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

Sl. No	E-Tender Specification Number
1	**BHE/PW/PUR/CHT-C&I-R&M/3150**

R&M OF COMPLETE CONTROL & INSTRUMENTATION SYSTEM INCLUDING REGULATING CONTROLS, INTERLOCKS, OPERATOR INTERFACE UNITS AND REQUISITE TERMINATOR OF ONE UNIT (UNIT-5) OF MAHAGENCO CSTPS, CHANDRAPUR-500 MW

VOLUME – I

FOR

VOLUME I – TECHNICAL BID

THIS TENDER SPECIFICATION CONSISTS OF:

Notice Inviting Tender	
Volume-IA	**Technical Conditions of Contract**
Volume-IB	**Special conditions of Contract**
Volume-IC	**General conditions of Contract**
Volume-ID	**Forms & Procedures**
~~**Volume-IE**~~	~~**Technical Specifications**~~
Volume II	**Price Bid**

Bharat Heavy Electricals Limited

(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

CONTENTS		
Volume No	Description	Hosted in website bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled
NIL	Tender Specification Issue Details	(Part of **Vol-IA-3150**)
NIL	Notice Inviting Tender	(Part of **Vol-IA-3150**)
I-A	Technical Conditions of Contract	Vol-I-A-3150
I-A	ANNEXURE-A	Vol-I-A-3150
I-A	ANNEXURE-B	Vol-I-A-3150
I-A	ANNEXURE-C	Vol-I-A-3150
I-B	Special Conditions of Contract	Vol-I-BCD-3150
I-C	General Conditions of Contract	(Part of Vol-I-BCD-3150)
I-D	Forms & Procedures	(Part of Vol-I-BCD-3150)
~~IE~~	~~Technical Specifications~~	~~Vol I E-3150~~
II	Price Bid Specification as specified in E-Procurement Portal	Volume-II-3150

E-TENDER SPECIFICATION

Sl. No	E-Tender Specification Number
1	**BHE/PW/PUR/CHT-C&I-R&M/3150**

R&M OF COMPLETE CONTROL & INSTRUMENTATION SYSTEM INCLUDING REGULATING CONTROLS, INTERLOCKS, OPERATOR INTERFACE UNITS AND REQUISITE TERMINATOR OF ONE UNIT (UNIT-5) OF MAHAGENCO CSTPS, CHANDRAPUR-500 MW

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION: Refer Notice Inviting Tender

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

M/s. ……

…….

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

GM (Purchase)
Place: Nagpur
Date:

3150

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: **BHE/PW/PUR/CHT-C&I-R&M/3150** Date: 12-09-2025

NOTICE INVITING E-TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD/ UPLOAD THE TENDER/ OFFER FROM/ON BHEL E-PROCUREMENT PORTAL → **https://eprocurebhel.co.in**

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To,

Dear Sir/Madam,

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system (National competitive bidding (NCB) ~~or International Competitive Bidding (ICB~~ are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1.0 **Salient Features of NIT**

S No.	ISSUE	DESCRIPTION	
i	**E-TENDER NUMBER**	**BHE/PW/PUR/CHT-C&I-R&M/3150**	
ii	**Broad Scope of job**	R&M OF COMPLETE CONTROL & INSTRUMENTATION SYSTEM INCLUDING REGULATING CONTROLS, INTERLOCKS, OPERATOR INTERFACE UNITS AND REQUISITE TERMINATOR OF ONE UNIT (UNIT-5) OF MAHAGENCO CSTPS, CHANDRAPUR-500 MW	
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-IE~~	~~*Technical Specifications*~~	~~*Applicable*~~
F	Volume-II	*Price Bid as specified in E-Procurement Portal*	*Applicable*
iv	**Issue of Tender Documents**	**Tender documents will be available for downloading from BHEL website (www.bhel.com) or e-procurement portal (https://eprocurebhel.co.in) as per schedule below:** ***Start : 12-09-2025 , Time :17:00*** ***Closes : 22-09-2025 , Time : 13:00*** Brief information of the tenders shall also be available at central public procurement portal. (***https://eprocure.gov.in/epublish/app***)	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date: 22-09-2025, Time : 13:00 Hrs*** ▪ ***Place: on E-Tender Portal*** **https://eprocurebhel.co.in**	*Applicable*

S No.	ISSUE	DESCRIPTION	
vi	**OPENING OF TENDER (Techno-Commercial Bid)**	***Date: 22-09-2025, Time: 17.00 Hrs*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender. For e-Tender, Bidder may witness the opening of tender through e-Procurement portal only.*	*Applicable*
vii	**EMD AMOUNT**	***RS 2,00,000 (Indian Rupees Two Lakhs Only)*** ***Important Note: Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC.***	*Applicable*
viii	**COST OF TENDER**	*Free*	
ix	**LAST DATE FOR SEEKING CLARIFICATION**	One day before due date of offer submission. Along with soft version also, addressing to undersigned & to others as per contact address given below: 1) Name: Varun Vaidya Designation: Manager Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Mobile-9792334127 Email :vvaidya@bhel.in 2) Mr. V K Arya Designation: GM Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Email: vkarya@bhel.in Mob:	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		Not Applicable
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*1) Shri Bishwamitra Pandey, IRAS (Retd.)* *2) Shri Mukesh Mittal, IRS (Retd.)*	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 Corrigendum), Central Public Procurement portal (https://eprocure.gov.in/epublish/app	

S No.	ISSUE	DESCRIPTION	
		) & on e-tender portal https://eprocurebhel.co.in **and not in the newspapers**. Bidders to keep themselves updated with all such information.	

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed digitally using Class III DSC & uploaded in E-Procurement Portal, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Not Used

4.0 Unless specifically stated otherwise, bidder shall deposit EMD as per clause 1.9 of General Conditions of Contract.

For Electronic Fund Transfer the details are as below-:

NAME OF THE BENEFICIARY	BHARAT HEAVY ELECTRICALS LTD
ADDRESS OF THE COMPANY	5th Floor, SHREE MOHINI COMPLEX 345, KINGSWAY,NAGPUR
NAME OF BANK	STATE BANK OF INDIA
NAME OF BANK BRANCH AND BRANCH CODE	SBI,NAGPUR MAIN BRANCH ,CODE-00432
CITY	NAGPUR
ACCOUNT NUMBER	40227423158
ACCOUNT TYPE	MC-C C Clean (C&I)
IFSC CODE OF THE BENEFICIARY BANK BRANCH	SBIN0000432
MICR CODE OF THE BANK BRANCH	440002002

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

5.0 **Procedure for Submission of Tenders**:

This is an E-tender floated online through our E-Procurement Site **(https://eprocurebhel.co.in)**. The bidder should respond by submitting their offer online only in our e-Procurement platform at **(https://eprocurebhel.co.in).** Offers are invited in two-parts only.

Documents Comprising the e-Tender

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

a. Technical Tender (UN priced Tender)

All Technical details (e.g. 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.~~ Earnest Money Deposit (EMD) furnished in accordance with NIT Clause 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.

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.
- 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.
- 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.

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).

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-:
NIC PORTAL (https://eprocurebhel.co.in)

For E-PROCUREMENT ASSISTANCE & TRAINING, NIC PORTAL HELPDESK CONTACTS AS PER FOLLOWING:

For any technical related queries, please call at 24 x 7 Help Desk Number
0120-4001 002
0120-4200 462
0120-4001 005
0120-6277 787
1. Peter Raj, NIC, Ph: 9942069052
Email Support: support-eproc@nic.in
Other details/update yourself from : https://eprocurebhel.co.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.

The contact details of the DSC certifying authority:-
please refer http://www.mca.gov.in/ →MCA SERVICES → DSC SERVICES

Vendors are requested to go through seller manual available on https://eprocurebhel.co.in.

Procedure for Submission of Tenders (To be used in case of Paper bid only): The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

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

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped) (To be used in case of Paper bid only):**

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

iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc. pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled in annexures, formats etc. as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
	Earnest Money Deposit (EMD) in the form as indicated in this Tender	

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

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as:	

	~~TECHNO-COMMERCIAL BID, PRICE BID & EMD~~ ~~TENDER NO:~~ ~~NAME OF WORK:~~ ~~PROJECT:~~ ~~DUE DATE OF SUBMISSION:~~ ~~**CONTAINING THE FOLLOWING:**~~	
~~i~~	~~o Envelopes I~~ ~~o Envelopes II~~ ~~o Envelopes III~~	

- **SPECIAL NOTE: All documents/ annexures to be submitted should be uploaded in respective places in the E-Tender portal as per the list mentioned given in this NIT. BHEL shall not be responsible for any in-complete documents.**

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

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

9.0 **PERFORMANCE OF BIDDERS**:

- 'Monthly Performance' of the bidder for all the package covered under the tendered scope-shall be captured for the packages Under execution'. (refer Table-1)
- The monthly performance rating, shall be calculated as per Online Systems i.e. Contractor Performance Evaluation System (CPES) and Safety Performance Evaluation System (HSEPES). The scores assigned in HSEPES shall be scaled down to 10 and assigned in CPES against the category "HSE" (mentioned in Form F-15).
- **Explanatory note:**
  - Identified Packages (Unit wise) **Table-1**

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

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

(a) Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages
(b) Up to Steam Blowing in case of Boiler/ESP/Piping Packages
(c) Up to Synchronization in all Balance Packages

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

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

- Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site/ GM Project latest by 27th of Evaluation Month or 5 days after approval of score, whichever is later. However, acceptance/rejection of 'Review Request' solely depends on the discretion of GM Site/GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.

- Project on Hold due to reasons not attributable to bidder -
  - **Short hold:** Evaluation shall not be applicable for this period.
  - **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation shall not be considered for this period.

Performance evaluation as specified above in this clause is applicable to Prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work

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

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

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

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

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

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

"Integrity Pact (IP)"

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

Sl. No.	IEM	Email
1.	*Shri Bishwamitra Pandey, IRAS (Retd.)*	Iem2@bhel.in
2.	*Shri Mukesh Mittal, IRS (Retd.)*	Iem3@bhel.in

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

(c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s):

Name:		Varun Vaidya/ Manager (Purchase)
Dept:	Purchase Department	
Address:	Floor No. 5 & 6, Shreemohini Complex, 345 Kingsway, Nagpur-440001	
Email:		vvaidya@bhel.in
Phone:		9792334127

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

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

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

19.0 **Reverse Auction:** "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com on "**supplier registration page".**) for this tender. RA shall be conducted among all the techno-commercially qualified bidders.

Price Bids of all the techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.

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

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

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

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

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement for the said contract with a validity period of six months initially. In case bidder becomes L1, Consortium Agreement valid till contractual completion period shall be submitted to BHEL before signing the contract. Consortium Agreement shall be kept valid till scope of work awarded to consortium partner(s) as per contract is completed.

23.2 'Standalone' 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) including Prime Bidder shall be NOT more than 3 (three).

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

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

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

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

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

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

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

23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL and BHEL shall take necessary action as per extant guidelines. 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 Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL.

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 one work with a consortium partner under direct order of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.

23.14 The consortium 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. In case there are two consortium partners, then each partner shall submit SD equivalent to 0.5% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. However, Prime Bidder has also option for submission of SD on behalf of consortium partner (s).

SD submitted by Consortium Partner(s) may be released in case corresponding scope of work of the respective Consortium partner(s) has been completed upto the extent of 80% based on certification by Construction Manager and concurrence by the prime bidder.

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

24.0 The bidder shall submit/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.

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

26.0 The consultant / firm (and any of its affiliates) shall not be eligible to participate in tender(s) for the related works or services for the same project, if they were engaged for the consultancy services.

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

28.0 The offers of the bidders who are on the banned/ hold list and 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.

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

28.1.1 **Commitment by BHEL:**

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

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

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

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

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

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

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~~	~~Women owned~~	~~Others (excluding SC/ ST & Women Owned)~~
~~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.~~

~~*a)* MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration Certificate or EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM-II Certificate along with attested copy of a CA certificate (**format enclosed as Annexure – 3**) where deemed validity of EM-II certificate of five years has expired applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. 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 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. Documents submitted by the bidder may be verified by BHEL for rendering the applicable benefits.~~

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 **PREFERENCE TO MAKE IN INDIA:**

For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/Non-Local Supplier and purchase preferences to Class I local supplier, is as defined I Public Procurement (Preference to Make in India), Order 2017 dated 19-07-2024 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.

31.1 ***Compliance to Restrictions under Rule 144 (xi) of GFR 2017***

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. The Competent Authority for the purpose of this Clause shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Clause means: -

a. *An entity incorporated established or registered in such a country; or*
b. *A subsidiary of an entity incorporated established or registered in such a country; or*
c. *An entity substantially controlled through entities incorporated, established or registered in such a country; or*
d. *An entity whose beneficial owner is situated in such a country; or*
e. *An Indian (or other) agent of such an entity; or*
f. *A natural person who is a citizen of such a country; or*
g. *A consortium or joint venture where any member of the consortium or joint venture falls under any of the above*

IV. *The beneficial owner for the purpose of (III) above will be as under:*

1. *In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.*

   Explanation

   a. *"Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company.*
   b. *"Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.*

2. *In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.*
3. *In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person has ownership of or entitlement to more than fifteen percent of the property or capital or profits of the such association or body of individuals.*
4. *Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;*
5. *In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.*

V. *An Agent is a person employed to do any act for another, or to represent another in dealings with third person.*

VI. *The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.*

Note:

(i) The bidder shall provide undertaking for their compliance to this Clause, in the Format provided in Annexure-11.

(ii) Registration of the bidder with Competent Authority should be valid at the time of submission as well as acceptance of the bids.

32.0 Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.
All overwriting/cutting, etc., will be numbered by bid opening officials and announced during bid opening.

33.0 In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

34.0 The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

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

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

It may please be noted that guidelines/ circulars/ amendments/ govt. directives issued from time to time shall also be applicable.

For BHARAT HEAVY ELECTRICALS LTD

(General Manager - Purchase)

Enclosure:

01. Annexure-1: Pre Qualifying Requirements.
02. Annexure-2: Check List.
~~03. Annexure-3: Certificate by Chartered Accountant~~

04. Annexure-4: Reverse Auction Process Compliance Form
05. Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process
06. Annexure-6: RA Price Confirmation and Breakup
07. Annexure-7: Integrity Pact
08. Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR
09. Annexure-9: Declaration reg. Related Firms & their areas of Activities
010. Annexure-10: DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)
011. Annexure 11: DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017
012. Annexure 12: Important information
013. Annexure 13: Bid Security Declaration

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	R&M OF COMPLETE CONTROL & INSTRUMENTATION SYSTEM INCLUDING REGULATING CONTROLS, INTERLOCKS, OPERATOR INTERFACE UNITS AND REQUISITE TERMINATOR OF ONE UNIT (UNIT-5) OF MAHAGENCO CSTPS, CHANDRAPUR-500 MW
TENDER NO	BHE/PW/PUR/CHT-C&I-R&M/3150

SL NO	PRE QUALIFICATION CRITERIA	~~Bidders claim in respect of fulfilling the PQR Criteria~~ Applicability	
A	Submission of Integrity Pact duly signed (if applicable) (Note: ~~To be submitted by Prime Bidder & Consortium /Technical Tie up partner jointly in case Consortium bidding is permitted~~, otherwise by the sole bidder)	**NOT APPLICABLE**	
B	**B Technical PQR** Bidder shall essentially meet all the Qualifying Requirements **i.e. B.1 & (B.2 or B.3)** as under, in the last seven years as on latest date of bid submission: **B.1** Bidder should have executed similar work for any one of the following in the last seven years from latest date of bid submission: **B.1.1** One (1) work (as defined below) of value not less than **Rs 92.80 Lakhs.** **OR** **B.1.2** Two (2) works (as defined below) each of value not less than **Rs 58.00 lakhs**. **OR** **B.1.3** Three (3) works (as defined below) each of value not less than **Rs 46.40 lakhs**. **AND** **B.2** Executed Erection and Commissioning of "C&I works for BTG/GT" or "C&I works consisting of DCS/DDC/Station C&I" in at least one unit of ≥ 190MW. **OR** **B.3** Executed Renovation and Modernization (R&M) works of "C&I works for BTG/GT" or "C&I works consisting of DCS/DDC/Station C&I" in at least one unit of ≥ 190MW. **Note:** • Bidder should satisfy all both **B.1 & (B.2 or B.3)** of the PQR. • AMC & Overhauling work shall not be considered. **Similar Works Definition:** C&I or Electrical and C&I works shall be considered as similar works.	**APPLICABLE**	
C.1	Bidders must have achieved an average annual financial turnover (audited) of **Rs. 34.80 Lakhs or more** over last three Financial Years (FY) i.e **2021-22 , 2022-23 & 2023-2024'**	**APPLICABLE**	
C.2	**NETWORTH** (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive.	**APPLICABLE**	

C.3	**PROFIT** Bidder must have earned profit in any one of the five Financial Years as applicable in the last five Financial Years (i.e. 2019-2020, 2020-2021, 2021-2022, 2022-2023 & 2023-2024). Bidders to submit audited balance sheets and profit & loss statements for the years as supporting documents.	**APPLICABLE**	
C-4	Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking **(Annexure-8)** to this effect.	**APPLICABLE**	
D	Assessment of Capacity of Bidder: The "Assessment of Capacity of Bidders" for this Tender shall be carried out by considering the identified packages i.e**. "C&I /ELECTRICAL"**	**NOT APPLICABLE**	
E	**Approval of Customer (if applicable):** **Note:** Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval	**APPLICABLE**	
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		**BY BHEL**
G	Consortium tie-ups	**NOT APPLICABLE**	

Explanatory Notes for the PQR (unless otherwise specified in the PQR):

Explanatory Notes for PQR B.1 (Technical)

- For the criteria (B.1), actual executed value shall be considered.
- Value of work is to be updated with indices for "All India Avg. Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per following formula-

$$P = R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0}$$

Where
P = Updated value of work
R = Value of executed work
X_N = All India Avg. Consumer Price index for industrial workers for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).
X_0 = All India Avg. Consumer Price index for industrial workers for last month of work execution
Y_N = Monthly Whole Sale Price Index for All Commodities for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).
Y_0 = Monthly Whole Sale Price Index for All Commodities for last month of work execution

- The evaluation currency for this tender shall be INR.

Explanatory Notes for Technical Criteria (B2):

1. VOID

2. Unless otherwise specified, for the purpose of "B2 Technical Criteria", the word 'EXECUTED' means achievement of milestones as defined below -
    a. "ACHIEVEMENT OF PHYSICAL QUANTITIES" as per PQRs.
    b. "READINESS FOR COAL FILLING" of at least one Bunker, in respect of Mill Bunker Structure.
    c. "CHARGING" in respect of Power Transformers/ Bus Ducts/ "HT/LT Switchgears" / "HT/LT Cabling".
    d. For C&I works: "SYNCHRONISATION" in case of power project / "WORK EXECUTION of the value as defined in PQR" in case of industry.
    e. "BOILER LIGHT UP" in respect of Boiler / CFBC / ESP.
    f. "CHARGING OF ATLEAST ONE PASS" in respect of ESP(R&M)
    g. "GAS IN" in respect of HRSG.
    h. "STEAM BLOWING" in respect of Power Cycle Piping.
    i. "HYDRAULIC TEST"/ ANY OTHER EQUIVALENT TEST LIKE "100% RT/UT OF WELDED JOINTS" of the system in respect of Pressure parts/ LP Piping/CW Piping.
    j. "FULL LOAD OPERATION OF THE UNIT" in respect of Insulation work.
    k. "SYNCHRONISATION" in respect of STG / GTG.
    l. "SPINNING" in respect of HTG.
    m. "GAS IN" in respect of FGD
3. Boiler means HRSG or WHRB or any other types of Steam Generator.
4. Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass.
5. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating of the same in terms of MW shall be considered for evaluation.

Explanatory Notes for PQR -C (Financial):

C-1:

i. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above.
ii. Evaluation of Turnover criteria shall be calculated from the Audited Balance Sheet and Profit & Loss Account for the three Financial Years (FY).
iii. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years.
iv. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant.

C-2: Net Worth (Only in case of companies) of the bidder should be positive.

Note: Net worth shall be calculated based on the latest Audited Accounts as furnished for 'C-1' above.

Net worth = Paid up share capital + Reserves

C-3: Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'C-1' above.

Note: PROFIT shall be PBT earned during any one year of last three financial years as in 'C-1' above.

C-4: Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking to this effect.

Common Explanatory Notes:

1. For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria B1 above, bidder may utilize the experience of its Parent/ Subsidiary Company along with its own experience, subject to following:
    a. The parent company shall have a controlling stake of ≥50% in the subsidiary company (as per Format-1).

b. The Parent Company/ Subsidiary Company of which experience is being utilized for bidding shall submit Security Deposit(SD) equivalent to 1% of the total contract value
c. The parent/ subsidiary company and bidder shall provide an undertaking that they are jointly or severally responsible for successful performance of the contract (as per Format-2).
d. In case Bidder is submitting bid as a Consortium Partner, option of utilizing experience of parent/subsidiary Company can be availed by Prime Bidder only.
e. Parent Company/ Subsidiary Company of which experience is being used for bidding, cannot participate as a 'Standalone Bidder' or as a 'Consortium bidder'.

2. Completion date for achievement of the technical criteria specified in the 'B' above should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work. Completion date shall be reckoned from the " Financial Year quarter of bid submission". (for e.g. -Work completed on 01.01.2014 shall be considered even if latest date of bid submission is 20.03.2021).

3. "Executed" means the bidder should have achieved the technical criteria specified in the Common QR even if the Contract has not been completed or closed.

4. In case the Experience/PO/WO certificate enclosed by bidders do not have separate break up of prices for the E&C portion for Electrical and C&I works (i.e. the certificates enclosed are for composite order for supply and erection of Electrical and C&I and other works if any), then value of Erection & Commissioning for the Electrical and C&I portion shall be considered as 15% of the price for supply & erection of Electrical and C&I.

5. Following shall be complied with in case of consortium:
   a. The Prime Bidder and Consortium Partner(s) are required to enter in to a consortium agreement and certify to BHEL regarding existence and validity of their consortium agreement in line with validity period mentioned in NIT.
   b. Prime Bidder and Consortium partners shall be approved by Customer for being considered for the tender (applicable if customer approval is required).
   c. Number of partners including prime Bidder shall be NOT more than 3 (three).
   d. Prime Bidder alone shall necessarily comply with "B1Technical Criteria" except for mechanical package where B1 criteria is not applicable.
   e. Prime Bidder and Consortium Partner shall together comply with the 'Pre-Qualification Requirements' specified for the respective category of technical requirement as per "B2 technical criteria".
   f. Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified.
   g. All other conditions shall be read in conjunction with clause no 23.0 of NIT.
   h. Prime Bidder shall be the Bidder who has a major share of work.
   i. Prime Bidder shall be responsible for the overall execution of the Contract.
   j. Performance shall be evaluated for Prime Bidder and the Consortium partner for their respective scope of work.
   k. In case the Consortium partner backs out, another consortium partner meeting the QRs, has to be engaged by Prime Bidder and if not, the respective work will be withdrawn and executed on risk and cost basis of the prime bidder.
   l. In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL
   m. After successful execution of one work with a consortium partner under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.

	n. The Consortium 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.

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.

Credentials submitted by the bidder against "PRE QUALIFYING CRITERIAS" shall be verified for its authenticity. In case, any credential (s) is/are found unauthentic, offer of the bidder is liable to the rejection. BHEL reserves the right to initiate any further action as per extant guidelines for Suspension of Business Dealings.

Format-1

Certificate for relationship between Parent Company / Subsidiary Company and the bidder

To,
.....

.....

Dear Sir,

Sub: Bid for NIT No .....dated..... for "....." (name of the tender).

We hereby certify that M/s..... is Parent Company/ Subsidiary Company of M/s.....(the bidder) and details of equity holding of the Parent Company in Subsidiary Company as on .....(not earlier than seven days prior to the Bid Submission Date) are given as below:

Name of Parent Company	Name of Subsidiary Company	Percentage of Equity Holding of Parent Company in Subsidiary Company

(Insert Name and Signature of Statutory Auditor or practicing Company Secretary of the Bidder)

Format-2

Undertaking from the Parent Company/ Subsidiary Company of the bidder

(On the Letter Head of Parent Company/ Subsidiary Company, as applicable)

From,
Name:
Full Address:

Telephone No.:
E-mail address:
Fax/No.:

To,
.....
.....

Dear Sir,

We refer to the NIT No ..... dated..... for "....." (name of the Tender).

"We have carefully read and examined in detail the NIT/Tender Terms and Conditions, including in particular, Clause .... of the NIT/Tender, regarding submission of an Undertaking, as per the prescribed Format 1 of the NIT/ Tender.

We confirm that M/s.....(the Bidder) has been authorized by us to use our Technical capability for meeting the Technical Criteria as specified in Clause.....of the PQR of the NIT/Tender referred above.

We agree to submit the Security Deposit equivalent to 1% of the total contract value in addition to Security Deposit to be submitted by Bidder as per Clause.....of the NIT/Tender for fulfillment of all obligations in terms of provisions of the contract, in the event of .....(the Bidder) being selected as the Successful Bidder.

We confirm that we along with M/s.....(the bidder), are jointly or severally responsible for successful performance of the contract.
We confirm that our company shall not participate in the above tender as a 'Standalone Bidder' or as a 'Consortium bidder' and also shall not authorize any other bidder to use our Technical capability for the above tender.

All the terms used herein but not defined, shall have the meaning as ascribed to the said terms under the referred NIT/Tender.

