/systems covered in the BOQ including loop checking and establishing the operation of instruments/equipment/systems to meet plant commissioning/operation. BHEL will provide vendor supports for special or proprietary type instruments/systems if necessity is accessed by engineer-in charge BHEL and contractor engineers/supervisors shall associate with the vendors and provide necessary manpower, T&P, IMTE's etc. The contractor shall be responsible for overall commissioning of all the instruments and systems covered in the BOQ.

Scope of commissioning starts with the commissioning of various equipment/ instruments/ systems erected by the contractor and making them available, as required, for the various commissioning activities of the main plants. The commissioning activities of the main plant shall be as below:

i. Trial run of various equipment. (coupled or/and de-coupled)
ii. Light up of boiler.
iii. Boiler acid cleaning.
iv. Boiler alkalis boil out.
v. Turbine barring gear.
vi. Steam blowing of piping
vii. Turbine rolling.
viii. Safety valve floating.
ix. First synchronization of unit.
x. Full load operation of unit.
xi. PG Test of all major equipment

The above commissioning activities, tests, trial runs may have to be repeated till satisfactory results are obtained to the satisfaction of customer / consultant / statutory authorities like boiler inspector, inspector etc.

1. The contractor shall co-ordinate with other contractor's during the above main plant commissioning activities to ensure successful commissioning of total plant.

2. The pre commissioning activities of the plant will start with run of various equipment prior to light up of boiler and commissioning operations shall continue till the unit is handed over to customer. The contractor shall simultaneously start commissioning activities for the equipment erected to match with the various milestone activities of commissioning programme of the project.

3. Contractor shall arrange specialized commissioning engineers, supervisors, electricians, and instrument mechanics in each area to be associated with BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. The manpower shall not be disturbed or diverted. It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers involving considerable payment of overtime, which forms part of Contractors Scope

4. The mobilization of these commissioning groups shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools and tackles with BHEL engineer and arrange for the same.

5. If at any time the requisite manpower, consumables, T & P are not arranged by the contractor to meet the schedule, BHEL shall make alternate arrangements and recover the cost with overhead from the running bills of the contractor.

6. After erection of various equipment prior to commissioning and after commissioning, protocols have to be made with BHEL's customer. The formats will be given by BHEL and have to be printed by the contractor in adequate numbers.

7. For works, 415 volts and above, the contractor has to bring qualified electricians and the total work has to be certified by license holder.

8. In case any rework/repair/rectification/modification/fabrication etc. is required because of contractor's faulty erection which is noticed during commissioning at any stage, the same has to be rectified by the contractor at his cost. If 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. Claims if any, for such works from the contractor shall be governed by clauses covered elsewhere.

9. During commissioning activities and carrying out various tests, if any of the instruments has to be temporarily erected and commissioned to suit the commissioning activities, the contractor have to carry out the erection of the same. After completion of activities the temporary systems have to be removed and returned to stores and no extra rate shall be paid for this

10. Minimum requirement of Man Power for commissioning works per unit shall be as follows:
Engineer (Electrical and C&I) – 6
Supervisor (Electrical and C&I) – 15
Technician (Electrical and C&I) –32

The above commissioning group shall be identified at the Pre-commissioning and commissioning time. The above commissioning group shall have the knowledge of various systems referred in the tender and also should have adequate experience. The above manpower for commissioning is only tentative and for any additional manpower as per site requirement the same shall be arranged by the contractor within the quoted rates.

11. If the contractor fails to deploy the above Engineer/Supervisor/ Technician at appropriate time of commissioning, no payment shall be made against commissioning activities as per terms of payment and BHEL reserves the right to required manpower on risk and cost of Contractor.

12. All the T&P,IMTE’s and other Erection & commissioning instruments/tools required for commissioning are to be arranged by the contractor.

Note: It shall be the responsibility of the contractor to arrange and complete all the testing, pre-commissioning and commissioning activities for the particular equipment as per relevant standard, code of practice, manufacturer's instructions and BHEL/NBPPL FQPs/ norms. All the above will be witnessed by the BHEL engineers and a joint report/protocol shall be made and signed by contractor.It shall be responsibility of contractor to get signed all protocols /reports from BHEL and or NBPPL and handing over to BHEL Engineer-in-charge. Contractor shall follow checklist of BHEL and testing & commissioning activities shall be carried out in accordance with the checklist.

2.14 Terminal Points and Exclusion of ETC of major equipment

S. No.	Equipment	Terminal points	Exclusions & remarks, if any
1.	Generator Transformer (GT)	GT EHV Bushing , LT power terminals of common marshalling kiosk (CMK), Terminal block in CMK for control & Screened control cables	Exclusions : Lightning arresters for GT HV side, Terminal connectors, BPIs, Overhead connectors / jumpers
2.	Unit Transformer (UT)	LV line & neutral terminals Bushing/Bus-duct flange LT power terminals of cooler control cabinet(CCC) Terminal block in CCC for control cables & Screened control cables	-
3.	Unit Auxiliary Transformer	HV & LV line & neutral terminals Bushing/Bus-duct flange LT power terminals of cooler control cabinet(CCC) Terminal block in CCC for control cables & Screened control cables	-
4.	Start up / Standby Transformer (ST	ST EHV Bushing, HV & LV line & neutral terminals Bushing/Bus-duct flange LT power terminals of cooler control cabinet(CCC) Terminal block in CCC for control cables & Screened control cables	Exclusions : Lightning arresters for GT HV side, Terminal connectors, BPIs, Overhead connectors / jumpers

S. No.	Equipment	Terminal points	Exclusions & remarks, if any
5.	Generator Bus Duct & Associated Equipment	Flange terminals of Generator bus-duct for connection to GCB, LT power & control terminals of Marshalling boxes of bus-duct and associated eqpt. Compressed air inlet pipe flange of Air pressurization equipments.*GCB-IPBD enclosure connection is in the scope of ETC of contract with in the quoted rate.*	Exclusions: Generator Circuit breaker, Compressed air system.
6.	Generator/GT/UT Protection Relay Panels	Terminal block in Generator Relay Panels for LT power, control & Screened control cables	-
7.	Start up/Standby Transformer Protection Relay Panels	Terminal block in Generator Relay Panels for LT power, control & Screened control cables	-

Chapter - III: Facilities in the scope of Contractor/BHEL

3.0 Scope Matrix

S.No.	Description	Scope /to be Taken care by		Remarks
		BHEL	**CONTR-ACTOR**	
1.1.0	**ESTABLISHMENT**			
1.1.1	**FOR CONSTRUCTION PURPOSE**			
A.	Open space for office	**YES**		Free of charge. As and where made Available by customer M/s NTPC/NBPPL/BHEL
B.	Open space for storage	**YES**		Free of charge. As and where made available by customer M/s NTPC/NBPPL/BHEL
1.1.2	**FOR LABOUR COLONY**			
A	Open space	**YES**		Contractor have to make own arrangement
1.2.0	**ELECTRICITY**			
1.2.1.	Electricity for construction purposes (chargeable/free)			
1.2.1.1	Single point source	**YES**		FREE OF CHARGE
1.2.1.2	Further distribution for the work to be done Which include supply of materials & Execution		**YES**	
1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:			
1.2.2.1	Distribution from single point including supply of materials & service		**YES**	
1.2.2.2	Supply, Installation & connection of material of Energy meter including operation & maintenance		**YES**	

1.2.2.3	Duties & deposits including statutory clearances for above		**YES**	
1.2.2.4	Demobilization of the facilities after completion Of works		**YES**	
1.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above Lines		**YES**	**Chargeable** As per UPPCL standard rates. **Contractor shall install calibrated energy meter for metering electricity consumption.**
1.3.0	**WATER SUPPLY**			
1.3.1	**FOR CONSTRUCTION:**			
1.3.1.1	Making the water available at single point	**YES**		Free.As and where ma Available by BHEL/ NE
1.3.1.2	Further distribution as per the requirement of work including supply of materials & Execution		**YES**	
1.3.2	**LABOUR COLONY:**			
1.3.2.1	Making the water available at single point			Contractor has to arrange on his own.
1.3.2.2	Further distribution as per the requirement of work including supply of materials & execution			
1.4.0	**LIGHTING**			
1.4.1	For construction work (supply of all materials) 1. At office storage area 2.At preassembly area 3.At construction site/area		**YES**	
1.4.2	For construction work (execution of lighting work/arrangements) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	

	Providing the necessary consumables like bulbs, Switches, etc during the course of construction		**YES**	
1.5.0	**Communications facilities for site operations of the bidder**			
1.5.1	Telephone, fax , internet ,intranet, email etc.		**YES**	
1.6.0	**COMPRESSED AIR SUPPLY**			
1.6.1	Supply of compressor and all other equipments Required for compressor & compressed air System including pipes, Valves,storage system etc.		**YES**	
1.6.2	Installation of the above system and operation & maintenance of the same		**YES**	
1.6.3	Supply of all the consumables for the above System during the contract period.		**YES**	
	ERECTION FACILITIES			
2.1.1	Providing erection drawings for all the Equipments covered under this scope	**YES**		
2.1.2	Drawings for construction method	**YES**	**YES**	In consultation with BHEL
2.1.3	As-built-drawings-where ever deviations Observed & executed and also based on Decisions taken at site		**YES**	**do**
2.1.4	Shipping lists etc for reference & planning the Activities	**YES**	**YES**	**do**
2.1.5	Preparation of site erection schedules and Other input requirements		**YES**	**do**
2.1.6	Review of performance & revision of site erection schedules in order to achieve the end dates &	**YES**	**YES**	**do**

	commitments			
2.1.7	Weekly erection schedule based on Sl. No.2.1.5		**YES**	**do**
2.1.8	Daily erection/work plan based on Sl. No.2.1.7		**YES**	**do**
2.1.9	Periodic visit of senior official of 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 month		**YES**	
2.1.10	Preparation of preassembly bay		**YES**	

3.1BHEL will not be responsible for any loss or damage to the contractor's equipment as a result of variation in voltage or frequency or interruptions in power supply.

