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2012

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

TENDER NO.: BHEL/NR/SCT/RAPP KOTA/TISCS C&I/1203

NAME OF WORK: "WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR TURBINE ISLAND SECONDARY CYCLE SYSTEM (TISCS) INCLUDING RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 OF 2 X 700 MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN."

Bharat Heavy Electricals Limited

Registered

Ref: BHEL/NR/SCT/RAPP KOTA/TISCS C&I/1203
Date: 17/08/2020

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

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To

Dear Sir/Madam

Sub : NOTICE INVITING E-TENDER

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

1. **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHEL/NR/SCT/RAPP KOTA/TISCS C&I/1203**	
ii	**Broad Scope of job**	**WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR TURBINE ISLAND SECONDARY CYCLE SYSTEM (TISCS) INCLUDING RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 OF 2X700 MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	**From BHEL website (www.bhel.com) and https://bhel.abcprocure.com** Tender documents will be available at website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 27/08/2020 , Time : 1500 HRS Place : on https://bhel.abcprocure.com***	*Applicable*
vi	**OPENING OF TENDER**	***At due date / time Date : 27/08/2020, Time : 1530 HRS***	*Applicable*

		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.* ***However it being an e-tender it shall be opened online***	
vii	**EMD AMOUNT**	*Rs 3,64,000/-.*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	***Five days before bid submission due date****.* *Along with soft version also, addressing to contact address given below* ***1)*** *Name:* ***G.V. RAJA SEKHAR*** *Designation: Sr. MANAGER* *Deptt: SCT* *Address: BHEL-PSNR, PLOT NO. 25, SECTOR – 16A, NOIDA - 201301* *Phone: (Landline) 0120-2416232* *Email : gvr@bhel.in* ***2)*** *Name:* ***R M CHANDRA*** *Designation: MANAGER* *Deptt: SCT* *Address: BHEL-PSNR, PLOT NO. 25, SECTOR – 16A, NOIDA - 201301* *Phone: (Landline) 0120 - 2416440* *Email : rmchandra@bhel.in*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		*Not applicable.*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) & portal https://bhel.abcprocure.com **and not in the newspapers**. Bidders to keep themselves updated with all such information	
xiii	**Tender submission**	on portal https://bhel.abcprocure.com	

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

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

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

4. Unless specifically stated otherwise, tender must be accompanied by the prescribed amount of Earnest Money Deposit (EMD) in the manner described in Clause no. 1.9 of General Conditions of Contract.

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

   However, the One Time EMD can be adjusted against the EMD applicable against this tender on specific request of bidder.

   For Electronic Fund Transfer the details are as below-:

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

   b) Bank Particulars

i).	Bank Name -:	STATE BANK OF INDIA
ii).	Bank Telephone No.(with STD code)-:	011-23475566
iii).	Branch Address-:	CAG II BRANCH, NEW DELHI 4th & 5th FLOOR, REDFORT CAPITAL, PARASNATH TOWERS, BHAI VEER SINGH MARG, GOLE MARKET, NEW DELHI-110001
iv).	Bank Fax No. (with STD code) -:	011-23475566
v).	Branch Code -:	17313
vi).	9 Digit MICR Code of the Bank Branch -:	110002562
vii).	Bank Account Number -:	10813608647
viii).	Bank Account Type -:	CASH CREDIT
ix).	11 Digit IFSC Code of Beneficiary Branch-:	SBIN0017313

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

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

   Documents Comprising the e-Tender

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

   a. Technical Tender (UN priced Tender)

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

i. Tender Cost and Earnest money Deposit (EMD) furnished in accordance with NIT Clause 3.0 & 4.0.
ii. Technical Bid (without indicating any prices).

b. Price Bid:

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

DO NOT"S

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

Digital Signing of e-Tender

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

The Requirement:

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

BHEL has finalized the e-procurement service Provider-:

M/s AbcProcure, Ahmedabad

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

Ellis Bridge, Ahmedabad-380006

The contact details of the service provider are given below:

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

Parmar	9328657215		Implementation & Support	
Devang Patel	+91 79 40270576 / 99983 05442	devang@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad

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

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

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

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

6. **Not Used**

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

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

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

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

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -
(**Note:** For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

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

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

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

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

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

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

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

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

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

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

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

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

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

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No. of similar packages for all Regions = $\mathbf{P_T}$ i.e. Sum (Σ) of columns (iii) to (ix)

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	--------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

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

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

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

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

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

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

III. 'Assessment of Capacity of Bidder':

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

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

Note:

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

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

Note: For the transition period of 1 year (i.e. for all the NITs floated between 11th May 2019 to 10th May 2020), in addition to above, 'Assessment of Capacity of Bidder' shall also be calculated considering 'performance scores' till 36 months as per Sl. no II ii).

Higher of the results obtained out of both shall be considered for 'Assessment of Capacity of Bidder'.

IV. **Explanatory note**:

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

ii). Identified Packages (Unit wise)

Table-1

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

iii). Bidders who have not been evaluated for at least six package months in the last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

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

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

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendors has been tagged as First Timer or availability of 6 evaluation scores within last 24 months preceding and including the cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

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

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

iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than four, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:

a) All the bidders having Overall Performance Rating ('R_{BHEL}') ≥60 shall be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
b) If even after using option "a", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a", "First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
c) If even after using option "a" and "b", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a" and "b", "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

Note:- In case, the number of bidders qualified against Technical and Financial Qualification criteria itself is less than four, then all bidders (a)- having Overall Performance Rating ('R_{BHEL}') ≥60, (b)- First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month, (c)- "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall be considered qualified against criteria of 'Assessment of Capacity of Bidders' for further processing of tender.

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

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

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

c. Up to Synchronization in all Balance Packages

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

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

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

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

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

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

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

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

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

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

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

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

15. Not Applicable.

15a Not Applicable

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

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

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

19. Not Applicable.

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

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

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

respect to tender.

23. **Consortium Bidding**–Not Applicable

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

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

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

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

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

27.1.1 **Commitment by BHEL:**

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

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

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

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

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

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

28.0 **Micro and Small Enterprises (MSE)- Not Applicable**

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

30.0 **PREFERENCE TO MAKE IN INDIA:**

For this procurement, Public Procurement *(Preference to Make in India), Order 2017 dated 15.06.2017, 28.05.2018, 29.05.2019 & 04.06.2020* and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/ PO/ WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and/ or local content in respect of this procurement, same shall be applicable.

31.0 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.

32.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure:-

(i) Annexure-1: Pre Qualifying criteria.
(ii) Annexure-2: Check List.
(iii) Annexure-3: Feedback form
(iv) Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR TURBINE ISLAND SECONDARY CYCLE SYSTEM (TISCS) INCLUDING RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 OF 2X700MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN
TENDER NO.	BHEL/NR/SCT/RAPP KOTA/TISCS C&I/1203

SL NO	NAME AND DESCRIPTION OF PRE QUALIFICATION CRITERIA	
A	Submission of Integrity Pact duly signed	**Not Applicable**
B	Assessment of Capacity of bidder to execute the work as per clause 9.0 of NIT	**Applicable – by BHEL**
C.1	**Technical** Bidder should have executed **Similar work** for any one of the following in the last seven years from latest date of bid submission:	**Applicable**
C.1.1	One work of Value not less than **Rs 145.6 Lakhs**. **'OR'**	
C.1.2	Two works each of Value not less than **Rs 91 Lakhs**. **' OR'**	
C.1.3	Three works each of Value not less than **Rs 72.8 Lakhs**.	
C.2	Bidder should have executed any one of the following in the last seven years from latest date of bid submission:	
C.2.1	C&I works for BTG/GT 'OR' C&I works consisting of DCS/DDC/Station C&I in one unit of ≥ 190 MW. **'OR'**	
C.2.2	One contract of C&I works consisting of DCS/DDC/Station C&I in any Industry with its executed value ≥ Rs 190 Lakhs.	
D	**Financial**	**Applicable**
D-1	**TURNOVER:** Bidders must have achieved an average annual financial turnover (Audited) of **Rs. 54.6 Lakhs** or more over last three Financial Years (FY) i.e. (2016-2017, 2017-2018, 2018-2019). Bidder shall submit audited accounts (balance sheets and profit & loss account) in support of this. In case audited financial statements have not been submitted for all the three years as indicated above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e. total divided by three. If Financial Statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Charted Accountant.	

D-2 **D-3** **D-4**	**Net worth**: Net Worth (Only in case of companies) of the Bidder should be positive. Note: Net worth shall be calculated based on the latest Audited Accounts as furnished for 'D-1' above. Net worth = Paid up share capital + Reserves **Profit:** Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'C-1' above. Note: PROFIT shall be PBT earned during any one year of last three financial years as in 'D-1' above. 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.	
E	**Approval of Customer**	**Applicable**
F	**Consortium Criteria**	**Not Applicable**

Explanatory Notes for QR 'C';

1) For Sl. No. 'C-1' above ,the word '**Similar Works'** means '**Electrical' OR 'C&I' OR 'Electrical and C&I' works**

2) For Sl. No. 'C-1' above, actual executed value shall be considered.

3) For Sl no 'C.2' above, '**Executed**' means "SYNCHRONISATION" in case of power project/ "WORK EXECUTION of the value as defined in **C.2.2 above**" in case of industry.

4) For Sl. No. 'C-1 & C-2' above, **"Executed**" means the bidder should have achieved the technical criteria specified even if the Contract has not been completed or closed.

5) For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria C 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).

6) Completion date for achievement of the technical criteria specified 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.

7) For QR 'C-1' and 'C.2.2' above, 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-

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

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.

8) 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.

9) Relevant documents, meeting above requirements at C & D, shall be submitted by bidders.

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.