Signature of Managing Director/Authorized signatory of Parent/ Subsidiary Company

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 GST & PAN Card	Applicable/~~Not Applicable~~	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc. are read understood and signed	Applicable/~~Not Applicable~~	YES/NO
10	Integrity Pact	~~Applicable~~/Not Applicable	YES/NO
11	OFFER FORWARDING LETTER / TENDER SUBMISSION LETTER	Applicable/~~Not Applicable~~	YES/NO
12	Declaration by Authorized Signatory	Applicable/~~Not Applicable~~	YES/NO
13	No Deviation Certificate	Applicable/~~Not Applicable~~	YES/NO
14	Declaration confirming knowledge about Site Conditions	Applicable/~~Not Applicable~~	YES/NO
15	Declaration for relation in BHEL	Applicable/~~Not Applicable~~	YES/NO
16	Non-Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO

17	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
18	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO
19	Tie Ups/Consortium Agreement are submitted as per format	~~Applicable~~/Not Applicable	YES/ NO
20	Power of Attorney for Submission of Tender/Signing Contract Agreement ~~Power of Attorney of Consortium Partner~~.	Applicable/~~Not Applicable~~	YES/NO
21	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO
22	Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process	Applicable/~~Not Applicable~~	YES/NO
23	Annexure-6: RA Price Confirmation and Breakup	Applicable/~~Not Applicable~~	YES/NO
24	Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR	Applicable/~~Not Applicable~~	YES/NO
25	Annexure-9: Declaration reg. Related Firms & their areas of Activities (x) Other Tender documents as per this NIT.	Applicable/~~Not Applicable~~	YES/NO
26	Annexure-10 Declaration regarding minimum local content	Applicable/~~Not Applicable~~	YES/NO
27	Annexure-11: Declaration regarding compliance to restrictions under rule 144 (xi) of GFR 2017	Applicable/~~Not Applicable~~	YES/NO
28	Annexure-13 Bid Security Declaration	Not Applicable	YES/NO

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

DATE :

AUTHORISED SIGNATORY

(With Name, Designation and Company seal)

~~ANNEXURE-3~~

~~Certificate by Chartered Accountant on letter head~~

~~(applicable upto 31st March'2021 in line with MSME notification no. S.O. 2119 (E), dated 26th June'2020)~~

~~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)/ Udyam Registration Certificate No. ..... dtd: ....., Category: ..... (Micro/Small/Medium)). (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~~

3. ~~**For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)~~

4. ~~**For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)~~

~~(Strike off whichever is not applicable)~~

~~The above investment of Rs..... ..... Lacs is within permissible limit of Rs..... Lacs for ..... Micro / Small/ Medium *(Strike off which is not applicable)* Category under MSMED Act 2006.~~

~~Or~~

~~The enterprise has been graduated upward from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise shall maintain its prevailing status till expiry of one year from the close of year of registration, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.~~

~~Or~~

~~The enterprise has been reverse-graduated from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise will continue in its present category till the closure of the financial year and it will be given the benefit of the changed status only with effect from 1st April of the financial year following the year in which such change took place, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.~~

~~Date:~~
~~(Signature)~~
~~Name:~~
~~Membership Number:~~
~~Seal of the Chartered Accountant~~

ANNEXURE-4

Reverse Auction Process Compliance Form

(The bidders are required to print this on their company's letterhead and sign, stamp before RA)

To

- M/s. {*Service provider*
- *Postal address}*

Sub: Agreement to the Process related Terms and Conditions

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the RFQ document for {Items} against BHEL enquiry/ RFQ no.{ BHE/PW/PUR/CHT-C&I-R&M/3150} dt. {…….}
This letter is to confirm that:

1) The undersigned is authorized official/ representative of the company to participate in RA and to sign the related documents.
2) We have studied the Reverse Auction guidelines (as available on www.bhel.com), and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that, in case we become L1 bidder, we will FAX/ email the price confirmation & break up of our quoted price as per *Annexure - 6* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post/ courier both to M/s. BHEL and M/s. {*Service provider.}*

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal
Name:
Company / Organization:
Designation within Company / Organization:
Address of Company / Organization:

Sign this document and FAX/ email it to M/s *{Service provider}* at *{……..}* prior to start of the Event.

ANNEXURE – 5

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

1	NAME OF THE BIDDER	
2	NAME & DESIGNATION OF OFFICIAL	
3	POSTAL ADDRESS (COMPLETE)	
4	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE – 6

Reverse Auction price confirmation and breakup
(To be submitted by L1 bidder after completion of Reverse Auction)

To
- M/s. *Service provider*
- *Postal address*

CC: M/s BHEL *POWER SECTOR WESTERN REGION, Nagpur*

Sub: **Final price quoted during Reverse Auction ~~and price breakup~~**

Dear Sir,

We confirm that we have quoted.

Rs. _____(in value) &

_____(in words)

for item(s) covered under tender enquiry No. BHE/PW/PUR/CHT-C&I-R&M/3150

~~Total price of the items covered under above cited enquiries is inclusive of {*Packing & forwarding, GST, E.D., C.S.T., freight and insurance charges up to {……} District,{……} State and Type Test Charges etc., (exclusive of service tax), other as per NIT*}~~

as our final landed prices as quoted during the Reverse Auction conducted today {*date* _____} which will be valid for a period ~~of {___ **in nos. & in words** ___} days~~. as mentioned in the subject tender.

Yours sincerely,
For _____
Name:
Company:
Date:
Seal:

ANNEXURE – 7

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for **UPGRADATION/R&M OF UNIFIED DISTRIBUTED CONTROL SYSTEM (DCS) OF ONE UNIT (UNIT#4)OF MAHAGENCO, KHAPERKHEDA TPS 210 MW**

The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.

6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.

8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.

8.9 IEM should examine the process integrity; they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.

8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.12 The word `Monitor' would include both singular and plural.

Section 9 - Pact Duration

9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.

9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

10.4 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract, in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

For & On behalf of the Principal — For & On behalf of the Bidder/ Contractor

(Office Seal) — (Office Seal)

Place

Date

Witness: — Witness:

(Name & Address) — (Name & Address)

ANNEXURE – 8

UNDERTAKING

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

GM-PURCHASE, BHEL-PSWR,
Floor No. 5&6, Shri Mohini Complex
345, KINGSWAY, NAGPUR-440001

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: NIT/Tender Specification No: BHE/PW/PUR/CHT-C&I-R&M/3150

I/We, _____ declare

that, I/We am/are not under insolvency resolution process or liquidation or Bankruptcy Code Proceedings (IBC) as on date,

by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

Sign. of the AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Place:
Date:

ANNEXURE – 9

DECLARATION

Date:_____

To

GM-PURCHASE, BHEL-PSWR,
Floor No. 5&6, Shri Mohini Complex
345, KINGSWAY, NAGPUR-440001

Sub: **Details of related firms and their area of activities**

Dear Sir/ Madam,

Please find below details of firms owned by our family members that are doing business/ registered for same item with BHEL,_____ (NA, if not applicable).

1	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
2	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
……		

Note: I certify that the above information is true and I agree for penal action from BHEL in case any of the above information furnished is found to be false.

Regards,
(_____)

From: M/s _____
Supplier Code: _____
Address: _____
_____
_____

ANNEXURE – 10

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,

GM-PURCHASE, BHEL-PSWR,
Floor No. 5&6, Shri Mohini Complex
345, KINGSWAY, NAGPUR-440001

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

Ref : 1) NIT/Tender Specification No: BHE/PW/PUR/CHT-C&I-R&M/3150,
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by…… *(specify the name of the organization here)* has a local content of _____ % and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier' **** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

1. _____ 2. _____
3. _____ 4. _____

…

Thanking you,
Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

****** - *Strike out whichever is not applicable.*

Note:

1. Bidders to note that above format Duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.)

ANNEXURE – 11

DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017

(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,

GM-PURCHASE, BHEL-PSWR,
Floor No. 5&6, Shri Mohini Complex
345, KINGSWAY, NAGPUR-440001

Dear Sir,

Sub: Declaration regarding compliance to Restrictions under Rule 144 (xi) of GFR 2017

Ref : 1) NIT/Tender Specification No: BHE/PW/PUR/CHT-C&I-R&M/3150,
2) All other pertinent issues till date

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries. I certify that _____ *(specify the name of the organization here)*,

(a) is not from such a country / ☐
(b) has been registered with the Competent Authority *(attach valid registration by the Competent Authority, i.e., the Registration Committee constituted by the Dept. for Promotion of Industry and Internal Trade (DPIIT))*; ☐

and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. *(attach relevant valid registration, if applicable)*

I hereby certify that we fulfil all requirements in this regard and is eligible to be considered.

Thanking you,
Yours faithfully,

(Signature, Date & Seal of
Authorized Signatory of the Bidder)

Note: Bidders to note that in case above certification given by a bidder, whose bid is accepted, is found to be false, then this would be a ground for immediate termination and for taking further action in accordance with law and as per BHEL guidelines.

ANNEXURE – 12

IMPORTANT INFORMATION

E -Tender for this work is invited by BHEL PSWR NAGPUR and offer shall be submitted through BHEL e-procurement portal only. All correspondences regarding this tender shall be through E-procurement portal.

Postal Address:
GM /Purchase BHEL PSWR,
SRIMOHINI COMPLEX, Floor No. 5 & 6, 345 KINGSWAY, NAGPUR 440001, INDIA

Following are the concerned BHEL officials to whom bidders can contact in case of any difficulty:
Manager Purchase, Email: vvaidya@bhel.in
Sr Manager/Purchase, email: biraj@bhel.in,
GM Purchase, Email: vkarya@bhel.in. Ph: +91 – 712 – 2858 – 633

1. **Refer the abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' which is available at www.bhel.com on "supplier registration page" at the following link:** https://www.bhel.com/sites/default/files/suspension_guidelines_abridged.pdf

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

3. **Following clause shall form part of the HSE documents issued under Chapter IX of Volume IB 'Special Conditions of Contract'**

   "In case of any financial deduction made by Customer for lapses of safety other than what is provided elsewhere in the contract, the same shall be charged on back-to-back basis on the defaulting contractor without prejudice to any other right spelt anywhere in the tender /contract"

4. **BHEL Fraud Prevention Policy: "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."**

5. **"Pradhan Mantri Kaushal Vikas Yojna:** The contractor shall, at all stages of work deploy skilled/semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/Industrial Training Institute/ National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in–Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs.100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding".

6. **Conflict of Interest among Bidders/ Agents:**
   "A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. ***The bidder found to have a***

conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

a) they have controlling partner (s) in common; **or**

b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; **or**

c) they have the same legal representative/agent for purposes of this bid; **or**

d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder; **or**

e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid; **or**

f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/dealer. There can be only one bid from the following:

1. The principal manufacturer directly or through one Indian agent on his behalf; **and**

2. Indian/foreign agent on behalf of only one principal;

or

g) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid; **or**

h) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business."

Treatment of cases regarding conflict of interest:

The bidder notes that a conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:

i) If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly;

ii) The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating;

iii) Procurement of goods directly from the manufacturers/ suppliers shall be preferred. However, if the OEM/ Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from

the agent shall be ignored. However, this shall not debar more than one Authorised distributor (with/ or without the OEM) from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.

iv) A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.

The Bidder declares that they have read and understood the above aspects, and the bidder confirms that such conflict of interest does not exist and undertakes that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder{s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitab1e action shall be taken by BHEL as per extant policies/ guidelines

7. Acceptance of Bank Guarantee (BG)

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

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

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below:

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

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

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

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

8. Broad Terms & Conditions of Reverse Auction:

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

*"BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) (**https://www.bhel.com/guidelines-reverse-auction-2024**) for this tender. RA shall be conducted among the techno-commercially qualified bidders.*

Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

Note:-

1. Reverse Auction will be conducted if two or more bidders are techno-commercially qualified .
2. Wherever RA is opted in a tender, the techno-commercially qualified H1 will not be allowed to participate in RA. In case more than one H1 bidder quote the same rate, the Price Offer received last, as per the time log of the Portal, shall be removed first, on the principle of last in, first out by the system.
3. However, H1 will be allowed to participate in RA in the following cases:

   a) If number of techno-commercially qualified bidders are only 2 or 3.

   b) In case Primary product of only one OEM is left in contention for participation in RA on elimination of H1.

   c) For cases where there are more than 3 techno-commercially qualified bidders, if lowest bidder in sealed price bid is non-MSE and H-1 is eligible MSE and H-1 price is coming within price band of 15% of Non-MSE lowest bidder.

   d) For cases where there are more than 3 techno-commercially qualified bidders, if lowest bidder in sealed price bid is non-MII and H-1 is eligible MII and H-1 price is coming within price band of 20% of Non-MII lowest bidder.

9. Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC
10. **Clause no. 2.24 of GCC PERFORMANCE GUARANTEE FOR WORKMANSHIP:** Performance Guarantee of Workmanship/negligence/omission for the work done / Defect liability period shall be as per 2.24 of GCC with the amendment in Cl 2.24.1 shall be 12 months.
11. Overrun Compensation (Clause no. 2.12 of GCC) shall not be applicable
12. Price Variation Compensation (Clause no 2.17 of GCC) shall not be applicable
13. LIQUIDATED DAMAGES/PENALTY: 2.7.9 of GCC with the amended of Liquidated Damage/Penalty at the rate of 2.0% of the contract value, per day of delay or part thereof subject to a maximum of 10% of the contract value.
14. Interest bearing recoverable advances- Cl no. 2.13 of GCC, is not applicable

15. Bonus clause is not envisaged in this tender.

16. Limitation of Liability in Clause 2.22 of General Conditions of contract for services/works has been amended as below:

    "Notwithstanding anything to the contrary in this Contract or LOA or Work Order or any other mutually agreed document between the parties, the maximum liability, for damages, of the contractor, its servants or agents, shall under no circumstances exceed an amount equal to the Price of the Contract or the Work Order. Neither party shall be liable to the other for any indirect or consequential loss or damage, including but not limited to loss of use, loss of profits, or loss of contracts, or special, punitive, exemplary losses whatsoever, arising out of or in connection with this contract. This shall not be applicable on the recoveries made by Customer from BHEL on account of Contractor, any other type of recoveries for workmanship, material, T&P etc. due from the contractor."

    This shall be the part of General Conditions of Contract for this tender

ANNEXURE-13

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

GM/Purchase
BHEL PSWR
Floor No. 5 & 6, Shree Mohini Complex,
345-Kingsway, Nagpur-440001

Dear Sir/Madam,

Sub: Bid Security Declaration

E-Tender Spec No: BHE/PW/PUR/CHT-C&I-R&M/3150

JOB Description :

R&M OF COMPLETE CONTROL & INSTRUMENTATION SYSTEM INCLUDING REGULATING CONTROLS, INTERLOCKS, OPERATOR INTERFACE UNITS AND REQUISITE TERMINATOR OF ONE UNIT (UNIT-5) OF MAHAGENCO CSTPS, CHANDRAPUR-500 MW

1. I/We Mr/ Ms…… authorised person to sign the bid documents for tender pertaining to the captioned scope do hereby declare that I/We have gone through the entire tender documents including terms and condition mentioned in the tender documents and undertake to comply with them.

2. I/We further declare that we will not withdraw our bid or modify our offer during the period of validity of the bid after the deadline for submission of such documents.

3. If I/we withdraw or modify the bids during the period of validity, or if I/We are awarded the contract and fail to sign the contract, if applicable or to submit security deposit as defined in the tender document/LOA, we will be suspended for the period of time as specified in the tender document from being eligible to submit bids/proposals to BHEL.

Signature of the Authorised Signatory
(With Name, Designation and Company seal)

Place:
Date:

3150

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – I: Project Information

Sl No	DESCRIPTION	Chapter
Volume-IA	**Part-I: Contract specific details**	
1	Project Information	Chapter-I
2	Scope of Works	Chapter-II
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V
6	Time Schedule	Chapter-VI
7	Terms of Payment	Chapter-VII
8	Taxes and other Duties	Chapter-VIII
9	Specific Inclusion	Chapter-IX
10	Annexures& Technical details & BOQ	Chapter-X
11	Weightages/ factor	Chapter-XI
12	Schedule of Prices	Chapter-XII

1.0	**Project Information**			
1.1	1	OWNER	:	Maharashtra State Power Generation Company Ltd.
	2	PROJECT	:	**R&M OF COMPLETE CONTROL & INSTRUMENTATIONSYSTEM INCLUDING REGULATING CONTROLS, INTERLOCKS, OPERATOR INTERFACE UNITS AND REQUISITE TERMINATOR OF UNIT#5**
	3	PROJECT RATING	:	500 MW
	4	LOCATION	:	Chandrapur, Distt – Chandrapur, Maharashtra
	5	NEAREST RAILWAY STATION	:	Chandrapur Railway Station on Delhi - Chennai rail route- 6 Km from project site
	7	NEAREST AIRPORT	:	Nagpur - 150 Kms
	8	MAIN ROAD HIGHWAYS	:	**State Highway**- SH 264 connecting Chandrapur with Jam, Rajura & Mul **National Highway**– NH-7 connecting Varanasi to Madurai passing through Jabalpur, Seoni, Nagpur, Buti Bori, Jam, Adilabad and Hyderabad. Jam is at a

The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder. The information given here in under is for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site data/ information as may be necessary shall have to be obtained/ collected by the Bidder.

Brief Scope of Work

Dismantling, Erection & Commissioning of Unified Distributed Digital Control Monitoring & Information System (DDCMIS) for Renovation & Modernization of complete Control & Instrumentation system, including regulating controls, interlocks, operator interface units and requisite terminations.

Complete dismantling, erection and commissioning of the system are in Bidder's scope.

(A) Being R&M work, erection consists of two major parts:

1) Proper identification and dismantling of existing system wise panels, control desks, cables, marshalling etc.

2) Erection/ installation of new system wise panels, control desks, marshalling panels with proper glanding and termination of old field cables, laying and termination of new cables.

(1) Proper identification and dismantling:

(Dismantling of system wise panels, control desks and HMI)

All existing cables are armored and lifted up through panel bottom gland plate with proper glanding. Because of the weight of the cable, glanding is necessary and to be maintained in new DDCMIS panels. Proper identification of the cables with core wise usage details to be established before removal of termination/ disconnection.
After de-glanding, all cables with proper identification tags can be pulled down. Now old panels can be removed. Existing base frame with anti-vibration pads if cannot be re-used for new DDCMIS panels, to be removed.

Important Note:

Existing field cables terminated in marshalling or control panel are having different length because of allocation in various racks or location. New cables from marshalling or inter-panels are to be laid and terminated with proper glanding and identification tags/ ferrules.

(2) Erection/ installation of new system wise panels, control desks, and HMI:

a. New power supply cables are to be laid and terminated as per requirement.
b. Existing cut-out size if necessary to be modified.
c. Civil works like modification in cut out for panels, making approach through walls, breaking of concrete floors to suite DCS Panels erection etc. wherever required.
d. Base frames with anti-vibration pads to be erected and properly grouted after proper alignment.
e. Panel earthing where ever required to be extended.
f. New panels/ desks are to be installed.
g. Modification/ laying of trays, conduits as per system requirement.
h. Gland plate of required size and number of gland holes to be fixed/ erected.

i. Glanding, lifting, dressing, clamping and termination of identified old and new cables in marshalling, supply distribution systems, power supply units and HMI including all peripherals.

(B) Commissioning

Systems commissioning is a critical activity and hence following conditions are to be fulfilled:
Bidder has to ensure availability of expert commissioning team to successfully commission new DDCMIS system.

Commissioning of the system will comprise of activities in three parts viz. Pre-commissioning, Trial and Tuning.

1. Pre-commissioning :

i)Pre-commissioning activities starts with the powering of new panels/ HMI system.

ii) Analog and Binary field input signal loop tests and correct signal validation.
iii) Analog and Binary output signal to field and HMI tests and validation.
iv) Interfacing relay pick up through O/P modules and auxiliary contact changeover.
v) Proper window alarm through binary O/P.
vi) Proper HMI signal/ event validation.
vii) Inter-panel signal validation.
viii) HT/ LT breakers cold trial in "TEST POSITION"
ix) Motorised valves limit switches, torques switches correct status validation.
x) Solenoid operated valves, open/ close type of dampers/ valves correct status validation
xi) 220V DC, 24V DC, 110V AC, 240V AC solenoid valves trials through relays and allocated feeders.
xii) HT/ LT auxiliaries' permissive, interlock and protection checking with breaker in test position.

2. Trials :

Trials are to be taken to ensure proper functioning of the following:
i) HT/ LT auxiliaries' actual trial with valid permit.
ii) Motorised valves actual open/ close with designed permissive and interlocks operation.
iii) Solenoid operated valves actual trials.
iv) Function testing of auto control loops in limited final control element action.
v) Boiler, Turbine, HT auxiliaries permissive, interlock and protection trials.
vi) System wise interlock and protection trials with correct alarm and event recording.

NOTE:

Trials to be hold up in case any concerned parameter is not available because of new system.

3. Tuning:

i) Auto control loops are to be finally tuned to achieve better result than with previous system.
ii) Drum level control, Furnace draft control, are required to be finely tuned quickly.

iii) Co-ordinated master control (CMC), Boiler master, Fuel master, Feeder speed controls are to be finely tuned with runbacks of coal mills (02 nos. simultaneously), ID fan, FD fan, PA fan, BFP, CEP, BCWP.

iv) Island Grid/ House load operation to be tried if permitted.

v) FGMO/ RGMO to work.

SCOPE OF WORK

PRE-SHUTDOWN WORK:

1. Mobilization of site.
2. Arranging Gate pass, Insurance, medical fitness certificate, police verification & Accommodations to the contract personnel.
3. Shifting of material and T&Ps to and from the site.
4. Shifting of materials from Customer (owner) store to site.
5. Laying of Cables, Cable Trays, Junction Boxes (JB's), Instrument Calibration, Ferrule Printing, Cable Tag preparation, etc.
6. Any work pertaining to this contract that the Customer (MSPGCL) provides the permit for may be carried out during pre-shutdown.

Following is the package wise scope of E&C work. The scope of work is indicative type and Bidder has to carry out all the related works for completion of the project whether it is specifically mentioned or not.

Sr. No.	ITEM DESCRIPTION	QUANTITY
1.0	Dismantling, Testing, Erection & Commissioning of Unified Distributed Digital Control Monitoring & Information System (DDCMIS) for Renovation & Modernization of complete Control & Instrumentation system, including regulating controls, interlocks, operator interface units and requisite terminations.	
1.1	**Steam Generator Controls (SG)** comprising of Electronic System Cabinets. 1. Existing power supply and field cables are to be removed after proper tagging/ Ferruling. 2. Existing panels are to be removed and replaced with newly supplied panels. 3. Base frames with anti-vibration pads are to be installed. 4. New panels with canopies are to be installed. Proper alignment like Levelling, verticality etc. are to be checked. 5. All existing cables are entered in the panel through proper gland of panel bottom gland plate.	1set Approx. 22 panels

	6. Existing Field control element and primary sensors shall be retained except newly offered system. 7. Existing field cables shall be retained with suitable marshalling panels and gland plates. However, new field/main cables may need to be laid and terminated with proper glands, tags and ferrules as per requirement. 8. Minimum emergency backup console to be installed. Necessary wirings with DDCMIS panels to be done. 9. Power supplies to be distributed from existing UPS, G1/ G2 board, 110V ACCSP panels and new UPS if supplied. 10. 110V AC both sources are available and are to be connected to newly supplied static switch panel and commissioned. 11. Static switch panel output through newly supplied distribution board to be connected to FSSS panels. 12. Existing Safe Flame –II Scanners to be replaced by New flame scanner system for all seven elevations with necessary mechanical modifications and field cabling. 13. Existing **Hydrastep LHS & RHS** to be removed and replaced by 16 port **Electronic Water Level Indicator (EWLI)** drum level monitoring system with necessary mechanical work and field cabling. 14. Existing soot blower system with field devices is to be replaced by **Smart Soot Blowers** with necessary mechanical modifications and field cabling. 15. Existing power supplies are to be used where ever possible. Additional supplies if required are to be hooked up from existing UPS, G1/ G2 boards etc. by Bidder. If new UPS is supplied/provided by the Customer, necessary incomer feeder installation and commissioning, cabling work along with accessories shall be in the Bidder's scope. 16. All civil works such as removal of existing grouted base frame, changes in cut-out size of floor, grouting etc. including materials required are to be in the scope of Bidder.	

1.2	**Steam Turbine Controls** and TDBFP controls comprising of Electronic System Cabinets of size (800 mm X 800 mm X 2355 mm) 1. Electro Hydraulic Governor 2. Introduction of Axial shift 2/3 electrical Trip/ Electrical over speed Trip/ Variable condenser Vacuum set point protection/ Low M.S. temperature protection. 3. Provision of Vacuum Pump Control in proposed DDCMIS to replace existing local control panel (Simatic Panel) with solenoids and necessary cabling. 4. New contactless power switches for switching of power signals to existing motorising control valves of Lub oil temperature control, Primary water temperature control, Cold gas temperature control, HP C/F temperature control. However, existing motorising control valves shall be retained and used as it is. 5. Main Turbine Existing moving coil type Electro-Hydraulic Governor (EHG) is to be replaced with I/H converter or proportional valve with amplifier and capacitor module and 02 no. of LVDT/Micro pulse type position feedback transmitter along with necessary mechanical accessories. 6. Installation and commissioning of Turbovisory System for main turbine along with Analysis and Diagnostic software package. 7. Installation and commissioning of new type of speed probes in line with unit-8 and 9 CSTPS for main turbine speed measurement with necessary mechanical arrangement as per requirement. 8. TDBFP Existing moving coil type Electro-Hydraulic Governor (EHG) is to be replaced with I/H converter with 02 no. of LVDT/Micro pulse type position feedback transmitter along with necessary mechanical accessories. 9. Installation and commissioning of Turbovisory System for TDBFPs along with Analysis and Diagnostic software package. 10. Installation and commissioning of new type of speed probes for TDBFP's speed measurement with necessary mechanical arrangement as per requirement. 11. Existing Field control element and primary sensors like orifice, flow nozzles etc. shall be retained. 12. Existing field cables shall be retained with suitable marshalling panels. However, new field/main cables may need to be laid and terminated with proper glands, tags and ferrules as per requirement. 13. Existing power supply shall be retained for powering of panels. If new UPS/Battery Charger is supplied by buyer, necessary incomer feeder installation and commissioning along with cabling works including accessories shall be in bidder's scope.	1set Approx 30 panels

14. TSE indicator function shall be realised in the operator workstation. Hence the conventional TSE available in the existing system shall not be used.
15. Installation and commissioning of new Auto Synchroniser and LSR is in Bidder's scope.
16. Existing panels are to be removed after proper cable tagging and MTP disconnection. New panels are to be accommodated in the available space.
17. Existing power supplies shall be retained for powering the panels. However, new power cables may need to be laid, terminated with proper glands, tags etc. as per requirement.
18. HP/ IP control valves, LPBP control valves LVDT type PFTs are now connected to 7MJ modules. Same LVDTs are to be interfaced with DDCMIS modules.
19. Vibration probes are to be installed in X-Y direction with necessary cabling where vertical provision on bearing housings is available.
20. MOT/ FRF tank level measurement 06 no. per unit of guided wave radar type of level transmitters are to be installed and commissioned with required cabling up to DDCMIS.
21. FCNRVs PFTs are to be replaced and hooked up to DDCMIS.
22. Local panel analog indicator for seal oil pressure, hydrogen pressure, seal oil/ Hydrogen DP, Hydrogen purity and current of all general auxiliaries to be retained.
23. All cabling to and from DCDB chargers and distribution board to individual panels is in the scope of Bidder.
24. All three no. of existing load transducers to be replaced.
25. AVR, GCB, Field breaker and control interface to be covered in DDCMIS along with hard wired back-ups on control desk as per existing scheme.
26. Replacement of existing phase reversal thyristor drives for Siemens Germany make motorised control valves of lub. Oil temperature control, Primary water temperature control, Cold gas temperature control, HP C/F temperature control.
27. All existing 4 wire pressure, Differential pressure transmitters are to be replaced with necessary piping work.
28. Existing pressure, level, differential pressure, flow transmitters of critical parameters are to be replaced with necessary mechanical piping changes.
29. Existing RTD and Thermocouples temperature transmitters are to be replaced with proper field mounting.
30. Installation and commissioning of newly supplied transmitters along with manifolds and required accessories shall be in Bidder's scope

31. Installation and commissioning of new GAMP (Generator Auxiliary Monitoring Panel) system and MCC Panel in place of existing CXW01 panel with complete electrical and switchgear accessories, cables and interfacing of the same to DDCMIS.
32. Installation and commissioning of ANK01 (DC EOP and DC JOP starter panel) new panel with complete electrical accessories, cables with interfacing hardware (interfacing of the same to DDCMIS) as per requirement.
33. Installation and commissioning of new GIC (Generator Instrumentation Cabinet Panel) Panel with complete electrical and switchgear accessories, cables and interfacing of the same to DDCMIS.
34. All civil works such as removal of existing grouted base frame, changes in cut-out size of floor, grouting etc. including materials required are to be in the scope of Bidder.