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

3.3 Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets. **The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the NTPC/NBPPL at his cost.**

3.4 The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points:

a. All electrical installations should be as per Indian Electricity rules.

b. All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.

c. Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.

d. All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

e. Contractor has to make their own earthing arrangement for their equipment / DB earthing.

f. All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.

g. Contractor should use “MCCB” and “ELCB” either on incoming or outgoing connections to the DBs.

h. Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.

i. For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.

3.5ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.

3.6 In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

3.7 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. Shall be dismantled and levelled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

3.8 Compressor required capacity for construction purposes shall be arranged by Contractor.

4.0 T&P, IMTEs AND MMD DEPLOYED BY CONTRACTOR

S.NO	EQUIPMENT	CAPACITY	QTY
1.	Welding Generators & Transformers, Rectifiers & TIG Welding sets		APR
2.	Chain pulley blocks	5/10 T	APR
3.	Trailer with Pulling Unit	10 / 20 MT	1 No.
4.	Hydra crane	14/18 MT	1 No.
5.	Copper tube bender and cutter sizes 6mm, 8mm, 1/2", 1/4"		2 No. each
6.	Pipe bending machine	2" size	2 No.
7.	Dye sets for threading	upto 2" pipe.	2 Set
8.	Tap sets for both BSP and NPT	threads upto 1" each	2 Set each
9.	Crimping tools up to all size of cables under scope of work	up to all size of cables under scope of work	Adequate nos.
10.	Hydraulic crimping tool		2 No.
11.	Vacuum Cleaner (Industrial)		2 No.
12.	Grinding Machine		2 No
13.	Drilling Machines		APR
14.	Electric Winches		APR
15.	Phase sequence indicator		APR
16.	Schering Bridge for Tan delta test		APR
17.	Digital Multimeters 3½ digit of reputed make		08 No.
18.	Digital,41/2 digit Motwane/HIL/Fluke		6 no.
19.	Hydraulic Jack (Low Height)	25/50/100T	APR
20.	Screw Jacks	5/10/25/50T	APR
21.	Oil Filtration Machine	12/15/24 Kl/hr	APR
22.	Oil tank	20/30 Kl	APR
23.	Transformer oil testing kit (for BDV etc)		APR
24.	Transformer Turn ratio Kit		APR
25.	Testing Kit For Moisture Content/Resistivity/ Acidity, Etc Or Suitable For Testing The Equipment		APR
26.	Analog multimeter		4 no.
27.	250V/500 V / 1000V rated Hand operated Megger Mains/battery operated		APR
28.	Tong Testers AC 5/10,25/60/300 ,Amp Range ,of reputed make		APR
29.	Tong Testers DC 30/60/300 A		2 No.
30.	HV Test Kit	50 kV AC 70kV DC +/-10%	1 No. each

31.	Wheatstone bridge	0.05 m ohm -100 ohm	1 No
32.	Hacksaw Blades & tolls	Upto300 mm	APR
33.	Stop watch		2 No.
34.	Tele talk 2 wire system		APR
35.	Torque wrench(12-60 Nm,50-225 Nm)		APR
36.	Ferrule printing machine		4 no.
37.	Dead Weight Tester rated 400 Kg/cm2 with weights & test gauge facility		2 no.
38.	Oil temperature bath	Suitable to calibrate the instruments range 0-300 deg. C with standard temp. gauges & thermostatic control	4 no.
39.	Standard gauges	12" dial size make	
40.	A) pressure gauge(vacuum gauge) B) pressure gauge	0-1 kg/cm2 0 – 5 or 6 kg/cm2 0 – 10 kg/cm2 0 – 25 kg/cm2 0 – 60 kg/cm2 0 – 100 kg/cm2 0 – 250 kg/cm2 0 – 600 kg/cm2 0.2 to 1 kg	02 nos. of each type
41.	Manometers With hand bulb for lab and small manometers for field purpose.	(+/-) 1000 mm water column	4 no.
42.	Manometer with hand bulb for lab and small manometer for field purpose.	(+/-) 500mm mercury column	2 no.
43.	Inclined manometer	(+/-) 300 mm water column	2 no.
44.	Portable air compressor with drier and regulator	rated for 7 to 10 kg/cm2	4 no.
45.	Vacuum pump		2 no.
46.	Standard milliamps / mill volts source of reputed make.	Range 0to 50 ma and 0 to 100 mv	4 no.
47.	DC power supply make "Aplab" or equivalent (variable source)	0-50 VDC, 5 A	2 nos.
48.	Single phase variac	250 V, 8 amp	2 no.
49.	3 phase variac rating	5 amps	2 no.
50.	Glass thermometer	0-120 deg. C 0-200 deg.c 0-600 Deg.C	2 no. each
51.	Primary current injection kit		1 no.
52.	Secondary current injection kit	up to 300 amp	1 no.
53.	DC shunt	400 amp 75 mv	1 no.
54.	Tachometer non-contact type	0 to 4000 rpm	1 no.
55.	Decade resistance box		2 sets

56.	Relay testing kit		APR.
57.	Equipment and consumables for LPI/MPI test on impulse pipes		1 no.
58. .	Function generator		1 no.
59.	Insulation Tester (upto 5KV) of reputed make		APR
60.	Oil specific gravity and PPM measuring equipment		2 no.
61.	Dew point measurement instrument		2 no.
62.	Working Lamps		APR
63	Wire spool		APR
64	Dewatering equipment with Pumps and motors		APR
65	Combination Pliers, ring spanners, De spanners, Insulated cutting pliers etc		APR

***APR-Contractor have to deploy as per the requirement of the BHEL site as decided by BHEL Engineer In-Charge**

NOTES:

1. The above list specifies only major T&P/MMD (may not be complete) to be deployed by the contractor. All additional/ other tools and plants, IMTEs required in different quantity and specification for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate/ price.

2. Phase wise requirement of T&P's and IMTE's etc shall be decided by Engineer-in-charge at the start of the contract along with duration of deployment of T&Ps and IMTEs.

3. If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC

4. All testing instruments shall have calibration certificate issued by recognized /accredited agencies.

5. Contractor shall maintain calibration records as per the BHEL format and produce them whenever called for by BHEL Engineers.

6. Wherever frequent calibration is required, contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments.

7. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

8. Other terms and conditions regarding above items shall be as per T&P clause in SCC.

Chapter - V: T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

5.0 T&P AND MMD DEPLOYED BY BHEL ON SHARING BASIS

LIST OF T&P and MMD being provided by BHEL for use of contractor Free of hire charges on sharing basis.				
S.NO.	**T&Ps**	**CAPACITY**	**QTY**	**REMARKS**
1.	EOT crane in TG Hall	105/15 MT	01	*APR
2.	Available crane	75MT/135 MT/250MT	01	*APR(Any one as per availability)

***APR-As per the requirement of the site as decided by BHEL Engineer In-charge and availability of T&Ps/IMTEs.**

NOTES:

1. For crane at Sl no. 2 above, day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc. including repair of self-starter, batteries and dynamo of these cranes shall be the responsibility of the contractor. **Manpower for these works and other crane related works is in the scope of Contractor**. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contactor. BHEL may also provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance may be excluded from scope of contractor.

2. **Operator for** BHEL's cranes at sl no. 2 above for **100 MT & above capacity** being provided by BHEL free of cost. **Further, Helpers and fuel for operation of all BHEL cranes shall be provided by contractor within the final accepted rates.**

3. The cranes at Sl. No.1 will be provided as per requirement on sharing basis for the purpose of loading/unloading and lifting to locations as stated above at erection site at the discretion of the BHEL Engineer.