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.:
Email 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 Tenchnical 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 oto 1% of the total contract value in addition to Security Deposit to be submitted by Bidder as per Clause……of the NIT/T 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 'Çonsortium 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 of the Tenderer**	
2	**Address of the Tenderer**	
3	**Type of the Firm/ Company**	
(i)	In case of Individual Tenderer	His / her full name, address and place & nature of business shall be furnished along with the offer.
(ii)	In case of Partnership Firm	The names of all the partners and their addresses, A copy of the partnership deed/instrument of partnership dully certified by the Notary Public shall be furnished along with the offer..
(iii)	In case of Companies	a) Date and place of registration including date of commencement certificate in case of Public Companies (certified copies of Memorandum and articles of Association are also to be furnished). b) Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.
4.a	**Details of Contact person for this Tender**	Name : Mr/ Ms Designation: Telephone No: Mobile No: Email ID: Fax No:
4.b	**Details of alternate Contact person for this Tender**	Name : Mr/ Ms Designation: Telephone No: Mobile No: Email ID: Fax No:
5	**EMD DETAILS**	Mode of payment: Demand Draft/ NEFT/ RTGS/ OTHER Details of Transaction:
6	**Validity of Offer**	TO BE VALID FOR **SIX MONTHS** FROM DUE DATE

	DESCRIPTION	**APPLICABILITY (BY BHEL)**	**ENCLOSED BY BIDDER**
7	Whether all pages of the Tender documents including annexures, appendices etc are read and understood	Applicable	YES / NO
8	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE – 1) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
9	Audited Balance Sheet and profit & Loss Account for the last three years	Applicable	YES / NO
10	Copy of PAN Card	Applicable	YES / NO
11	Copy of GST registration	Applicable	YES / NO

SL. NO.	DESCRIPTION	APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
12	Organization Chart of the tenderer's organization, including the names, addresses and contact information of the Directors/Partners shall be furnished along with the offer.	Applicable	YES / NO
13	Integrity Pact	Not Applicable	
14	Offer forwarding letter / tender submission letter ***[Form No. F-01 (Rev 00)]***	Applicable	YES / NO
15	Declaration by Authorised Signatory ***[Form No: F-02 (Rev 00)]***	Applicable	YES / NO
16	Declaration by Authorised Signatory regarding Authenticity of submitted documents ***[Form No: F-02A (Rev 00)]***	Applicable	YES / NO
17	No Deviation Certificate ***[Form No: F-03 (Rev 00)]***	Applicable	YES / NO
18	Declaration confirming knowledge about Site Conditions ***[Form No: F-04 (Rev 00)]***	Applicable	YES / NO
19	Declaration for relation in BHEL ***[Form No: F-05 (Rev 00)]***	Applicable	YES / NO
20	Non-Disclosure Certificate ***[Form No: F-06 (Rev 00)]***	Applicable	YES / NO
21	Bank Account Details for E-Payment ***[Form No: F-07 (Rev 00)]***	Applicable	YES / NO
22	Format for seeking clarification ***[Form No: F-08 (Rev 00)]***	Applicable	YES / NO
23	Capacity Evaluation of Bidder for current Tender ***[Form No: F-09 (Rev 00)]***	Applicable	YES / NO
24	Power of Attorney for Submission of Tender/Signing Contract Agreement ***[Form No: F-25 (Rev 00)]***	Applicable	YES / NO
25	Analysis of Unit rates ***[Form No: F-26 (Rev 00)]***	Applicable	YES / NO
26	Tie Ups/Consortium Agreement are submitted as per format ***[Form No: F-22 (Rev 00)]***	Not Applicable	

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE – 3

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

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

Rev 01
1st June 2012

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No. PS: MSX: TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/NR/SCT/RAPP KOTA/TISCS C&I/1203

FOR THE

"WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR TURBINE ISLAND SECONDARY CYCLE SYSTEM (TISCS) INCLUDING RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 OF 2X700MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN"

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)
INDEX

Sl. No.	Title	Description
1.1	Owner	Nuclear Power Corporation of India Ltd.(NPCIL)
1.2	Project Title	**2x700 MWe Rajasthan Atomic Power Projects Unit-7 &8**
1.3	Type of Project	Mega, Domestic, Nuclear Power Project
1.4	Location	Rawatbhata, via KOTA, Rajasthan, 323303
1.5	Nearest road head	13 km from town of Rawatbhata
1.6	Nearest railway station	70km from Kota Railway Station (Western Railway)
1.7	Ambient Temperature	Maximum dry bulb temperature with corresponding RH:+48.7 deg C, 96% Minimum dry bulb temperature with corresponding relative humidity: +6.7 deg C, 33% Design temperature for electrical equipment/devices: +50 deg C
1.8	Relative Humidity	Maximum during monsoon: 100% Minimum (Design): 2%

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.

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

BHEL has been awarded the work of Erection, Testing, Commissioning of CONTROL & INSTRUMENTATION WORKS FOR TURBINE, GENERATOR AND ITS AUXILIARIES at RAPP-7 of 2X700 MWe, NPCIL, at Rawatbhata, Kota, Rajasthan.

The scope of work under this tender for Erection, Testing, pre-commissioning, commissioning, integration & handing over of TISCS of Unit 7 at 2x700 MWe RAPP NPCIL broadly consists of:

Handling and receipt of material from BHEL/client's stores, storage yard and other places of unloading in project premises, transportation to erection site, inspection and preparation of foundation, erection, alignment, fixing of Panels, termination of cables, inter-panel wiring, calibration, testing, operational check, pre commissioning tests, validation, commissioning of systems, integration of various auxiliaries/systems supplied by the vendor, functional checking of logic relay panels and handing over of system after obtaining erection completion certificate/construction completion certificates, operational acceptance & handing over of TISCS package of **Unit-7** of **2X700 MWe** sets at RAPP Rawatbhata site to BHEL's customer.

Preparation of handling, loading-unloading, instrumentation erection procedures for all equipment, panels and systems of this package as specified therein. The contractor has to prepare procedure in line with the safety and quality standards, drawings, QAP's, FQP of BHEL/NPCIL and get these approved from BHEL/NPCIL before starting erection, testing, pre-commissioning/ commissioning, shifting/ loading, charging etc. of equipment / panels etc.

The work shall be executed under the usual conditions affecting major Nuclear 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.

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, hence not limited to these for the completion of the work in all respects

CONTRACTOR SHALL ABIDE BY THE SAFETY / SECURITY RULES AND REGULATIONS AS PER THE REQUIREMENT OF NPCIL / BHEL. CONTACTOR SHALL OBTAIN INFORMATION ABOUT ALL SAFETY / SECURITY NORMS OF NPCIL WELL IN ADVANCE. BHEL WILL NOT ADMIT ANY CLAIMS WHATSOEVER ON ACCOUNT OF CONTRACTOR'S NON-FAMILIARIZATION OF SITE SAFETY / SECURITY REGULATIONS.

2.1.1

The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship, engineering and construction management. The contractor should ensure timely completion of work. The contractor must have adequate quantity of tools, measuring instruments, calibrating equipment etc. in his possession. He must also have on his rolls adequately trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployment identified by contractor should match requirement of sophistication involving microprocessor-based Metso/max DNA systems.

2.1.2

The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

2.1.3

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

2.1.4

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

2.1.5

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

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, 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

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

2.1.8

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

2.1.9

During the course of erection, testing and commissioning of C&I work, certain rework/ modification/ rectification/ repairs/ fabrication etc., will be necessary on account of feedback from various thermal power stations or units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/ maintenance requirements. Contractor shall carryout such rework / modification / rectification / fabrication repairs etc. promptly and expeditiously. 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.

2.1.10

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

2.1.11

All tools, tackles, fixtures, equipment's, 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.

2.1.12

The scope of work under this tender specification covers transportation, calibration, erection, testing and commissioning, etc. of control / instrumentation and electrical equipments of the following packages.

A. Turbo generator Control & Instrumentation and its auxiliaries

Digital distributed microprocessor based Metso/maxDNA system panels consist of TSC, EHTC, LPBP, TSI, ATT, LSR/AS, ATRS, turbine protection and monitoring,

Gamp and field instrumentation work / cabling, boiler feed pumps /condensate extraction pump, and misc. System like lube oil, seal oil, hydrogen gas system, vacuum pumps etc.

2.1.13

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.

2.2.0 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 him till these are fully erected, tested and commissioned and taken over by the customer. The contractor should note that the transport of equipment's to erection site, assembly yards etc. should be done by the prescribed route in the most professional manner without disturbing other ongoing works of various contractors. Special equipment's such as laboratory equipment's, measuring and control equipment's, 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. *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.

2.2.1.2

The contractor shall take delivery of the components, equipment's 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 handover 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

Void

2.2.3

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

2.2.4

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

2.2.5

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.

2.2.6

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

2.2.7

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.

2.2.8

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.

2.2.9

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

2.2.10

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.

2.2.11

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

2.2.12

Housekeeping in the erection and preassembly 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 reshifting 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.

2.2.13

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.

2.2.14 Troubleshooting during plant operation

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

2.2.15.0 Pre-commissioning / commissioning and post commissioning activities

2.2.15.1

The work is also inclusive of various commissioning activities of the turbine package along with its auxiliaries. 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 electrical inspector etc.

2.2.15.2

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.

2.2.15.3

During each stage of commissioning, if any part of the instrument needs repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim, if any, for such repair/rectification/ rework/replacement etc. for reasons not attributable to contractor will be governed by Section-13 of the special conditions of contract. The parts to be replaced shall however be provided by BHEL free of cost.

2.2.15.4

Contractor shall calibrate, erect, carry out cabling/wiring and terminations, commission all the equipment, cabinets/panels, instruments etc. as per sequence prescribed by BHEL at site. The sequence of erection / commissioning methodology will be decided by BHEL depending upon the availability of materials/work fronts etc. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection / commissioning adopted in erection / commissioning of similar jobs or for any reasons whatsoever. All these works need specialized 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 mobilization of these commissioning gangs shall be such that planned activities are taken up in time and also completed as per schedule and the work undertaken round the clock if required. It is the responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools and tackles with BHEL engineer and arrange for the same. If at any time the requisite manpower, consumables, T&P are not arranged then BHEL shall make alternate arrangements and necessary recoveries with overhead cost will be made from the bills of the contractor.

2.2.15.5

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.

2.2.15.6

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 if any, for such works from the contractor shall be governed by Special Conditions of Contract.

2.2.15.7

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 erection, testing and commissioning of this work is delayed due to reasons not attributable to the contractor.

2.2.15.8

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.

2.2.15.9 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 peak months there could be requirements of separate commissioning gangs simultaneously in even up to 8 to 10 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.

2.2.15.10

It shall be specifically noted that contractor manpower 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.

2.2.15.11

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.