S N	ITEM DESCRIPTION	QUANTITY
1.3	**Station C&I:** Electronic System Cabinets of size (800 mm X 800 mm X 2355 mm) Catering to 5. Replacement of all existing control room temperature scanner by DDCMIS system through suitable marshalling. 6. Hooking-up of approx. 300 no. Temperature signals pertaining to HT auxiliaries with proposed DDCMIS system. 7. Hooking up of 350 nos. of signals (temp. signals with thermocouple-200, with RTD-50 and 100 other signals) of existing DAS in the proposed new DDCMIS to be done. Other events/ SOE shall be integral to the proposed system. 8. Existing control desk-8 (related to AVR, GCB, and field breaker) shall be removed and existing PB and indicators of the same or new PB and indicators shall be provided and shall be placed under extended new HMI desk. Also paralleling of the same shall be done with the proposed DDCMIS system. However, operations like GCB and field breaker shall be proposed through Hardwired. The cable from existing control desk-8 to the respective areas shall be retained and used. 9. Existing Field control element and primary sensors like orifice, flow nozzles etc. shall be retained. 10. Existing field cables shall be retained with suitable modifications of existing marshalling cabinets or supply of new cabinets. However, new field/main cables may need to be laid and terminated with proper glands, tags and ferrules as per requirement. 11. Minimum emergency backup console shall be provided. 12. Existing power supply shall be retained for powering of panels. However, new power cables may need to be laid, terminated with proper glands, tags etc. as per requirement. 13. 24V DC driven relays to interface other system like CPU. 14. 220V DC contact rating relays to be supplied in relay panel mounted on bases and wired up to TB. 15. Existing field cables shall be retained with supply of suitable marshalling panel. Marshalling panel TBs are to be replaced and re-termination of field cables to be done. Marshalling panel to DDCMIS cabling to be done. 16. All existing 4 wire pressure, Differential pressure transmitters are to be replaced with necessary piping work. 17. Replacement of MDBFPs Scoop control actuator with PFT and power controller shall be in Bidder's scope.	01 Set Approx. 50 Panels

	18. Existing pressure, level, differential pressure, flow transmitters of critical parameters are to be replaced with necessary mechanical piping changes. 19. Existing RTD and Thermocouples temperature transmitters are to be replaced with proper field mounting. 20. Complete E&C of Field Instruments including JB's for marshalling existing field cables with new cabinets etc. 21. Hooking up of Temp. Signals (Approximately 300 Nos.) directly coming from Field to Temp. Scanners on existing UCP pertaining to HT auxiliaries (Existing Field cables to be retained). 22. Installation and commissioning of **Vibration Monitoring System (VMS)** (sensors, cables, electronic modules) for approx. 65 points for ID/ FD/ PA/ MILL/ MDBFP/ CEP. 23. Installation and commissioning of newly supplied transmitters along with manifolds and required accessories shall be in Bidder's scope. 24. All civil works such as removal of existing grouted base frame, changes in cut-out size of floor, grouting etc. including materials required are to be in the scope of Bidder.	

2.0	**Control Desk And Control Panel tiled for back-up consoles** 1. Emergency shut-down control desk (with minimum configuration) along with 300 distributed Alarm Annunciation windows for SG/TG/Station C&I as well as ECP. 2. Control operating desks and panels: a. Control operating desks (COD) 1 to 8 including AVR console to be removed and replaced with suitable latest look type desk. b. Control upright panels (CUP) 1 to 13 are to be removed and field cables are to be utilised by marshalling to accommodate emergency backup consoles, drum level hydrasteps/ new EWLI, windows and some of the instruments like dew point display meter to be retained. c. DDCMIS Remote I/O panel for CW/ ACW/ OHP/ AHP/ Compressor system along with suitable connectivity to main control room for information/monitoring of signals only. (No output/ operation is required). a. The Tentative Nos. of signals shall be b. ACW & CCW: Analog: 100 Nos., Digital: 50 Nos. c. OHP & AHP: Analog: 100 Nos., Digital: 50 Nos. d. Compressor: Analog: 50 Nos., Digital: 100 Nos. 3. Any communication cable to be routed underground. 4. Hooking up of approx. 350 nos. of signals (temp. signals with thermocouple-200, with RTD-50 and 100 other signals) of existing DAS in the proposed new DDCMIS to be done. Other events/ SOE shall be integral to the proposed system.	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – II: Scope of Works

CIVIL WORK:

All civil work involved in up-gradation of C&I system is in the scope of Bidder.

Scope of civil works involves:

- Removal of existing panels and re-accommodation of all panels with required base frames and anti-vibration pads with base frame grouting / welding and extending.
- Fabrication of base frames for panels/ cabinets is in Bidder's scope along with supply of fabrication material as per BOQ. Bidder must provide material test certificate along with supply material as per BOQ.
- Existing control desk and minimum back up console panel excluding electrical panel are required to be removed and replaced by Bidder.
- Dismantling of existing Boiler, Turbine and Station C&I Siemens DAS and H&B DDC cabinets and Installation of new cabinets for control system, marshalling cabinets as applicable and termination of existing field cables through suitable marshalling elements to new DCS panel. After dismantling of existing equipment/ panels/ cabinets etc. which are to be replaced/ modified, the Bidder shall hand over the dismantled material at the Customer's designated place. This will also include disconnection/replacement of the existing cabling/ piping as applicable.
- The required civil works for floor cut-outs for additional panel are required to be removed and replaced.
- The required civil works for floor cut-outs for additional panels to be located in existing free space in existing relay room/ DAS room, compressor room, AHP room, ACW/ CCW room.
- Extension of earthing system as per requirement.
- Laying and termination of power cables.
- Laying and termination of additional cables as per scope.
- Underground routing, Laying and termination of optical fibre cable as per requirement.
- Erection of HMI system with peripherals.
- Erection and Commissioning of the instruments is under the scope of Bidder.
- Any other civil work arising because of system up-gradation is in Bidder's scope.
- All materials (Cement, concrete, Iron/TMT bars etc.) related to civil work modification including T&P and manpower shall be in the scope of bidder.

MECHANICAL WORKS:

All the mechanical work involved in up-gradation of C&I system is in the scope of Bidder.

Scope of mechanical works involves:

1. Replacement/retrofitting of existing main turbine and TDBFP's moving coil type EHG by I/H or proportional valve based system and position feedback transmitters along with necessary mechanical piping changes.

2. Cutting/ welding of instruments impulse pipes for (If Applicable):

a. Primary water bushing flow transmitters.

b. Hotwell level control radar type transmitters.

c. MOT/ FRF Guided wave radar type level transmitters.

d. Control panels, Control desks etc.

e. Electronic drum level monitoring system.

f. Flame scanner guide pipe assemblies.

g. Any other works as per requirement.

3. Main turbine keyphasor/ notch preparation for diagnostic system.

4. Main Turbine and TDBFP's any mechanical work required for the new Turbovisory system (TSS/TSI). This involves drilling/tapping of holes, minor modifications in the brackets etc required for mounting of TSI sensors.

5. Any other mechanical work arising because of system up-gradation is in Bidder's scope.

NOTE:

Whatever things required for complete C&I up-gradation of CSTPS, Chandrapur U#5, 500 MW shall be the scope of work, irrespectively whether it is specifically mentioned in the enquiry specification/ scope of work or not.

2.0.0 Scope of work involving Dismantling, Erection, Testing, Commissioning, and Calibration.

2.1.1

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

2.1.2

The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship, engineering and construction management. The contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, measuring instruments, calibrating equipment, modern/ latest construction aids etc. He must also deploy adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor should match requirement of sophistication involved with the items mentioned in the BOQ.

2.1.3

The work shall be executed under the usual conditions without affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

2.1.4

Contractor shall erect, align and commission all the equipment and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment

from the contractor will be entertained on the ground of deviation from the methods/ sequences adopted in erection of similar sets elsewhere.

2.1.5

The services, tests and support to be provided by the agency for the work mentioned in the various sections of this tender are indicative and not exhaustive, but not limited to these for the completion of the work in all respects.

2.1.6

The work to be carried out under the scope of this specification covers the complete work of loading, handling, transporting, unloading, preassembly, dismantling, erection, calibration, testing, air flushing, pre commissioning tests, commissioning of systems, trial run of various auxiliaries, achieving various activities till handing over of the unit to BHEL's customer, providing maintenance team to cater to guarantee responsibilities and maintenance thereafter. The work shall conform to dimensions and tolerances specified in various drawings that will be provided during the erection. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done departmentally or by engaging other agencies and recoveries will be effected from contractor's bills towards expenditure incurred including 30% departmental charges.

2.1.7

Contractor shall dismantle, calibrate, erect, commission all the equipments, cabinets/panels, instruments and cabling etc. as per sequence prescribed by BHEL at site. The sequence of dismantling/ erection / commissioning methodology will be decided by the BHEL engineers depending upon the availability of materials/work fronts etc. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of dismantling/ erection / commissioning adopted in erection / commissioning of similar jobs or for any reasons whatsoever.

2.1.8

The services, tests and support to be provided by the agency for the work mentioned in the various sections of this tender are indicative and not exhaustive, but not limited to these for the completion of the work in all respects.

2.1.9

Plant materials should not be used for any temporary supports/ scaffolding/ preparing pre-assembly bed etc.

2.1.10

The contractor shall have total responsibility for all equipment and materials in his custody at contractor’s stores, or any loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL Engineer’s instructions. The machined surfaces/ finished surfaces should be greased and covered.

2.1.11

At all stages of work, equipment/ materials in the custody of contractor, including those erected, will have to be preserved as per the instructions of BHEL. The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work (excepting, those specifically included in BHEL scope). However, necessary steel will be provided from the scrap/ surplus materials available at site.

2.1.12

The terminal points as decided by BHEL shall be final and binding on the contractor.

2.1.13

Descriptions of certain packages appearing in the rate schedule are available in this section and also in **Appendix-I**, to give general idea to tenderer about the type of equipment to be erected, calibrated, tested and commissioned.

2.1.14

During the course of dismantling, erection, testing and commissioning of C&I work, certain rework/ modification/ rectification/ repairs/ fabrication etc., will be necessary on account of feed back from various thermal power stations or units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/ maintenance requirements. Contractor shall carryout such rework / modification / rectification / fabrication repairs etc. promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours, consumables used etc., shall be maintained by the contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per clauses 2.15 of GCC

2.1.15

The contractor's scope of work is further described in the clauses hereafter:

2.1.16

All tools, tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables, electrodes including oxygen, acetylene argon etc gases, primers, paints etc. required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies. Electrodes shall be baked / dried in the electrode drying oven (range 375 – 425 deg C) to the temperature and period specified by BHEL Engineer before their use. Necessary drying oven / portable oven shall be provided by the contractor at his cost.

2.1.17

The scope of work under this tender specification covers transportation (to & fro and before erection & after dismantling), calibration, dismantling, erection, testing and commissioning, etc. of control / instrumentation and electrical equipments of the following packages.

A. Boiler Control & Instrumentation and its Auxiliaries

Digital Distributed microprocessor based max DNA system panels for FSSS, SADC, HP Bypass, auxiliary PRDS, SMART soot blowers, Electronic water level indicator, Blanks Cabinets for flame scanner system etc.

B. Steam Turbine and TDBFP Control & Instrumentation and its auxiliaries

Digital distributed microprocessor based maxDNA system panels consist of Turbine Stress Evaluator, Electro Hydraulic Governor (EHG), LPBP Seal/ Gland Steam control, Turbovisory System (TSS/ TSI) for Main Turbine and BFP drive, turbine extended protection, Turbine & generator auto control loops, Turbine protection Channel, TDBFP controls along with interlocks, protection and TSS, GAMP (Generator Auxiliary Monitoring Panel) DC EOP, DC JOP Starter Panel, Main turbine existing moving coil type Electro-Hydraulic Governor (EHG), etc.

C. Station C&I / Balance of Plant

Digital Distributed microprocessor based maxDNA system panels for Balance of Plant controls, consisting of Open Loop and Closed Loop controls, interlock and protection systems for various HT, LT, pneumatic, hydraulic drives, remote multiplexed signal acquisition, alarm processing, HMI including computers and accessories, computer furniture, control desk, Large Video Screen, instrumentation, cabling, etc, etc.

2.1.18

Equipments /instruments required to be erected for this work, though not limited to but are generally as per rate schedule. For any items or class of work not specified herein but required for total completion of work, the same shall be carried out as per BHEL requirement. However, the payment of these items/class of work shall be regulated as per the General Condition of the contract. Contractor shall provide necessary resources for completion of such work within the stipulated time schedule. Value of such work shall be included while computing the total value of work finally executed for all contractual purposes, particularly for contract variation purpose.

2.1.19 Smart Soot Blowing System

Consist of 48 nos. of Heat Flux sensors. JBs for the sensors and temperature transmitters. Scope includes calibration/checking of heat flux sensors, calibration of temperature transmitters and complete erection and commissioning of the system components including erection of heat flux sensors. **Brief description of work involves following:**

a) The smart soot blowing system consists of water-wall heat flux sensors installed in between wall blowers. The water-wall insert heat flux sensors are to be welded inside the boiler.

b) Insulation removal and cutting of existing water walls to fit heat flux sensors inside the boiler will be in bidder's scope.

c) IBR certified welder arrangement and welding of heat flux sensors will be in bidder's scope. Approx. 200 weld joints will be required.

d) Radiography testing of weld joints along with boiler inspector's approval will be in bidders scope.

e) JB erection (approx. 08 Nos.), temperature transmitters erection.

f) Cable laying from DCS panel to JB and from JB to individual heat flux sensors

g) Commissioning of the system.

2.1.20 REPLACEMENT OF TDBFP Existing moving coil type Electro-Hydraulic Governor (EHG) with I/H converter

Brief description of work involves following:

a) Dismantling, loading and handling of existing TDBFP Governing Console from Site to Customer's store. This involves cutting of pipes, instrument lines etc.

b) Erection of new governing console, modification of existing pipelines, welding and fitting of pipelines.

c) Making arrangement for flushing of system.

d) Commissioning of system.

2.1.21 TDBFP's SPEED PROBES

Brief description of work involves following:

a) Disassembly of existing front plate & front end coupling of TDBFP.

b) Machining/modification of pole wheel/toothed wheel & baffle plate.

c) Shrink fitting of Pole wheel.

d) Assembly of new front plate

e) Mounting and commissioning of speed probes.

2.1.22 Earth Pit

If required, erection of separate electronic earth pit for new system will be in scope of bidder including material. Any changes in the existing earthing system will be in the scope of bidder.

2.2.0 Collection of materials

2.2.1.1

The contractor shall take delivery of equipment, materials from the storage yard/ stores/sheds of BHEL/Customer. He shall also make arrangements for verification of equipment, safe custody, watch and ward of equipment after it has been handed over to bidder till these are fully erected, tested and commissioned and taken over by the customer. The contractor should note that the transport of equipments to erection site, assembly yards, etc. should be done by the prescribed route in the most professional manner without disturbing other on- going works of various contractors. Special equipment (whichever applicable) such as laboratory equipments, measuring and control equipments, gauges, panels, console inserts, switches, transmitters, controllers, power cylinders, cables, conduits etc. shall be stored when taken over by the contractor in appropriate manner as per BHEL's instructions. The contractor should also note that while taking delivery of materials from BHEL stores (open/closed), it may be necessary to handle other items which could be blocking the exit route of the materials. The dismantled material shall also be transported from site to the place designated by the Customer. ***This aspect shall be taken care of in the quoted rates and no extra payment shall be done in this regard*.** It shall be the contractor's responsibility to arrange necessary cranes/tractors, trailer, trucks, slings, labour, etc., etc., for transport of equipment to and from site to designated location as decided by BHEL/ Customer.

2.2.1.2

The contractor shall take delivery of the components, equipments and special consumables from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer.

2.2.1.3

The contractor shall hand over all parts/materials remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or use over actual design requirements, BHEL reserves the right to recover the cost of parts/materials used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.

2.2.2

All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments/components for checking and cleaning, fabrication of tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing of cut outs/openings for mounting of console inserts, modules, indicators, recorders, drilling of holes for gland entries, reaming, scrapping, cable laying, dressing, fitting up etc. as may be applicable in such erection works are treated as incidentals to erection work and are necessary to complete the work satisfactorily shall be carried out by the contractor as part of the work.

2.2.3

Overhauling, cleaning, revisioning, servicing of equipment / instruments, valves etc. during erection and commissioning stages will be arranged by the contractor. However, gaskets /packing for replacement will be provided by BHEL free of cost. All equipments shall be preserved and protected before and after erection as per the advice of BHEL engineer.

2.2.4

The contractor should take all reasonable care to protect equipment and materials under his custody either in his stores or at site. Copper tubing, brass fittings, brass valves etc. forming an integral part of equipment or system are liable to greater damages / pilferages /theft / losses. It will be responsibility of contractor to arrange for adequate security round the clock for protection from such damages / pilferages / theft / losses.

2.2.5

All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the engineer. The equipment from the storage yard shall be moved to the actual site of erection/location at the appropriate time as per the direction of BHEL engineer to avoid damage/loss of such equipment at site.

2.2.6

The contractor shall collect all scrap materials periodically from various levels of power house, working area of the power station, auxiliary and piping around power station and collect the same at one place earmarked for the same. Loads of scraps are to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.

2.2.7

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

2.2.8

All pipes and tubes, equipment, instruments issued to contractor and kept at site for erection shall be covered with plastic caps/steel caps or shall be closed with suitable plugs by the contractor.

2.2.9

The contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before these equipments are erected in position.

2.2.10

Contractor shall plan and transport equipment/components from storage yard/sheds to erection site and erect them in such a manner and in a sequence that material accumulation at site should not lead to congestion. Materials shall be stacked neatly, preserved and stored in the contractor's shed and work areas in an orderly manner. It may be specifically noted that the space available in the thermal power plant is limited and accumulation of material may lead to the necessity of shifting and restacking the materials to enable other agencies to carry on with their work or to comply with customer's requirements. If required, the contractor shall arrange shifting of surplus material expeditiously failing which the same will be arranged by BHEL and all charges together with departmental charges at 30% will be recovered from his bills.

2.2.11

House-keeping in the erection and pre-assembly area is as important as the well-planned and orderly work. The access to site for inspection approaches by BHEL and customer engineers and leading of the material shall be made available by the contractor at all times. The shifting and re-shifting of erection materials, tools and plants and clearance of restrictions, filling of ditches,

undulation near the preassembly and boiler area is the responsibility of the contractor. Contractor should visit the site and acquaint himself with all restrictions and difficulties that he may encounter during erection/commissioning stages.

2.2.12

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*. Non-establishment of above equipment will attract penalty @ Rs 10000 (Rupees Ten thousand only) per month.*

BHEL uses its own software SOMS (Site Operation and Management System) for total project execution and billing. The contractor shall also provide adequate and suitable manpower for updating / entries into SOMS in BHEL computers at site.

2.2.13 <u>Troubleshooting during plant operation</u>

During pre-commissioning / commissioning stages when the plant will be under various stages of operation, it will be necessary to have continuous (day and night) presence of suitable manpower along with required tools to attend to any defects etc that may arise during such operation. The contractor will be required to put such personnel in shifts in C&I area. The bidder must also take this aspect into consideration.

As the Shutdown Activities (from complete steam generation stoppage up to first Synchronization of Unit) has to be completed within prescribed period, the contractor has to ensure round the clock (24X7) availability of manpower and deploy required number of manpower/personnel in shifts during the complete shutdown period.

2.2.14.0 Pre-commissioning / commissioning and post commissioning activities.

2.2.14.1

The work is also inclusive of various commissioning activities of BHEL scope. The various activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of customer/ consultant/ statutory authorities like boiler inspector, electrical inspector etc.

2.2.14.2

In case any malfunctioning and/or defects are found during tests, trial runs such as loose components, undue noise or vibration, strain on connected equipments etc., the contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment and realignment is necessary, the same shall be done as per BHEL engineer's instructions.

2.2.14.3

During each stage of commissioning, if any part of the instrument needs repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim, if any, for such repair/rectification/ rework/replacement etc. for reasons not attributable to contractor will be dealt as per clauses 2.15 of GCC. The parts to be replaced shall however be provided by BHEL free of cost.

2.2.14.4

Simultaneous commissioning activities will be in progress in various areas. All these works need specialised gangs including electricians/instrument mechanics in each area. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted.

The mobilisation of these commissioning gangs shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools and tackles with BHEL engineer and arrange for the same. If at any time the requisite manpower, consumables, T&P are not arranged then BHEL shall make alternate arrangements and necessary recoveries with overhead cost will be made from the bills of the contractor.

2.2.14.5 Contractor shall cut open works if needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

2.2.14.6

In case any rework / repair / rectification / modification / fabrication etc. is required because of contractor's faulty erection which is noticed during commissioning or at any stage, the same has to be rectified by the contractor at his cost. If any improvement /repair /rework/rectification/ fabrication/ modification due to design improvement/ requirement is involved, the same shall be carried out by the contractor promptly and expeditiously. Claims of contractor, if any, for such works will be dealt as per clauses 2.15 of GCC

2.2.14.7

It is the responsibility of contractor to provide for necessary labour, tools and tackles and consumables till the completion of work under these specifications even in case dismantling, erection, testing and commissioning of this work is delayed due to reasons not attributable to the contractor.

2.2.14.8

During commissioning activities and carrying out various tests, minor items like gauges, manometers, etc., have to be temporarily erected and put in service to suit the commissioning activities. BHEL will provide the necessary gauges and equipment. Contractor has to carry out the erection, calibration, dismantling of the same. After completion of activities the temporary systems have to be removed and returned to stores. No extra charges will be payable towards these.

2.2.14.9 Commissioning

During pre-commissioning, commissioning, post commissioning and trial operation stages of various systems, certain category of manpower with T&P and consumables will have to be provided to BHEL commissioning engineers exclusively at their disposal. It shall be the responsibility of the contractor to provide Engineers, Electricians, technicians, Helpers, Fitters etc along with necessary consumables, hand tools, calibration equipment etc, for the various commissioning activities in progress. During shutdown period there could be requirements of separate commissioning gangs simultaneously in even up to 12 to 15 areas. Contractor has to augment the manpower as and when required as per work demand and necessity at site. The quoted rates shall include this.

2.2.14.10

It shall be specifically noted that contractor manpower may have to be engaged round the clock simultaneously at different areas and hence considerable number of personnel and their overtime payment may be involved. ***This aspect must be considered by the contractor while quoting their rate.*** No additional compensation by for the same shall be payable, irrespective of number of persons engaged or number of working hours per day.

2.2.14.11

For electrical works, 415 volts and above, the contractor has to bring qualified electricians.

2.2.14.12

Certain systems may be supplied with portable programming units, which are to be connected at various locations during pre-commissioning to handing over. Necessary cabling interconnecting the programming units and other connected panels has to be carried out by the contractor and are to be dismantled after work. For the purpose of testing, monitoring, commissioning, etc., these programming units will have to be repeatedly connected and disconnected at various locations. These will be considered as part of commissioning activities and no separate payment will be entertained for the above.

2.2.14.13 Calibration, Testing & Commissioning

Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipment, devices, systems etc. are broadly classified below. However, there may be some overlapping between the activities (dismantling, erection, calibration and testing, commissioning) .The classification of activity is only a guideline for understanding the total volume of work in each activity. The contractor shall have no claim for performing or providing manpower for such overlapping work, which is also within the scope of the work.

(A) Calibration

Verification after drawing of material of various types, range of the field devices with respect to instrument schedule, data sheet or system document.

- Codification of instruments as per system tag numbers
- Calibration / adjustment of instrument as per system requirement / set values.
- Providing head correction in case of pressure measurement as per calculated values or actual measured value for the instrument, which are used for interlock protections / monitoring. This is generally applicable for turbine / generator, lube oil systems, lube oil system of fans etc.
- Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.
- Checking and ensuring the proper function of instrument.
- All the recorders shall be made functional with proper chart movement and ink marking (if applicable).
- Preparation of computerised calibration certificates in the formats specified by BHEL Engineers and getting those signed by the customer is in the scope of the contractor.

(B) Erection

- Withdrawal of material from store, verification, inspection as per shipping list, drawings and documents.

- Preservation, up keeping, safe custody of the erected equipments till handing over to the customer.

- Verification of installation as per drawing and document for the correctness of cabling, JBs, impulse pipe, various field device, panels, instruments etc.

- Continuity check and IR value check of cables.

- Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule.

- Checking earthing of the equipments and cable shield wire continuity.

- Energizing the functional group control panels and field devices.

- Flushing of impulse pipe before making the instruments process connections through.

- Any leakages, damages to impulse pipe, field device connections, air connections etc. shall be fully attended by contractor.

- All cable glands/piping/tubing to be fixed as per installation requirement before commissioning.