4. The contractor shall make necessary arrangement like lying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of BHEL cranes at Sl no. 2. Steel plates for laying shall be provided by BHEL free of cost and same has to be returned back to BHEL stores upon completion of work.

5. Any other special T&P if supplied by the manufacturer and available with the BHEL/NBPPL/NTPC will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.

6. After handing over/ commissioning/load test of The EOT to Customer by BHEL, BHEL's EOT vendor shall provide skilled operation and maintenance personnel for EOT cranes available in TG hall for the next 24 months.

7. Other terms and conditions regarding above items shall be as per T&P clause in SCC.

Chapter - VI: TIME SCHEDULE

6.0 TIME SCHEDULE

6.1 The contractor is required to commence the work within 15 days from the date of issue of LOIunless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilization of manpower and T&Ps by the contractor.

6.2Delivery Period: Entire work as detailed in the tender specifications shall be completed within **14months** from the Zero date as per program/milestones indicated by BHEL Engineer-In Charge. Contractor has to mobilize adequate resources to meet BHEL's commitments to their customer as indicated from time to time.

6.3 The contractor has to augment his resources in such a manner that following tentative dates of major milestones of erection & commission are achieved on specified schedules as below:

MILE STONES	MONTHS
Erection Start	ZERO
Boiler Light up	05 months
Barring gear	07 months
Synchronization on coal	09 months
Full Load	11 months
Trial Operation	13 months
PG Test and handing over	14 months

6.4 In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract.

6.5 The contractor has to ensure that work is completed in all respects leaving no pending points. However the punch list/ pending points, which are possible to be attended at site, shall be fully liquidated ***within one month from successful trial operation of the unit***.

6.6The work under the scope of this contract is deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

Chapter - VII: TERMS OF PAYMENT

7.1 The 'Engineer In-Charge' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.
7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.
7.3 Subject to any deduction which BHEL may be authorized to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment at different stages of erection as explained hereunder:

7.4. PROGESSIVE PAYMENT ON PRORATA BASIS

7.4.1 85 % of Item rate payable on fulfilment of following conditions:

(A) For Equipment / items such as Panels,ACDB ,UPS, Battery & Charger,Cable Trays, cable, JBs, impulse pipe, tubing etc. where no calibration is required.

(i) 50% of item rate shall be payable on erection /installation /cable laying/cable dressing.
(ii) 20% of item rate on final alignment, welding, clamping, termination etc.
(iii) 10% of item rate on testing, pre-commissioning, charging etc.
(iv) 5 % of item rate on pending point clearance

(B) For equipment/items where calibration and testing is required.

i) 20% of item rate on calibration and testing
ii) 30% of item rate on erection, installation alignment and termination wherever involved.
iii) 15% of item rate on individual device loop checking/hydro test/ charging of installation and panels.
iv) 15% of item rate on system loop checks, pre-commissioning checks by simulation/ field calibrationor with actual system operation.
v) 5% of item rate on pending point's clearance.

(C) For equipment/items such Transformers, Bus Ducts & its accessories etc.

i) 20% of item rate shall be payable on placements
ii) 40% of item rate shall be payable on erection/installation
iii) 15% of item rate on final alignment, oil centrifuging, welding, clamping, termination etc as applicable for individual system.
iv) 5% of item rate on testing, pre-commissioning, charging etc.
v) 5% of item rate on pending point's clearance.

(D)	STAGE/MILESTONE PAYMENTS (15% of Contract Value)	% Payment
1.	Charging of stand-by Transformer (01 no)	0.50%
2.	Charging of Unit Auxiliary Transformer (02 nos)	2x0.250%= 0.5%
3.	Boiler Light up	1%
4.	Barring Gear (TG)	1%
5.	Synchronization	2%
6.	Full Load	2%
7.	Trial Operation of Unit	3%
8.	Painting (including arrow marking,nomenclature, etc	2%
9.	Area cleaning, temporary structures, cutting/removal and return of scrap	0.50%
10.	Punch List points/pending points liquidation	0.50%
11.	Material Reconciliation	1%
12.	Completion of Contractual Obligations	1%
13.	**Total**	**15%**

7.5 Further break-up of above terms of payment, if required can be carried out at site entirely at the discretion of BHEL Engineer In charge.

7.6 The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.

7.7 Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalized at site.

7.8 If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.

7.9 Payment of retention amount and final bill shall be as per GCC.

7.10 **Commencement of Guarantee Period:** Commencement of guarantee period for good workmanship shall be from completion of work as certified by ENGINEER IN CHARGE.

Chapter - VIII: TAXES, DUTIES, and LEVIES

8.0	**TAXES & DUTIES**
8.1	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.
8.2	**Service Tax & Swachh Bharat Cess on Service Tax**
8.2.1	Service Tax and Swachh Bharat Cess as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Swachh Bharat Cess. **The bid process should be exclusive of Swachh Bharat Cess**. **The Service invoice on output services should show the Swachh Bharat Cess amount separately**. **The documentary evidence of deposition of service tax and Swachh Bharat Cess is to be submitted**.
8.2.2	Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract.
8.2.3	**For the purpose of claiming any Service Tax and/or Swachh Bharat Cess from BHEL, the following procedure shall be adopted :**
8.2.3.1	Contractor shall submit serially numbered Service Tax and Swachh Bharat Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely:
8.2.3.1.1	The name, address and registration number of the contractor
8.2.3.1.2	The name and address of the party receiving taxable service (BHEL)
8.2.3.1.3	Description, classification and value of taxable service provided and
8.2.3.1.4	The Service Tax and Swachh Bharat Cess and/or Swachh Bharat Cess payable thereon. (Service Tax and Swachh Bharat Cess should not be combined).
8.2.4	All the four conditions shall be fulfilled in the invoice for payment of Service Tax and/or Swachh Bharat Cess by BHEL. Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the break up of all values for each nature of Service.
8.2.5	Name and address of the contractor should be same in the service tax invoice and

	monthly bill. Any change in the name and address in past should be supported by documentary evidence duly certified by the registering authority.
8.2.6	Purpose of above requirements, inter-alia, is to enable availment of CENVAT credit by BHEL. As per recent amendments, Time restrictions for taking Cenvat credit is within six months from date of invoice. Wherever Cenvat credit could not be availed by BHEL within statutory time limit of 6 months due to delay in submission of invoices or for any other reasons attributable to contractors, Liability towards loss of such Cenvat credit shall be passed on to contractors.
8.3	**VAT (Sales Tax /WCT)**
8.3.1	The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.
8.3.2	The Contractor shall register himself with the respective Sales Tax authorities of the state if applicable and submit proof of such registration to BHEL along with the first RA bill. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to. Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.
8.4	**Modalities of Tax Incidence on BHEL**
8.4.1	Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.
8.5	**New Taxes/Levies and Change in Tax Laws:**
8.5.1	In case the Government imposes any new levy/tax on the output service/ goods/work of sub-contractor after award of the contract, the same shall be reimbursed by BHEL at actual. The reimbursement on account of new tax/levy is limited to direct transaction between BHEL and Sub-Contractor.
8.5.2	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.
8.5.3	No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work of the sub-contractor 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.

Chapter - IX: Other important clauses

CHAPTER IX	Other terms and conditions
9.1	**Modification/ deletion in Price Variation Compensation** Clause no. 2.17of GCC:
9.2	**Clause No. 2.17.5 of GCC shall be 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 delivery period as defined in clause no 6.0 of TCC (Part-I)**
9.3	**Clause No. 2.17.9 shall be modified as:-** PVC shall be applicable only **for the extended period of contract (if any) after the schedule completion date.** However, the total Quantum of Price Variation amount payable/recoverable shall be regulated as follows:
9.4	For the portion of backlog attributable to the contractor, **no PVC shall be paid.**
9.5	For the period of Force Majeure, the PVC (if applicable) will be limited to the indices applicable at the beginning of the force majeure period.
9.6	For the portion of backlog attributable to BHEL, the PVC will be as per the indices applicable for the respective months
9.7	The total amount of PVC shall not exceed 20% of the cumulatively executed contract value. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works.
9.8	All other terms & conditions of Clause No. 2.17 of GCC shall remain same.
9.9	Penalty imposition against non-compliances in quality area shall be as per Chapter XII (Annexures).