2.2.15.12 Calibration, Testing & Commissioning

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

A <u>Calibration</u>

- 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.
- 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**

- Drawal of material from store, verification, inspection as per shipping list, drawings and documents.
- Preservation, upkeeping, 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 **Testing, Commissioning & Trial Operation**

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

- Adjustment, testing, calibration of pneumatic drive (control valve, trip valve, power cylinder), electrical actuator operated valve of other functional elements.

- 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 for **Trial Operation** of the unit is in scope of this specification. Trial Operation shall be considered successful on completion of operation of the respective units for a continuous period of 720 hours at maximum available load. Out of this period, 72 hours shall be at full rated load of the unit. Smooth operation and availability of all instrument/controls of the systems installed under the scope herein, shall be ensured by the contractor. Contractor shall provide adequate number of skilled manpower and T&P for this Purpose. Interruption in Trial Operation for reasons attributable to the

Contractor shall result in re-start of the Trial Operation all over again, consequential extension in Time Schedule / Contract Period shall be to the contractor's account.

- 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 Post-commissioning

- Contractor shall rectify the defect observed/informed by customer during the trial run.

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

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

E. PG Test Assistance

In case PG test is to be conducted, laying of impulse pipes, cables, etc. and installation of instrument tapping points shall be done by the contractor. Payments will be made as per item rates of comparable similar or identical items in the rate schedule. Such temporary installations shall have to be dismantled and returned to BHEL Stores, after the completion of PG Test for which no separate payment is admissible.

2.3.0 Brief description of work

2.3.1 Installation of Cable trays/cable ducts

2.3.1.1 Various types of sheet metal, galvanized 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 galvanizing 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 application 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 fiber)

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 fiber 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, 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 type of junction boxes are to 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, (if applicable) DPT, 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

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 airline 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 airline 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 airline 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

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. 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 supplied

in running meters and same shall be used for fabrication of panel base frame, cable tray supports, canopies, instrument and junction box frames, impulse pipe/instrument air pipe supports and instruments etc.

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. Paint, primer etc supply is 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, galvanized members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/welding. The installation rate as quoted shall include the assembling of the frames.

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 suit of either one/two/three or loose shipping sections with integral base frame or loose supplied.

These panels may have to be installed as stand alone or in 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 fixing of base frame, fabrication of base frame if required, 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.

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 RAPP Unit#7.

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 troubleshooting has to be carried out by the contractor as part of testing and commissioning work as per the quoted rates.

2.8.9

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

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

TG, system panels are based on Metso/Max DNA distributed digital control philosophy. Metso/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 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 Battery/battery charger/UPS

2.10.1

HDP Tubular 550/600AH or NiCd (or similar type) or Lead acid Batteries will be supplied loose along with battery interconnection in the series/parallel links/bus bar, lugs, steel/wooden battery stand either assembled or knocked down condition, cables and associated charger and UPS system.

2.10.2

In case of Lead acid battery, the electrolyte shall be supplied in plastic cans. After installation,

the electrolyte has to be filled in batteries and charging/discharging shall be carried out to achieve specific gravity of electrolyte and stability of battery/battery bank. If required, discharging of the charging cycle shall be repeated to achieve the desired results. However, BHEL engineer's decision shall be final. Any preparatory arrangement required to be done for charging and discharging of battery, the contractor shall arrange consumables, safety equipments etc., at his own cost.

2.10.3

In case of NiCd (or similar type) batteries are normally supplied in charged condition, due care shall be exercised while handling/installation of the same. If the battery charge is found to be less than the required level, the charging/discharging cycle shall be carried out as per instruction of BHEL engineer.

2.10.4

Battery charging/discharging is a continuous process and skilled manpower shall be deployed by the contractor round-the-clock.

2.10.5

Contractor shall arrange suitable load, cables, safety equipments and consumables for discharging the battery during charging and discharging cycle at his cost.

2.10.6

Contractor shall provide skilled manpower for periodic maintenance after the battery are fully charged for the activities such as checking of electrolyte level, specific gravity, topping up with distilled water and cleaning till the set is handed over to customer and record of the same shall be maintained and submitted before handing over of the system.

2.11.0 Vibration monitoring system for TG auxiliaries

2.12.0 Field instrumentation

2.12.1

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.

2.12.2

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

2.12.3

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.

2.12.4

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.

2.12.5

Wherever thermowells are supplied along with temperature gauges, thermocouples, temperature switches, thermostats, etc., the contractor has to co-ordinate with the mechanical contractor for identification and fixing of thermowells on the pipeline. However actual fixing of thermowells on pipeline and seal welding shall be done by mechanical contractor and is not a part of instrument installation.

2.12.6

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.

2.12.7

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, refixing, 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.

2.12.7.1

Transmitter enclosure / open racks for various packages which are to be erected and commissioned at various locations of the 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.

2.12.8

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 (Chapter-7)

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 lumpsum 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.

2.12.9

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.

2.12.10

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.

2.13.0 Unit control desk and components

2.14 Final painting

2.14.1 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.

2.14.2

Other equipments 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.

2.14.3

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.

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

2.15.1

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

2.15.2

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.

2.15.3

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.

2.15.4

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.

2.15.5

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.

2.15.6

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.

2.16.0 Guidelines for erection

2.16.1 Impulse Pipelines

2.16.1.1

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

2.16.1.2

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

2.16.1.3

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

2.16.1.4

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

2.16.1.5

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.

2.16.1.6

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

2.16.1.7

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

2.16.1.8

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.

2.16.1.9 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.

2.16.1.10

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 is less, in 30 minutes and there shall be no leaks at any of joints/welds when isolated from source of pressure.

2.16.1.11 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.

2.16.1.12 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.

2.17.1 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.

2.17.1.1

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

2.17.1.2

Insulation test of the various circuits shall be done.

2.17.1.3

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

2.17.1.4

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

2.17.1.5

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

2.17.1.6

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

2.17.1.7

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 TG area.

2.17.1.8

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.

2.17.1.9

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

2.17.1.10

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

2.17.1.11

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

2.17.1.12

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.

2.17.1.13

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.

2.17.1.14

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

2.17.1.15

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

2.17.1.16

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

2.17.1.17

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.

2.17.1.18

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.

2.17.2.0 Earthing installations

2.17.2.1

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

2.17.2.2

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.

2.17.2.3

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.

2.17.2.4

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

2.17.2.5

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

2.17.2.6

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

2.17.2.7

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

2.17.2.8

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.

2.18.0 Instruments and Equipments:

2.18.1

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.

2.18.2

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.

2.18.3

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.

2.18.4

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.

2.18.5

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.

2.18.6

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.

2.18.7

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

2.19.0 Guidelines for handling and storage of electronic cubicles / subassemblies / loose

items.

2.19.1

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.

2.19.2

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.

2.19.3

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.

2.19.4

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

2.19.5 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.

2.20.0 Storage

2.20.1

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.

2.20.2

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.

2.20.3

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

2.20.4

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.

2.20.5

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.

2.20.6

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

2.20.7

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

2.21.0

Sub-assemblies

2.21.1

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

2.21.2

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.

2.21.3

Subassemblies should not be stacked one above the other.

2.22.0 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.

2.23.0 Guidelines for handling of electronic modules 2.23.1

All the modules shall be handled by qualified persons only.

2.23.2

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

2.23.3

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.

2.23.4

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

2.23.5

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

2.23.6

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

2.23.7

Soldering irons and any other tools used must be grounded.

2.23.8

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 to the other.

2.24.0 STATUTORY CLEARANCES

1. Contractor should have / Obtain valid Electrical Contractor-ship License to carry out the Erection, Testing & Commissioning work on High / Low Voltage electrical equipments from the appropriate *statutory authority of concern state or Central Electricity Authority*, as the case may be. All the fees and expenses in this regard shall be in the contractor's account.

2. Contractor shall arrange inspection of concerned Statutory Authority for the installation, testing & commissioning of High / Low voltage equipment covered under this tender specification and obtain their approval in appropriate format prior to charging of the equipments.

3. Contractor shall be responsible for all necessary liasioning work with Statutory Authority towards the certification of installation / works. BHEL shall reimburse Statutory Fees as per actual on submission of original receipt, however all incidental expenses shall be borne by Contractor. BHEL/ BHEL's Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority. Contractor shall provide all logistics services in this regard.

4. The installation of all electrical equipments shall be carried out only by persons holding valid certificates of Competency for the voltage classes as defined in this tender specification, issued by appropriate state or central Statutory Authority. Contractor shall submit the particulars of Licenses held by him.

5. The contractor has to arrange electrical license to work of the concerned state where the project being executed within a 6 weeks of mobilization at site for carrying out the works covered under this contract.

Note:- Obtaining statutory clearance from Electrical Inspector for Generator is in the scope of the agency. The quoted rates shall include the same and no separate payment shall be done for obtaining statutory clearance.

2.25.0 BRUSHLESS EXCITATION SYSTEM:

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

Checking from Control desk & Field related inputs/ outputs to commission the excitation system fully operational,

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

2.26.0 INTEGRATED ELECTRICAL TESTING/COMMISSIONING

The brief scope of work under is defined as below, but not limited to the following. Contractor shall discuss & finalize testing procedure with BHEL Engineer In-Charge for the test to be conducted on Generator system. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and binding on the contractor.

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

Contractor shall maintain the charged and commissioned equipment till the same is taken over by customer.

Contractor's quoted rates for all concerned items shall include Integrated Testing as defined hereinafter.

2.27.0 GENERATOR SYSTEM TESTING

The following major works also shall be in the scope of the Contractor

1. Generator stator winding resistance and PI value measurement / check
2. Generator rotor winding resistance, impedance, IR value measurement before and after rotor insertion.
3. Generator Bushing HV test
4. Main exciter winding resistance, IR value measurement / check
5. PMG winding resistance, IR value measurement / check
6. Testing and commissioning of generator and exciter accessories viz., heaters, blowers, stroboscope, diodes, enclosure lighting, potential measurement of bearings (TE &EE) etc
7. Meggering during drying out of generator.
8. Meggering of generator bushing and its accessories. This test has to be conducted many times during erection and commissioning stages

Note:- Obtaining statutory clearance from Electrical Inspector for Generator is in the scope of the agency. The quoted rates shall include the same and no separate payment shall be

done for obtaining statutory clearance.