(C) <u>Testing, Commissioning & Trial Operation</u>

- Checking/verification of binary/analogue input and output signal from field and panel and upto recording/indicating instrument/HMI monitors.

- Checking the operating electrical/pneumatic drive through functional group panel, remote control desk, HMI, CRT operation and repeatability and smooth operation to be checked.

- Checking the interlock, protection and alarm for various process by simulation of field devices/process changes.

- Functional check of sub-loop control, sub group control and auto loop and fine tuning.

- Adjustment of limit switches/feedback position transmitter checking the actuator for correct Limit switch operation for correct position indication and repeatability shall be ensured.

- Motor IR value measurement, bearing/winding RTD checking, drying out of motor, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.

- Contractor shall prepare calibration/testing report/protocols.

- During trial run of various systems, if the performance of any instrument is found erratic, un-satisfactory and requires re-adjustment, re-calibration etc., the defect shall be attended by contractor.

- Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same should be attended properly.

- Observe the proper functioning of sub-group/sub-loop control.

- Check the operation of various controls in manual/auto mode for smooth functioning.

- Clearing of all bad / invalid signals noticed during commissioning.

- Providing necessary assistance during restart of the unit is in scope of this specification. Smooth operation and availability of all instrument/controls of the systems installed under the scope herein, shall be ensured by the contractor. Contractor shall provide adequate number of skilled manpower

and T&P for this purpose. Interruption during restart till stable operations at full load or any mutually agreeable load for reasons attributable to the Contractor may result in re-start of the unit all over again, consequential extension in Time Schedule / Contract Period shall be to the contractor's account.

- If any small wiring correction or minor modification in control panel wiring is noticed during the commissioning, it shall be carried out as a part of commissioning activity.

(D) <u>Post-commissioning</u>

- Contractor shall rectify the defect observed/informed by customer during the restart of the Unit

- Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL engineer.

- After restart/handing over of the equipment, if due to unforeseen reasons, certain works crop up, the contractor shall provide all the assistance.

(E) <u>Tests & PG Test Assistance (kindly refer Annexure-C)</u>

2.3.0 Brief description of work

2.3.1 Installation of Cable trays/cable ducts (If applicable)

2.3.1.1 Various types of sheet metal, galvanised cable tray, i.e. Perforated, ladder type, seal metal duct, solid bottom tray, shall be provided in standard lengths along with accessories like hardware, bends, reducers, coupler plate, tray covers and tray clamps etc.

2.3.1.2

Installation of cable tray/cable duct shall include cutting, laying, jointing, supporting, drilling holes in the support, providing tees/reducers/bends/clamps as per tray route layout, fabrication of bends/tees/reducers from straight length, fixing of tray covers, welding of tray on support, cleaning and application of cold galvanising paint on weld joints (supply of paint is in the scope of contractor). *Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.*

2.3.1.3

In case cable trays are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instance.

2.3.1.4

Cable trays/ducts have to be routed underground in cable trench, over head on structure, valves, floors etc. for various applications such as cable laying, copper tubes, conduits, thermocouple, temperature gauge capillary etc.

2.3.1.5

Installation of Copper tubes/SS tubes/copper pipes shall include cutting into required length, laying, bending, cleaning, brazing wherever required, fixing of brass fittings like compression fittings/tees/end connectors/straight connectors/bulk heads/valves etc., supporting clamping including supply of clamps and hardware, flushing and conducting leak test.

2.4.0 Cable laying (power / control / instrumentation shielded / unshielded cables / plug-in cables / coaxial / UTP / STP / data highway, armoured / un-armoured, single / multi-core, PVC/HR PVC/FRLS/TEFLON/XLP insulation, optical fibre)

2.4.1

Cable laying includes cutting to the required length, laying in overhead/underground cable trench/through pipes/flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, providing PVC numerical/alphabetical / printed ferrules, termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, termination (crimp, soldering, etc.), plug-in connections with insert type crimping, providing identification PVC/aluminium cable tags (at both the ends and at 15 m intervals throughout the route length and also at each bend), continuity checking, insulation resistance checking, high voltage test on HT cables.

Laying, etc of Optical fibre cables on cable trays /cable trench shall necessarily be done using flexible conduit

2.4.2

Entry to the panels and JBs may be at top, sides or bottom. All cables are required to be properly supported and clamped near to the JB/panel.

2.4.3

Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, prefab plug-in cables, etc., for such cases cables may have to be lifted inside the panel by either making cut-out in gland plate and providing rubber profile for sharp edge protection or alternatively, providing 4" or 6" PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rate of cable laying.

2.4.4

Copper tinned lugs of various types (pin, ring, fork, snap-on) upto 4 sq.mm, PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metallic, clamping and dressing material with hardware, PVC sleeves etc. shall be supplied by the contractor within the quoted rates for cable laying. The quality of material shall be got approved from BHEL engineer prior to their use on job.

2.4.5

All care should be taken to avoid abrasion, tension, twisting, kinking, and stretching of cables during installation.

2.4.6

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

2.4.7

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

2.4.8

Many of the cable trays and cables have to be laid in cable trenches. For this purpose, the cover of the trenches have to be opened for working in site and whenever the cables are to be laid in existing cable tray, all safety precautions have to be observed.

After completing the work, the trenches have to be cleaned and covers put back into position. Contractor shall also carry out de-watering from the trenches if required and arrange pumps etc., at his cost.

2.4.9

Looping wire at terminal block of panels and electrical actuator as shown in the inter-connection diagrams or as required is to be done by contractor at no extra cost.

2.4.10

Contractor shall carefully plan the cutting schedule of each cable drum in consultation with site engineer such that wastage are minimised.

2.4.10.1

The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed the following limits;

Sl No.	Item	% Wastage on issued Qty
1.	Fabrication steel	2
2.	Each size of power cables	1
3.	Each size of control/Inst cables	2
4.	Impulse pipe/tubes/GI pipes/copper tube	1

If however, the bidder quotes for more wastage than specified above, the excess portion will be considered for adjustment during the tender evaluation at the quoted supply rate of material.

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

2.4.11 Terminal Connections:

The types of cable terminations are generally as detailed below:

SG package, TG package, Station C&I and Auxiliaries

1) All field cables in SG package are crimp type of different sizes.

2) All JBs are both side screw type.

3) All console tiles wiring: screwed or plug-in type to be fabricated at site.

2.5.0 Junction Boxes:

2.5.1 Different types of junction boxes are to be erected by the contractor like junction boxes below 48 ways and above 48 ways. The junction boxes are to be located at the locations jointly decided at site during erection. The junction boxes are to be erected on the frames fabricated at site.

2.6.0

Laying of pipes and tubes (impulse pipe & instrument air pipe)

2.6.1

Root valves are generally provided on process pipe line by other agencies. Prior to starting impulse pipe, contractor to identify the process point with respect to PIDs.

2.6.2

Installation of impulse pipe of CS/AS/SS material shall include cleaning, air flushing, cutting to length from running meter, edge preparation, cold bending, welding of sockets / reducers / tee / cross / isolating valves / union, nut and tail pieces / nipples, condensing and other pots, etc., mounting of SS/CS valve manifolds and compression fittings, providing supports, clamping, conducting leak test / hydraulic pressure test, painting as per colour code (primer and two coats) and erection and commissioning of other standard accessories as per instrument hook-up diagram.

Piping works shall involve either arc or TIG welding. Paint, primer etc supply is in the scope of the contractor. Colour codes for impulse piping, etc will be as per standard codes. Contractor to follow the BHEL supplied welding schedule and welding procedures. The decision of BHEL engineer will be final in this regard.

2.6.3

If applicable, IBR certified welders shall be deployed for welding of impulse pipe and contractor shall take approval for welder and welding consumables from BHEL site engineer.

2.6.4

Laying of GI pipe for instrument air line shall include air blowing, cutting from the running meter length, threading, installation of elbows/tee/reducer /moisture traps/auto drain pot/check valves/isolating valves, supporting clamping, conducting leak test and also seal welding of threaded joints, if required.

2.6.5

Threaded joints of air line shall be made leak proof by using Teflon tapes or sealing compound. All consumables shall be in the scope of contractor.

2.6.6

All fittings and accessories for impulse pipe and air line shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings and no separate rates are envisaged.

2.6.7

Contractor shall provide GI "U" clamps for impulse pipe and GI pipes within the quoted rates for installation of the same.

2.6.8

Impulse pipes (as per paint schedule) shall be applied with one coat of primer red oxide paint and two coats of synthetic enamel of prescribed shade of final paint. BHEL may prescribe a time gap between first coat and second coat of final paint.

2.7.0 Structural steel fabrication and installation

2.7.1

Structural steel material like MS angles, channels, beams, flats, plates etc. shall be used for fabrication of panel base frame, cable tray supports, canopies, instrument and junction box frames,

impulse pipe/instrument air pipe supports and instruments etc. **Supply of Structural Steel- the material shall be as per specifications mentioned as per BOQ will be in Bidder's/ Contractor's scope along with material test certificate for the supplied material.**

2.7.2

This shall include cutting into size, conduiting of end connections, if required, welding, grinding of excess weld deposits, drilling of holes for mounting of device/instrument, installation at location, levelling, alignment, providing bracings, painting etc. No gas cut holes will be permitted. Contractor to follow the BHEL supplied welding schedule and welding procedures.

2.7.3

All the fabricated supports/frames shall be applied with one coat of primer red oxide paint before installation and two coat of synthetic enamel of prescribed shade of final paint,. If required, BHEL shall prescribe time gap between first and second coat of final paint. Supply of paint, primer etc. are in contractor's scope.

2.7.4

Frame installation/cable tray accessories' installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. *All consumables including anchor fasteners shall be arranged by the contractor***.**

2.7.5

In certain packages, galvanised members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/welding. The installation rate as quoted shall include the assembling of the frames.

2.7.6

Gas cutting of tray/impulse pipe support and gas cut holes in frame shall be avoided. Only drilled hole shall be permitted in frame etc.

2.8.1 Installation of panels

Electrical control panels, electronic control panels, etc., are normally supplied in suite of either one/two/three/four/five or loose shipping sections with integral base frame or loose supplied.

These panels may have to be installed as stand alone or in groups consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

2.8.2

Installation of panel shall include **construction/ fabrication of base frame**, levelling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware, bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates and sealing of cable entries. In certain case where canopies are not supplied but have to be fabricated out of MS sheets **(to be arranged by the Bidder), payment will be done on square meter basis after all requisite documents**

2.8.3

Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be part of work and no claim whatsoever will be entertained with regard

to non-availability of opening as per shortest route etc. Panel have to be erected at different locations and elevation in boiler, TG, GTG hall, LT & HT switchgear room, unit control room, ESP control room etc.

2.8.4

Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

2.8.5

Wherever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication, installation rates shall be applicable.

2.8.6

Normally the panels shall be supplied with instruments, relays, meters, electronic modules etc. mounted and pre-wired. However, if these are supplied loose / separately for safety in transit, contractor shall mount/wire such devices as part of the panel installation work and no separate rates shall be applicable unless otherwise *specially* listed in the rate schedule.

2.8.7

No separate payment shall be made for replacement of any devices like electronic modules, relays, conductors, terminal block, push buttons etc. which are found defective during pre-commissioning / post-commissioning of any equipment / item.

2.8.8

For the panels erected by other agencies, commissioning/calibration work and trouble shooting has to be carried out by the contractor as part of testing and commissioning work as per the quoted rates.

2.8.9

Associated civil works like drilling, chipping, punching holes and opening in concrete floors, slabs and brick walls, grouting, related to Rack, support fabrication and installation, associated civil works required for installation of control panels, Junction boxes etc., shall be included in the erection cost of such items. Also all associated civil works like chipping away and making good as necessary in floor slab/wall for cabling / earthing etc., as required are included in the scope for which no separate payment is applicable. The scope also includes supply of grouting material, if any. Mechanical works as per BOQ is also in the scope of the contractor.

2.8.10

Supplier's instruction manuals, packing slips, door keys etc. received along with the panels should be promptly handed over to BHEL's engineer on opening of the panels.

2.9.0 Control panels

SG, TG, Station C&I system panels are based on Max DNA distributed digital control philosophy. Max DNA system is having communication through UTP cables amongst themselves. The system consists of computer network with servers and workstations and various peripherals like printers, etc. Optical fibre cables are also used for communication, especially for larger distances. The various components/devices are generally located in control room/computer room/diagnostic and shift in charge room. Some panels (viz. network panels) are also located in outdoor plants and other units.

The entire work of dismantling, erection, testing, commissioning of the connected devices/equipments as listed in rate schedule is to be carried out including laying of peripherals cables (either plug-in or plugs to be fabricated at site), placement of computer furniture in computer room as per lay out. The computer furniture shall be supplied either assembled or in knocked down condition, which have to be assembled at site. The quoted rate shall be inclusive of cable laying, termination and placement of furniture against each device as given in the rate schedule.

2.10.0

Vibration Monitoring System (VMS) for boiler auxiliaries

System comprises of transducers with integral cables, weldable pads, wall mounted cabinet including monitors. The pads required to be welded on SS block on HT motors end shield and fan bearing housing. In case of pad sizes more than the SS block provided on motor, contractor shall get the pads machined as per the required size and blue matching to be carried out before welding on bearing housing. No extra charges will be applicable. Fabrication of all support, Frame for JB or Probe shall be in the scope of contractor.

2.11.0 Field instrumentation

2.11.1

Various type of primary/secondary indicating/recording instrument for pressure, temperature, flow, level and analytical measurement shall be supplied either loose or mounted along with the equipment.

2.11.2

Scope of work under erection/calibration/testing/commissioning shall include calibration, setting, adjustment, writing instrument tag number with paint, report making, installation, servicing, minor repairs/servicing, putting instrument into service, signal checking from field up to the functional group panels and remote indicating instrument, functional checks, interlock and protection/alarm checks by simulating the field devices, troubleshooting during pre-commissioning/post-commissioning till system is handed over to the customer.

2.11.3

It is the responsibility of contractor to make erection, calibration/testing protocols for various C&I equipments/devices and they should get duly certified by customer/BHEL engineer and should be submitted to BHEL engineer regularly. However, sample formats will be given by BHEL and have to be printed by contractor in adequate numbers.

2.11.4

Contractor shall establish calibration laboratory with adequate facilities and they should arrange standard test instruments duly calibrated from recognized agencies and calibration report of the same to be submitted prior to start of calibration of the field instruments/devices.

2.11.5

Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the bidder has to fix the thermowells on the pipeline. However, actual fixing of thermowells on pipeline and seal welding shall be done by the bidder .

2.11.6

Installation of instrument shall also include drilling of holes and tapping for mounting of instrument and local instrument frames/panels and supply of hardware for mounting of the instrument.

2.11.7

Some devices line solenoid valves, position feedback transmitters, limit switches, air filter regulators, airlock relays, positioners etc., are supplied assembled along with mechanical equipments like pneumatic control valves, power cylinders, trip valves, dampers, motorised actuators, etc. These will need removal, calibration/testing, re-fixing, adjustment, etc., and commissioning. Separate payment shall not be made for this. The rates quoted for the commissioning of these equipments (viz., pneumatic control valves, power cylinders, trip valves, dampers, etc.) should take care of the above. Also, the contractor shall remove such devices prior to erection either at site or at store to avoid damages/pilferages and keeping in safe custody and the same shall be installed prior to commissioning of such equipment.

2.11.7.1

Transmitter enclosure / open racks for various packages which are to be erected and commissioned at various locations of the Boiler, turbine and outdoors, shall be supplied with internal tubing, air filter regulators, rotameters, provision of continuous or intermittent purging arrangements wherever required, etc. The quoted rates for these racks / enclosures shall include the erection and commissioning of all such items inside these racks / enclosures.

2.11.8

Sometimes recalibration of equipments may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be as under:

Recalibration Charges = 60% of the Percentage Stage Payment for Calibration as per split-up defined in Terms of Payment

The contractor shall keep record of such instrument with the reason for re-calibration and certified by the BHEL Engineer.

Note: For recalibration of skid mounted items or other systems where lump-sum rates are quoted, the recalibration charges, if admissible, will be calculated from the relevant unit rates quoted for same / similar items elsewhere in the rate schedule. The decision of BHEL Engineer shall be final and binding on the contractor.

2.11.9

For the very few cases where required, the contractor shall carry out re-orientation of bottom/top entry arrangement for process connection if needed due to site condition in existing instrument rack/enclosure/JB and re-location of existing instrument including removing of the existing tubing and re-installation of the same at appropriate location due to any change in grouping of the instrument and no extra payment shall be applicable.

2.11.10

In certain cases instruments / devices are supplied on equipment or drawn by other agencies as part of mechanical package. The same are to be received or to be collected from other agencies for keeping in safe custody to avoid damages. The same are to be erected back after calibration for which unit rate shall be applicable for erection and calibration. Contractor shall maintain record of such instrument duly certified by BHEL engineer. However for removal of such instrument, no separate rate/payment shall be applicable.

2.12.0 Unit control desk and components

2.12.1 Unit control desk will be supplied in a single shipping section for erection at site.

Console Inserts shall be supplied either mounted on console grid or supplied loose. Also, the items (indicators, pushbuttons, etc.) of the console insert may be supplied mounted in the console insert or may be supplied loose. The lump-sum rates quoted for console inserts should take the above into consideration. No separate payment will be done for the erection of individual components of console inserts. However, for the other items like recorders, indicators, etc., unit rate shall be applicable. Alarm facia on the control desk may be supplied mounted or loose. Mounting these, if required, will not attract any extra payments. The commissioning of these will constitute a part of the panel commissioning from where the alarm is driven.

2.12.2

Wherever control desk / panel is not supplied by BHEL or is in customer scope of supply and installation, loose item supplied by BHEL if any, shall have to be mounted by the contractor.

2.12.3

Console/console tiles shall have plug-in/screwed/soldering/crimp snap-on, connection. Interconnecting cable between console and process control panel shall be either of pre-fabricated plug-in cable or plugs are required to be made at site with crimp insertion type of pins. BHEL shall provide plugs and any special lugs at free of cost. However, other ordinary lugs required for the work shall be arranged by contractor.

2.12.4

Generally, 0.5 sq.mm multi pair shielded cables are envisaged for console cabling. Cable may have to be terminated at different console tiles, spliced wire of individual cable need to be routed through PVC sleeves up-to the plug end of the tiles.

2.13 Final painting

2.13.1 All the fabricated frames, instrument racks, Junction box frame, trays / impulse pipes, supports, panel base frame, etc., wherever applicable shall be first painted with one coat of primer paint (metal red oxide) and then two coats of synthetic enamel paint of approved shade (decided by BHEL Engineer) after thoroughly cleaning the surface of dust, rust, scale, grease, oil, etc., by wire brushing, scrapping or any other suitable method. The quoted rates should be inclusive of all these including supply of paints and consumables.

2.13.2

Other equipment like JBs, Panels, transmitter racks, Local gauge boards etc., shall be painted with two coats of synthetic enamel paint. The quoted rates should be inclusive of application of two final coats of synthetic enamel paint. All the consumables such as wire brush, other cleaning materials, painting implements, etc., is to be arranged by the contractor at his own cost. All equipment painting will be done by spray painting. The quoted rates should be inclusive of all these including supply of paints and consumables.

2.13.3

Cable trays shall, in general, be connected by bolted joints. However, in some cases welding of joints may be required. All the weld joints of GI cable trays and GI structural members shall be applied with a coat of cold galvanising zinc paint. Paint, etc. shall be arranged by contractor at his cost.

The contractor shall provide the Primer (ROZC as per IS:2074) for the scope of painting work

indicated in Section-4 as well as for protection of site weld joints and gas cut locations. Contractor shall also arrange to provide the required thinner and other consumables, T&P etc. **required for application of ROZC Primer. All paints and thinners shall be sourced only from BHEL approved manufacturers. Some of them are as listed under:**

- M/ s Asian Paints
- M/ s Berger paints
- M/ s Jenson & Nicholson
- M/ s Shalimar Paints
- M/ s Akzo Nobel
- M/ s Kansai Nerolac Paints

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

Touch up paintings on damaged areas: Surface preparation by manual tools, wire brush/ emery paper etc. Minimum 6" peripheral area, adjoining to damaged area to be covered of metal surface is exposed; it is to be painted with Zinc rich epoxy (70 micron) or suitable primer with existing paint scheme. If primer is intact, intermediate & top coat to be done with specified DFT in scheme.

All the fabricated frames, instrument racks, Junction box frame, trays/ impulse pipes, supports, panel base frame, etc., wherever applicable shall be after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc., by wire brush, scrapping, sand blasting/ shot blasting (as applicable) 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. 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 color, shade etc. shall be as per specification. Painting schedule will be furnished at site. The quoted rates should be inclusive of all these including supply of paints and consumables.

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, sand blasting/ shot blasting (as applicable) 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. 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 color, shade etc. shall be as per specification. Painting schedule will be furnished at site.

Other equipment like JBs, Panels, transmitter racks, Local gauge boards etc., shall be painted with two coats of synthetic enamel paint. The quoted rates should be inclusive of application of two final coats of synthetic enamel paint. All the consumables such as wire brush, other cleaning materials, painting implements, etc., is to be arranged by the contractor at his own cost. All equipment painting will be done by spray painting. The quoted rates should be inclusive of all these including

All the weld joints of GI cable trays and GI structural members shall be applied with red oxide and aluminium paint and then coated with bitumen.

All damaged surfaces of galvanized or un-galvanized faces of steel structures etc. shall be brushed up and painted with red primer paint followed by two coats of aluminium paint/ enamel paint to the satisfaction of Engineer. The contractor has to arrange all the materials for painting at his cost.

Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/ wires which are exposed these are required to be painted with one coat of cold galvanizing zinc paint. Contractor to arrange the required paints and other items at his cost.

In case of GI 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 primer shall be compatible with the final coat paint schedule.

Colour Banding, Legend and Identification Marking, Direction marking etc. shall be in scope of the contractor.

Impulse pipes shall be applied with one coat of primer red oxide paint and two coats of synthetic enamel of prescribed shade of final paint as instructed by BHEL Engineer/ painting schedule. BHEL may prescribe a time gap between first coat and second coat of final paint. Paint, primer, brush, etc. supply is in the scope of the contractor. Colour codes for impulse piping, etc. will be as per standard codes/ mother pipe.

The external & internal colour of the panels/ enclosures shall be RAL 7032 and brilliant white respectively. The panels shall have matt finish to prevent any glare surface due to illumination.

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

Supply of paint, primers, other consumables etc. for above and any other scope in these specifications shall be in Contractor's scope.

Irrespective to scopes of painting & supply of paint mentioned elsewhere it is to be noted that supply of paint, primers, other consumables etc. for all primer/ painting works to be done by the contractor, shall be in Contractor's scope. No dispute shall be entertained on the above matter.

STRUCTURAL

Structural components may be supplied without any primer/ paint coat. The surface of such items shall be cleaned as per specifications and then coated with two coats of Primer.

PANELS, JUNCTION BOXES

Panels and Junction Boxes shall be Touch-up painted as and where original shop paint is peeled off. Necessary surface cleaning and preparation shall be done by the contractor as per relevant painting codes followed by two coats of Primer and two coats of Finish Paint.

2.14.0 Misc. Other instrument/ equipment erection, calibration and commissioning.

2.14.1

Wherever panels, pneumatic power cylinders and control valves have been erected by the contractor, calibration/ commissioning has to be carried out by the contractor.

2.14.2

Electronic Water Level Indicator (EWLI) Scope includes erection of 16 Port vessel, fixing of spring-loaded hanger support, laying of vent line and drain lines including welding (IBR applicable), fixing of electrodes, hydrotest, fabrication of frame for JB, fixing of local measurement unit at Boiler drum level. Installation of remote display unit at control room, laying and termination of cables etc. and commissioning of the system. Dismantling/Cutting/Removal of existing EWLI system and JBs is also included in scope.

2.14.3

If applicable-The calibration of position transmitters of the NRVs in the turbine extraction system has to be carried out by the contractor. Position transmitters are to be erected by contractor if supplied loose.

2.14.4

If applicable-The solenoids in the corner valves / HEA will be received in mounted condition and will be erected by the mechanical contractor. The contractor has to provide the services required for dismantling the solenoids and reinstalling the same after servicing/adjustment. Payments will be made as per testing/commissioning portion of the rate quoted for these items and no extra charges will be payable for removal and re-fixing. Small items like speed regulators, etc. will have to be fitted in the copper tubing route of corner stations. No separate rate will be applicable for such devices.

2.14.5

Dimension and weight as mentioned against control panels, MCCs, etc. in rate schedule are only approximate and there may be changes in dimension and weight in actual supply of the equipment and no rate variation shall be applicable on this account.

2.14.6

Wherever brief description of the system is given under various sub-heads, it is only for the understanding system requirements. It does not indicate the total specification of work. For such system, other clauses are also applicable wherein work details are specified.

2.14.7

Normally, cable glands on junction boxes side are received in mounted condition. While terminating the cables as per drawings, the cable glands are to be removed and fixed. Wherever cable glands are not received along with junction boxes, the cable glands as per the requirement will be provided by BHEL and the contractor has to make necessary holes/adjust the available holes in the JB for fixing these. No separate payment will be made for drilling of holes and fixing the cable glands to the junction boxes. Nameplates for JBs will be supplied separately. These are to be suitably written and fixed onto the JBs. Wherever nameplates for JBs are not supplied, the JB no. are to be written with paint on JBs for identification. Separate payment will not be made for this.

2.14.8

The push buttons and indicators in C&I systems are provided as loose with different type of connectors. The fixing of connectors and their wiring from push buttons to indicators shall be the responsibility of contractor. No separate payment will be made for fixing of connectors. The cable laying and termination charges will be paid as per applicable rate schedule.

2.15.0 Guidelines for erection

2.15.1 Impulse Pipelines

2.15.1.1

All impulse lines, air lines shall be thoroughly cleaned by removing the dust, burrs etc., and any foreign matter inside the pipe/air line is to be cleaned by compressed air or any other suitable means before installation.

2.15.1.2

The routing of pipe lines shall include sufficient flexibility near tap off points to allow for thermal expansion of process equipment.

2.15.1.3

The pipes shall be cold bent using hydraulic bending machines only.

2.15.1.4

The horizontal impulse lines shall be laid with proper slopes towards the tapping point.

2.15.1.5

Supports for piping and tubing shall be adequate and in no case exceed limits shown below:-

A) 1/4" OD / 3/8" OD copper	continuous
B) 1/2" NB pipe/tube	5 ft.
C) 3/4" NB pipe/tube	5 ft.
D) 1" NB pipe/tube	8 ft.