Chapter - X: BILL OF QUANTITY (BOQ)

ERECTION, TESTING, COMMISSIONING, ASSISTANCE IN PG TEST AND HANDING OVER OF ALL C&I EQUIPMENTS, STATION C&I AND ELECTRICAL EQUIPMENTS AS PER TENDER SPECIFICATION AT Unit#6 of 1X500 MW: UNCHAHAR TPP, STAGE IV DIST- RAEBARELLI- U.P

Sl No.	Description of Item	UOM	Quantity
A	DDCMIS/MAX PANELS/RACKS/CONSOLES etc		
1	suit of one panel (approx. weight 400kg, 900(L) X 900(B) X 2500(H) mm	No.	6
2	suit of two panels approx. weight 800kg, 1800(L) X 1000(B) X 2500(H) mm	No.	19
3	suit of three panels (approx. weight 1200kg, 2700(L) X 1000(B) X 2500(H) mm	No.	14
4	suit of Four panels (approx. weight 1600kg, 3600(L) X 1000(B) X 2500(H) mm	No.	6
5	suit of five panels (approx. weight 2000kg, 4500(L) X 1000(B) X 2500(H) mm	No.	5
6	Generator Relay Panel(2300x1000x1000 mm each) with Generator disturbance recorder	No.	4
7	Station Transformer Relay Panel (2230x1000x1000 mm each)	No.	1
8	Generator Instrumentation Cabinet (WDH:1000x800x2200 mm)	No.	1
9	DAVR PANEL (4053x800x2415 mm)	Set	1
10	CCTV PANEL (800x800x2315 mm each) with CCTV system (INCLUDING cameras, local control boxes, remote panel)	Set	1
11	VIBRATION MONITORING SYSTEM	Set	4
12	CWP RIO PANEL-CW (800x800x2315 mm each)	Set	3
13	Bottom Ash Panel (800x800x2415/2315 mm each)	Set	5
14	Acoustic pyrometer remote cabinet including PC station	Set	1
15	Acoustic Steam leak detector system	Set	1
16	FTP LOCAL STARTER Box	No.	4
17	FACP- Fire Alarm Control Panel(445x225x600 mm)	No.	1
18	Elevator control Panel	No.	2

19	SCANNER AIR FAN DC STARTER box	No.	1
20	Data Concentrator Panel (02 nos- 800x800x2315 mm each)	SET	1
21	HART Management System for SMART Transmitter Panel dimension 800X800X2415 mm	SET	3
22	GROUNDING BRUSH MONITOR	SET	1
23	Furnace Flame Viewing System –Remote Panel	Set	1
24	Furnace Flame Viewing System –Local Panel	Set	4
25	GRAVIMETRIC FEEDER PANEL (WITH ELECTRONICS) (Local and remote) (Electronic package includes-calibration probe-01 no., cable for calibration probe with retro reflective tape)	No.	10
26	NETWORK PANEL With accessories (800x800x2415 mm each)	Set	5
27	Power Distribution Panel	No.	1
28	Starter cabinet for Emergency Lube Oil Motor, DC seal oil Motor with resistance box	No.	3
29	Max engineer/max Storian/max operator/max link stations/station supervisor/shift in charge terminal/MIS PC/PCAL PC/LVS PC/TFT monitor along with installation of workstation with all connectivity and associated racks	No.	35
30	Printers(A4 & A3 Colour Laser Jet, Inkjet, Dot Matrix) With Printer Table and accessories	No.	20
31	LARGE VIDEO SCREEN(approx 67" or more in two tier arrangement) (1360x1250x850 mm) with screen, mirror assembly, base frame, matrix switch,controller,cables and accessories,CPU and loose items.	No.	13
32	Ethernet switches-upto 16 ports	Set	1
33	Control Desk	Set	2
34	Computer Furniture(for all servers ,pc, printer)	Set	1
B	LIE/LIR/LGB		
36	Local Instrument racks (LIR) Type A 1650x2150x800	No.	3

37	Local Instrument racks (LIR) Type B 1300x800x2150 mm	No.	1
38	Local Instrument racks (LIR) Type C 800x850x1650 mm	No.	7
39	Local Gauge Boards(LGB)	No.	11
40	Rack of size 2150x1800x1650x1680 mm- Type A	No.	21
41	Rack of size 1350x1000x850x880 mm- Type B	No.	4
C	24 V DC BATTERY & CHARGER SYSTEM and UPS		
42	24 V DC Battery for SG and TG	Set	2
43	24 V DC Battery for Station C&I	Set	2
44	UPS Battery banks (2 step 2 tier) ALONG WITH ms RACKS AND OTHER ACCESSORIES	Set	1
45	24 V DC Battery Charger for SG ,TG along with DCDB. Each set of Charger comprises of 2x199% FCBC,1x100% DCDB and BHMS	Set	2
46	24 V DC Battery Chargers for Station C&I along with DCDB. Each set of Charger comprises of 2x100 %FCBC,1x100% DCDB and BHMS	Set	2
47	UPS system comprising of the following: UPS Panel, Voltage stabilizer cubicle, Input Isolating Transformer cubicle, Static invertors etc. including ACDB (1&2) AND BATTERY HEALTH MONITORING SYSTEM	Set	1
D	INSTALLATION,CALIBRATION & COMMISSIOINGOFLOCAL/FIELD INSTRUMENTATION/EQUIPMENT		
48	Flow meters/Flow transmitters/Flow Nozzles with orifice assembly	No.	21
49	Temperature gauges/Pressure gauges/ Diff. Pressure gauge	No.	491
50	Temp. Transmitter /Pressure Transmitters / Differential pressure/Position transmitters/SPEED TRANSMITTERS with probe and all accessories	No.	255
51	Level Transmitter/Level gauge/sight flow glass with probe and all accessories	No.	82
52	Temp. switches/Pressure switches /DP switches	No.	58

53	Level switch/Level switch(Conductivity/capacitance type)/ Level switch(Float type) / Level Instruments	No.	6
54	Pneumatic Pressure controller with probe and all accessories	Set	2
55	Electronic/Guided Wave Radar /Ultrasonic type level Transmitters with probe and all accessories	No.	17
56	Conductivity cell	No.	6
57	ERV Controller WITH SWITCHES	No.	9
58	Reverse Rotation Monitoring system	SET	1
59	Flame scanner head assy. (Along with fibre optic and 19' single euro card rack, lens barrel assembly with miniature JB's and test kit)	No.	40
60	Microprocessor based Flame scanner LGM SWITCH BOX	No.	20
61	Hand Held HART communicator	Set	1
62	Conductivity/Dissolved oxygen/sodium/pH/silica/analyser	Set	10
63	Gas Analyser(CABINET WITH ACCESSORIES)	Set	2
64	Moisture sensor PROBE & DEW POINT MONITOR	Set	1
65	Flue gas analysers comprising of SOX/NOX/CO/Co2 analyzer, along with Sensor head, in situ probe, Pressure, temp. Transmitter, Display, control & Air drier unit other accessories.	Set	2
66	Steam and water analysis system, SWAS consisting of: Conductivity analyser-16 No.,pH analyser-8 No., Dissolved oxygen analyser-3 No., Silica analyser-1 No., Sodium analyser-1 No, phosphate/chloride/hydrazine analyser-1 No each , Conductivity analyser with drawable type-2 no., SWAS primay rack- 1 set, Wet panel-1 set, Dry panel- 1 set,Chiller-1 set, Swas Sample Handling System-01 set,	Set	1
67	Oxygen Analyser –Low temperature along with Electronic Unit and other accessories.	Set	6
68	Thermocouples(K/R type)	No.	321
69	RTDs with thermo well (ALL TYPE) ALONG WITH CONVERTERS WHEREVER APPLICABLE	No.	299

70	MTM Thermo Couple up to 35 M (duplex) with clamps and pads	No.	497
71	Thermo well	No.	200
72	Thermometer(Bimettalic)/Gas filled/MIS	No.	1
73	Co –AXL dial thermometer	No.	12
74	Bearing Element	No.	16
75	Burner Tilt shear pin failure indication system	set	4
76	Heavy Duty Limit switch	No.	70
77	Furnace temp. Probe with starter boxes	No.	2
78	HEA exciter box assembly	Set	16
79	Air Filter Regulators/LUBRICATORS	No.	60
80	I/P Converters	No.	30
81	Vibration Transducers/Monitor/ Detectors/Element	No.	4
82	Rota meters	No.	8
83	Solenoid Valves	No.	150
84	Speed Regulators / Air lock valves in oil gun corner rack	No.	20
85	Speed measuring loop	Set	6
86	Coal bunker level Monitoring system consists of Ultrasonic level sensor-14 no. and transmitter-14 no., Extension cable 320 mtr, Junction box-8 no. and Local panel -02 nos	Set	8
87	COAL FLOW MONITOR	Set	8
88	SOOT BLOWER MCC	No.	1
89	SOOT BLOWER Local control boxes	No.	20
90	Opacity Monitor	SET	1
91	Electronic /Digital Indicators (Bar Graph Indicators, Temperature Indicatorsetc.)	No.	10
92	Electronic Water Level Indicator(EWLI) Along with Display Units, Ascertor Unit And Other Accessories	SET	4
93	Speed switch / Speed detector	No.	12