2.28.0

Equipments / instruments etc., under the above scope of erection and commissioning are generally dispatched from BHEL's manufacturing units / vendor's works at site well before start of erection. Sometimes, such dispatched materials may get stuck up with transporters/railways. The contractor shall provide support / manpower for necessary chase up for removal of such bottlenecks in transportation. Also, for smaller items, it could be necessary to depute his person to personally carry certain items from works to site. Requirement of such activities, which will be decided by BHEL engineer and chase up activities, if required, shall be performed under authorization by BHEL. The above services shall be provided within the quoted rates.

2.29.0 HOUSE-KEEPING

After the completion of major civil work, area/fronts will be released to the contractor in phased manner for maintaining and up keeping. While handling over the area from the civil Contractor, it will be ensured that civil works have been substantially completed. This point of time onwards till all works of the contractor in the building is completed, notwithstanding the fact that other contractors are also working in the same area; it shall be the responsibility of the contractor to maintain general cleanliness in the area assigned to him.

In order to maintain general cleanliness in the area, the contractor may take the Help/ assistance from the agencies working in the same area and he shall also extend all cooperation to other Contractors for such works. However, overall responsibility of Housekeeping of the assigned area shall lie with the contractor.

2.29.1 General description of work:

Sl. no	Operation	Min. Frequency
1	Cleaning and sweeping of all control room floors, equipment, JBs, pipes , cable shafts, etc.	Daily
2	Vacuum cleaning of Panels, JBs, ceilings	Weekly

2.30.0 ADDITIONAL REQUIREMENTS/QUALIFICATION OF MANPOWER DEPLOYED

The contractor to provide qualified manpower as per details below:

A. Electrician:

1. Only qualified electrician – ITI
2. Must possess electrician/wireman license
3. At least 6 years of experience

B. Welder:

1. Only qualified welder will be deployed for welding. Welder test is taken by NPCIL, test piece is sent to Vadodara for testing. Based on this, interview is conducted by NPCIL quality for final approval of welders.
2. Welder test piece to be arranged by contractor

C. Fitter:

1. Only qualified fitter – ITI

2. At least 2 years experience

D. NDT:

1. Qualified Level-1&2 NDT operators/ engineer are required for NDT testing

E. Quality Engineer:

1. Qualified quality engineer is required. NPCIL quality dept will conduct written test and interview and then authorise.

F. Safety:

1. AERB safety rules are followed.
2. Certified safety officer is to be deployed from start of work

G. HR:

H.

1. Central labour laws are applicable here and labour payment has to be done accordingly. NOT AS PER RAJASTHAN STATE LABOUR RATEs.
2. Gate pass is issued to labours/staffs having original IDs like passport, driving license, voter ID, Aadhar card, ration card, etc

I. Documentation:

1. Documentation requirement will be very stringent. Various protocols has to prepared for work done.

S. No.	Description	Scope of / To be taken care by		Remarks
		BHEL	Contract--or	
3	**ESTABLISHMENT**			
3.1	**For Construction Purpose**			Refer clause no. 3.9
3.1.1	Open space for office (as per availability)	**YES**		As and where made available by customer M/s NPCIL /BHEL.
3.1.2	Open space for storage/Lab setting etc.	**YES**		As and where made available by customer M/s NPCIL /BHEL.
3.1.3	Construction of bidder's office, canteen and storage building including supply of materials, consumables and arrangement its safety etc. including firefighting service		**YES**	
3.2	**FOR LABOUR ACCOMODATION**			
3.2.1	Labour Colony		**YES**	Contractor to make its own arrangement, further guided as per clause No. 3.9.3
3.3	**ELECTRICITY**			
3.3.1	a. Electricity for construction purposes /testing	**YES**		Chargeable. (As per clause 3.9.6)
	b. Electricity for Commissioning	**YES**		Free of cost

3.3.2	Single point source for construction	**YES**		Chargeable. (As per clause 3.9.6)
3.3.3	Further distribution for the work.		**YES**	Contractor shall install calibrated energy meter and maximum demand meter for metering of electricity consumption.
3.3.4	Electricity for the office, stores, canteen etc. of the bidder which include:		**YES**	**Chargeable** As per clause 3.9.6 ,3.9.7
3.3.5	Distribution from single point.		**YES**	For distribution and installation for use of electricity for construction and accommodation, the contractor has to follow directions of BHEL / NPCIL
3.3.6	Supply, Installation & connection of energy meter including operation & maintenance		**YES**	
3.3.7	Duties & deposits including statutory clearances for above		**YES**	
3.3.8	Demobilization of the facilities after completion of works		**YES**	
3.3.9	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		**YES**	**Chargeable** (As per clause 3.9.7)
3.4	**WATER SUPPLY**			
3.4.1	**FOR CONSTRUCTION:**			
3.4.1.1	Making the Service water available at single point	**YES**		Chargeable, As per clause no. 3.10
3.4.1.2	Potable water for the workers at site		**YES**	To be arranged by Contractor
3.4.1.3	Further distribution as per the requirement of work including supply of materials & Execution		**Y ES**	As per clause no. 3.10

3.4.2	**LABOUR ACCOMODATION:**			
3.4.2.1	Making the SERVICE/POTABLE water Available.		**YES**	As per clause No. 3.10
3.4.2.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
3.5	**LIGHTING**			
3.5.1	For construction work (supply, erection and arrangement of all materials) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	Related NPCIL instruction and norms to be followed
3.5.2	Providing the necessary consumables like bulbs, Switches etc. during the course of construction		**YES**	Related NPCIL instruction and norms to be followed
3.6	**Communications facilities for site Operations of the bidder**			
	Telephone, fax, internet, intranet, email etc.		**YES**	
3.7	**Compressed Air for Construction work**			
3.7.1	Supply of compressor and all other equipment required for compressor & compressed air system including pipes, valves, storage system etc.		**YES**	
3.7.2	Installation of the above system and operation & maintenance of the same		**YES**	
3.7.3	Supply of all the consumables for the above system during the contract period.		**YES**	
3.8	**ERECTION FACILITIES**			
3.8.1	Providing erection drawings for all the Equipment's covered under this scope	**YES**	**YES**	
3.8.2	Drawings for construction method	**YES**	**YES**	

3.8.3	As-built-drawings-where ever deviations observed & executed and also based on Decisions taken at site.	**YES**	**YES**	Inputs to be provided by Contractor
3.8.4	Shipping lists etc. for reference & planning the activities	**YES**		In consultation with BHEL
3.8.5	Preparation of site erection schedules/ procedures and other input requirements	**YES**	**YES**	**Do**
3.8.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	**YES**	**YES**	**Do**
3.8.7	Weekly erection schedule		**YES**	**Do**
3.8.8	Daily erection/work plan		**YES**	**Do**
3.8.9	Periodic visit of senior official of bidder to site to review the progress so that works are completed as per schedule.		**YES**	**Do**
3.8.10	Preparation of facilities for preassembly		**YES**	**Do**
3.9	**Land and Site Mobilization**			
3.9.1	In respect of any land allotted to the Contractor for purposes of or in connection with the Contract, following conditions shall be followed:			
3.9.1.1	That contractor shall pay a nominal license fee of Rs.5/ Hectare for plant site and Rs.200/ Hectare for colony per year/ part of a year for use and occupation, in respect of each and every separate area of land allotted to him.			
3.9.1.2	That such use or occupation shall not confer any right of tenancy of the Land to the Contractor.			
3.9.1.3	That the Contractor shall be liable to vacate the land on demand by the Engineer-in-charge / NPCIL. The issue of vacation of land and the time period permitted for it shall be mutually discussed and agreed upon by both BHEL and Contractor provided such vacation does not affect the performance of the Contract by the Contractor.			

3.9.1.4	That the Contractor shall have no right to any construction over this land without the written permission of the BHEL Engineer-in-charge / NPCIL. In case, he is allowed to construct any structure he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.
3.9.1.5	On completion of work, the Contractor shall handover the land duly cleaned (made vacant after demolishment of any establishment, leveling and clearing of debris) to the Customer (NPCIL).
3.9.2	**Land for Contractor's Office, Stores, workshop at site etc. :**
3.9.2.1	The Engineer-in-charge shall, at his discretion and for the duration of the Contract, make available land at Site, for construction of Contractor's field office, workshop, stores, open storage, fabrication and assembly space etc. required for execution of the Contract. Levelling and dressing of site, any construction of temporary roads, offices, workshops etc. as per plan approved by the Engineer-in-charge shall be done by the Contactor at his own cost.
3.9.3	**Land for Contractor's Colony**
3.9.3.1	Land will be given if available, by the Engineer-in-charge for the Contractor's colony. Land will be made available for the period of Contract. The Contractor shall make his own arrangement for water supply, electric supply, sanitation, access road and general cleanliness, of his colony. All these amenities shall be got approved by the Engineer-in-charge prior to construction of the camp.
3.9.3.2	The Contractor shall not permit any of his employees to maintain any temporary or permanent living quarters within the project Site premises. No areas inside the Plant and residential area of NPCIL's personnel shall be used as labour colony.
3.9.4	**Possession of Site**
3.9.4.1	The Contractor shall be permitted to enter on (other than for inspection purposes) or take possession of the site only when instructed to do so by the Engineer-in-Charge in writing. The portion of the Site to be occupied by the Contractor shall be defined and /or marked on the Site Plan, failing which these shall be indicated by the Engineer-in-Charge at site and the Contractor shall on no account be allowed to extend his operations beyond these areas. The Contractor shall provide, if necessary or if required on the Site, all temporary access thereto and shall alter, adapt and maintain the same as required from time to time and shall take up and clear them away as and when no

	longer required and as and when ordered by the Engineer-in-Charge and make good all damage done to the Site.
3.9.5	**Site Workshop/Calibration/testing shop by Contractor**
3.9.5.1	The Workshop to be set up by the Contractor shall be of sufficient space, with adequate weather protection. The workshop shall consist of general fabrication shop, machining shop etc., wherever applicable/ required.
3.9.5.2	The size and arrangement of the machines, calibration/testing shop shall be got approved from Engineer-in-charge.
3.9.6	**Electricity**
3.9.6.1	Construction Power Supply shall be made available on chargeable basis to the contractor of this work scope. All power use by the contractor for construction purpose and for office, store etc. shall be on chargeable basis only. The contractor shall install energy meters for metering their actual use of construction power. **The Construction Power requirements shall be provided to contractor on chargeable basis at the prevailing rates of NPCIL (customer).** The present rate of power is approx.Rs.5 per unit(Kwh) .Recovery towards power, utilized by the contractor shall be made from running account bills. The required power for commissioning of the equipment's of TG C&I package shall be provided free of charge.
3.9.6.2	Construction Power Supply will be from NPCIL substation and will be made available to the Contractor at a nominal system voltage of 415 volts 3 phase 4 wire 50 cycles.
3.9.6.3	Construction Power Supply to the contractor will be made available subject to the following terms and conditions and other guidelines laid down by NPCIL:
3.9.6.3.1	This power supply shall not be used for any unauthorized purposes.
3.9.6.3.2	The power will be supplied at 01 point for the said contract at 415V 3 Phase 50 cycles or 230 V single phase 50 cycles as the case may be. The contractor shall install his own switch controls, cables etc. of adequate capacity of suitable type complying with all relevant regulations to receive control and distribute the power involved. The exact location and further details about the supply point will be decided by BHEL/NPCIL whose decision in the matter will be final and binding.