2.15.1.6

All CS impulse line welding shall be done through welding generator/rectifier and only structural welding may be done with welding transformer.

2.15.1.7

Impulse pipes of alloy steel/SS/carbon steel etc. shall be TIG welded. Contractor shall arrange for necessary TIG welding sets, electrodes etc.

2.15.1.8

Minimum number of fittings shall be used on all lines wherever possible, to keep threaded joints to a minimum wherever threaded connections are to be made.

2.15.1.9 Testing

On completion of pipeline installation, the pipelines shall be hydraulically tested. Contractor shall arrange for water filling pump, hydraulic test pump and standard gauges and conduct the test satisfactorily.

2.15.1.10

The impulse lines shall be isolated from instruments and tested at 2 times the maximum working pressure. The fall in pressure shall not be more than 1 kg/cm^2 or 1% of the working pressures whichever less, in 30 minutes is and there shall be no leaks at any of joints/welds when isolated from source of pressure.

2.15.1.11 Air Piping

All instrument air pipelines shall be isolated from the instruments and pressurised pneumatically to maximum work pressure. They shall then be isolated from the source of pressure and fall shall be less than 1 PSI in 20 minutes.

2.15.1.12 Pneumatic Signal Lines

All pneumatic signal lines shall be disconnected and blown through with instrument air. The line shall be blanked off and pressurised pneumatically 20 psi and checked with soap solution for leaks and attended accordingly.

2.16.1 Electrical cabling /wiring

All the cables will be properly laid in cable trays, dressed and clamped with aluminium flats. The cable will be terminated at both ends with suitable lugs and *printed ferrules* and will be glanded properly. Suitable equipment and consumables for ferrule printing has to be arranged by the contractor at his own cost. For cable identification, the contractor shall provide at his cost aluminium tags at regular intervals (15 m) through each run of cable.

2.16.1.1

All electrical connections shall be tested for polarity and proper connections.

2.16.1.2

Insulation test of the various circuits shall be done.

2.16.1.3

The checking of operation of individual equipment and instruments to which the cabling/wiring connected shall also be done by the contractor.

2.16.1.4

Wherever supplied, GI cable trays shall be of bolted construction only with fixing screws and coupler plates.

2.16.1.5

To the extent possible, all the trays shall be fixed in vertical orientation

2.16.1.6

Sharp bends of cable trays shall be avoided in all type of cable trays.

2.16.1.7

Installation of cable racks and supports structure shall be carried out in all the required areas. Steel embedment shall be provided in the cable trenches, ceiling slabs and concrete blocks for installing the cable racks and support structures.

A) Ladder perforated type cable trays shall be used in cable trenches and vertical risers.

B) Perforated cable trays shall be used in higher elevations in boiler and TG area.

2.16.1.8

Cable racks in the trenches and control room are to be shared with other contractors installing cables in different areas wherever required. Contractor shall cooperate with the other contractors in sharing the cable trays and proper dressing and clamping the cables.

2.16.1.9

Where power and control cables are to be laid in the same route, suitable barriers to segregate them physically shall be employed.

2.16.1.10

Space equal to the diameter of cable shall be provided between power cables of six over 50 mm in diameter.

2.16.1.11

When cables pass through floors, walls etc., it shall be passed through a pipe for mechanical protection and the pipe ends sealed suitably.

2.16.1.12

Care shall be taken to avoid short bending and kinking of conductor damaging insulation and stressing the cable beyond pulling force recommended by the manufacturer. Cable shall be protected at all times from mechanical damage.

2.16.1.13

The minimum radius of formed bend of an insulated cable shall be 12d for un-armoured cables and 15d for armoured cables where'd' is the overall diameter of the cables.

2.16.1.14

No cable shall be laid in ducts or trenches where other services such as oil pipes, steam or water pipes are laid.

2.16.1.15

Where cabling passes through brickwork or concrete work, the contractor shall provide suitable local protection against mechanical damage wherever necessary.

2.16.1.16

The layout of all cables shall be arranged to give adequate clearance from other services and cables shall be routed to avoid hot zones.

2.16.1.17

Jointing of cables shall be avoided as far as practicable. However, jointing if at all necessary shall be done by crimping type cable joints after getting approval of BHEL engineer.

2.16.1.18

The cable schedules indicating cable sizes, tentative cables routing information will be furnished by BHEL at site to the contractor. Required steel inserts on cable trenches, ceilings of the platforms in TG hall for erecting the cables will be provided by BHEL. The contractor shall design number of cable/racks to accommodate the cables on racks/trays properly.

2.16.2.0 Earthing installations

2.16.2.1

All equipments shall be earthed by two separate and distinct connections. Earthing terminals will be available in all equipment supplied by BHEL.

2.16.2.2

The earthing conductors shall be of mild steel/GI strip/ wires. All connections from equipment to main earthing conductors shall be made as illustrated in earthing drawing / as per instruction of BHEL engineer.

2.16.2.3

A continuous earthing conductor shall be installed in all cable trays and securely clamped to each tray section by suitable connectors to form a continuous earthing system. When two or more trays supporting power cables run in parallel, a continuous earthing conductor shall be provided on trays only with tap offs to the control cable trays. All valve and damper motors and rapping motors will be earthed to this conductor.

2.16.2.4

All joints in the earthing system shall be welded type. Earthing connections to all equipments including motors shall be bolted type.

2.16.2.5

Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint.

2.16.2.6

Metallic sheaths, screens/shields and armour of all multicore cables shall be bonded and earthed.

2.16.2.7

Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm.

2.16.2.8

Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/wires which are exposed these are required to be painted with one coat of cold galvanising zinc paint. Contractor to arrange the required paints and other items at his cost.

2.17.0 Instruments and Equipment

2.17.1

All field mounted instruments are to be located in such a way as not to obstruct walk-ways or plant equipment access but shall be easily accessible for maintenance. Hand rails shall not be used for mounting or supporting instruments.

2.17.2

Racks/stands and supports for instruments and transmitters shall be fixed on RCC column/floor by chipping and grouting or by welding to steel structure. In no case these shall be welded to floor grills.

2.17.3

The power cylinders support/base erection will be welded to steel structure or by grouting. The power cylinder will be properly aligned and linkage mechanism wherever required shall be connected to the driven equipment. All accessories for power cylinders line air sets, solenoid valves, air lock, limit switches, if supplied loose, shall be fixed, aligned and connected up.

2.17.4

When installing flow and pressure transmitters/switches for Liquid /steam/condensate vapour services, the instrument is to be mounted below its primary element or tapping point. For gas service applications, the instrument is to be mounted above Primary element tapping point.

2.17.5

During erection and commissioning stage, the site mounted instrument shall be protected suitably. Contractor shall provide suitable security arrangement in main control room, and other areas where equipments are positioned, at no extra cost.

2.17.6

All brackets/racks and support steel work for tubing impulse lines/instruments shall be painted with two coats of primer and two coats of final colour prior to installation. Paints, etc supply in the scope of contractor. **(Also Refer 2.13)**

2.17.7

Contractor shall arrange for own fire fighting equipments for the materials stored under contractor's custody.

2.18.0 Guidelines for handling and storage of electronic cubicles / subassemblies / loose items.

2.18.1

Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipments may get damaged due to vibration and shock.

2.18.2

After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site engineer.

2.18.3

Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.

2.18.4

After opening the case, all supports provided for transport are to be removed with due care.

2.18.5

Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.

2.19.0 Storage

2.19.1

The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL engineer. The equipment should be best protected in its cases. It should be arranged away from walls.

2.19.2

The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damps, sinking into around and to circulate air under the stored equipment. This will also help in lifting packing with fork-lifter.

2.19.3

Periodic inspection if silica gel placed inside the equipment is necessary. It has to be replaced or regenerated when decolourisation takes place.

2.19.4

Due care should be taken to ensure that the equipment is not exposed to fumes, gases etc., which can affect electrical contacts of relays and terminal boards.

2.19.5

The storage room and the equipment should be checked at regular interval to ensure protection from termites, mould growth, condensation of water etc., which can damage the equipment.

2.19.6

All the equipment, materials and goods kept in the store room should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site engineer.

2.19.7

The packing material shall be retained if the cubicle is to be repacked after inspection.

2.20.0

Sub-assemblies

2.20.1

All subassemblies should be kept in a separate place where it is easily accessible.

2.20.2

Subassemblies should have a protective cover in case it is stored without wooden packing/case to prevent accumulation of dust. Silica gel packets should also be kept along with it.

2.20.3

Subassemblies should not be stacked one above the other.

2.21.0 Loose items

The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorised and stored separately.

2.22.0 Guidelines for handling of electronic modules

2.22.1 *All the modules shall be handled by qualified persons only.*

2.22.2 Electronic modules should only be touched when it is absolutely essential to do so.

2.22.3

Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.

2.22.4

The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.

2.22.5

The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched.

2.22.6

The electronic modules should not be placed close to television sets or CRT units.

2.22.7

Soldering irons and any other tools used must be grounded.

2.22.8 All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place tothe other.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		Yes	*Agency has to make his own arrangement at his own cost.*
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V			*Free; Any penalty due to non-maintenance of power factor by the customer shall be passed on to the contractor.*
a	Single point source	Yes		
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**			*Agency has to make his own arrangement at its own cost.*
a	Single point source	Yes		

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL (Scope Matrix)

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**			*Agency has to make his own arrangement at its own cost.*
a	Single point source	Yes		
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	**WATER SUPPLY**			
3.3.1	**For construction purposes**			*Agency has to make his own arrangement at its own cost.*
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3 At the construction site /area		Yes	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Telephone, fax, internet, intranet, e-mail etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.9.1	Engineering works for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	**Yes**		
b	Drawings for construction methods	**Yes**		*In consultation with BHEL*
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		**Yes**	*In consultation with BHEL*
d	Shipping lists etc for reference and planning the activities	**Yes**		
e	Preparation of site erection schedules and other input requirements		**Yes**	*In consultation with BHEL*

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/ BHEL
(Scope Matrix)

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		**Yes**	*In consultation with BHEL*
g	Weekly erection schedules based on Sl No. e		**Yes**	*In consultation with BHEL*
h	Daily erection / work plan based on Sl No. g		**Yes**	*In consultation with BHEL*
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two weeks.		**Yes**	
j	Preparation of preassembly bay		**Yes**	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		**Yes**	
L	Arranging the materials required for preassembly		**Yes**	
M	HSE Permits, Approvals, Requirements		**Yes**	

04.00.0 ERECTION CONDITIONS OF CONTRACT

The provisions shall supplement the conditions already contained in the other parts of these specifications and documents and shall govern that portion of the work of this contract which is to be performed at site. The erection requirements and procedures not specified in these documents shall be in accordance with the recommendations of BHEL, or as mutually agreed to between BHEL and the Bidder prior to commencement of erection work.

The Bidder upon signing of the Contract shall, in addition to a Project coordinator, nominate another responsible officer as his representative at Site suitably designated for the purpose of overall responsibility and coordination of the Works to be performed at Site. Such a person shall function from the Site office of the Bidder during the pendency of Contract.

04.01.0 ELECTRICAL SAFETY REGULATIONS

04.01.01 In no circumstances will the Contractor interfere with fuses and electrical equipment belonging to the other Contractor or Customer

04.01.02 Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Customer, he shall:

1) Satisfy BHEL/Customer that the appliance is in good working condition.

2) Inform the BHEL/Customer of the maximum current rating, voltage and phase of the appliances.

3) Obtain permission of the BHEL/Customer detailing the socket to which the appliances may be connected. The BHEL/Customer will not grant permission to connect until he is satisfied that the appliance is in good condition and is fitted with a suitable plug.

4) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.

04.01.03 No electric cable in use by the other Contractor/ Customer will be disturbed without permission. No weight of any description will be imposed on any such cable and ladder or similar equipment will rest against or be attached to it.

04.01.04 No repair work shall be carried out on any live equipment. The equipment must be declared safe by the BHEL/Customer and a permit to work issued before any work is carried out.

04.01.05 The Contractor shall employ the necessary number of qualified, full time electricians to maintain his temporary electrical installation.

04.02.0 WELDING PROCEDURE

The welding of all equipment, piping, pressure parts shall be in accordance with qualified welding procedures. The welders must be qualified in accordance with the latest applicable and statutory requirements.

04.03.0 REMOVAL OF MATERIAL

No material brought to the Site shall be removed from the Site by the Contractor without the prior written approval of the BHEL/Customer.

04.04.0 ACCESS TO SITE AND WORKS ON SITE

04.04.01 Suitable access to site and permission to work at the Site shall be accorded to the Contractor by the BHEL/Customer in reasonable time.

04.04.02 The execution of the Works, no person other than the Contractor or his duly appointed representative, and workmen, shall be allowed to do work on the Site, except by the special permission, in writing by the BHEL/Customer or his representative.

04.05.0 CONTRACTOR'S SITE OFFICE ESTABLISHMENT

The Contractor shall establish an Office at the Site and keep posted an authorized representative for the purpose of the Contract.

04.06.0 FACILITIES TO BE PROVIDED BY THE CUSTOMER

04.06.01 ELECTRICITY

The Contractor shall be provided with free supply of electricity for the purposes of the Contract, only at two locations in the Customer's Site and at 415V voltage level. The Contractor shall make his own

further distribution arrangement. All temporary wiring must comply with local regulations and will be subject to Customer's inspection and approval before connection to supply. The free supply of power will not be provided for the use in the labor and staff colony.

04.06.02 WATER

Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labor and other personnel at the worksite/colony.

04.07.0 FACILITIES TO BE PROVIDED BY THE CONTRACTOR

04.07.01 Contractor's site office Establishment: The Contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the contract.

04.07.02. Contractor shall deploy labour workers whose police verification is carried out. Contractor has to give under taking for the same while obtaining the gate pass. Contractor has to submit police verification record of his labour /workers to Dy. Commandant, CISF, CSTPS/A.D. Security, CSTPS.

04.07.03. Contractor shall obtain gate pass with receipt of work order & start the work as per directives of contract operating authority, otherwise action as deemed fit shall be taken against Contractor.

04.08.0 TOOLS, TACKLES AND SCAFFOLDINGS

The Contractor shall provide all the construction equipment, tools, tackles and scaffoldings required for pre-assembly, installation, testing, commissioning of the equipment covered under the Contract. He shall submit a list of all such materials to BHEL/Customer before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without the written permission of the BHEL/Customer. The Contractor shall arrange Dozer, Hydra, Cranes, Trailer, truck, etc. for the purpose of fabrication, dismantling, erection and commissioning, and material management to and from the site.

04.09.0 CLEANLINESS

04.09.01 The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish and scrap material shall be stacked or disposed in a place to be identified by the Customer. Materials and stores shall be so managed to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

04.09.02 Similarly, the offices and the residential areas of the Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction. Proper sanitary arrangements shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.

04.10.0 SECURITY

The Contractor shall have total responsibility for all equipment and materials in his custody stores, loose, semi-assembled and/or erected by him at Site. The Contractor shall make suitable security

arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the Site only with the written permission of the BHEL in the prescribed manner.

04.11.0 COMMISSIONING ACTIVITIES

04.11.01 Upon completion of pre-commissioning activities/tests, the contractor shall initiate commissioning of equipment/systems. During commissioning the Contractor shall carry out system checking and reliability trials on various parts of the equipment/systems.

04.11.02 Contractor shall carry out the checks/tests at site, according to instructions of BHEL engineer, to prove to the Customer that each equipment of the supply complies with requirements stipulated and is installed in accordance with requirements specified.

01.11.03 Before the plant is put into initial operation the Contractor shall be required to conduct test to demonstrate to the BHEL/Customer that each item of the plant is capable of correctly performing the functions for which it was specified and its performance, parameters etc. are as per the specified/approved values. These tests may be conducted concurrently with those required under commissioning sequence. Decision of BHEL engineer shall be final and binding on contractor.

04.11.04 Other tests shall be conducted, if required by the BHEL/Customer, to establish that the plant equipment are in accordance with requirements of the specifications.

04.11.05 The Contractor shall conduct all the commissioning tests and undertake commissioning activities pertaining to all other auxiliaries and equipment including all electrical and C&I equipment/systems not specifically brought out above but are within the scope of work and facilities being supplied and
Installed by the Contractor and follow the guidelines indicated above or elsewhere in these technical specifications.

04.12.0 MATERIALS HANDLING AND STORAGE

04.12.01 Contractor after issue of material shall be responsible for examining all the shipment and notify the BHEL/Customer immediately of any damage, shortage, discrepancy etc. for the purpose of BHEL/ Customer's information only. However, the Contractor after receipt/issue of material shall be solely responsible for any shortages or damage in transit, handling and / or in storage and erection of the equipment to and from the site.

04.12.02 All electrical panels, controls gear and such other devices shall be properly dried by heating before they are installed and energized. Exposed parts shall be protected against moisture ingress and corrosion during storage at site after issue to the contractor and periodically inspected.

04.12.03 The Contractor shall ensure that all the packing materials and protection devices used for the various equipment during transit and storage are removed before the equipment are installed.

04.12.04 The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.

04.12.05 After issue all the materials stored in the open or dusty location must be covered with suitable weather-proof and flameproof covering material wherever applicable.

04.12.06 If the materials belonging to the Contractor are stored in areas other than those earmarked for him, BHEL will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.

04.13.0 PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY

04.13.01 The Contractor shall be responsible for any damage resulting from his operations. He shall also be responsible for protection of all persons including members of public and employees of the BHEL/Customer and the employees of other Contractors and Sub- Contractors and all public and private property including structures, building, other plants and equipment and utilities either above or below the ground.

04.13.02 The Contractor will ensure provision of necessary safety equipment such as barriers, sign - boards, warning lights and alarms, etc. to provide adequate protection to persons and property.

04.13.03 The Contractor shall follow and comply with all the Safety Rules, standards, code of practices of MSPGCL and relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time.

04.14.0 FOUNDATION DRESSING, GROUTING AND DOWELLING

04.14.01 The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment/equipment bases on the foundations. All the equipment/ equipment bases shall be grouted and finished as per these specifications unless otherwise recommended by the equipment manufacturer. The concrete foundation surfaces shall be properly prepared by chipping, grinding as required to bring the top of such foundation to the required level, to provide the necessary roughness for bondage and to assure enough bearing strength.

04.14.02 Grout

The grout shall be high strength grout having a characteristic compressive strength as per standard for equipment.

04.14.03 DOWELLING

All the turbine supervisory sensors and other equipment shall be suitably doweled with tapered machined dowels as per the standards and direction of the BHEL/Customer

04.15.00 Bidder is to provide one office boy in each shift for BHEL Office.

04.16.00

04.16.01 Equipment Installation

a) General Requirements

i) The Contractor shall furnish all construction materials, tools and equipment other than that being supplied by BHEL and shall perform all work required for complete installation of all control and instrument equipment furnished under this specification. This clause is to be read in conjunction with relevant clauses, instructions, guidelines etc. mentioned elsewhere in this document.

(ii) Contractor shall prepare Marked-Up drawings incorporating modifications and deviations from original drawings or prepare fresh sketch for actual installation/ connection details if need be, that can be converted to "As-built" drawings.

iii) The Contractor shall coordinate his work with other suppliers/contractors where their instruments and devices are to be installed under specifications.

b) **Regulatory Requirements**

All installation procedures shall confirm with the accepted good engineering practice and with all applicable governmental laws, regulations and codes.

c) **Cleaning**

All equipment shall be cleaned of all sand, dirt and other foreign materials immediately after removal from storage and before the equipment is brought inside the power plant building or to other installation sites. All piping and tubes shall be air blown.

d) **Equipment Assembly**

Equipment installed under these specifications shall be assembled if shipped unassembled. The equipment shall be dismantled and reassembled as required to perform the installation and commissioning work described in these specifications.

e) **Equipment Setting**

Field mounted instruments and accessories, other than those in local instrument enclosures/racks, shall be bracket or sub panel mounted on the nearest suitable firm steel work or masonry. The brackets, stands, supports and other miscellaneous hardware required for mounting instruments and accessories such as receiver gauge, air set, valve manifold, purge-meter etc. shall be furnished and installed. No field mounted instruments shall be installed such that it depends for support or rigidity on the impulse piping or on electrical connection to it.
Indicating type field mounted instruments shall be installed in such a way that centre of indicating dial shall be about 1600-1800mm from operating floor level or as instructed by BHEL engineer. Non-indicating type field instruments shall be installed such that operating handle of manifold block / isolating cock comes within 1600 mm from operating floor level or as instructed by BHEL engineer. All free standing instrumentation cabinets and panels shall be located within the construction tolerances of +/- 3 mm of the location dimensions indicated on the Customer's plant arrangement drawings or as per recommendation/instruction of BHEL engineer.

f) Free-Standing Equipment

Free-standing Cabinets shall be attached to the floor, concrete equipment bases or supporting steel as indicated on relevant drawings/documents. The cabinets shall be shimmed for proper alignment before bolting them to the floor or welding of base frame as required. Adjacent enclosures shall be shimmed to maintain mutually level appearance before they are attached to floor. Vibration dampening mounts shall be installed between supporting structures and panels when specified.

g) Non-free Standing Equipment :

Non-free standing local enclosures and cabinets shall be mounted in accessible locations on columns, walls, or stands in locations as indicated on the Customer's Plant Arrangement Drawings or as per instruction of BHEL engineer which shall be final and binding on contractor. Bracket and stands shall be fabricated as required to install the local enclosures and cabinets in a workman like manner

ii) Rough edges and welds on all fabricated supports shall be ground smooth. The supports shall be finished as per painting schedule previously mentioned.

h) Equipment Location :

(i) All individual items of equipment not located in cabinets or on panels and racks are located approximately according to the floor elevation and the nearest building column designated by the BHEL/Customer.

(ii) Solenoid valves not located in enclosures or mounted on valves shall be mounted in easily accessible protected locations near the components with which they are associated.

(iii) All brackets, stands, supports and other miscellaneous hardware required for mounting devices shall be furnished, other than that being supplied by BHEL and installed.

i) Installation of Field Mounted Instruments and Devices

All installation work under this specification shall be strictly as per installation drawings or as per instructions of BHEL engineer which shall be final and binding on contractor. In addition to above relevant Portion as specified elsewhere in technical specification may be referred.

j) Piping Connections

(i) All equipment having piping connections shall be levelled, aligned and wedged in place but shall not be grouted or bolted prior to the initial fitting and alignment of connecting piping. However, all equipment shall be grouted or bolted to its foundation prior to final bolting or welding of the connection piping.

(ii) All flanged joints shall be checked and retightened after approximately 10 days of operation at normal operating temperature.

k) Equipment Checkout

(i) All equipment shall be cleaned after installation. Equipment subject to pressure differentials shall be checked for leakage.

(ii) After erection, all equipment having moving parts, having electrical apparatus, or subject to pressure differentials shall be trial-operated.

l) Defects

(i) All defects in erection shall be corrected to the satisfaction of the BHEL/ Customer and the Project Manager. The dismantling and reassembly of Contractor furnished equipment to remove defective parts, replace parts, or make adjustments shall be included as a part of the work under these specifications.

m) Equipment Protection

(i) All equipment to be erected under these specifications shall be protected from damage of any kind from the time of contract award until commissioning of each unit.

(ii) The equipment shall be protected during storage as described herein.
(iii) Equipment shall be protected from weld spatter during construction.
(iv) Suitable guards shall be provided for protection of personnel on all exposed rotating or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy removal and maintenance.

(v) Equipment having glass components such as gauges, or equipment having other easily breakable components, shall be protected during the construction period with plywood enclosures or other suitable means. Broken, stolen, or lost components shall be replaced by the Contractor.

(vi) Machine finished surfaces, polished surfaces, or other bare metal surfaces which are not to be painted, such as machinery shafts and couplings shall be provided temporary protection during storage and constructional periods by a coating of a suitable non- drying, oily type and rust preventive compound.

04.17.0 DEVIATIONS DISPOSITIONING:

Any deviation to the contract and BHEL/ Customer approved documents shall be properly recorded. All the deviations shall be brought to the knowledge of BHEL representative for suitable disposition.

5.00.00 ARRANGEMENT OF SAFETY ENGINEERS ALONG WITH COMPLIANCE OF ALL HSE REQUIREMENTS:-

1) Two (2) Nos Safety Engineers are to be deployed by the contractor for complete duration of R&M works in consultation with BHEL Site-In-Charge. Safety Engineer should be qualified from approved institute. Certificate shall be produced at the time of deployment.

2) Bidder has to fulfil all HSE related requirement at site.
3) In Addition to BHEL safety conditions in tender, Bidder has to fulfill MSPGCL safety norms at site **(KINDLY REFER Annexure-B)**

6.00.00 ARRANGEMENT OF C&I EXPERTS:-

1) Two (2) Nos. C&I experienced experts are to be deployed by the contractor for complete duration of R&M works in consultation with BHEL Site-In-Charge.

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A: TOOL & PLANTS

List of major testing & measuring equipment/ tools and tackles to be arranged/ brought by contractor.