94	GPS based Master & Slave clock system (Panel dimen. 800*800*2415 mm approx)) INCLUDING SLAVE CLOCKS(*23 nos.), GPS ANTEENA WITH CABLE, RECEIVER AND SLAVE BOOSTER	Set	1
E	CONTROL/SIGNAL/SCREENED/POWER CABLES LAYING,DRESSING,CLAMPING & TERMINATION LT Shielded /Screened Cable//FRLS/Power cable		
95	2P X 0.5 SQ MM	Mtr	41160
96	2/3/6 Triad X 0.5/1.5 SQ MM	Mtr	1000
97	4P X 0.5/1.5 SQ MM	Mtr	125000
98	8P X 0.5 SQ MM	Mtr	45000
99	12P/16 P/20 X 0.5 SQ MM	Mtr	15600
100	2P X 1.3/1.5 SQ MM/flame scanner cable	Mtr	25000
101	2C X 2.5 SQ MM	Mtr	7700
102	3C X 2.5 SQ MM	Mtr	4700
103	5C X 2.5/1.5 SQ MM	Mtr	5500
104	7C X 2.5 SQ MM	Mtr	7500
105	10C X 2.5 SQ MM	Mtr	7500
106	16C X 2.5 SQ MM	Mtr	5500
107	19C X 1.5 SQ MM	Mtr	6000
108	UTP E-CAT cable/fibre optic cable	Mtr	12000
109	Compensating cable/ T/C extension cable(2P/4P/6Px0.5 sq mm Kx or Rx type)	Mtr	11000
110	4C - 2.5- CU ARMOURED LT XLPE CABLE	Mtr	6500
F	CABLE TRAYSCOMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT,BENDS, CROSS ,REDUCERS & COVERS		
111	Ladder/ Perforated type Cable tray, W=50mm	Mtr	782
112	Ladder/ Perforated type Cable tray, W=100mm	Mtr	2500
113	Ladder/ Perforated type Cable tray, W=150mm	Mtr	1518
G	INSTALLATION & FABRICATION OF STRUCTURAL STEEL		
114	ANGLE ,ISMC,PLATES etc	MT	10
H	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS		
115	Copper Tube-6mm/8mm/1'/1/4”/3/4"	Mtr	380
116	1’ CS PipeSCH 80	Mtr	15
117	CS Pipe 21.3 x3.73/4.78	Mtr	600
118	CS Pipe 16x2.6	Mtr	1900

119	3/4" CS Pipe SCH 80	Mtr	340
120	Seam less CS tube 13.5x2.6	Mtr	130
121	Carbon steel tube 88.9x4	Mtr	20
122	Seam less CS tube 21.3x2.3	Mtr	550
123	Seam less AS tube 21.3x4.78	Mtr	210
124	Seam less SS tube 21.3x2.6	Mtr	320
I	Installation of Junction boxes/Indication boxes/Local control boxes		
125	FRP JUNCTION BOXES- IP-55/65	No.	130
126	JB upto 48 way	No.	334
127	JB above48 way	No.	32
128	Temperature transmitter JB	No.	40
129	Shear Pin failure Indication box	No.	4
130	Local oil gun maintenance switch	No.	20
131	Local start stop Push button	No.	5
J	COMMISSIONING/CALIBRATION/TESTING of control valves, on/off valves, /pneumatic valves, actuators, power cylinders etc.		
132	Commissioning of Pneumatic actuators(Power cylinder) - On/Off type	No.	24
133	Commissioning of Pneumatic actuators(Power cylinder) - Regulating type	No.	10
134	SADC drives with power cylinder	No.	88
135	Over fire air tilt drives	No.	4
136	Pulversier Lube oil skid The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.	Set	10
137	Lube oil skids for FD/ ID/ PA Fans The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.	Set	6
138	Gravimetric feeder mounted C&I Equipment like motion ,monitor sensor, micro switches, etc.	Set	10
139	Commissioning of Electric actuators/dampers/valves Open/Close type	No.	14

140	Commissioning of Control Valves with/without limit switch	No.	100
141	Commissioning of motorised actuators (local and remote)	No.	150
142	Commissioning of Pneumatic Valves/Safety relief valves/NRV	No.	12
K	TRANSFORMERS, IP-BUS DUCT and VFD System		
	Description of Item	UOM	Quantity
143	Transportation upto foundation , assembly, testing and commissioning of Generator Transformer coming in separate single phase with description of each phase as below: RATING-200 MVA each ph, 21/420 KV 3X1-ph to be connected at site TYPE OF COOLING (ONAN/ONAF/OFAF ETC)-OFAF WEIGHT- 249000 kg CORE & WINDING- 153515 kg SHIPPING WT (N2 ETC FILLED)-174900 kg OIL QUANTITY-50 KL OVERALL DIMENSION-10000 x 7600 x 10330 mm TOTAL WEIGHT WITH OIL-249000 kg	Set	1
144	Transportation upto foundation , assembly, testing and commissioning of Stand-by Transformer with description as below: RATING-50 MVA , 400/11.5 KV 3-ph TYPE OF COOLING (ONAN/ONAF ETC)-ONAF WEIGHT-135394 kg CORE & WINDING-59720 kg SHIPPING WT (N2 ETC FILLED)-75950 kg OIL QUANTITY-42640 ltrs OVERALL DIMENSION- 8150 x 3100 x 3400 mm TOTAL WEIGHT WITH OIL-135394 kg	Set	1
145	Transportation upto foundation , assembly, testing and commissioning of Unit Transformer with description as below: RATING-50 MVA , 21/11.5 KV 3-ph TYPE OF COOLING (ONAN/ONAF ETC)-ONAF WEIGHT-79000 kg CORE & WINDING-40000 kg SHIPPING WT (N2 ETC FILLED)-50000 kg OIL QUANTITY-22225 ltrs OVERALL DIMENSION- 8150 x 3100 x 3400 mm TOTAL WEIGHT WITH OIL-79000 kg	Set	2

146	**Transportation upto foundation , assembly, testing and commissioning of Unit Auxiliary Transformer with description as below:** **RATING-16 MVA , 11/3.5 KV 3-ph** **TYPE OF COOLING (ONAN/ONAF ETC)-ONAN** **WEIGHT-40000 kg** **CORE & WINDING-16700 kg** **OIL QUANTITY-9800 ltrs** **OVERALL DIMENSION- 6700x5100x5300mm** **TOTAL WEIGHT WITH OIL-40000 kg**	**Set**	**2**
147	**Transportation from stores/storage yard/place of unloading to erection site,asSembly,erection,welding,testing& commissioning of Isolated phase bus duct for interconnections of Generator& Generator Transforms (each phase), tap-off to Unit transformers, SP & VT, LA & VT cubicles, NG cubicles, air pressurisation equipments, flexiblehoses,CT/PT transformers, supporting structures along with all accessories &auxilliaries.Details of Isolated Phase Bus duct :** **Delta Run 21kV, 11000A** Enclosure Size: Round,OD1000 mm Thk 8 mm Conductor size: Round, OD 450 mm, Thk. 15 mm Phase to phase distance:1800 mm Approx. length per unit 100 Mtr. **Main run 21kV, 19000 A** Enclosure Size: Round,OD1500 mm Thk 8 mm Conductor size: Round, OD 800 mm, Thk. 16 mm Phase to phase distance:1750 mm Approx. length per unit 190 Mtr. **Tap-off 21kV, 3000A** Enclosure Size: Round ,780x4.78 mm Conductor size: Box formation 2 channel, OD 2x203.2 mm, Thk. 11.8 mm Phase to phase distance:1000mm Approx. length per unit 115 Mtr. SP and VT Cubicle – 03 Nos. **Each cubicle consists of :** Epoxy cast dry type VT – 09 Nos., Surge Capacitor –03 Nos, etc Weight of Cubicle approx. 3.5 MT,	**SET**	**1**