3.9.6.3.3	The connected load shall not be less than 75% of the estimated load and the contractor shall have the option to make changes in the connected load on max 6 (six) occasions at each point during the entire period of contact. For the purpose of calculating minimum BHP calculation, loads connected at various points will be taken into consideration.
3.9.6.3.4	The Customer shall meter the supply of power to the contractor at the point at which the supply is given. For this purpose, the energy meter will be installed by the contractor on their distribution panel. Contractor shall be required to install actual Maximum Demand Meter on the incoming panel to ensure that demand does not exceed the demand requested by the Contractor and Minimum BHP calculation shall be done on Maximum Demand Meter reading. If any dispute on accuracy of meter, the meter in dispute will be checked in the standard laboratory of the State Government and the meter will be replaced if required. The fees levied by the Standard laboratory for testing the meter shall be charged to the contractor. The Engineer may at his discretion replace any meter installed at the cost of contractor, if found defective/faulty. It would be the contractor's responsibility to ensure the safety of the meter and to ensure protection so that the meter is not tampered with. In case, it is found that the meter has been tampered with, the supply will be disconnected and re-connection charges at State Electricity Board rates per BHP will be charged. In case the meter is found faulty, the charges will be recovered on the basis of average consumption for the preceding 6 months.
3.9.6.3.5	The contractor shall make his own arrangements for the distribution of power to all his works from the points of supply mentioned above.
3.9.6.3.6	It shall be the responsibility of the contractor to provide and maintain complete installation on the load side of the supply with due regard to safety requirements at site. All cabling and installations shall be subject to the approval of the NPCIL Engineer/ Safety Engineer and shall comply in all respects to the appropriate statutory requirements given in the following: - Indian Electricity Act, 1910 (as amended) - Electricity Supply Act, 1910 (as amended) - Indian Electricity Rules 1956 (as amended) - Latest State Electricity Board regulations It is to be clearly understood that disturbance in power supply or non-availability of

	electricity shall not entitle the Contractor for any claim for compensation either in time or money. The Contractor is advised to make his own arrangements of diesel generators to meet his requirements of electrical power during interruption in power supply and keep electrically operated equipment to the minimum in view of uncertainty of 24 hours power supply. Temporary power supply as arranged by the contractor on his own shall be provided for the bonafide construction purposes limited to the extent required for the job. For this purpose, the contractor shall provide full specifications of the equipment and the layout drawings. Approval of the Engineer-in-charge does not absolve the contractor from complying with any or all other conditions laid down in this section. Contractor shall have to follow all the safety and statutory guidelines regarding electrical installation for construction and domestic supply as per Customer (NPCIL), Electricity Department, AERB (Atomic Energy Regulatory Board) and other related departments. Any decision of BHEL/NPCIL in this regard shall be final and binding on contractor.
3.9.6.3.7	The power supply shall be subject to all such restrictions and regulations as are in existence now and as may be enforced by the BHEL/ Government/ State Electricity Board/NPCIL or by any other competent authority from time to time for which the contractor will not have any claim whatsoever.
3.9.6.3.8	**The contractor shall maintain a power factor of not less than 0.9 by installing, if necessary at his own cost suitable corrective devices/capacitor banks etc.** The contractor's failure in this regard within a period as stipulated by the Engineer-in-charge shall lead to penalty and may further lead to disconnection of Power Supply. The individual, single-phase loads shall be suitably connected so that the total load at the supply point balances as much as possible.
3.9.6.3.9	BHEL will not be liable for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions planned or unplanned in power supply. BHEL will also not be liable for any loss to the contractor arising from any interruption, failure or stoppage of works and any attendant delays consequent on such failure, interruption or stoppage of power supply or variation voltage or frequency. The contractor shall install all safety devices for such purpose as deemed fit by him.
3.9.6.3.10	After completion of the works, the contractor shall at his own cost promptly dismantle the distribution and other facilities he may have erected.
3.9.7	**Domestic Power Supply**

3.9.7.1	The power for contractors' colony shall be arranged by the contractor itself.
3.10	**Water**
3.10.1	**Unfiltered Water Supply/Construction water** The contractor shall make his own arrangements for water required for the work from the single point source made available by NPCIL/BHEL. Nothing extra will be payable for making any arrangement for water supply. Water supply will be subject to the following conditions:
3.10.1.1	The contractor shall construct suitable storage tanks to meet at least 7 days requirement of water at work site. To ensure adequate water supply at all levels on the facilities for the purpose of construction, he shall install necessary pumps, for delivery of water at all levels with requisite pressure. To ensure uninterrupted water supply in the event of power failure, contractor is directed to install diesel pumps as a stand by measure. The contractor shall at his own cost arrange to receive and distribute the water and shall lay and maintain water supply lines to his construction site.
3.10.1.2	The water used by the contractor shall be fit for construction purposes to the satisfaction of the Engineer –in –charge.
3.10.1.3	The Engineer in-charge shall make alternative arrangements for supply of water at the risk and cost of the contractor if the arrangements made by the contractor for arrangement of water are in the opinion of the Engineer –in – charge, unsatisfactory.
3.10.1.4	Water as per availability, may be supplied to the contractor at one point, on chargeable basis. In this case, water requirements shall be provided on chargeable basis at the rate of 0.05% of the executed contract value.
3.10.1.5	<u>Water Supply to Labour Camp</u> The contractor shall make his own arrangement to receive, treat, test, pump and distribute the water required for the labour camp. He shall construct at his own cost storage tank(s) of adequate capacity to meet 4 days requirement. He shall also lay at his own cost the distribution lines and maintain the same during the currency of the contract.

3.10.1.6	The contractor shall ensure availability of potable quality of water required for all his requirements at all times at site and in labour accommodation. In case, it is arranged from Customer, the charges levied by the customer has to be borne by the contractor.

A: TOOL & PLANTS

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

Sl. No.	Description	Quantity
I. Instruments		
01	Dead weight tester rated 400 Kg/cm2 and with weights and test gauge facility. Make 'Budenberg or 'Ravika'	APR
02	Oil temperature bath suitable to calibrate the instruments range 0 – 200 deg. C with standard temperature gauges and thermostatic control	APR
03	Muffle furnace – 800 deg. C with standard temperature gauges	APR
04	Standard gauges 12" dial size make "Budenberg" or "H Guru" or "Odin"	
	A) – 1-0 kg/cm2 pressure gauge(vacuum gauge) B) 0 – 5 or 6 kg/cm2 pressure gauge C) 0 – 10 kg/cm2 – do – D) 0 – 25 kg/cm2 – do – E) 0 – 60 kg/cm2 – do – F) 0 – 100 kg/cm2 –do – G) 0 – 250 kg/cm2 – do– H) 0 – 600 kg/cm2 – do– I) 0.2 to 1 kg -- do --	APR
05	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field PURpose.	APR
06	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field PURpose.	APR
07	Inclined manometer (+/-) 300 mm water column	APR
08	Portable air compressor with drier and regulator make "Toshniwal" / "Khosla" rated for 7 to 10 kg/cm2	APR
07	Soldering iron "Soldron" make 25 watt	APR

09	Vacuum pump	APR

Sl. No.	Descriptio n	Quantity
10	Multimeters	
A) B) C)	Digital, 3 1/2 digit Motwane/HIL/Fluke Analog: Motwane make Digital, 4 1/2 digit Motwane/HIL/Fluke	APR
11	Standard milliamps / millivolts source of reputed make. Range 0 to 50 ma and 0 to 100 mv	APR
12	Insulation tester hand operated 250V / 500V / 1000V rated mains/battery operated	APR
13	DC power supply 0-50 VDC, 5 A make “Aplab” or equivalent (variable source)	APR
14	Single phase variac 250 V, 8 amp	APR
15	3 phase variac rating 5 amps	APR
16	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c	APR
17	Tong tester AC 5/10 and 25/60/300 amp of reputed make	APR
18	Tong tester DC 30/60/300 amp	APR
19	Secondary current injection kit upto 300 amp	APR
20	Tarpaulin fire proof	APR
21	DC shunt 400 amp 75 mv	APR
22	Tachometer non-contact type 0 to 4000 rpm	APR
23	Industrial type vacuum cleaner	APR
24	RTD/Pt 100 source	APR
25	Decade resistance box	APR
26	Equipment and consumables for LPI/MPI test on impulse pipes	APR
27	Function generator	APR
28	**Torque screw driver for cable termination**	APR

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

recognised agency prior to deployment of it at site and periodical calibration of the same to be arranged by contractor as per procedure of BHEL.