S. No.	Description	UoM	Qty
1	DC power supply 0-250 V, 10 A make "Aplab" or equivalent (variable source)	Nos.	4
2	DC shunt 400 A 75 mV	Nos.	2
3	Dead weight tester rated 400 kg/ cm^2 and with weights and test gauge facility. Make 'Budenberg' or 'Ravika'	Nos.	2
4	Decade resistance box	Sets	4
5	Digital Tong tester AC 5/ 10 and 25/ 60/ 300 A of reputed make	Nos. Each	2
6	Digital Tong tester DC 30/ 60/ 300 A	Nos.	1
7	Earth Resistance Tester	Nos.	1
8	Equipment and consumables for LPI/ MPI test on impulse pipes	Sets	As required
9	Ferrule printing machine	Nos.	2
10	Fire proof tarpaulin		As required
11	Function Generator	Nos.	2
12	Glass thermometer 0-120 °C, 0-200 °C and 0-600 °C	Nos. Each	As required
13	Inclined manometer (+/ -) 300 mm water column	Nos.	2
14	Industrial type vacuum cleaner	Nos.	2
15	Insulation Tester Hand Operated 250V/ 500V/ 1000V rated mains/ battery operated	Nos.	2
16	Insulation Tester Hand Operated 250V/ 500V/ 1000V rated mains/ battery operated	Nos. Each	2
17	Manometers (+/ -) 500 mm mercury column with hand bulb for lab and small manometer for field purpose.	Nos.	2
18	Muffle furnace – 800 °C with standard temperature gauges	Nos.	As required
19	Multimeters		
	A) Digital, 3 1/ 2 digit Motwane/ HIL/ Fluke or any reputed make	Nos.	4
	B) Digital, 4 1/ 2 digit Motwane/ HIL/ Fluke or any reputed make	Nos.	4
20	Oil temperature bath suitable to calibrate the instruments range 0 – 200 °C with standard temperature gauges and thermostatic control	Nos.	4
21	Portable air compressor with drier and regulator make "Toshniwal/ Khosla" or any reputed make rated for 7 to 10 kg/ cm^2	Nos.	As required
22	Rheostat	Nos.	2
23	RTD/ Pt 100 source	Nos.	2
24	Single Phase Variac 250 V, 8 A	Nos.	2

25	Soldering iron "Soldron" make 25 W	Nos.	2
26	Standard gauges 12" dial size make "Budenberg" or "H Guru" or "Odin" or any reputed make		
	A) –1– 0 kg/ cm^2 pressure gauge(vacuum gauge)	Nos.	2
	B) 0 – 5 or 6 kg/ cm^2 pressure gauge	Nos.	2
	C) 0 – 10 kg/ cm^2 pressure gauge	Nos.	2
	D) 0 – 25 kg/ cm^2 pressure gauge	Nos.	2
	E) 0 – 60 kg/ cm^2 pressure gauge	Nos.	2
	F) 0 – 100 kg/ cm^2 pressure gauge	Nos.	2
	G) 0 – 250 kg/ cm^2 pressure gauge	Nos.	2
	H) 0 – 600 kg/ cm^2 pressure gauge	Nos.	2
	I) 0.2 to 1 kg pressure gauge	Nos.	2
27	Standard milliamps/ millivolts source of reputed make. Range 0 to 60 mA and 0 to 100 mV	Nos.	3
28	Temperature Gun Digital Type	Nos.	1
29	Three Phase Variac 05 A	Nos.	2
30	Vacuum Pump	Nos.	2

NOTE:
Instruments shown above are for the regular works only. However, separate sets of tools and instruments are to be arranged and provided to commissioning gang. If contractor fails to arrange the testing instruments as listed above, BHEL site will arrange the instruments at the cost of contractor. Contractor to submit calibration report from recognized agency prior to deployment of it at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

HANDLING EQUIPMENTS

S. No.	Description	UoM	Qty
1	Chain pulley block/ turfer		As required
2	Cranes, trucks etc. for transportation and erection of equipment		As required
3	D-shackles		As required
4	Manila ropes		As required
5	Nylon Slings		As required
6	Steel wire ropes		As required
7	Turn buckles		As required

MAJOR T&Ps

8	24V AC Transformer & Hand lamps	Nos.	10
9	Cable Rollers		As required
10	Chain Pulley Blocks 5/ 10 T	Nos. Each	2
11	Copper tube bender and cutter sizes 6mm, 8mm, 1/ 2", 1/ 4"	Nos. Each	2
12	Crimping tool up to all sizes of Cables under scope of work	Nos. Each	10
13	Die sets for threading up to 2" pipe.	Nos.	4

14	Distribution boards with power cable complete as required		As required
15	Drilling machines 1/ 4", 1/ 2", 3/ 4" & 1"	Nos. Each	2
16	Electrician tool kit	Sets	16
17	Electrode drying ovens		As required
18	Ferrule printing machine	Nos.	2
19	Fire extinguishers (Type: as required)	Nos.	5
20	Fire proof tarpaulin		As required
21	Flood light fittings	Nos.	10
22	Grinding machine	Nos.	10
23	Measuring instruments like Micrometres and Callipers	Sets Each	2
24	Mechanical tool kit for fitters	Sets	10
25	Painting brush		As required
26	Personal computer and accessories, Printer	Sets	1
27	Pipe bending machine – 2" size	Nos.	4
28	Safety belts and Safety helmets		As required
29	Spirit level	Nos.	4
30	Tap sets for both BSP and MPT threads up to 1" each	Sets Each	2
31	TIG Welding Set	Nos.	4
32	Welding Generators		As required
33	Welding Transformers		As required

The following materials/ consumables are to be arranged by the contractor as part of the contractual scope.

S. No.	Description
1	Welding electrodes for welding AS/ CS/ SS pipe and other welding from BHEL approved vendors only
2	Filler wire for argon welding
3	Argon, oxygen and acetylene gas
4	Provision for temporary scaffoldings.
5	GI "U" clamps with nuts and washers for impulse and GI pipe clamping.
6	Round aluminium tags (30mm dia. x 3mm thick)
7	Teflon tape and insulation tape.
8	Hold tight/ bitumen tape for GI pipe coupling.
9	Required paints and primer from BHEL approved vendors only.
10	Solder wire (60/ 40)
11	Protocol/ calibration report sheets as per BHEL format.
12	Panel/ JB sealing compound material (for cable entry from bottom/ top of panel).
13	PVC cable tie, aluminium strip and hardware for clamping of cables, copper tube, and temperature gauge capillary.
14	Copper lugs up to 4 sq. mm, PVC sleeve of different size, PVC button & tape
15	Ferrules (PVC) and suitable for ferrule printing.

NOTE:

a) Instruments shown above are for the regular works only. However, separate sets of tools and instruments are to be arranged and provided to commissioning gang. If contractor fails to arrange the testing instruments as listed above, BHEL site will arrange the instruments at the cost of contractor.

b) The list of instruments/ equipment to be brought by the contractor as shown above is only indicative. Any other instruments/ equipment are required for the execution of the work is to be necessarily arranged by the contractor. The testing/ calibration instruments which are used to be duly calibrated in the interval prescribed by BHEL engineer from the BHEL approved agencies. And test certificate to be furnished.

c) The testing/ calibration instruments which are used to be duly calibrated in the interval prescribed by BHEL Engineers from the reputed agencies decided by BHEL and test certificate to be furnished. Contractor to submit calibration report from recognized agency prior to deployment of same at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

d) Other than the aforesaid, one computer, printer and other necessary peripherals will have to be maintained by the contractor in his site office.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – V: T&Ps and MMEs to be deployed by BHEL on sharing basis

List of T&P/instruments and consumables that will be made available by BHEL free of hire charges (on sharing basis).

1	EOT crane in TG hall shall be made available on sharing basis for handling panels	

Note:-

Skilled EOT Crane operators, for round the clock working is in bidder's scope.

Above T&P will be provided on sharing basis only. Contractor has to plan his activities well in advance and inform BHEL Engineer in charge/ Construction Manager the date of actual use. The decision of BHEL Engineer in-charge/ CM on this will be final and binding.

6.0 TIME SCHEDULE AND MOBILIZATION:

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION AND TENTATIVE SCHEDULE

AFTER RECEIPT OF FAX/ EMAIL LOI, CONTRACTOR SHALL DISCUSS WITH PROJECT MANAGER/ CONSTRUCTION MANAGER REGARDING INITIAL MOBILIZATION. CONTRACTOR SHALL REACH SITE, MAKE HIS SITE ESTABLISHMENT AND BE READY TO COMMENCE THE ERECTION WORK **WITHIN TWO WEEKS** FROM THE DATE OF ISSUE OF LETTER OF INTENT OR AS PER THE DIRECTIONS OF CONSTRUCTION MANAGER/ PROJECT MANAGER OF BHEL. SUCH RESOURCES SHALL BE PROGRESSIVELY AUGMENTED TO MATCH THE SCHEDULE OF MILESTONES AND COMMISSIONING.

THE CONTRACTOR HAS TO SUBSEQUENTLY AUGMENT HIS RESOURCES IN SUCH A MANNER THAT THE ENTIRE WORK IS COMPLETED TO ACHIEVE THE FOLLOWING TENTATIVE SCHEDULE:

PRE- SHUT DOWN WORKS: 02 MONTHS PRIOR TO SHUTDOWN DATE.

SHUTDOWN WORKS:
Completion of Identification, Dismantling, and Erection & Commissioning (up to first synchronization of Unit) of Unified Distributed Digital Control Monitoring & Information System (DDCMIS) for Renovation & Modernization of complete Control & Instrumentation system in SHUTDOWN PERIOD: **35 DAYS FROM COMPLETE STEAM GENERATION STOPPAGE UP TO FIRST SYNCHRONIZATION OF UNIT.**

TENTATIVE SHUTDOWN SCHEDULE: JAN-2026 to MAR-2026. However, the exact date of the Unit (Unit-5) shutdown shall be intimated to Contractor by BHEL.

6.1.2 Contract Period

The Contract period shall be 125 days from the start of work. Contract period includes the following:-

Pre-Shutdown activities: 60 days (Tentative)

Shut down period: 35 days (from complete steam generation stoppage up to first synchronization of Unit)

After completion of work and successful running of DDCMIS system: 30 days

Pre-Shutdown works, Dismantling, Erection, Testing, Calibration and Commissioning of permanent equipments required for completion of system shall be completed within the time schedule given above.

NOTE: Above time schedule is tentative and in order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule, contractor shall arrange & augment all necessary resources from time to time as per the instructions of BHEL.

6.2

The contractor should reach site and establish his site office and mobilise to commence the work as per directions of BHEL engineer. The date of starting the work at site shall be fixed in consultation with BHEL's engineer and the same will be recorded in measurement book while entering the first RA bill.

6.3

Subject to availability of materials and other inputs, it is the responsibility of the contractor to carry out work to achieve the weekly progress and keep up the schedules.

6.4

Contractor shall draw the periodic (weekly.) erection programme along with BHEL engineer indicating the work to be achieved and event to be completed. Once the programme is drawn, he shall adhere to the same. Contractor shall plan and erect the materials as it is received at site. The monthly/weekly planned percentage shall take into consideration the material available at site before the start of the month/week and also any material received during the month. Contractor shall mobilise his resources required to achieve the monthly programmes.

6.5 DEFINITION OF WORK COMPLETION

The contractor's scope of work under these specifications will be deemed to have been completed in all respect, only when all the activities are completed satisfactorily and so certified by BHEL site in charge. The decision of BHEL in this regard shall be final and binding on the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – VII: TERMS OF PAYMENT

The progressive payment for dismantling, erection, testing and commissioning on accepted price of contract value for C&I Package rates will be released as per the break up given hereinafter:

	TERMS OF PAYMENT FOR C&I	
Sl. No.	**Activity/Work Description**	**% of unit rate**
A	**Main E&C Equipments/Items**	
(I)	**PRO RATA PAYMENTS (85%)**	
1.0	**Cable tray and accessories**	
1.1	Fabrication and fixing/welding/bolting in position	60%
1.2	Earthing of cable trays	15%
1.3	Tagging of cable trays (painting cable tray numbers on sides)	5%
1.4	Covering of trays where ever envisaged	5%
	Total =	**85%**
2.0	**Cable laying (Control and Signal Cables)**	
2.1	Laying of cables	45%
2.2	Glanding, Termination and tagging of cables	15%
2.3	Dressing and clamping of cables	10%
2.4	Shielding of cables	5%
2.5	Testing and charging of cables	10%
	Total =	**85%**
3.0	**Cable laying (Power Cables)**	
3.1	Laying of cables	45%
3.2	Glanding, Termination and tagging of cables	15%
3.3	Dressing and clamping of cables	10%
3.4	Testing and charging of cables	15%
	Total =	**85%**
4.0	**Junction box/Push button station (local)**	
4.1	Erection including fixing of terminal blocks where ever applicable	75%
4.2	Name plate fixing where ever applicable , Labelling (both inside and outside) and Commissioning of connected equipment	10%
	Total =	**85%**
5.0	**Conduits/impulse pipe/tubes**	
5.1	Fabrication, Laying and Erection	50%
5.2	Leak Test/Hydraulic Test (where ever applicable, otherwise clubbed with next activity)	20%
5.3	Dressing, clamping, tagging and painting where ever applicable	8%
5.4	Testing & commissioning of associated equipment/system	7%
	Total =	**85%**
6.0	**Miscellaneous Structural steel including frames for Panels/Racks/Instruments, supports for cable tray/pipes/tubes, Canopies etc**	
6.1	Fabrication, Erection, Alignment , Welding/bolting and where ever applicable chipping/grouting/painting	65%

6.2	Erection of associated Items/Equipments/Systems as applicable	20%
	Total =	**85%**
7.0	**Panels/Cubicles/Desks/Racks/Enclosures/Monitors/Computers/Computer peripherals/PLCs/UPS/Batteries**	
7.1	Erection and alignment	50%
7.2	Fixing of loose items/instruments where ever applicable	5%
7.3	Pre commissioning checks, Charging of panel and Loop testing etc	15%
7.4	System commissioning	15%
		85%
8.0	**Void**	
9.0	**Instruments/Devices including Sensors/Cells/Probes etc**	
9.1	Removal & refixing /Fixing loose supplied components, including tubing/hose, regulators, etc	20%
9.2	Calibration/Testing/Pre-erection checks	30%
9.3	Erection/Placement and fixing of loose items/accessories	15%
9.4	Pre-commissioning checks/loop testing/Simulation testing as required	10%
9.5	Remote/local commissioning as required	10%
	Total =	**85%**
10.0	**Void**	
11.0	**Miscellaneous items (items not covered under above heads)**	
11.1	Erection	50%
11.2	Alignment	10%
11.3	Testing	15%
11.4	Completion/Commissioning	10%
	Total =	**85%**
12.0	**Dismantling**	
12.1	Old cable removal and Dismantling of existing Panels from Site.	40%
12.2	Shifting of existing/old Panels from site to Customer's store/designated area.	20%
12.3	Disconnection, Reconnection of existing cables	15%
12.4	Completion	10%
	Total =	**85%**
13.0	**Civil Works**	
13.1	Modification in cut-out, making holes, breaking concrete floors etc	50%
13.2	Finishing	10%
13.3	Clean-up	15%
13.4	Completion	10%
	Total =	**85%**

(II) STAGE/MILESTONE PAYMENTS (15%)

Boiler Light Up	1%
Rolling and Synchronisation	1%
Coal Firing	1%
Full Load	1%
Area cleaning, temporary structures cutting/removal and return of scrap	1%
Punch List points/pending points liquidation	2%
Material Reconciliation	1%
Completion of Contractual Obligation	1%
Arrangement of safety engineers along with compliance of all HSE requirements	2%
Arrangement of C&I Experts (Qty-02) (i.e 2% for Each Expert)	4%
Total for Milestone/Stage payments (15%)	**15%**
OTHERS	
Laboratory Instruments installation and demonstration where ever applicable	100%
PG Test Instruments installation (50%) and removal (50%)	100%

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – VIII: TAXES & DUTIES

8.0 TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

1. All taxes excluding GST, GST Cess **& BOCW** Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**
2. Any increase of the taxes excluding GST, GST Cess & BOCW **Cess**, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.
3. **GST :**

   The successful bidder shall furnish proof of GST registration. GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.
4. GST charged in the Tax Invoice/Debit note by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return
5. E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.

   If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.
6. Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details will as below:

   BHEL GSTN – As per **Annexure -1**

   NAME -- Bharat Heavy Electricals Limited

   ADDRESS – Site address
7. Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances :-

   Email id ---- to be intimated later on.

   In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.
8. In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.
9. Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other

reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.

10. Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.
11. Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

    The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.
12. **New taxes and duties**:-Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
    Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.
    In case any new tax/levy/duty etc. becomes applicable after the date of bidder's offer but before opening of the price bid, the bidder must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of the price bids. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

13. For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further, transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

14. **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**

15. **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**

16. **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding**

financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, **TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**

i. Buyer shall be as per clause (a) of section 206C- (1H)
ii. Seller shall be as per clause (b) of section 206C- (1H)
iii. No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.

If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.

For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.

17. Refer Annexure – 2 for BOCW Act & Cess Act.

ANNEXURE-1

State wise GSTIN no.s of BHEL

Sl. No	Projects under state	GSTIN
1	Andhra Pradesh	37AAACB4146P7Z8
2	Bihar	10AAACB4146P1ZU
3	Chhattisgarh	22AAACB4146P1ZP
4	Gujarat	24AAACB4146P1ZL
5	Jharkhand	20AAACB4146P5ZP
6	Madhya Pradesh	23AAACB4146P1ZN
7	Maharashtra	27AAACB4146P1ZF
8	Orissa	21AAACB4146P1ZR
9	Telangana	36AAACB4146P1ZG

9. SPECIFIC INCLUSIONS

9.1 Specific Inclusions for C&I works:

9.1.1. Consumables/ items to be provided by BHEL free of charge

a) Metallic Cable glands.
b) Steel for fabrication.
c) Lugs beyond 4 sq. mm size.

9.1.2. Consumables/ items to be arranged by Bidder at his/ her own cost.

a) Lugs up to 4 sq. mm size.
b) Paint, primer and consumables.
c) LT cable straight through jointing Kits.
d) Cable ferruling printing machine along with ferrule rolls.
e) Identification tags PVC/ Metals with tying/ fixing material, sleeve and clamps with hardware. PVC ties, Ferrule, Buttons and tap for cables at both end & field instruments.
f) Cable Markers.
g) Trefoil Clamps.

1. TECHNICAL DETAILS OF CABLING WORKS

Details (wherever required) of items listed in the rate schedule

SPECIAL NOTE:

a) All the items in general are to be erected and commissioned by the contractor, unless specifically mentioned otherwise.

b) In such cases where systems are described with component quantities lump sum rates are to be quoted. No separate payment will be made for the component items of those systems, although these systems may have certain items for which separate unit rates are also available.

c) The dimensions and weights mentioned are only approximate. No extra claims will be entertained due to change in dimensions/ weight.

d) Work includes instrumentation work in main plant area as well as all the off-site/ BOP areas.

10.1 SECTION I4: ASSEMBLY OF JUCTION BOXES AND PUSH BUTTON MOUNTING FRAMES:

Galvanized members will be supplied. These are to be assembled as per drawings. Some frames are suitable for one side JB mounting and others are suitable for JB mounting on both sides. Rate quoted should include assembly and installation.

10.2 GENERAL INFORMATION

10.2.1 CONTACT PRESSURE

Following torque are normally recommended for various bolts.

BOLT SIZE	RECOMMENDED TORQUE	TORQUE SPANNER CAPTY.
M10	0.85 to 1.30 Nm (20-30 ft-lb)	0.85 to 1.3 Nm
M12	1.30 to 1.70 Nm (30-40 ft-lb)	0.85 to 4.3 Nm
M16	1.70 to 2.10 Nm (40–50 ft-lb)	0.85 to 4.3 Nm
M20	2.10 to 2.50 Nm (50–60 ft-lb)	0.85 to 4.3 Nm

Alternatively tightening the nut till Belleville washer becomes flats. Then unscrew the nut by 1/ 8th turn. Exact method and extent of tightening shall be done as per instructions of BHEL site engineer/ as per equipment supplier's recommendation.

Note: - Considering the layout of the bus ducts as mentioned above for interconnection between the transformer and Generator it is not possible to the segregate the quantity of structural support materials for individual area, hence the total quantity is mentioned.

Flexible joints, seal off bushings, rubber bellows, CT and their wiring, conduits/ GI pipes breather tapping etc., are accessories and form a part of the system.

10.2.2 Recommendation for Welded Joints (For Enclosure, Box Conductor, Make Up Pieces, Shunt and Flexible Joint etc.)

TYPE OF WELDING	MIG/ TIG WELDING

Filler Wire	1.6 mm dia. (NG 21 with 5% silicon)
Angle	10 to 15 degree foreheads.
Cleaning	Degrease and scratch brush.
Current Setting	Depend on thickness.

SCHEDULE OF ITEMS QUANITTIES AND FACTOR FOR DEPRIVING ITEM RATE FROM THE ACCEPTED LUMPSUM PRICE.

This Chapter consists of Part A & Part B of Volume II "Price bid":

CONTENTS	
Description	**Remarks**
Part A: Instructions to the Bidders	Instructions
PART B: % weightage for amount of individual items of Schedule of quantity	Refer Latest Chapter-XI: Schedule of items Quantities and Factor for deriving Item Rate from the accepted Lump sum Price

Part A: Instructions to the Bidders

11.1 Any other entry elsewhere in the offer of the bidder shall be treated as Null and Void.

11.2 BHEL has fixed the Factors of individual items of Schedule of Quantity w.r.t. the total lump sum price (as quoted by the bidder). These item wise factors are available in Chapter-XI of Volume I TCC. Also schedule of items & Quantities are also available in Chapter-XI of Volume I TCC.

11.3 Based on the pre-fixed factors and the quoted total lump sum price, individual item rates shall be derived by BHEL by multiplying the respective factors with total lump sum price.

11.4 Item rates thus derived shall be rounded off to zero decimal places. Rounding off may lead to minor variation in the total lump sum price. This will be adjusted by BHEL by very minor adjustment of the derived item rates. This will be done to arrive at the exact quoted/ accepted Lump sum price given by the bidder.

11.5 For only the convenience of bidders, BHEL has issued an excel sheet with all requisite formulae as detailed above. However, this excel sheet shall not form part of contract document.

PART B: % weightage for amount of individual items of Schedule of quantity w.r.t. the total price (as quoted by the bidder in part C of Vol-II-Price Bid Specification)

S No.	Description of Items	UOM	Qty	Factor
1	**Cable Tray & Accessories**			
1.1	Galvanised Perforated type cable tray, W=150mm/100mm	M	600	0.003612269
1.2	Galvanised Perforated type cable tray, W=50mm	M	1000	0.003418127
2	**Cable laying (Control and Signal Cables)**			
2.1	FLAME SCANNER CABLE - P/O SHIELDED- 2P X 1.31 sqmm P/O Flame Scanner Shielded Cable	M	4000	0.006319921
2.2	Instrumentation Cable: 2P x0.5 sq mm armoured / unarmoured-Individual & Overall shielded (I& OA)	M	1500	0.002087278
2.3	Instrumentation Cable: 4P x0.5 sq mm armoured / unarmoured-Overall Shielded (OA) or Individual & Overall shielded (I& OA)	M	20000	0.028363917
2.4	Instrumentation Cable: 8P x0.5 sq mm armoured / unarmoured-Overall Shielded (OA) or Individual & Overall shielded (I& OA)	M	12000	0.023575785
2.5	Instrumentation Cable: 12P x0.5 sq mm armoured / unarmoured	M	12000	0.030742493
2.6	Network UTP Cables in flexible GI pipes(special termination using UTP connectors involved)	M	8500	0.016699514
2.7	Single Mode/Multi Mode Optic Fiber Cable-Laying, Terminaion & Testing etc of Optical Fiber Cables on cable trays, conduits etc. with minor civil works.	M	3500	0.008376219
2.8	PTFE Cable-10PRx0.6 SQMM COPPER SHLD	M	2000	0.005123749
2.9	Co-Axial Cable for IRIG-B Signal Communication	M	1000	0.002393205
2.10	9509125-HEAT FLUX SENSOR CABLE (SMART SOOT BLOWING SYSTEM)	M	1200	0.001282572
3	**Cable laying (Power Cables)**			
3.1	4CX2.5 sqmm/2CX4 sqmm Power Cable	M	2000	0.003455992
3.2	LT POWER CABLES: 1C X35 SQ MM	M	1000	0.002166879

3.3	Control Cable: 2C x1.5 sq mm/2Cx2.5 sq mm armoured / unarmoured	M	1000	0.001407869
3.4	Control Cable: 5C x1.5 sq mm/5Cx2.5 sq mm armoured / unarmoured	M	1000	0.001321814
3.5	Control Cable: 12C x2.5 sq mm armoured / unarmoured	M	500	0.001034388
4	**Junction box/Push button station (local)**			
4.1	6 Way Miniature Junction Box (For Flame Scanner)	Nos	28	0.001984727
4.2	FRP JUNCTION BOX - DIN RAIL MOUNTED 6TT	Nos	9	0.001055303
4.3	Junction boxes upto 48 way	Nos	80	0.005670649
4.4	DIN RAIL MOUNTED TT - 0 - 6 MILLIVOLT	Nos	48	0.005628282
5	**Conduits/impulse pipe/tubes**			
5.1	PIPE D21.3 X 4.78-IMPULSE PIPE	M	25	0.000776974
5.2	PIPE D33.4 X 6.35-IMPULSE PIPE	M	15	0.000466185
6	**Miscellaneous Structural steel including frames for Panels/Racks/Instruments, supports for cable tray/pipes/tubes, Canopies etc**			
6.1	**Supply** of Channel, angles, flats (list is given below)	Kgs		
6.1.1	MS Channel as per IS 2062 Gr.A Size: 100 x 50 x 5 mm web Thickness	Kgs	3100	0.017196141
6.1.2	MS Plate 1Omm thick as per IS 2062E250	Kgs	1100	0.005206362
6.1.3	ANGLE 50 X 50 X 6 mm (MS) -IS2062E250A	Kgs	1400	0.006626279
6.2	**Fabrication** of Channel, angles, flats (list is given below) Approximate Measurements.	Kgs	6000	0.006552271
6.2.a	PL.6 X 50 X 2000-04 Nos.	Kgs	100	Cumulative weight in Sl. 6.2
6.2.b	ANGLE 50 X 50 X 6 -IS2062E250A- 50 Metres	Kgs	1400	
6.2.c	CHANNEL 100 X 50 -IS2062E250A-75 Metres	Kgs	100	

6.2.d	FLAT 50 X 6 - IS2062GRA-50 Metres	Kgs	100	
6.2.e	ISMC 100 X 50-10 Metres	Kgs	100	
6.2.f	MS Channel as per IS 2062 Gr.A Size: 100 x 50 x 5 mm web Thickness-500 Metres	Kgs	3100	
6.2.g	MS Plate 6mm thick as per IS 2062E250- 25 SqM	Kgs	1100	
7	**Panels/Cubicles/Desks/Racks/Enclosures/Monitors/Computers/Computer peripherals/PLCs/UPS/Batteries**			
7.1	Suite of One: Cubicle (Dimensions - L X B X H: 750 X 750 X 2415 mm) - Approximate weight = 400 Kg.	No	28	0.059937851
7.2	Suite of Two: Cubicle (Dimensions - L X B X H: 750 X 1500 X 2415 mm) - Approximate weight = 800 Kg.	No	22	0.093435381
7.3	Suite of Three: Cubicle (Dimensions - L X B X H: 750 X 2250 X 2415 mm) - Approximate weight = 1200 Kg.	No	4	0.022142133
7.4	Suite of Four: Cubicle (Dimensions - L X B X H: 750 X 3000 X 2415 mm) - Approximate weight = 1600 Kg.	No	2	0.014721410
7.5	Suite of Five: Cubicle (Dimensions - L X B X H: 750 X 3750 X 2415 mm) - Approximate weight = 1600 Kg.	No	1	0.008175279
7.6	Unit control Panel (Dimensions - L X B X H: 1000 X 2100 X 2415 mm) - Approximate weight = 1200 Kg.	No	1	0.005611430
7.7	Electrical control Panel (Dimensions - L X B X H: 1000 X 1100 X 2415 mm) - Approximate weight = 800 Kg.	No	1	0.005488971
7.8	TSS-Turbvisory System-Main Turbine-TSI. Turbovisory System for Main Turbine along with new sensors, cables, modificaion in brackets, drilling work etc.	Set	1	0.005776140
7.9	TSI SYSTEM FOR BFPDT	Set	2	0.007081700
7.10	Operator Desk/Plant Control Desk	Sections	9	0.021736858
7.11	Computer Furniture (Cmputer Table-08 nos, Printer Table-07 nos, Chairs-18 nos)	Set	1	0.006490044
7.12	**VMS (ID/FD/PA/MILL/MDBFP/CEP)** **Following Items are part of VMS** **Sl. No. 1-5**	Set	1	
7.12.1	**FIELD DEVICES**			
7.12.1.1	Acceleration Sensor (100 mV/g ± 5% Sensitivity)	No	65	0.003068712