	Dimension 2200 x 2500 x 800 mm LA and VT Cubicle -03 Nos. **Each cubicle consists of :** Epoxy cast dry type VT – 03 Nos., Lighting arrestor –03 Nos, etc Weight of Cubicle approx. 1.5 MT, Dimension 1450 x 1750 x 800 mm **Neutral Grounding Cubicle(NGR-NGT) consist of** a) Dry type epoxy cast NG transformer b) NG Resistor c) Dimensions 2500x 2500 x2000 mm ***Supporting structural steel approx. 80 MT***		
L	**VARIABLE FREQUENCY DRIVE SYSTEM FOR ID FANS and VFD Transformers**		
148	**VFD Transformer** **3000 KVA, 11/3.3 KV 3 Phase, ONAN Outdoor type transformer with HV, LV cable boxes, radiators, conservator tank, marshalling box etc.** **Total Weight: 9145 kg** **Overall Dimensions: 5000 x 3000 x 3200 mm** **Shipping Dimensions: 3650 x 2100 x 3000 mm** **Oil Qty : 1845 litres (approx.)**	**No.**	**4**
149	**SF6/Vacuum Circuit Breaker** **Overall dimensions 2360 x1835x1650 mm, Weight 1400 KG**	**No.**	**4**
150	**DC Air core Reactor** **Floor/channel mounting type 3.6 KV grade, 10 mH, 800 A rated air cored DC reactor housed in 3mm thick Aluminium cubicle with suitable input/output terminals** **Dimension: 1700 x 2000 x 2600 mm , Weight: 1800 kg**	**No.**	**4**
151	**LCI Drive Panel comprising Control and Excitation Panel, Fan and Filter Panel with air duct for exhausting air and Bridge** **Panel Size: 3700 x 1450 x 2400 mm; Weight: 3000 kg**	**No.**	**4**
152	**Control Panel for VFD Drives, including PC System for MMI** **Size: 800 x 1450 x 2400 mm; weight: 400 kg**	**Set**	**2**
153	**Adaptor Panel for VFD Drives** **Size: 600 x 1450 x 2400 mm; weight: 200 kg**	**No.**	**4**
154	**O&M Panel**	**No.**	**1**
155	**CLC panel**	**No.**	**4**

Chapter - XI-A: Rate Schedule

ERECTION, TESTING, COMMISSIONING, ASSISTANCE IN PG TEST AND HANDING OVER OF C&I , STATION C&I AND ELECTRICAL EQUIPMENTS AS PER TENDER SPECIFICATION AT Unit#6 of 1X500 MW: UNCHAHAR TPP, STAGE IV DIST- RAEBARELLI- U.P

Sl No.	Description of Work	Total Value (T) in INR (In figure & words)
01	**Total Lumsum Price For Erection, Testing, Commissioning, Assistance In Pg Test And Handing Over Of All C&I Equipments, Station C&I And Electrical Equipments As Per Tender Specification At Unit#6 Of 1x500 MW: Unchahar TPP, Stage Iv Dist- Raebareli- U.P**	
Notes:	1. The rates of individual item of the entire scope of work as defined in BOQ at chapter X and scope of work of tender shall be arrived as per calculation defined in Chapter XI 'B'. 2. The derived item rates will remain firm throughout the contract period.	

Chapter - XI B:

Derivation of different item rates based upon total quoted value at Chapter-XI 'A'

ERECTION, TESTING, COMMISSIONING, ASSISTANCE IN PG TEST AND HANDING OVER OF ALL C&I EQUIPMENTS, STATION C&I AND ELECTRICAL EQUIPMENTS AS PER TENDER SPECIFICATION AT Unit#6 of 1X500 MW: UNCHAHAR TPP, STAGE IV DIST- RAEBARELLI- U.P

A	Description of Item DDCMIS/MAX PANELS/RACKS/CONSOLES etc	UOM	Quantity (Q)	Items Factor (F)	Item RATE/Unit(R)=(Total Amount *FACTOR/1000000) i.e. (R)= (T X F)/1000000
1	suit of one panel (approx. weight 400kg, 900(L) X 900(B) X 2500(H) mm	No.	6	374.9178662569960	
2	suit of two panels approx. weight 800kg, 1800(L) X 1000(B) X 2500(H) mm	No.	19	609.6131058013700	
3	suit of three panels (approx. weight 1200kg, 2700(L) X 1000(B) X 2500(H) mm	No.	14	1886.3839546320700	
4	suit of Four panels (approx. weight 1600kg, 3600(L) X 1000(B) X 2500(H) mm	No.	6	1217.0737292143300	
5	suit of five panels (approx. weight 2000kg, 4500(L) X 1000(B) X 2500(H) mm	No.	5	1060.5543374959000	
6	Generator Relay Panel(2300x1000x1000 mm each) with Generator disturbance recorder	No.	4	566.8073447783580	
7	Station Transformer Relay Panel (2230x1000x1000 mm each)	No.	1	566.8073447783580	
8	Generator Instrumentation Cabinet (WDH:1000x800x2200 mm)	No.	1	536.1518912253170	
9	DAVR PANEL (wxdxh= 4053x800x2415 mm)	Set	1	1060.5543374959000	
10	CCTV PANEL (800x800x2315 mm each) with CCTV system (INCLUDING cameras, local control boxes, remote panel)	Set	1	2033.6364157690300	
11	VIBRATION MONITORING SYSTEM	Set	4	996.4427529314020	
12	CWP RIO PANEL-CW (800x800x2315 mm each)	Set	3	996.4427529314020	
13	Bottom Ash Panel	Set	5	996.4427529314020	

	(800x800x2415/2315 mm each)				
14	Acoustic pyrometer remote cabinet including PC station	Set	1	617.3198503755970	
15	Acoustic Steam leak detector system	Set	1	3673.1223705074900	
16	FTP LOCAL STARTER Box	No.	4	308.6798343098540	
17	FACP- Fire Alarm Control Panel(445x225x600 mm)	No.	1	996.4427529314020	
18	Elevator control Panel	No.	2	996.4427529314020	
19	SCANNER AIR FAN DC STARTER box	No.	1	200.6360918552680	
20	Data Concentrator Panel (02 nos- 800x800x2315 mm each)	SET	1	374.9178662569960	
21	HART Management System for SMART Transmitter Panel dimension 800X800X2415 mm	SET	3	457.6774065685390	
22	GROUNDING BRUSH MONITOR	SET	1	514.5064640056890	
23	Furnace Flame Viewing System –Remote Panel	Set	1	429.2402886537850	
24	Furnace Flame Viewing System –Local Panel	Set	4	276.3581403878420	
25	GRAVIMETRIC FEEDER PANEL (WITH ELECTRONICS) (Local and remote) (Electronic package includes- calibration probe-01 no., cable for calibration probe with retro reflective tape)	No.	10	301.7579685859020	
26	NETWORK PANEL With accessories (800x800x2415 mm each)	Set	5	326.9510482087680	
27	Power Distribution Panel	No.	1	536.1518912253170	
28	Starter cabinet for Emergency Lube Oil Motor, DC seal oil Motor with resistance box	No.	3	308.6798343098540	
29	Max engineer/max Storian/max operator/max link stations/station supervisor/shift in charge terminal/MIS PC/PCAL PC/LVS PC/TFT monitor along with installation of workstation with all connectivity and associated racks	No.	35	160.4755639915440	
30	Printers(A4 & A3 Colour Laser Jet, Inkjet, Dot Matrix) With Printer Table and accessories	No.	20	149.3379416722910	

31	LARGE VIDEO SCREEN(approx 67" or more in two tier arrangement) (1360x1250x850 mm) with screen,birrorassembly,baseframe,matrixswitch,controller,cables and accessories,CPU and loose items.	No.	13	714.0571258411880	
32	Ethernet switches-upto 16 ports	Set	1	143.9345293728200	
33	Control Desk	Set	2	2262.2386982288800	
34	Computer Furniture(for all servers ,pc, printer)	Set	1	9295.6946684358900	
B	LIE/LIR/LGB				
36	Local Instrument racks (LIR) Type A 1650x2150x800	No.	3	319.3809874148080	
37	Local Instrument racks (LIR) Type B 1300x800x2150 mm	No.	1	284.2988171462230	
38	Local Instrument racks (LIR) Type C 800x850x1650 mm	No.	7	281.6512867805430	
39	Local Gauge Boards(LGB)	No.	11	310.0248486518110	
40	Rack of size 2150x1800x1650x1680 mm-Type A	No.	21	216.1349605079210	
41	Rack of size 1350x1000x850x880 mm- Type B	No.	4	216.1349605079210	
C	24 V DC BATTERY & CHARGER SYSTEM and UPS				
42	24 V DC Battery for SG and TG	Set	2	1327.1133611550000	
43	24 V DC Battery for Station C&I	Set	2	1327.1133611550000	
44	UPS Batteries banks (2 step 2 tier) ALONG WITH ms RACKS AND OTHER ACCESSORIES	Set	1	1695.3524826977700	
45	24 V DC Battery Charger for SG ,TG along with DCDB. Each set of Charger comprises of 2x199% FCBC,1x100% DCDB and BHMS	Set	2	2019.8998872860400	
46	24 V DC Battery Charger for Station C&I alongwith DCDB. Each set of Charger comprises of 2x100 %FCBC,1x100% DCDB and BHMS	Set	2	1613.1726041322300	