Sl. No.	Description	Quantity
II. Handling equipment		
1	Turn buckles	APR
2	D-shackles	
3	Steel wire ropes	
4	Manila ropes	
5	Chain pulley block/turfer	
6	**Hand travel hydraulic lifting machine for lifting and transport of panels**	
III. Major T&P		
1	Pipe bending machine – 2” size	APR
2	Grinding machine	APR
3	Drilling machines 1/4”, 1/2”, 3/4” & 1”	APR
4	Copper tube bender and cutter sizes 6mm, 8mm, 1/2”, 1/4”	APR
5	Die sets for threading upto 2” pipe.	APR
6	Spirit level	APR
7	Tap sets for both BSP and NPT threads upto 1” each	APR
8	Measuring instruments like micrometers and callipers	APR
9	Welding generators	APR
10	Welding transformer	APR
11	TIG welding set	APR
12	Mechanical tool kit for fitters	APR
13	Electrician tool kit	APR
14	Crimping tool	APR
15	Flood light fittings	APR
16	Fire extinguishers as required	APR
17	Distribution boards with power cable complete as required	APR
18	Painting brush	APR
19	Fire proof tarpaulin	APR

20	Safety belts and safety helmets	APR.
21	24V AC transformer & hand lamps	APR
22	Ferrule printing machine	APR
23	Electrode drying ovens	APR
24	Personal computer and accessories, Printer	APR
25	Cranes/Hydra, truck/Trailer etc for transportation and erection of equipments	APR

Note:

1. ***APR- Contractor has to deploy T&P,MMD AS PER REQUIREMENT of BHEL site as decided by BHEL Engineer In-charge. The capacity, quantity, duration of deployment shall be decided by Engineer In-charge as per site requirement. Decision of BHEL Engineer In-charge in this regard shall be final and binding on the contractor.**

The deployment schedule for the equipment/T&P is only tentative, the vendor may note that interim de-mobilisation/ re-mobilisation/ replacement may be allowed/ required by BHEL, subject to approval of BHEL in writing to the contractor, in case it is understood that the T&Ps are not further required or are idle or there is delay in availability of erection fronts etc.

The intent of indicative list of T&Ps is only for smooth progress of works and not for unnecessary idle deployment of T&Ps by the contractor.

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

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

SN	Description
01	Welding electrodes for welding AS/CS/SS pipe and other welding from BHEL approved vendors only
02	Filler wire for argon welding
03	Argon, oxygen and acetylene gas
04	Provision for temporary scaffoldings.

05	Round aluminium tags (30mm dia x 3mm thick)
07	Teflon tape and insulation tape.
08	Hold tight / bitumen tape for GI pipe coupling.
09	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 upto 4 sq. mm. PVC sleeve of different size, PVC button & tape
15	All Paints, primers etc for all paintable equipments in the scope

Please note: The above list is only indicative. The contractor to arrange consumables as required as per scope of contract.

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

1	EOT crane (125/25 MT) in TG hall shall be made available on sharing basis for panels handling	1 no
2	135 MT Crane	1 no

5.1 Note: Notes governing the provision of the above T&P for use by Contractor

Cl.4.2.2.16 c) of SCC shall be read

a. **For BHEL's cranes 75 MT & above:-** Day to day upkeep and running maintenance like filling topping up of lubricants, changing filters, etc. including repair of self-starter, batteries and dynamo of BHEL owned 75 MT & above capacity cranes shall be excluded from the scope of the contractor. In case of breakdown of crane, contractor shall provide the necessary manpower for maintenance of the crane to maintenance agency, failing to do so BHEL will get the job done at the risk and cost of contractor. BHEL may also provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall be excluded from scope of contractor.

The contractor shall arrange fuel for the operation of hired & BHEL owned cranes.

b. **For BHEL's cranes below 75 MT capacity:-** The day-to-day upkeep and running maintenance like filling / topping up of lubricants, changing filters, etc. including repair of self-starter and dynamo of these cranes shall be the responsibility of the contractor. If on checking it is found that the same is not followed, BHEL will exercise its right to get the job/works done at the risk and cost of contactor.

Common for above Sl. No. (a) & (b):- In case of breakdown of crane, contractor shall provide the necessary manpower for maintenance of the crane to maintenance agency, failing to do so BHEL will get the job done at the risk and cost of contractor. BHEL may also provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall also be excluded from scope of contractor.

The contractor shall arrange fuel for the operation of hired & BHEL owned cranes.

Cl.4.2.2.16 e) of SCC Shall be read as

a. For BHEL's cranes 75 MT & above:- The operator, helper & maintenance personal (Engineer /Technician /OEM) for BHEL owned 75 MT & above capacity cranes are being provided by BHEL

free of cost.

b. For BHEL's cranes below 75 MT capacity:- For less than 75 MT cranes: Trained operators for BHEL owned cranes shall be provided by the contractor. These operators should possess valid license for heavy vehicle.

5.2 The Cranes at Sl No 1 &2 will be provided as per requirement & availability for special package handling only at the sole discretion of the BHEL Engineer.

5.3 The contractor shall make necessary arrangement like lying of special sleeper beds, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.

5.4 Cranes provided by BHEL will be on sharing basis with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor. Cranes will be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose. Augmentation of BHEL T & P under special circumstances shall be discretion of BHEL

6.0 TIME SCHEDULE AND MOBILIZATION:

6.1	The contractor is required to commence the work within 15 days from the date of issue of letter of award (LOA) unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilization of manpower and T&Ps (as required for finalisation of Zero date) by the contractor.
6.2	Entire work as detailed in the tender specifications shall be completed within **14 months** from the Zero date as per programme / milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.
6.3	Entire work shall be carried out in accordance with the broad schedule for C&I furnished below, within the stipulated completion period. This schedule will undergo review on regular basis by Customer and BHEL. Based on achieved progress vis-à-vis project requirement, contractor shall be provided with the revised Erection schedule by Customer. The contractor will have to submit a program for E&C to meet the revised project schedule and accordingly augment his manpower/T&P at no extra cost to BHEL.

6.4	**Schedule of Work**	
	Milestone	**Schedule**
6.4.1	Start of work	0 months
6.4.2	Turbine Barring Gear **(M1)**	6 months
6.4.3	Synchronization **(M2)**	9 months
6.4.4	Capacity Addition	12 months
6.4.5	Trial Operation	12 months
6.4.6	PG Test	13 months
6.4.7	Completion of Facilities	14 months

6.5	**Provision of Penalty in case of slippage of Intermediate Milestones:**
6.5.1	**M1& M2 are the intermediate LD milestone.** Milestones LD shall be applicable if the delay in achieving the milestone is solely attributable to the contractor.
6.5.2	In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones

6.5.3	In case delay in achieving M1 Milestone is solely attributable to the contractor,0.5% per week of executable contract value*, limited to maximum 2% of executable contract value, will be withheld.
6.5.4	In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 3% of executable contract value will be withheld.
6.5.5	Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.
6.6.6	Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment (corresponding RA Bill) and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
6.6.7	Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion/ closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
6.6.8	In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery
6.6.9	**** Executable Contract Value - Value of work for which inputs/ fronts were*** **made** ***available to contractor and were scheduled for execution till the date of achievement of that milestone.***
6.7	Contractor shall plan their work in such a manner so as to meet the above project schedule, in consultation with BHEL/ customer. To achieve the above schedule contractor shall work in the all the available fronts concurrently and be prepared for working in the shift operation as per the instruction of BHEL Engineer. All formalities regarding permissions/gate passes for shift working are to be applied in time in line with customer requirements.

6.8	Completion of facilities shall be completed in all respects only when on successful erection, trial run of individual equipment's and successful commissioning, trial operation, attending punch points ,handing over of the Unit#7 to the customer.
6.9	The work under the scope of this contract shall be deemed to have been completed in all respects only when so certified by BHEL. The decision of BHEL shall be final and binding on the contractor.
6.10	If the completion of work as detailed in the scope of work gets delayed beyond the contract/ completion period, the contractor shall request for an extension of the contract and BHEL at its discretion may grant time extension for the contract as per GCC clause 2.11
6.11	**Commencement of performance guarantee** shall be as per clause no.2.24 (Performance Guarantee for Workmanship) of General Conditions of Contract. The commencement of guarantee period for the quality of the workmanship shall start from the date of trial operation acceptance of facilities/handing over to the customer for the respective unit.
6.12	**The Contract period shall be 14 months from the start of work. Erection, Testing, Calibration and Commissioning of permanent equipment's required for completion of system shall be completed within the time schedule given above.** **BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule by up to 15%. This will result in advancement of various milestones. Contractor shall plan his activities and mobilize additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.**
6.13	**Material Re-conciliation** The contractor shall do material re-conciliation periodically**.**

7.0	**TERMS OF PAYMENT**
7.1	The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.
7.2	The progressive payment for erection, testing and commissioning on accepted price of contract value will be released as mentioned below in Clause 7.4 to 7.5
7.3	Progressive Payment against monthly running bills will be made upto 85% of the value of the erected items Pro rata as per Clause no 7.4.1 to 7.4.11 of the following table.

TERMS OF PAYMENT FOR C&I WORKS

Sl. No.	Activity/Work Description	% of unit rate
A	**Main E&C Equipment/Items**	
7.4	**PRO RATA PAYMENTS (85%) -I**	
7.4.1	**Cable tray and accessories**	
1	Fabrication and fixing/welding/bolting in position	70%
2	Earthing of cable trays	5%
3	Tagging of cable trays (painting cable tray numbers on sides)	5%
4	Covering of trays where ever envisaged	5%
	Total =	**85%**
7.4.2	**Cable laying (Power Cables)**	
1	Laying of cables	45%
2	Glanding, Termination and tagging of cables	15%
3	Dressing and clamping of cables	15%
4	Testing and charging of cables	10%
	Total =	**85%**
7.4.3	**Cable laying (Control and Signal Cables)**	
1	Laying of cables	45%
2	Glanding, Termination and tagging of cables	15%
3	Dressing and clamping of cables	10%
4	Shielding of cables	5%
5	Testing and charging of cables	10%
	Total =	**85%**
7.4.4	**Junction box/Push button station (local)**	