7.12.1.2	Extension Cable, SS armored, 10 meter length	No	65	0.003068712
7.12.1.3	Mounting Blocks for Bearing Casing Vibration Sensor	No	65	0.004603067
7.12.1.4	JB-12 way (+20% spare TB) Junction Box 5 1/P Glands & 2 0/P Glands, FRP material	No	20	0.002606073
7.12.1.5	Calibration Kit	No	1	0.000472113
7.13	**HMI**			
7.13.1	Operator Work Station along with accessories	NO	9	0.001822678
7.13.2	maxLINK Workstation	NO	1	0.000291311
7.13.3	Shift-In-Charge Workstation	NO	1	0.000285805
7.13.4	PCR I/C Workstation	NO	1	0.000285805
7.13.5	Engineering Workstation (EWS)	NO	2	0.000571610
7.13.6	MAX Storian Workstation (max HIST)	NO	2	0.000571610
7.13.7	A3 Colour Laser Printer	NO	1	0.000098483
7.13.8	A4 Colour Laser Printer	NO	2	0.000169423
7.13.9	A4 B/W Laser Printer	NO	2	0.000169423
7.13.10	DOT MATRIX PRINTER	NO	1	0.000121701
7.13.11	NOTE BOOK PC	NO	1	0.000138157
7.13.12	Network Panel	NO	2	0.003885247
7.13.13	Void			
7.13.14	Large Video Display-LVS	NO	3	0.005187809
7.13.15	Void			
7.13.16	HEAT FLUX SENSOR ASSEMBLY (SMART SOOT BLOWING SYSTEM)	NO	48	0.105747091
7.13.17	FLAME SCANNER HEAD ASSY. L-DIM.99"	NO	28	0.001784324
7.13.18	BHELSCAN AMPLIFIER MODULE	NO	7	0.000571300
7.13.19	Void			
7.13.20	Void			
7.13.21	Void			

7.13.22	Void			
7.13.23	**EWLI**			
7.13.23.1	LOCAL INDICATION BOX-EWLI	NO	1	0.001133072
7.13.23.2	ASCERTOR CABINET-EWLI	NO	2	0.001661838
7.13.23.3	EWLI BODY ASSEMBLY (16 PORTS)	NO	2	0.002832679
7.13.23.4	ELECTRODE PROBE WITH GASKET EWLI	NO	32	0.003021528
7.13.23.5	16 PORT DISPLAY UNIT	NO	4	0.001888452
7.13.23.6	Dismatling/Cutting/Removal of Existing EWLI	NO	2	0.002427984
7.13.23.7	Erection of EWLI (including IBR welding, Hydrotest, Radiography Testing of welding Joints etc)	NO	2	0.006884446
8	**Void**			
9	**Instruments/Devices including sensors/Cells/Probes etc**			
9.1	Temperature Elements (RTDs)	NO	100	0.006851745
9.2	E/P Converter	NO	50	0.002085471
9.3	Electronic Transmitters	NO	200	0.051614239
9.4	Transducers	NO	70	0.018064984
9.5	Single I/p Temperature Transmitter	NO	100	0.011771025
9.6	Dual I/p Temperature Transmitter	NO	50	0.003336418
10	**Void**			
11	**Miscellaneous items (items not covered under above heads)**			
11.1.1	EHC WITH FOLLOW UP PISTON	NO	1	0.003235619
11.1.2	MOUNTING OF SPEED SENSOR	NO	1	0.000188450
11.1.3	SOLENOID VALVE FOR VACUUM PUMP	NO	6	0.005264417
11.1.4	LEVEL INSTRUMENTS FOR OIL SYSTEM-LEVEL TRANSMITTER	NO	6	0.001674366
11.1.5	ANNUNCIATION CABINET	NO	1	0.004495994
11.1.6	CONDUCTIVITY MEASURING INSTRUMENT (Flow transmitter+ Conductivity sensor)	NO	2	0.001236736

11.1.7	DC STARTERS & INSTRUMENTATION	ST	1	
11.1.7.1	STARTER CABINET FOR DCJOP	No	1	0.002510041
11.1.7.2	STARTER CABINET FOR EOP	No	1	0.002510041
11.1.7.3	MCC Panel (Dimensions: 2600X600X2400mm)	No	1	0.005535533
11.2	**Mechanical**			
11.2.1	ROUND DIA 6 MM	NO	192	0.034422229
11.2.2	ERW PIPE NB100 LIGHT	M	5	
11.2.3	PIPE D48.3X7.14	M	4	
11.2.4	VLH SH 05-80 KN/C/H 235/38/65	NO	2	
11.2.5	EYE HANGER NB100	NO	4	
11.2.6	EYE HANGER NB150	NO	2	
11.2.7	SUSPN ROD L600 NB50-80	NO	4	
11.2.8	PUN WASHER-M 8 -IS:2016-A	NO	32	
11.2.9	NB25 GLV 2500 H A105 SW	NO	8	
11.2.10	NB15 GLV 2500 H A105 SW	NO	8	
11.2.11	RESG TL/NB10&15/GLV/1500-3000	NO	2	
11.2.12	RESG TL/NB25/GLV & GV/1500-3000	NO	2	
11.2.13	FLAME SCANNER GUIDEPIPE ASSEMBLY.04	NO	28	
11.2.14	ER 70S-A1 GTAW ROD DIA2.4MM	KG	0.595	
11.3.1	Governing Oil Console Assembly (Including erection of governing console, welding, fitting of pipes, flushing of system and commissioning)	EA	2	0.014629447
11.3.2	SPARE GOVERNING FILTER ELEMENTS	EA	4	0.000566535
11.3.3	SPEED PROBES	EA	14	0.002638295
11.3.3.1	Mechanical work/modiifcations for mounting of Speed Probes (including disassembly of existing front plate & front end coupling, machining/modification of pole wheel/toothed wheel & baffle plate, shrink fitting of pole wheel, assembly of new front plate etc.)	EA	2	0.002581667
11.3.4	ELECTRO MECHANICAL ACTUATOR/POWER UNIT for MDBFP	EA	1	0.001980485
11.4	**Piping**			

11.4.1	ALL PIPING MATERIAL REQUIERD FOR CARRIYING OUT PIPING.LOOSE ITEMS -700 kgs approx.	EA	1	0.002231661
11.5	Hart Management System Hart Calibrator-02 Nos included	Set	1	0.003219907
12	**DISMANTLING**			
12.1	Dismantling, loading and handling of existing DCS Panels from Site to Customer's store, Approx Size: 100x800x2440 mm	NO	104	0.126255166
12.2	Dismantling, loading and handling of operator desk from Site to Customer's store	SET	9	0.029743137
12.3	Disconnection, Reconnection of existing cables	NO	20000	0.047210087
12.4	Dismantling, loading and handling of existing TDBFP Governing Console from Site to Customer's store. Approx Size: 2000x1000x2440	NO	2	0.006609586
13	Civil works like modification in cut out for panels, making approach through walls, breaking of concrete floors to suite DCS Panels erection etc. wherever required.	LOT	1	0.004721133
14	Electronic Earth Pit/ Modification in existing earthing system	SET	1	0.004302779

1. TECHNICAL DETAILS OF CABLING WORKS

Details (wherever required) of items listed in the rate schedule

SPECIAL NOTE:

a) All the items in general are to be erected and commissioned by the contractor, unless specifically mentioned otherwise.

b) In such cases where systems are described with component quantities lump sum rates are to be quoted. No separate payment will be made for the component items of those systems, although these systems may have certain items for which separate unit rates are also available.

c) The dimensions and weights mentioned are only approximate. No extra claims will be entertained due to change in dimensions/ weight.

d) Work includes instrumentation work in main plant area as well as all the off-site/ BOP areas.

10.1 SECTION I4: ASSEMBLY OF JUCTION BOXES AND PUSH BUTTON MOUNTING FRAMES:

Galvanized members will be supplied. These are to be assembled as per drawings. Some frames are suitable for one side JB mounting and others are suitable for JB mounting on both sides. Rate quoted should include assembly and installation.

10.2 GENERAL INFORMATION

10.2.1 CONTACT PRESSURE

Following torque are normally recommended for various bolts.

BOLT SIZE	RECOMMENDED TORQUE	TORQUE SPANNER CAPTY.
M10	0.85 to 1.30 Nm (20-30 ft-lb)	0.85 to 1.3 Nm
M12	1.30 to 1.70 Nm (30-40 ft-lb)	0.85 to 4.3 Nm
M16	1.70 to 2.10 Nm (40–50 ft-lb)	0.85 to 4.3 Nm
M20	2.10 to 2.50 Nm (50–60 ft-lb)	0.85 to 4.3 Nm

Alternatively tightening the nut till Belleville washer becomes flats. Then unscrew the nut by 1/ 8th turn. Exact method and extent of tightening shall be done as per instructions of BHEL site engineer/ as per equipment supplier's recommendation.

Note: - Considering the layout of the bus ducts as mentioned above for interconnection between the transformer and Generator it is not possible to the segregate the quantity of structural support materials for individual area, hence the total quantity is mentioned.

Flexible joints, seal off bushings, rubber bellows, CT and their wiring, conduits/ GI pipes breather tapping etc., are accessories and form a part of the system.

10.2.2 Recommendation for Welded Joints (For Enclosure, Box Conductor, Make Up Pieces, Shunt and Flexible Joint etc.)

TYPE OF WELDING	MIG/ TIG WELDING

Filler Wire	1.6 mm dia. (NG 21 with 5% silicon)
Angle	10 to 15 degree foreheads.
Cleaning	Degrease and scratch brush.
Current Setting	Depend on thickness.

PROJECT INFORMATION

1.00.0 LOCATION OF PLANT

Plant is situated about 7 Kms. from Chandrapur Railway Station by the side of Tadoba National Park.

1.01.0 STATION INFORMATION

a) Owner / Purchaser : Maharashtra State Power Gen. Co. Ltd., Mumbai – India.

b) Name of Project : CHANDRAPUR Thermal Power Station, Unit 5 & 6 (500 MW)

c) Project Location : Chandrapur, Dist. Chandrapur, Maharashtra State, India, Pin-442404.

1.02.0 POWER GENERATION : 2920 MW

a) Stage – I (Unit 1&2)	----------	----------
b) Stage – II (Unit 3&4)	2 X 210 MW	420 MW
c) Stage – III (Unit 5,6&7)	3 X 500 MW	1500 MW
d) Stage – IV (Unit 8&9)	2 X 500 MW	1000 MW

1.03.0 CLIMATIC CONDITIONS

a) Climate	:	Tropical–Hot – Dry
b) Daily average ambient Temperature	:	40 Deg. C.
c) Maximum ambient Temperature	:	49 Deg. C.
d) Minimum ambient Temperature	:	5 Deg. C.
e) Humidity during Monsoon	:	87 %.
f) Altitude from mean sea level	:	192.3 M.
g) Average rain fall	:	1250mm / Annum
h) Total land area acquired	:	11256 Hectres
i) Main plant including ARW And Railway Siding	:	1117 Hectres
j) Ash disposal area	:	2665 Hectres
k) Erai Dam including pipeline to Plant	:	7134 Hectres
l) Colony	:	340 Hectres
m) Air Quality	:	Dusty (Coal & Ash)

1.03.01 TRANSPORT FACILITIES

a) Rail : Nearest Railway Station is CHANDRAPUR and is connected to major cities.

b) Road : The site is connected by all weather roads to Nagpur – Mancherial State Highway at a distance of 4.0 Kms from the power station.

1.04.0 WATER

The source of raw water for the project is Erai Dam water Reservoir on River Erai.

STORAGE CAPACITY

Erai dam live storage 193 M. Cu. M.

Live storage at Power House 1.7 M. Cu. M.

1.05.0 HOSPITAL FACILITIES

Modern Hospital facilities are available at the permanent township of CSTPS. Multi Specialty & super Specialty hospitals available at Chandrapur.

1.06.0 LAYOUT OF UNIT 5 AND 6:

C&I systems in Unit 5 and 6 are:

- Unit 5 and 6 have Analog Control System (ACS).
- The Station C&I package is of the CONTRONIC-3I, Non DCS Analog type. OEM is M/s H&B Germany and supplier is M/s BHEL, EDN Bangalore.
- The EAST package is of the ISKAMATIC A/B/C, Non DCS Analog type. OEM is M/s Siemens Germany and supplier is M/s BHEL, Haridwar.
- The FSSS package is of the PLC 984with 800 series I/O, Microprocessor based type. OEM is M/s MODICON, U.S.A and supplier is M/s BHEL, Trichy.
- The DAS system is of SPPA-T 1000 type. OEM and supplier is M/s Siemens. Operating system is Windows XP and application software is SoftOM.
- The on-line performance software package is by M/s Siemens India Ltd.

All existing units of Owner's Chandrapur Super Thermal Power StationStage-III, Unit 5 & 6 are provided with individual control rooms located at 17 M level which has unit control desk and a control panel for operating Electrical breakers. There is individual DAS cum programmer room housing buffer

cabinets, I/O cabinets and the server cabinets of DAS system located adjacent to Control Room.

Individual control equipment rooms (CER) housing the control cabinets are located at 17 M elevations. All the control cabinets for SG, TG, SCI, BOP systems along with the GRP & excitation system cabinets are located at 17 M elevations. Presently four supplies are used for the various control systems viz 220 VDC, 240 VAC, 110 VAC and +/- 24 VDC. The 220 VDC power supply is required for FSSS system (For HOTV, HORV, Scanner fans etc). This 220 VDC is derived from chargers (located at 8.5 M outside CER) with 220 VDC station battery backup. The 110 VAC is used for Boiler corner valves and as interrogation supply in FSSS and relay interlock panels. Both the power supply systems have contactor based change over circuits. The 110 VAC is derived from 240 VAC UPS and distributed from ACCSP. There is 2 X 75 KVA UPS system with battery backup for SCI, FSSS, HPBP, PRDS and all analysers. A +/-24 VDC charger system with battery backup is provided for TG control panels.

1.07.0 CONTROL SYSTEM a) SG C&L SYSTEM

The existing Steam generators were supplied by M/s. BHEL along with associated FSSS, SADC, Soot Blower Control etc. The boilers are of drum type, two pass, tangentially fired with oil and coal fuels. The SG (C&I) of these boilers are PLC based. The FSSS employs ring type distributed control system utilizing 05 nos. of Programmable Controllers of which 01 no. is used for Unit Logics and the other 04 nos. used for Elevation and mill logics. Each processor consists of primary logic and redundant logic of another processor. All these processors simultaneously control the entire logics. Redundancy is available up to the field devices including cables. By this way, the entire unit / oil / coal elevation logics are formed in ring configuration with 05 processors. The signal exchanges between Unit and Elevation processors are hardwired without having any soft exchanges. Care has to be taken while making the functional groups for retaining the redundancy. The existing operator interfaces are of hardware consoles, switches and indicators/ recorders. For flame monitoring there are 28 nos. of safe scan scanners for oil flame and coal flame monitoring.

The volumetric feeder panels are of STOCK make. The interface required between VFC and DDCMIS system is included in this package.

b) TG C&L SYSTEM

The existing Turbine generators were supplied by M/s. BHEL (KWU Make). The control is through solid state based EAST package supplied by M/s. BHEL (KWU Make). The control of HP Bypass system comprising of pressure and temperature controls is through SULZER make cards. There is a local relay based generator monitoring panel (CXW 01) for control of various generator auxiliaries like seal oil pumps, primary water pumps, gas driers etc. There is a local relay based panel (ANK 01) for control of DC EOP and DC

JOP logic. The control of LP-Bypass is through EHC (Electro hydraulic converter) similar to main turbine EHC.

c) SCI SYSTEM

The Station Control and Instrumentation (SCI) system comprises of modulating control functions pertaining to the other plant areas like Coordinated master control, Firing rate control (air flow and fuel flow), Furnace draft control, FW flow control, Feeder speed control, Mill PA flow and outlet temp. control, SH/RH temp control, Hotwell level control, HP & LP heaters controls etc. and binary control functions pertaining to other plant auxiliaries like FD/ID/PA fans/APH/ BFP/ CEP/ CW/ Pumps, various other pumps, valves, dampers, fans and electrical breakers.

The open loop control functions of the units are presently implemented in Relay based system. The commands of the drives are wired to the Switchgear/ MCCs directly via the relay based system. The operator interface for the drives is by means of Pushbutton stations / switches mounted on UCB. The closed loop control functions of the units are presently implemented in solid state single loop control modules of H&B design (CONTRONIC 3I series), which give 4-20 mA outputs, which operate the pneumatic control valves through the E/P converters.

The Information functions of the units are implemented in Data Acquisition System (DAS) of M/s Siemens India, make.

d) PLANT AUXILIARY SYSTEMS CONTROL SYSTEMS

The control of offsite equipments like CW pumps, Plant Air and Instruments air compressors are presently implemented in local relay based control systems and operator interface are presently through Pushbutton switches, feed back through glowing lamps and window (lamp) based annunciation fascia.

1.08.0 EXISTING PANEL AND ITS CONTENTS

Sr. No.	Panel	Description
1.	**FSSS For Boiler Fuel Monitoring & Safe Guard**	

	a) Unit Panel	Boiler protection, PA fans, Seal air fans , scanner air fans etc.
	b) CD Processor	Redundant Boiler Protection, Mill C&D, oil Elevation CD.
	c) AB Processor	Mill A&B, oil Elevation AB.
	d) EF Processor	Mill E&F, oil Elevation EF.
	e) GH Processor	Mill G&H, oil Elevation GH.
2.	**H&B Analog Control & Measurement System for Power plant process control.**	
	a) CGA 01	CMC, Fuel master, FO, LDO Pressure control.
	b) CGA 02	Mills A&B, FD Fan A&B, O2 control.
	c) CGA 03	Mills C, D, E control.
	d) CGA 04	Mill F, G, H control.
	e) CGA 05	Furnace draft I.D Fans A,B,C,D control, PA Fans control.
	f) CGA 06	Boiler drum level & Hotwell controls.
	g) CGA 07	SH, RH & BT control.
	h) CGA 08	LPH 2-3 control
	i) CGA 09	Deaerator press/level control, CEP R/C valve etc.
	j) CFA 01	HP heater level, gas damper controls. measurement system
3.	**H&B Binary Contr ol for Sequence Control and interlocking**	

	a) CBA 01	IDF-A, FDF-A,CEP-A, and PAF-A, PAH-A and SAH-A,
	b) CBA 02	IDF-B, FDF-B, CEP-B, PAF-B, PAH-B SAH-B
	c) CBA 03	ID-C, MDBFP-C, Gas dampers
	d) CBA 04	IDF-D, MDBFP-D, MS, RH VLVS.
	e) CBA 05	CEP-C, BCW A, B, C IBD valves.
	f) CBA 06	PRDS valves, Aux. steam valves, drain valves.
	g) CBA 07	Extraction steam valves, drain & vent valves
4.	**H&B Relay Panel for interfacing Process control signal with other Packages as FSSS, EAST Package such**	
	CRA 01	Relay interface
5.	**HP BYPASS PRDS**	
	a) AUX PRDS 1	POWER SUPPLY AND ALARM
	b) AUX PRDS 2	Control system
	c) HP Bypass-1	Power supply, alarm, oil supply unit
	d) HP Bypass-2	Control system
6.	**Turbo generator Control for Turbo Generator control , automatic start up / shutdown , Turbine stress evaluator etc.**	
	a) CJJ 01	Turbine stress evaluator
	b) CJJ 02	Electro hydraulic controller
	c) CJJ 03	LP Bypass & gland seal Pr. control
	d) CJJ 04	Turbo supervisory panel
	e) CJJ 06	Turbo generator extended protection

	f) CJJ 07-08	Turbine side motorized regulation valve.
	g) CJJ 09	Load shedding relay panel.
	h) CJJ 10	Turbine protection panel
	i) CJJ 11	Binary signaling panel
	j) CJJ 12	ATT drive & relay panel
	k) CJJ 13-15	Analog signaling Conditioning panel.
	l) CJJ 14	Marshalling panel.
7.	**Turbine side Binary type sub group control.**	
	a) CCA 01	Interlock panel for sub group & sub loop controls.
	b) CCA 02	Limit value monitor.
	c) CCA 03	Interface drive card
	d) CCA 04	Binary signal conditioning
	e) CCA 05	Interface relay panel
	f) CCA 06	Auto synchronization & interlock panel for sub loop control of vacuum pump.
8.	**TDBFP SYSTEM**	
	a) CJJ 20	TDBFP- A Analog Controls.
	b) CJJ 21	TDBFP-B Analog controls
	c) CCA 20	TDBFP-A Binary controls
	d) CCA 21	TDBFP-B Binary control

1.09.0 EXISTING AUTO CONTROL LOOPS

Sr. No.	**Description of the loop**
1.	Coordinated Master Control
	I) Fuel Master Control
	II) Boiler Master Control
2.	HFO Pressure Control
3.	LFO pressure Control

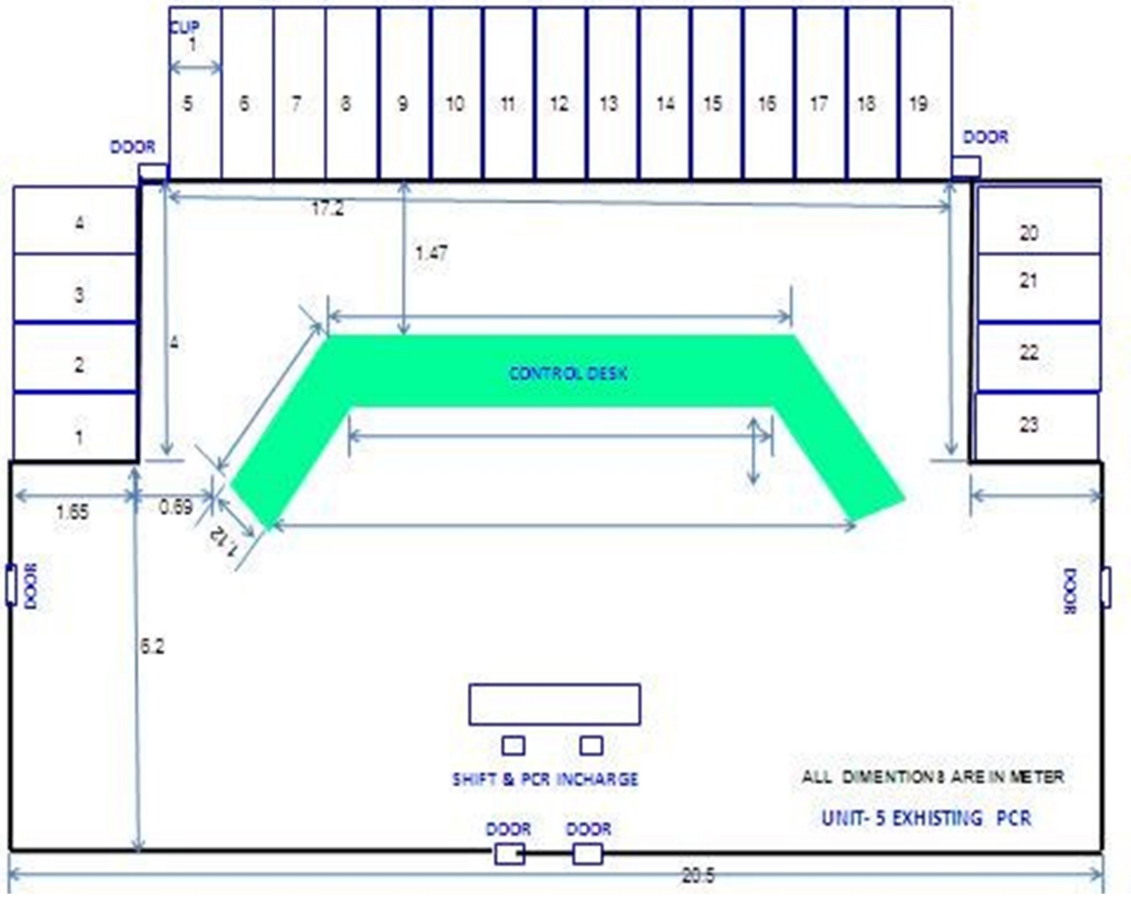
4.	Primary air header pressure control
5.	Feeder speed "A" Control
6.	P.A. flow to mill 'A' hot air damper control
7.	Mill outlet temperature 'A' cold air damper control
8.	Feeder speed "B" Control
9.	P.A. flow to mill 'B' hot air damper control
10.	Mill outlet temperature 'B' cold air damper control
11.	Feeder speed "C" Control
12.	P.A. flow to mill 'C' hot air damper control
13.	Mill outlet temperature 'C' cold air damper control
14.	Feeder speed "D" Control
15.	P.A. flow to mill 'D' hot air damper control
16.	Mill outlet temperature 'D' cold air damper control
17.	Feeder speed "E" Control
18.	P.A. flow to mill 'E' hot air damper control
19.	Mill outlet temperature 'E' cold air damper control
20.	Feeder speed "F" Control
21.	P.A. flow to mill 'F' hot air damper control
22.	Mill outlet temperature 'F' cold air damper control
23.	Feeder speed "G" Control
24.	P.A. flow to mill 'G' hot air damper control
25.	Mill outlet temperature 'G' cold air damper control
26.	Feeder speed "H" Control
27.	P.A. flow to mill 'H' hot air damper control
28.	Mill outlet temperature 'H' cold air damper control
29.	Air Demand O2 Control
30.	FD Fan A Control
31.	FD Fan B Control
32.	ID Fan A Control
33.	ID Fan B Control

34.	ID Fan C Control
35.	ID Fan D Control
36.	SH spray control left

37.	SH spray control right
38.	RH spray control left
39.	RH spray control right
40.	Drum level control 1E
41.	Drum level control 3E
42.	TDBFP A feed water control
43.	TDBFP B feed water control
44.	MDBFP C feed water control
45.	MDBFP D feed water control
46.	Drain flash tank- A temperature control
47.	Drain flash tank- B temperature control
48.	HPH 5A level control Normal
49.	HPH 5A level control Emergency
50.	HPH 5B level control Normal
51.	HPH 5B level control Emergency
52.	HPH 6A level control Normal
53.	HPH 6A level control Emergency
54.	HPH 6B level control Normal
55.	HPH 6B level control Emergency
56.	Hotwell level control Normal
57.	CEP A recirculation valve control
58.	CEP B recirculation valve control
59.	CEP C recirculation valve control
60.	GSC Minimum flow control CD 27
61.	LPH - 2 level control Normal
62.	LPH - 2 level control High
63.	LPH - 3 level control Normal

64.	LPH - 3 level control High
65.	Deaerator level control
66.	Deaerator pressure control
67.	SADC wind box - furnace DP (aux. air damper)
68.	Soot blower pressure control local
69.	PRDS pressure control
70.	PRDSE temperature control
71.	PRDSD spray water pressure control
72.	HP Bypass pressure control BP1
73.	HP Bypass pressure control BP2
74.	HP Bypass temperature control BPE1
75.	HP Bypass temperature control BPE2
76.	Lub oil temperature control MAV 41 AA 001
77.	HP control fluid temperature control PGB 23 AA 001
78.	Cold gas temperature control PGB 33 AA 001
79.	Primary water temperature control PGB 73 AA 001
80.	L.P. Bypass auto control
81.	Gland steam / leak steam control
82.	Speed control
83.	Load control & limit pressure control
84.	Initial pressure control

1.10.0 EXISTING PCR LAYOUT:



ANNEXURE-B
General terms & conditions (works)

1. Registration of the contract: Contractor will have to register the contract under Labour Contract Act, 1971 and any other sets as may be applicable from time to time and certificate that effect should be submitted from the concerned authority and also adhere to the relevant formalities as per the statutory laws and rules framed there from time to time.