47	UPS system comprising of the following: UPS Panel, Voltage stabilizer cubicle, Input Iso. Transformer cubicle, Static invertors etc. including ACDB (1&2) AND BATTERY HEALTH MONITORING SYSTEM	Set	1	1868.9784046748500	
D	INSTALLATION,CALIBRATION& COMMISSIOINGOFLOCAL/FIELD INSTRUMENTATION/EQUIPMENT				
48	Flow meters/Flow transmitters/Flow Nozzles with orifice assembly	No.	21	48.2853640011203	
49	Temperature gauges/Pressure gauges/ Diff. Pressure gauge	No.	491	22.6228885390176	
50	Temp. Transmitter /Pressure Transmitters / Differential pressure/Position transmitters/SPEED TRANSMITTERS with probe and all accessories	No.	255	29.8100816011357	
51	Level Transmitter/Level gauge/sight flow glass with probe and all accessories	No.	82	41.6269112766745	
52	Temp. switches/Pressure switches /DP switches	No.	58	26.6571658294256	
53	Level switch/Level switch(Conductivity/capacitance type)/ Level switch(Float type) / Level Instruments	No.	6	55.7646851426331	
54	Pneumatic Pressure controller with probe and all accessories	Set	2	122.8997761854790	
55	Electronic/Guided Wave Radar /Ultrasonic type level Transmitters with probe and all accessories	No.	17	123.5808978804240	
56	Conductivity cell	No.	6	82.5355626884154	
57	ERV Controller WITH SWITCHES	No.	9	143.9345293728200	
58	Reverse Rotation Monitoring system	SET	1	77.2194442318039	
59	Flame scanner head assy. (Along with fibre optic and 19' single euro card rack, lens barrel assembly with miniature JB's and test kit)	No.	40	93.4534189295917	
60	Microprocessor based Flame scanner LGM SWITCH BOX	No.	20	61.0092073333903	

61	Hand Held HART communicator	Set	1	143.9345293728200	
62	Conductivity/Dissolved oxygen/sodium/pH/silica/analyser	Set	10	310.9299479698830	
63	Gas Analyser(CABINET WITH ACCESSORIES)	Set	2	474.6729051849580	
64	Moisture sensor PROBE & DEW POINT MONITOR	Set	1	203.4922851348010	
65	Flue gas analysers comprising of SOX/NOX/CO/Co2 analyzer, along with Sensor head, in situ probe,Pressure, temp. transmitter, Display, control & Air drier unit other accessories.	Set	2	2797.2841017091800	
66	Steam and water analysis system, SWAS consisting of: Conductivity analyser-16 No.,pH analyser-8 No.,Dissolved oxygen analyser-3 No.,Silica analyser-1 No.,Sodium analyser-1 No, phosphate/chloride/hydrazine analyser-1 No each , Conductivity analyser with drawable type-2 no.,SWASprimay rack- 1 set,Wet panel-1 set,Dry panel-1 set,Chiller-1 set,Swas Sample Handling System-01 set,	Set	1	4272.3364058443300	
67	Oxygen Analyser –Low temperature along with Electronic Unit and other accessories.	Set	6	401.0608407225590	
68	Thermocouples(K/R type)	No.	321	37.7293177665337	
69	RTDs with thermo well (ALL TYPE) ALONG WITH CONVERTERS WHEREVER APPLICABLE	No.	299	29.8973754439954	
70	MTM Thermo Couple up to 35 M (duplex) with clamps and pads	No.	497	92.9350160206791	
71	Thermo well	No.	200	14.6760858969270	
72	Thermometer(Bimetallic)/Gas filled/MIS	No.	1	155.2620540870660	
73	Co –AXL dial thermometer	No.	12	22.6228885390175	
74	Bearing Element	No.	16	22.6228885390175	
75	Burner Tilt shear pin failure indication system	set	4	114.4066212900510	
76	Heavy Duty Limit switch	No.	70	31.8059710872225	

77	Furnace temp. Probe with starter boxes	No.	2	241.9536460046150	
78	HEA exciter box assembly	Set	16	117.3122045069920	
79	Air Filter Regulators/LUBRICATORS	No.	60	15.3882198781511	
80	I/P Converters	No.	30	24.8289724098851	
81	Vibration Transducers/Monitor/ Detectors/Element	No.	4	23.1520117444217	
82	Rota meters	No.	8	24.3679996607486	
83	Solenoid Valves	No.	150	22.9869957519983	
84	Speed Regulators / Air lock valves in oil gun corner rack	No.	20	43.5783881058678	
85	Speed measuring loop	Set	6	148.4519857408110	
86	Coal bunker level Monitoring system consists of Ultrasonic level sensor-14 no. and transmitter-14 no., Extension cable 320 mtr, Junction box-8 no. and Local panel -02 nos	Set	8	336.1674402496430	
87	COAL FLOW MONITOR	Set	8	282.9924724451820	
88	SOOT BLOWER MCC	No.	1	609.6131058013700	
89	SOOT BLOWER Local control boxes	No.	20	60.5547433356951	
90	Opacity Monitor	SET	1	1364.3526082247800	
91	Electronic /Digital Indicators(Bar Graph Indicators, Temperature Indicatorsetc.)	No.	10	51.4574231594225	
92	ELECTRONIC WATER LEVEL INDICATOR(EWLI) ALONGWITH DISPLAY UNITS,ASCERTOR UNIT AND OTHER ACCESSORIES	SET	4	570.1053674204350	
93	Speed switch / Speed detector	No.	12	45.3005271636884	
94	GPS based Master & Slave clock system (Panel dimen. 800*800*2415 mm approx)) INCLUDING SLAVE CLOCKS(*23 nos.), GPS ANTEENA WITH CABLE, RECEIVER AND SLAVE BOOSTER	Set	1	1169.4158854257000	
E	CONTROL/SIGNAL/SCREENED/ POWER CABLES LAYING,DRESSING,CLAMPING & TERMINATION				
	LT Sheilded /Screened Cable//FRLS/Power cable				

95	2P X 0.5 SQ MM	Mtr	41160	0.3415180168021	
96	2/3/6 Triad X 0.5/1.5 SQ MM	Mtr	1000	0.4192401663658	
97	4P X 0.5/1.5 SQ MM	Mtr	125000	0.4161772245111	
98	8P X 0.5 SQ MM	Mtr	45000	0.4479552462539	
99	12P/16 P/20 X 0.5 SQ MM	Mtr	15600	0.4789675325330	
100	2P X 1.3/1.5 SQ MM/flame scanner cable	Mtr	25000	0.4544639976952	
101	2C X 2.5 SQ MM	Mtr	7700	0.4127314149245	
102	3C X 2.5 SQ MM	Mtr	4700	0.4226859759524	
103	5C X 2.5/1.5 SQ MM	Mtr	5500	0.4567612040862	
104	7C X 2.5 SQ MM	Mtr	7500	0.4931336386111	
105	10C X 2.5 SQ MM	Mtr	7500	0.6133541064092	
106	16C X 2.5 SQ MM	Mtr	5500	0.6133541064092	
107	19C X 1.5 SQ MM	Mtr	6000	0.7197913358610	
108	UTP E-CAT cable/fibre optic cable	Mtr	12000	0.6470464668112	
109	Compensating cable/ T/C extention cable(2P/4P/6Px0.5 sq mm Kx or Rx type)	Mtr	11000	0.5398435018957	
110	4C - 2.5- CU ARMOURED LT XLPE CABLE	Mtr	6500	0.4368520820305	
F	CABLE TRAYSCOMPLETE WITH COUPLER PLATES, FASTENERS, CLAMPS AND FIXING HARDWARES ETC ERECTION INCLUDING SUPPORT,BENDS, CROSS ,REDUCERS & COVERS				
111	Ladder/ Perforated type Cable tray, W=50mm	Mtr	782	3.1747392324251	
112	Ladder/ Perforated type Cable tray, W=100mm	Mtr	2500	3.9431547702299	
113	Ladder/ Perforated type Cable tray, W=150mm	Mtr	1518	4.4064247257574	
G	INSTALLATION & FABRICATION OF STRUCTURAL STEEL				
114	ANGLE ,ISMC,PLATES etc	MT	10	504.0312028625210	
H	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS				
115	Copper Tube-6mm/8mm/1'/1/4”/3/4"	Mtr	380	2.8642335019021	
116	1’ CS PipeSCH 80	Mtr	15	9.8106027606923	
117	CS Pipe 21.3 x3.73/4.78	Mtr	600	9.7145029600002	
118	CS Pipe 16x2.6	Mtr	1900	6.2771164635322	
119	3/4” CS Pipe SCH 80	Mtr	340	6.9076996178743	