1	Erection including fixing of terminal blocks where ever applicable	75%
2	Name plate fixing where ever applicable , Labelling (both inside and outside) and Commissioning of connected equipment	10%
	Total =	**85%**
7.4.5	**Conduits/impulse pipe/tubes**	
1	Fabrication, Laying and Erection	50%
2	Leak Test/Hydraulic Test (where ever applicable, otherwise clubbed with next activity)	20%
3	Dressing, clamping, tagging and painting where ever applicable	10%
4	Testing & commissioning of associated equipment/system	5%
	Total =	**85%**
7.4.6	**Miscellaneous Structural steel including frames for Panels/Racks/Instruments, supports for cable tray/pipes/tubes, Canopies etc**	
1	Fabrication, Erection, Alignment , Welding/bolting and where ever applicable chipping/grouting/painting	65%
2	Erection of associated Items/Equipment's/Systems as applicable	20%
	Total =	**85%**
7.4.7	**Panels/Cubicles/Desks/Racks/Enclosures/Monitors/Computers/Computer peripherals/PLCs/UPS/Batteries**	
1	Erection and alignment	50%
2	Fixing of loose items/instruments where ever applicable	5%
3	Pre commissioning checks, Charging of panel , etc.	20%
4	Loop testing and System commissioning	10%
		85%
7.4.8	**Instruments/Devices including Sensors/Cells/Probes etc.**	
1	Calibration/Testing/Pre erection checks	30%
2	Erection/Placement and fixing of loose items/accessories	30%
3	Pre commissioning checks/loop testing/Simulation testing as required	10%
4	Remote/local commissioning as required	15%
	Total =	**85%**
7.4.9	**Commissioning and Testing activities for Equipment's erected by other agencies, like control valves, on/off valves, electrical/pneumatic valves, actuators, solenoid valves, valves, limit switches, ERV controllers, power cylinders, Pressure & Temperature Guages/Transmitters,etc**	
1	Removal & refixing/Fixing loose supplied components, including tubing/hose, regulators, etc	30%
2	Calibration/Local testing - commissioning readiness	30%
3	Local Commissioning & Loop Testing as required	10%

4	System Commissioning or Remote Commissioning as required	15%
	Total =	**85%**
7.4.10	**Power Cylinders**	
1	Erection and alignment of Power Cylinders	30%
2	Fixing of loose items and Commissioning readiness	30%
3	Loop Checking, Calibration and Local commissioning	20%
4	System/Remote commissioning as required	5%
	Total =	**85%**
7.4.11	**Miscellaneous items (items not covered under above heads)**	
1	Erection	50%
2	Alignment	10%
3	Testing	15%
4	Completion	10%
	Total =	**85%**
7.4.12	**STAGE/MILESTONE PAYMENTS (15%)-II**	
1	Boiler Light Up	0%
2	ABO	0%
3	Steam Blowing	0%
4	Safety Valve Floating (Electrometric Relief valves)	0%
5	Oil Flushing (TG)	0%
6	Barring Gear (TG)	3%
7	Rolling and Synchronisation	3%
8	Coal Firing	0%
9	Full Load	2%
10	Trial Operation of Unit	2%
11	Painting	0%
12	Area cleaning, temporary structures cutting/removal and return of scrap	1%
13	Punch List points/pending points liquidation	1%
14	Submission of 'As Built Drawings'	1%
15	Material Reconciliation	1%
16	Completion of Contractual Obligation	1%
	Total for Milestone/Stage payments (15%)	**15%**
	Total(I+II)	**100%**

7.5	**OTHERS**	
1	Laboratory Instruments installation and demonstration where ever applicable	100%
2	PG Test Instruments installation (50%) and removal (50%)	100%

1. **The Terms of payment is only for enabling release of payments through RABs and is not indicative of the actual quantum or value of work.**
2. **If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.**
3. **In line with GCC clause 2.23.1.(v) to facilitate part payment, BHEL Site Engineer at his discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work.**

8.0 TAXES AND DUTIES:

8.1.1	Price quoted should be inclusive of all applicable Taxes/charges but **Excluding GST.** The Contractor shall pay all other taxes, fees, royalty, commission etc. which may be levied on the contractor in executing the contract. In case BHEL is forced to pay any of such taxes, it shall be recovered from Contactor's bills or otherwise as deemed fit. **GST Shall be payable extra as per following :**
8.1.2	Contractor/Vendor has to issue invoice indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder. With the implementation of e way bill provisions, contractor shall comply with same as applicable.
8.1.3	Vendor has to submit GST compliant invoice within seven days from the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts. Special care should be taken in case of month end transactions.
8.1.4	GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor : - a. Supply of goods and/or services have been received by BHEL. b. Original Tax Invoice has been submitted to BHEL. c. Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor.
8.1.5	TDS under GST law as applicable shall be deducted.
8.1.6	Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder
8.1.7	In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment .

8.1.8	Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor.
8.1.9	The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract is limited to direct transactions between BHEL & its Contractor. BHEL is not responsible for any liability that may arise due to any transaction beyond the direct transaction between BHEL & its Contractor.
8.1.10	**Variation in Taxes & Duties**: Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability. In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contactor only and within the contractual delivery period only. In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
8.1.11	**Modalities of Tax Incidence on BHEL:** Where GST law permits more than one option or methodology for discharging liability of tax/ levy/ duty; the contractor shall approach BHEL before choosing any option to discharge his tax liability. BHEL shall have the right to direct the contractor to adopt the appropriate option considering the amount of tax liability on BHEL as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.
8.2	**BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.**
	In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-
8.2.1	It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a licence to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to

	furnish a copy of such certificate of licence / permission to BHEL within a period of one month from the date of award of contract.
8.2.2	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on gross payment made for value of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.
8.2.3	It shall be the responsibility of the sub-contractor to furnish the receipts /challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.
8.2.4	It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.
8.2.5	The contractor shall, however ensure before deposit of any BOCW Cess, that customer is not depositing the same in order to avoid excess deposit of cess.
8.2.6	The contractor shall bear cost of BOCW cess either by way of deposit or through recovery by BHEL in case the same is deposited by the customer.
8.2.7	In case of failure in above mentioned compliances, BOCW Cess @ 1% as well as applicable penalty as specified in BOCW Act/Rules shall be deducted from the contractor.

Note:

1	The Gross amount is to be construed as cost of construction in line with the provisions of the BOCW of the BOCW Cess act and in case of compliance by customer by way of deduction at source in line with clause No 3(2) of the act an equitable adjustment to the relatable cost of construction attributable to the bidder shall be made in terms of clause no 8.2 of TCC
2	In case compliance by customer by way of deduction at source in line with clause no 3(2) is not resorted to, the compliance of BOCW Cess act shall be ensured by the bidder in line with the provisions of BOCW Cess act in terms of clause no 8.2.2 of TCC
3	The bidder may consider the cost of construction for levy of BOCW Cess inclusive of GST, however, due to whatsoever reason if the GST does not form the cost of construction for levy of aforesaid Cess an equitable adjustment thereof shall be made to the contract price.

9.0 SPECIAL INCLUSIONS:

Consumables/items to be provided by BHEL free of charge

01 Metallic Cable glands

02 Steel for fabrication

03 Lugs beyond 4 sqmm size

10.0 Exclusions

The following are specific exclusions from this work.

1. Attachment welding of thermocouple pads for boiler tube metal temperature measurement and fixing of thermo wells in the pipelines.

2. Erection of flow nozzles.

3. Erection of valves, actuators along with valves, damper actuators along with dampers, burner tilt power cylinder, seal air dampers and scanner air emergency dampers and control valves. *(However, SADC power cylinder installation will be in the scope of the contractor if applicable)*

4. Erection of electro hydraulic actuators.

Note:

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

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

Please Note:

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

2. In such cases where systems are described with component quantities (viz., Vibration monitoring systems, Lube Oil skids, etc., etc.) 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 elsewhere.

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

- **Sl No I1.0.1 to I1.0.3: Cable trays and accessories:**

  Flexible GI cable support system, consisting of single/double channels, base plates, cantilever arms as per BOQ given. Wherever necessary, the base plate and beam clamps will be supplied for bolting. Otherwise, the base plates are to be welded to the racks or beams. Necessary 90 deg. angle fittings, flat plate fittings, clamps for single & double channels, fasteners etc. will be supplied for fixing trays and cantilever arms and for this no separate erection charges will be paid. Rates shall be accommodated in support channel and cantilever arm erection. Support channels will be supplied in standard running lengths, and shall be cut at site depending on requirement, and exposed metal portion shall be painted as per specification given in the relevant sections. Payment for erection will be made on per meter basis. No separate rate will be paid for cutting & painting.

  Cantilever Arm for 150 mm tray, complete with 4 Nos. spring nuts, 2 Nos. bolts & washers for fixing to main channel support and for fixing cable tray.

  Cantilever Arm for 100 mm tray, complete with 4 Nos. spring nuts, 2 Nos. bolts & washers for fixing to main channel support and for fixing cable tray.

Base Plate (For Single Channel) complete with 2 Nos. spring washers, bolts and nuts for fixing main support channel

- **Sl No I5.0.1 to I5.0.5: Impulse Pipes / Tubes**

All site erected impulse lines are subject to hydrotest, radiography test in line with mother pipe requirements. All weld joint in CS, SS, AS line are subject to 100% radiography test with minimum two shots per joint. Same shall be in erection agency scope. Vendor shall generate all testing reports/ documentation required for final acceptance of customer.

- **Sl No I7.0.2 to I7.0.4 & I7.0.6: Control panels**

These are microprocessor based sophisticated electronic control panels in majority. Weights range from 400 to 1600 Kg from I7.0.2 to I7.0.4 respectively.

- **Sl No I7.0.5: Network panels**

These panels are used basically for housing Ethernet switches which are to be wired up with various other max stations. System interface network panels also house computer CPUs, monitors, etc.

- **Sl No I7.0.17: Vibration Monitoring, Analysis & Diagnostic system for Main turbine/ Generator:**

1 set of Vibration Monitoring, Analysis & Diagnostic system for Main turbine consist of following (approximate quantities):

IMPORTED ITEMS:

- Standard 19" Rack containing various cards like power supply cards, CPU card, condition monitoring cards, etc. supplied mounted or loose – 07 nos.
- Software for configuration of Machinery Protection System – 01 nos.
- Software for Analysis & Diagnostics – 01 nos.

HP Admission Valve:

- Piezo-Accelerometer Probe with 10 Meter Cable – 08 nos.
- Charge Amplifier for Piezo-Accelerometer – 08 nos.

Rotor Eccentricity:

- Proximity Probe with 2 Mtr Integral Cable – 01 nos.
- 8 Meter Extension Cable – 01 nos.
- Signal Conditioner – 01 nos.