2. Labour License: The contractor will have to submit the Labour License from the Labour Commissioner before starting the work. If he fails to do so the contract will be cancelled at risk and cost of the contractor.

3. Safety: The contractor should provide all the safety equipment viz. safety helmets, hand gloves, safety belts, shoes, masks, ladders etc. required for the work to these workers. If any accident occurs due to non-supply of these equipment or careless handling of equipment, the same shall be to the contractor's risk and cost. The contractor must maintain first aid be the same closet.

4. The contractor will have to keep ready two buckets of water while carrying out the welding work. One bucket is to be used for quenching in case of any fire. Last bit of electrodes she be dropped in the second bucket to ensure red-hot electrode bit not cause any fire.

5. Insurance: The contractor should take group insurance policy if their labours deployed for the work under the workmen compensation scheme of LIC.

6. Laws and regulation: (I) The relevant Labour laws govern this contract and regulations and the amendments made therein from time to time such as: A) Workmen's Compensation Act. B) Factory Act. C) Minimum Wages Act. D) Contract Labour Regulation & Abolition Act. E) Industrial Dispute Act. F) Provident Fund & Misc. Provision Act.

II) It shall be responsibility of the contractor to abide by the conditions of consent granted by MPCB/ CPCB and Environmental Regulations in force from time to time. Following Acts are applicable:

A) The water (Prevention & Control of pollution) Act 1974, amended upto date.
B) The Air (Prevention & Control of Pollution) Act 1981.amended up to date
C) The Environment Protection Act. 1986.
D) Hazardous washes (Management & Handling) Rules 1989.

BHEL will not responsible in any way either legal or financial for the accident to the contractor’s labour at the time of working and the same shall be the risk & cost of the contractor Compensation as applicable in this regard shall be paid by the contractor to his labour as per workmen's Compensation Act.

III) The contractor should be aware of significant / non-significant environment aspects of CSTPS and should comply to special terms & conditions relevant to work order.

7. Payment to his worker. The contractor will have to pay minimum wages to his workers as per the prevailing rates as specified by commissioner of Labour at that time.

8. Security Rules & Regulation: The power station is a prohibited area. The contractor should observe all the Security Rules and Regulations and should obtain the entry permit for him and his workers from the Security Officer. For Security Gate-Pass, the contractor in his letterhead will request BHEL/MSPGCL's authority to issue Gate-Passes against the names, permanent address and age of his workman.

9. Contractor's Responsibility:

A) It is the responsibility of the contractor to maintain the discipline of his workers and himself and any hindrance / misbehavior towards the BHEL/MSPGCL staff will viewed very seriously and the contract will be terminated without entertaining any financial claim from the contractor in this regard.

B) In case there is any damage to the BHEL/ MSPGCL property or to any other contractor's property or to the BHEL/ MSPGCL employee or to any other contractor's persons due to careless working of the contractor's labour, the cost of the same will be recovered from the contractor.

10. Penalty:

A) Continuous operation & maintenance of the plant is the essence of the contractor. If the contractor fails to give the services at a particular day, penalty at 1.5 times the accepted rate for the day will be recovered from the bill taking such lapse seriously.

11. Keeping of the Plant Clean: It is the responsibility of the contractor to keep the building; plant equipment, machinery and surrounding are neat clean.

12. The contractor should make the arrangement for camping his labours /workers at his own cost.

13. The contractor should keep attendance register of his staff & labour working under him up to date & submit to the BHEL/MSPGCL's officers whenever required.

14. Contractor has to obtain the identity card for his workers, without identity card he may not permit to work. Any delay due to this shall be his account.

15. Safety terms and conditions enclosed is also the part of this contract.

16. Contractor shall provide all protective equipment to his staff labour.

17. Scrap generated during works shall be MSPGCL's property. Such scrap shall be stacked property at the designated place & as per instructions of Engineer in charge.

Safety terms & condition

1. The contractor shall provide all applicable PPEs to its workers & subcontractor workers viz. industrial safety shoes, industrial safety helmets, industrial safety hand gloves, safety harness, dust mask, goggles, welding screen /helmet etc. at its own cost. All PPEs shall be of the quality as per applicable BIS standard or ISO standard. Contractor shall ensure its proper usage at work place.

2. The contract shall be governed by all applicable acts, rules, regulation and internal standing instructions and SOPs, such as:

a. The Factories Act, 1948, (FA)
b. The Maharashtra Factories Rules, 1963, (MFR)
c. CEA Safety Regulations, 2011, (CEASR)
d. Workmen's Compensation Act, 1932, (WCA)

e. Minimum Wages Act, (MWA)
f. Contract Labour Regulate & Abolition Act, (CLRAA)
g. The Maharashtra BOCW Rules, 2007, (BOCWR)
h. The Environment Protection Rules, 1986, amendment 2010, (EPR)
i The Hazardous Waste (Management & Handling) Rules, 2008, amendment 2010, (HWMHR)
j. The Water (Prevention & Control of Pollution) Rules, 1975, (WPCPR)
k. The Central Motor Vehicles Act, 1988, (CMVA)
l. The Central Motor Vehicles Rules, 1989, (CMVR)
m. The Petroleum Act, 1934, (PA)
n. The Petroleum Rules, 2002, (PR)
o. The Explosives Act, 1884, (EA)
p. The Explosives Rules, 1983, (ER)
q The static and Mobile Pressure Vessels (Unfired) Rule, 1981, (SMPVR)
r The Gas Cylinders Rules, 2004 (GCR)
s The Public Liability Issuance Act, 1991, (PLIA)
t The Public Liability Insurance Rules, 1991, (PLIR)
u The Environment Protection Act, 1986, (EPA)
v. The Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996, (CAR)

3. The contractor shall maintain proper attendance record at its site office.

4. The contractor shall ensure proper gate pass for its workers & supervisors before starting the work & shall ensure all its persons are carrying it.

5. Any portable light/ hand lamp shall be of 24 V.

6. Every portable hand tools to be used with plugs, to avoid electric shock while at work, proper earthing should be checked both at supply end and tool end, if required, before commencement of work. Colour code of the three wire system should be: RED for Live, GREY /BLACK for Neutral and GREEN for Earthing. Al portable took should have its healthiness certificate from a competent person.

7. All portable supply board shall have three wire systems, MCB or ELCB. The supply shall be taken from a regular plug socket arranged by MSPGCL authorized persons only.

8. All hazardous area should be covered or cordoned off to restrict movement.

9. Transportation of any gas cylinder & its storage shall be in capped condition. Filled cylinder transportation should be in up-right position.

10. All Mobile Crane /Hydra should have its „REVERSE HORN" functioning. No Mobile Crane /Hydra should be operated without Attendant. The Driver should carry valid Driving License as applicable.

11. Contractor shall ensure the issue of permit & isolation done - before starting any work.

12. All work shall be supervised by designated competent supervisor.

13. All Lifting Tools and Tackles shall have valid Test Certificate, issued by Competent Person. A copy of that certificate to be submitted to the Controlling Section and the Safety Office, before commencement of work.

14. The contractor employing two hundred employees or more, including contract workers, shall have a safety

coordinator in order to ensure the implementation of safety requirements of the contract and a contractor with lesser number of employees, including contract workers, shall nominate one of his employees to act as safety coordinator, who shall liaise with the Safety Officer on matters relating to safety and his name shall be displayed on the notice board at a prominent place at the work site.

15. The contractor shall depute one of his regular employees as a representative of the local safety committee & shall make him available during all of that committee activity.

16. The contractor shall ensure the training/awareness program is participated by all its workers & supervisors, arranged by the concerned Controlling Authority, relates to work associated hazards at its site and keep a record of that program & attendance.

17. The contractor shall be responsible for non-compliance of the safety measures, implications, injuries and legal implications & compensation arising one of such situations or incidents.

18. In case of any accident, the contractor shall immediately submit a statement of the same to the owner and safety officer, containing the details of the accident, any injuries or casualties, extent of property damage and remedial action taken to prevent recurrence and in addition, the contractor shall submit a monthly statement of the accidents to the Factory Manager at the end of each month.

19. The contractor shall always keep First Aid box ready at site.

20. In case of injury, arrangement for shifting of the person for medical treatment is to be made immediately by the contractor. Any medical injury /illness / fitness certificate shall be recommended by MSPGCL Medical Officers.

21. The contractor shall ensure removal of all scraps & debris generated out of his work, its disposal at designated place. The area shall be kept clean everyday & scrap removal shall be complete before cancelling the permit

22. Safety of its own staff is contractor's sole responsibility. If any BHEL/MSPGCL Officer / Supervisor find:
a. Violation of any Statutory Act, Rule or Regulation applicable:
1) Working at height or confined space:
1.1 10000/- on the first occasion,
1.2 Stoppage of work in the next occasion.
2) Other areas:
1.1 5000/- on the first occasion, 1.2 10000/- on the second occasion, 1.3 Stoppage of work in the next occasion.
b. Any of the safety norms /directives violated the contractor shall be penalized for 3000/- on the first occasion, 5000/- on the second occasion & 10000/- on the third occasion. For violation further, the contractor's activity can be stopped for a period to be decided by the competent authority.

Work Specific Safety Terms & Conditions
For Working at Height (above thee meters from the working floor)

1. Working at Height permit (FF98258) shall be taken in addition to Regular permit (FF9825 /9826).

2. All scaffolding shall be prepared with proper base, rigid & good quality maternal & couplers. Working platform should be made of good quality plank, property tied with structure. Toe guard shall be provided.

3. Ladder should be property mounted at its landing, firm footing. It should be mounted close to an in inclination of 4:1. Top three rungs of the ladder shall be above the landing.

4. No ladder shall be extended by tying with another ladder; unless it is designed for.

5. All persons working in the scope of Work at Height" will have to use safety harness. The safety hamess will be property anchored at a suitable place, to avoid free fall.

6. Safety nets and life lines are to be provided as and when require.

7. All persons working with safety harness should be property trained by a competent person, appointed by contractor.

8. Duck ladder, Crawling Boards to be provided by the contractor for its workers, working at steep or fragile roof or as and when necessary.

9. Tool bags should be used by the workmen working at height.

10. All scaffoldings / Platforms erected inside the Boiler /ESP /AMP shall be certified by a competent person for its healthiness

11. All workers should be given specific instructions by the supervisor about his responsibility & hazard & risk associated with his works.

12. A minimum penalty of Rs.10000/ shall be imposed on the contractor for any sort of Unsafe Act during work.

Working in confined space

1. Working in Confined Space permit (FF98254) shall be taken in addition to Regular permit (FF9825 /9826).

2. All workers working in any confined space e.g. Vat, Pit, Tank, Chamber, inside bunker or sewage chamber, pipelines, condenser etc. shall be healthy & fit to work in such a condition.

3. All workers shall be property trained to understand their responsibilities & hazard & risk associated with his works.

4. Before entering any confined space, it should be during property & checked for presence of any toxic or flammable fumes or gases, inside should be free from any dust or mist. Oxygen content should be checked for in between 19-21%.in case of lesser "Self Contained Breathing Apparatus shall be used by the entrants.

5. Person working inside a confined space shall use all necessary PPEs, which include Safety Harness.

6. Attention & assistance shall always be provided to person working inside for earty emergency response and speedy evacuation.

7. Any openings created at the floor level or near to any pathway shall be cordoned & glow sign /indication lamp to be mounted for easy detection.

Welding /cutting and other hot work

1. Any welding m/c shall require its healthiness certificate from a competent person; the certificate shall be made available on demand.

2. No cut cable shall be used with joint.

3. Earthing to be mounted on work, not any structure.

4. Supply connection to be made by the concern BHEL/MAHAGENCO staff only.

5. Al gas cutting torch shall be fitted with NRVS at both gas inlet.

6. All regulators shall have proper Pressure gauges, Flashback Arrestors units.

7. No Domestic LPG cylinder shall be used for any industrial purpose.

8. While welding /cutting work, all necessary precautions to be taken by the contractor to avoid fire hazard.

9. Transportation of all gas cylinders shall be done in a Trolley only, in chained condition and its upright position.

Transportation of Hazardous Chemicals and materials

1. Documents relating to the vehicle to be carried in the vehicle, as per the material transported:

a. Applicable license for transport of Specific Products,
b. License to transport petroleum class A & B in bulk. [PR Form XI, Article 2 of the First Schedule)
c. License to transport compressed gas. [SMPVR Form IV, Rules 49 & 50]
d. License to transport explosives. [ER Form 25 & 26 Rule 155]

2. Loading/Unloading to be done at approved places. (PR Form XI (5) & Rule 76; ER 81 Form 25 (12)]

3. Additional conditions, if any. [PR-Form XT)

4. Vehicle to be fitted with Techograph [CMVR-129(2)]

5. Spark Arrestor to be fitted at the exhaust of the engine. [OMVR-129A, PR-70)

6. Vehicle to carry Portable Fire Extinguisher of 9 kg. [OMVR-129(1 (N), PR-72, SMVPR-41, ER-86)

7. Vehicle to carry Safety Kt. [CMVR-129(1)(i), Item No: 5 of circular issued by CCOE of Performa (Certificate of safety) issued 43]

8. Transport of Cylinders. [Schedule VI w/r 20 of GOR]

9. No parking shall be done on a public road or congested area or within 9 m of fire source. (PR-74)

10. The driver or operator of a vehicle carrying or containing Hazardous goods shall not stop unnecessarily or for a longer period than is reasonably required, stops at places where the public safety would be endangered shall be avoided. [SMPVR Form IV (9), ER 81 (6)]

11. No passengers or any other article to be carried. [SMPVR Form IV (11), PR Form XI (11), ER Form 25 (7) w/r 155]

12. Display EIP containing prescribed information of specified dimensions in a format at prescribed places on a vehicle carrying Hazardous goods. [CMVR-134]

13. The vehicle should have Hazard Class Labels. [OMVR-130, 134, 137]

14. The vehicle should carry Road worthiness and Periodic examinations report. (SMPVR-44(2))

15. Vehicle should carry Certificate of Fitness and annual renewal. (CMVR-62)

16. Driver should be qualified and trained. (3-day training and 1-day refresher training) [CMVR-9, CMVA Sec-14(2)]

17. Driver should carry the relevant Tremcard.

18. In case of death or injury to any person (other than a workman) or damage to any property owing to an accident involving a Hazardous goods, the owner is liable to give relief as specified in the Schedule of the PLIA. [PLIA-3(1)]

ANNEXURE-C

1.00.0 FUNCTIONAL GUARANTEES (Bidder shall provide complete assistance in conductance and completion of following tests)

The term "Performance Guarantees" wherever appears in this section shall have the same meaning and shall be synonymous to "Functional Guarantees" Similarly the term "Performance Tests" wherever appears in this section shall have the same meaning and shall be synonymous to "Guarantee Test(S)".

1.01.0 GENERAL REQUIREMENTS (applicable to BHEL, Bidder shall provide complete assistance in conductance of tests)

a) BHEL shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated for various equipment covered in these specifications.

b) The guaranteed performance parameters furnished by the Bidder in his offer, shall be without any tolerance values and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.

c) The Contractor shall demonstrate all the guarantees covered herein during functional guarantee / acceptance test. The various tests which are to be carried out during performance guarantee/acceptance test are listed in this Sub-section. The Contractor shall conduct the guarantee tests at site in presence of BHEL/Customer.

In case during tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the BHEL.

1.02.0 DDCMIS SYSTEM GUARENTEE REQUIREMENTS

The Bidder shall assist for conductance of test- for parameters/capabilities to be demonstrated for various systems/ equipment shall include but not be limited to the following:

1.02.01 Performance Requirement of the Closed Loop Control System:

a) The closed loop Control System shall provide automatic control of the plant for full applicable operating range of the unit. The closed loop Control System shall permit the performance of the dynamic load tests (ramp test, steady state test & step tests) while maintaining safe furnace conditions, major process parameters and without endangering other equipment. All tests will be performed with the system in automatic mode:

i) Drop 30 percent of maximum load capability from approximately full load at a rate of 10 percent per minute.

ii) Drop load from full rated output to the lowest runback limit, at a rate corresponding to the fastest run back rate

During transient conditions causing deviation of process variables, the control system furnished under the specification shall not permit deviations, which exceed those permitted by the manufacturers of the controlled process equipment, for load changes as indicated above, the exact parameters to be monitored for this test shall be decided during detail engineering. The control loops shall perform to return the controlled variable to the set point in a stable manner without cycling in the shortest possible time and without any loop interactions or cycling of generation when generation matches unit load demand.

b) The Bidder shall also guarantee that the control system provided by him will be responsive and stable and will maintain the deviation of controlled variables from set point within the limits specified so that the equipment being controlled will operate as specified over the range required. The controls shall operate automatically, with no assistance from the operator. The controller shall successfully demonstrate the performance of Closed Loop Control Systems before acceptance and taking over of this system by the Owner. However, limitation / constraints of main equipment of Owner shall be considered.

c) The control system including furnace draft & firing rate control shall also comply with all relevant requirements of NFPA code no. 85 'Standard for Prevention of Furnace Explosions in Pulverize Fired Utility Stations' and other applicable codes regarding safety

d) All runback conditions listed below shall be proved by the Contractor without any oil support.

i) FD/ID/PA fan trip ii)

BFP/CEP/BCW trip

iii) One mill and two mill trip iv) Turbine trip v) GCB open vi) Any

other condition decided during detailed engineering.

Note:

a) Sufficient time shall be allowed as setting period between conducting the tests.

b) Plant operating condition, i.e. main equipment status, availability of auxiliaries, operational and equipment constraints, which can influence the test, shall also be recorded.

c) Control system shall be running in the CMC mode i.e. Boiler master, fuel flow, air flow, feed water and turbine load control shall be in automatic mode Load set point, maximum and minimum load set point, rate of raise/lower of load shall be set through the Operator Work Stations and Large Video Screen.

d) FGMO/RGMO trials as per statutory / CERC requirement at that time shall be proved by the Contractor.

The parametric tests shall also be conducted under **worst case loading conditions A, B and C** as defined below :

a) For control system

CPU loading, Cycle time/controller reaction time

b) For HMI

CPU Loading, Spare Duty Cycle, Spare Memory Capacity

c) Spare duty cycle for system bus

d) Various display response time

e) Display update time

A. WORST CASE LOADING CONDITIONS FOR CONTROL SYSTEM

The worst case loading conditions shall include the following tasks.

i) All process inputs coming to Control System including SOE/annunciation inputs are being scanned, acquired, conditioned and processed.

ii) All closed loop controls are in operation during a disturbed (non-steady) state of the process

iii) All open loop controls of DDCMIS are in operation during a disturbed (nonsteady) state.

iv) All data being transferred between control system, system bus and HMI.

v) Three (3) alarms are being generated per second from each of the functional groups of Control System.

vi) Twelve control commands from HMI are being executed in one minute.

vii) All processors (including hot standby) health being monitored.

viii) All standby processors status being updated.

B. HMI WORST CASE LOADING CONDITIONS

The worst case loading conditions shall include the following tasks.

i) Continuous data transfer between System Bus & HMI.

ii) All calculations including performance calculations being performed at the specified rates.

iii) Alarms being reported at the rate of three (3) alarms per second for each of the Control System functional groups iv) Two control operator commands for control/ information within a base period of one minute from each OWS & each LVS.

v) Data collection for all logs/reports in progress.

vi) All printers connected to HMI are in operation at rated speed. vii) HMI processors and all peripherals health being monitored. viii) Data collection for trend function and historical data storage in progress.

ix) Four alarm acknowledgements within a base period of one minute from each OWS & LVS.

x) Calculations for long term storage of data being performed.

xi) SOE printing in progress.

xii) Data transfer with other DDCMIS sub-systems, all PLCs and SG/TG C&I Systems in progress for controls (commands) as well as for information.

C. THE WORST CASE LOADING CONDITIONS FOR SYSTEM BUS

The worst case loading condition shall mean continuous data transfer between the distributed modules (Control System/HMI), at their individual worst case loading conditions.

For the parametric test under above mentioned worst case loading conditions, the following requirements shall be met:

a) Processor Spare Duty Cycle (Free time)

i) Under worst case loading of HMI and system bus each HMI processor shall have 40% free time when measured over any two second period and 50% free time when measured over anyone minute period.

ii) Under worst case loading conditions of control system, control system processor shall have 20% free time when measured over any one minute period.

b) System Bus Spare Duty Cycle (Free Time).

The Bidder shall furnish all necessary data to fully satisfy the BHEL/Customer that the processor spare duty cycle figures quoted by the Bidder are realistic and based on configuration and computation capability of the offered system and these shall be actually achieved in the fully implemented system as commissioned at project site.

The system bus shall have min. 50% free time during the worst case loading conditions of control system, HMI and the system Bus, measured over any 2 seconds interval.

c) Response Time i) Display

The time from mouse click or last button pressed to the commencement of the requested display under the worst case loading conditions shall not be worse than the following:

All control related displays 1 sec Point Details Display (single point) 1-2 sec. Bar chart display (20 points, current data) 2-3 sec. Operator guide/plant start-up guide message display 1-2 sec. (Full screen of alphanumeric information and a maximum of ten numbers of dynamic data items)

Plant mimic display of fair complexity with a 2-3sec.minimum of 120 numbers of dynamic data items e.g., values, macros, line segment, etc. Group review display (current values of twenty points) 2-3 sec. X-Y plot display (2 X-Y plots and a single display 3-4 sec. requiring both historical as well as current data)

X-T plot display (Trend of 6 analog points and a 3-4 sec. Single display requiring both historical as well as current data)

Plant Summary display (e.g., bad point summary, 3-4 sec.Limit check removed point summary. Assume the Whole data base search is required and the Summary display contains ten points only). **ii) Command**

The response time for screen update, after the execution of the control command, from the time the command is issued (for example command to start a motor to the time the screen is updated) shall be within two seconds (excluding the drive actuation time).

d) Display update rates

All displays shall be updated at least every two seconds.

1.02.02 Sequence of event

The sequence of event in operating with 1 m sec. resolution as per technical specifications.

1.02.03 Availability Tests

BHEL shall guarantee system availability for a continuous period of 180 days. The bidder shall depute the required number of personnel to assist in conductance of availability test.

An availability guarantee test shall be conducted to assure this level of availability. If the accrued down time exceeds 0.3 percent of 180 days, during availability test run, a new 180 days test run shall start at the time when the system becomes available again. Loss of availability (unavailable system) shall be defined as the loss of the system's guaranteed accuracy and repeat ability or of any system function, except however, that the loss of a function for not more than five percent of the points shall not be considered loss of availability. Loss of a function for more than five percent of the points shall be treated as partial unavailability and the corresponding outage time shall be weighted with respect to the function and the percentage of the points for which the function is unavailable. Loss of each function shall have one weighing factor and unavailability of each equipment, peripheral device or process I/O card etc. shall have another weighing factor. The guaranteed accuracy and repeat ability and system parametric requirements specified in clauses on system parametric requirements shall be maintained for the entire 180 days run without any manual recalibration or any other changes made to the DDCMIS.

Downtime shall start upon loss of a system function and shall end upon full restoration of the affected system function. A minimum of one hour's down time shall be charged for each loss of availability in determining system availability.

If availability is lost due to reasons not attributed to the Contractor / Contractor's system or due to force majeure, then downtime shall not accrue & interrupted test resulting from the same shall be extended by an amount of time equal to the length of interruptions.

Loss of each of the following functions shall be treated as full system unavailability (i.e. factor of 1) and the downtime shall accrue individually for each of the following function:

a) Interruption of control command communication between HMI and controllers for a period more than three seconds for any drive (i.e. Unavailability of information in HMI for

carrying out the control command shall also be treated as interruption of control commands).

b) Permanent data loss in history functionality for a period more than three seconds for more than five percent of the history database.

c) Delay in reporting of alarms in **HMI** for more than five percent of the alarms for more than three seconds.

If loss of function as described at (a) to (c) above is attributed to server changeover, due to system feature, then unavailability due to the above loss of function shall accrue even if the function is not specifically attempted by Owner during the server changeover period.

The performance & guarantee test for C&I system shall constitute verification of the parameter as mentioned above & shall be earned out as per agreed procedure.

NOTE: - The Bidder shall provide complete assistance in conductance and completion of Closed Loop Control System Test, Availability Test, and PG Test.