120	Seam less CS tube 13.5x2.6	Mtr	130	6.0722822269973	
121	Carbon steel tube 88.9x4	Mtr	20	12.2019946137708	
122	Seam less CS tube 21.3x2.3	Mtr	550	6.0971686295670	
123	Seam less AS tube 21.3x4.78	Mtr	210	11.5472907923228	
124	Seam less SS tube 21.3x2.6	Mtr	320	6.2820937440462	
I	Installation of Junction boxes/Indication boxes/Local control boxes				
125	FRP JUNCTION BOXES- IP-55/65	No.	130	87.2188007842938	
126	JB upto 48 way	No.	334	51.0113822518278	
127	JB above48 way	No.	32	61.7833658871727	
128	Temperature transmitter JB	No.	40	29.7955326273257	
129	Shear Pin failure Indication box	No.	4	29.7955326273257	
130	Local oil gun maintenance switch	No.	20	60.5547433356951	
131	Local start stop Push button	No.	5	101.6820122223170	
J	COMMISSIONING/CALIBRATION/TESTING of control valves, on/off valves, /pneumatic valves, actuators, power cylinders etc.				
132	Commissioning of Pneumatic actuators(Power cylinder) - On/Off type	No.	24	52.8296211103405	
133	Commissioning of Pneumatic actuators(Power cylinder) - Regulating type	No.	10	54.5441028135242	
134	SADC drives with power cylinder	No.	88	112.2583504466910	
135	Over fire air tilt drives	No.	4	181.1263008438490	
136	Pulveriser Lube oil skid The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.	Set	10	330.8903743016790	
137	Lub oil skids for FD/ ID/ PA Fans The scope of work includes removal of instruments calibration, refixing, checking cable connection from JB to instruments etc.	Set	6	191.2899076532990	
138	Gravimetric feeder mounted C&I Equipment like motion ,monitor sensor, micro	Set	10	125.8107195506650	

	switches, etc.				
139	Commissioning of Electric actuators/dampers/valves Open/Close type	No.	14	16.7129422303208	
140	Commissioning of Control Valves with/without limit switch	No.	100	67.8590939237566	
141	Commissioning of motorised actuators (local and remote)	No.	150	26.0507033421895	
142	Commissioning of Pneumatic Valves/Safety relief valves/NRV	No.	12	84.9212115255163	
K	TRANSFORMERS, IP-BUS DUCT and VFD System				
	Description of Item	UOM	Quantity		
144	Transportation upto foundation , assembly, testing and commissioning of Generator Transformer coming in separate single phase with description of each phase as below: RATING-200 MVA, 21/420 KV 3X1-ph to be connected at site TYPE OF COOLING (ONAN/ONAF ETC)-OFAF WEIGHT- 249000 kg CORE & WINDING- 153515 kg SHIPPING WT (N2 ETC FILLED)-174900 kg OIL QUANTITY-50 kL OVERALL DIMENSION-10000 x 7600 x 10330 mm TOTAL WEIGHT WITH OIL-249000 kg	Set	1	80537.6570208527000	

145	Transportation upto foundation , assembly, testing and commissioning of Stand-by Transformer with description as below: RATING-50 MVA , 400/11.5 KV 3-ph TYPE OF COOLING (ONAN/ONAF ETC)-ONAF WEIGHT-135394 kg CORE & WINDING-59720 kg SHIPPING WT (N2 ETC FILLED)-75950 kg OIL QUANTITY-42640 ltrs OVERALL DIMENSION- 8150 x 3100 x 3400 mm TOTAL WEIGHT WITH OIL-135394 kg	Set	1	31684.8903156310000	
146	Transportation upto foundation , assembly, testing and commissioning of Unit Transformer with description as below: RATING-50 MVA , 21/11.5 KV 3-ph TYPE OF COOLING (ONAN/ONAF ETC)-ONAF WEIGHT-79000 kg CORE & WINDING-40000 kg SHIPPING WT (N2 ETC FILLED)-50000 kg OIL QUANTITY-22225 ltrs OVERALL DIMENSION- 8150 x 3100 x 3400 mm TOTAL WEIGHT WITH OIL-79000 kg	Set	2	24371.3719597306000	
147	Transportation upto foundation , assembly, testing and commissioning of Unit Auxiliary Transformer with description as below: RATING-16 MVA , 11/3.5 KV 3-ph TYPE OF COOLING (ONAN/ONAF ETC)-ONAN WEIGHT-40000 kg CORE & WINDING-16700 kg OIL QUANTITY-9800 ltrs OVERALL DIMENSION-6700x5100x5300mm TOTAL WEIGHT WITH OIL-40000 kg	Set	2	15998.3785704704000	

148	**Transportation from stores/storage yard/place of unloading to erection site,asSembly,erection,welding,testing& commissioning of Isolated phase bus duct for interconnections of Generator & Generator Transforms (each phase), tap-off to Unit transformers, SP & VT, LA & VT cubicles, NG cubicles, air pressurisation equipments, flexible hoses,CT/PT transformers, supporting structures along with all accessories &auxilliaries.Details of Isolated Phase Bus duct :** **Delta Run 21kV, 11000A** Enclosure Size: Round,OD1000 mm Thk 8 mm Conductor size: Round, OD 450 mm, Thk. 15 mm Phase to phase distance:1800 mm Approx. length per unit 100 Mtr. **Main run 21kV, 19000 A** Enclosure Size: Round,OD1500 mm Thk 8 mm Conductor size: Round, OD 800 mm, Thk. 16 mm Phase to phase distance:1750 mm Approx. length per unit 190 Mtr. **Tap-off 21kV, 3000A** Enclosure Size: Round ,780x4.78 mm Conductor size: Box formation 2 channel, OD 2x203.2 mm, Thk. 11.8 mm Phase to phase distance:1000mm Approx. length per unit 115 Mtr. SP and VT Cubicle – 03 Nos. **Each cubicle consists of :** Epoxy cast dry type VT – 09 Nos., Surge Capacitor –03 Nos, etc Weight of Cubicle approx. 3.5 MT, Dimension 2200 x 2500 x 800 mm LA and VT Cubicle -03 Nos. **Each cubicle consists of :** Epoxy cast dry type VT – 03 Nos., Lighting arrestor –03 Nos, etc Weight of Cubicle approx. 1.5 MT,	**SET**	**1**	**215063.1605794050000**	

	Dimension 1450 x 1750 x 800 mm **Neutral Grounding Cubicle(NGR-NGT) consist of** a) Dry type epoxy cast NG transformer b) NG Resistor c) Dimensions 2500x 2500 x2000 mm ***Supporting structural steel approx. 80 MT***				
L	**VARIABLE FREQUENCY DRIVE SYSTEM FOR ID FANS and VFD Transformers**				
149	**VFD Transformer 3000 KVA, 11/3.3 KV 3 Phase, ONAN Outdoor type transformer with HV, LV cable boxes, radiators, conservator tank, marshalling box etc. Total Weight: 9145 kg Overall Dimensions: 5000 x 3000 x 3200 mm Shipping Dimensions: 3650 x 2100 x 3000 mm Oil Qty : 1845 litres (approx.)**	**No.**	**4**	**2958.6410272194200**	
150	**SF6/Vacuum Circuit Breaker Overall dimensions 2360 x1835x1650 mm, Weight 1400 KG**	**No.**	**4**	**767.2879923344980**	
151	**DC Air core Reactor Floor/channel mounting type 3.6 KV grade, 10 mH, 800 A rated air cored DC reactor housed in 3mm thick Aluminium cubicle with suitable input/output terminals Dimension: 1700 x 2000 x 2600 mm , Weight: 1800 kg**	**No.**	**4**	**1035.2065793093700**	
152	**LCI Drive Panel comprising Control and Excitation Panel, Fan and Filter Panel with air duct for exhausting air and Bridge Panel Size: 3700 x 1450 x 2400 mm; Weight: 3000 kg**	**No.**	**4**	**1966.8838095902900**	
153	**Control Panel for VFD Drives, including PC System for MMI Size: 800 x 1450 x 2400 mm; weight: 400 kg**	**Set**	**2**	**557.6598689292140**	

154	Adaptor Panel for VFD Drives Size: 600 x 1450 x 2400 mm; weight: 200 kg	No.	4	436.4083383293110	
155	O&M Panel	No.	1	462.2006059525070	
156	CLC panel	No.	4	436.1479882716590	

NOTE:

1. The derived item rates will remain firm throughout the contract period.

2. The quantity indicated in the BOQ/ Rate Schedule is tentative only and based on engineering and inputs received from manufacturing units as on NIT date which is liable for variation. If any item or equipment not covered in the specification but requires being erected/commissioned to complete the system, the same shall be carried out by the contractor.

Chapter - XII(Annexure)

ERECTION, TESTING, COMMISSIONING, ASSISTANCE IN PG TEST AND HANDING OVER OF ALL C&I EQUIPMENTS, STATION C&I AND ELECTRICAL EQUIPMENTS AS PER TENDER SPECIFICATION AT Unit#6 of 1X500 MW: UNCHAHAR TPP, STAGE IV DIST- RAEBARELLI- U.P

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

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

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

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

_____

_____

_____

Penalty imposed:-

1, Rate as per above chart_____

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

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

Signature

(Witnessed by Sub- Contractor representative)
Name_____

(Witnessed by PSNR Personnel)
Name_____

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