Absolute Bearing Vibration:

- Accelerometer Probe – 33 nos.
- 10 Meter Extension Cable – 33 nos.
- Signal Conditioner – 01 nos.

Relative Shaft Vibration:

- Proximity Probe with 2 Mtr Integral Cable – 22 nos.
- 8 Meter Extension Cable – 22 nos.
- Signal Conditioner – 22 nos.

HP/LP3 Rotor Absolute Expansion:

- Probe Assembly – 03 nos.
- 9 Meter Extension Cable – 03 nos.
- Signal Conditioner – 03 nos.

HP Casing Absolute Expansion:

- 50mm LVDT Expansion Probe – 01 nos.
- Extension Cable – 01 nos.
- Signal Conditioner – 01 nos.

Rotor Axial Displacement:

- Probe Assembly – 03 nos.
- 8 Meter Extension Cable – 03 nos.
- Signal Conditioner – 03 nos.

Phase Reference:

- Probe Assembly – 03 nos.
- 8 Meter Extension Cable – 03 nos.
- Signal Conditioner – 03 nos.

INDIGENOUS ITEMS:

- Fully Wired & Assembled System Panel with Marshalling Panel (approx. dim. 1500 x 800 x 2250 mm) – 03 nos.

- Junction Boxes (approx. dim. 300 x 250 x 121 mm) – 23 nos.
- Mounting Brackets for mounting of above sensors like Brg. Abs. Vibration, Brg Relative Shaft Vibration, Phase measurements, etc. – 01 set
- Signal Isolators – 65 nos.
- SS conduits for transducer extension cables – 74 nos.
- Intelligent Ethernet Switch – 02 nos.
- HMI consisting of Server PC, Monitor, Printer – 1 set
- Fibre Optic Cable 300 mtr – 2 nos.
- Calibration Equipment (Portable Shaker Table, Micrometer Kit & Laptop) – 1 set

Lump sum rate per set is to be quoted.

❖ **Sl No I7.0.18: Condition Monitoring System Panels**

Condition monitoring system panels consists of the following (approximate quantities):

- Fully Wired & Assembled System Panel (approx. dim. 800 x 800 x 2250 mm) – 01 nos.
- VMS Rack (approx. dim. 543 x 300 x 220 mm) – 03 nos.

Lump sum rate per set is to be quoted.

❖ **Sl No I7.0.19: Generator End Winding Vibration Monitoring System**

Generator End Winding Vibration Monitoring System consists of (approximate quantities): Panel, pre-amplifier units, Junction Boxes, special cables for interconnecting the probes and amplifiers, PC based vibration monitor, printer, etc..

Approximate size & weight of the panel: 800 x 800 x 2200 mm; 250 Kg. Lump sum rate per set is to be quoted.

❖ **Sl No I7.0.15: Condenser Vacuum Pump (CVP) system**

Removal, calibration and commissioning of CVP skid mounted instruments including CVP PLC and motor mounted on the skid. The approximate quantity of skid mounted instruments shall be

- Pressure Indicators – 2 nos.
- Flow Switches – 1 nos.
- Level Switches – 2 nos.
- Pressure/DP Switches – 2 nos.
- Temperature Switch – 1 nos.
- Limit Switch – 1 nos.
- Temp. Indicators – 2 nos.
- Flow Indicators – 1 nos.
- Solenoid valves – 2 nos.

Lump sum rate per set is to be quoted.

❖ **Sl No I7.0.8: LIRs**

Local instrument racks are open type housing for field instruments. These have to be located in suitable places, impulse piping and cabling to be done. Number of instruments in each LIR will vary.

❖ **Sl No I7.0.11: Computer Furniture**

Details of Computer Furniture (approximate quantity) are as below:

- Computer Table (approx. dimension 750(W) x 765(H) x 1100(D) mm – 5 Nos.
- Printer Tables (approx. dimension 1500(W) x 750(H) x 750(D) mm – 4 Nos.
- Chairs – 7 Nos.

The furniture will be delivered in knocked down condition and will have to be assembled at site by contractor.

Lump sum rate is to be quoted.

❖ **Sl No I7.0.21: 24 V DC Battery charger, DCDB, Battery bank:**

Each set comprising of:

1. 24 VDC / 625A Battery Charger Dual FCBC along with DCDB (approx. overall dimension 2800 x 800 x 2300 mm) - 2 nos.

2. 24 VDC / 625A Standby Charger (approx. overall dimension 2100 x 800 x 2300 mm) - 1 nos.

3. Battery Bank (Battery TX1300P HDP cells – 13 nos., Electrolyte – 28 litre/cell, approx. wt. 138 kg/cell with electrolyte) along with stands – 2 nos. including BHMS (approx. overall dim. 1910 x 1210 x 1010 mm, approx. weight 2 MT) - 2 nos.

Battery accessories & commissioning spares, copper termination plates with proper support arrangements, assembling of battery stand of mild steel, battery discharge resistor bank, etc..

Lump sum rate per set is to be quoted.

- **Sl No I7.0.22: 220 V DC Battery charger, DCDB, Battery bank:**

Each set comprising of:

1. 220 VDC / 90A Battery Charger Dual FCBC along with DCDB (approx. overall dimension 1800 x 800 x 2300 mm) - 2 nos.

2. Battery Bank (Battery TX250P HDP cells – 110 nos., Electrolyte – 5.5 litre/cell, approx. wt. 28 kg/cell with electrolyte) along with stands – 7 nos. including BHMS (approx. overall dim. 6015 x 1730 x 847 mm, approx. weight 4.26 MT) - 2 nos.

Battery accessories & commissioning spares, copper termination plates with proper support arrangements, assembling of battery stand of mild steel, battery discharge resistor bank, etc..

Lump sum rate per set is to be quoted.

- **Sl No I7.0.23: 220/240VAC UPS System and ACDB**

Parallel Redundant UPS Power supply system with isolation transformer, inverter and SCVS, 2 X 30 KVA rating consisting of:

1. 2x30KVA UPS alongwith ACDB (approx. overall dimension 3200 x 1000 x 2500 mm, approx. wt. 2.5 MT).

2. Battery Bank (Battery TX500P HDP @500AH – 2x110 nos.) alongwith stands – 7 nos. (approx. overall dim. 6005 x 866 x 2022 mm per set, approx. total weight 11.11 MT).

Scope includes laying and termination of power cables between the panels, battery banks, ACDBs, cable connectors, etc.

Commissioning supervision is in the scope of the supplier. Contractor to provide erection and commissioning support only.

Lump sum rate per set is to be quoted.

❖ **Sl No I9.0.12: Rack mounted Instrument Commissioning**

The scope of work includes removal of instruments, calibration, refixing, checking cable connection from JB to instruments, motor connection, meggering and improving IR value of motor etc. and commissioning the skid.

Lump sum rate per set is to be quoted.

❖ **Sl No I11.0.2: DIGITAL AUTOMATIC VOLTAGE REGULATOR (DAVR) PANELS**

One set of DAVR Panel consist of Regulation Cubicle, Thyristor Cubicle and Field suppression cubicle. The approx. overall dimension shall be 2300 x 2300 x 1200 mm, total approx. weight – 2 MT. PC, LCD monitor, interfacing cables, etc. shall be supplied loose which are to mounted in the DAVR panel.

Erection, calibration (as the case may be) testing and commissioning of various equipments located in these panels will be considered as a part of DAVR panel erection and commissioning and no separate payment will be done for the same.

Lump sum price is to be quoted.

12.0 INDUSTRIAL SAFETY

The contractor shall comply with all provisions of "AERB Safety Guide for Works Contract"and other safety requirements as applicable to specific site. The Contractor shall meet statutory requirements as well as regulatory requirements applicable to the project, in general and NPCIL in particular, especially the requirements as per Factory Act- 1948 (amended in 1987). Atomic Energy Factories Rule-1996 (AEFR-1996 or latest version applicable at the time of work execution), safety guidelines for Job Hazard Analysis (JHA) and AERB notifications on Industrial Fire & Safety. The copies of the same can be obtained from BHEL/NPCIL on request.

12.1 SAFETY GUIDLINES

12.1.1

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

12.1.2

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

12.1.3

EMERGENCY VEHICLE: Contractor shall arrange / tie-up with nearest Hospital / Nursing Home to deal with any emergency situation including arrangement of ambulance as and when needed.

12.1.4

The contractor shall provide and maintain all lights, fencing, guards, warning signs and caution board and similar items as required to ensuring safe working conditions at work site.

12.1.5

The contractor shall comply with the instructions given by departmental safety officer or his representative regarding safety precautions, protection measures and housekeeping etc.

12.1.6

The contractor shall provide proper access and working platforms for all place of work as per laid down standards or as advised by Engineer –in-charge or Head- IS&F.

29.1.7

The contractor shall ensure that all floor openings in his work are guarded/barricaded during the course of work and at the end of each day's work.

12.1.8

The contractor‘s safety professionals shall be aware about Acts, Rules connected with Industrial Safety and practices particularly applicable to the project and to threat effect they have to undergo an assessment a the project within 15 days of their placement at the project at the cost of the contractor and then only he/she would be given permanent entry pass and considered in required strength of the safety professionals.

12.1.9

All PPE procured and provided to workers shall confirm to relevant Indian Standards and should be maintained in healthy condition by suitable storage, maintenance and inspection.

12.1.10

Contractor working at the height of more than 2.5 metres above stable floor or ground floor must acquire height pass as per procedure including the worker‘s medical fitness certificate by certifying surgeon (having MBBS qualification) and worker‘s height qualification etc. If in any height work, the worker is found without having height pass, it will be recorded for regulation of payment. The decision of BHEL engineer with regards to the regulation of payment shall be final and binding.

12.1.11

Contractor shall ensure safe movement of man and material as well as vehicles in site premises as per rules/regulations applicable at or issued by plant. In case of violation of the rules/regulation it will be recorded for regulation of payment. The decision of BHEL engineer with regards to the regulation of payment shall be final and binding.

12.2 SAFETY PLAN

12.2.1

Contractor at his cost shall perform following tasks for the job having high risk as Identified by Department Safety Group:

a. Prepare Safe Working Procedures and ensure its implementation in field. Carry out Job Hazard Analysis (JHA) and implement in field.
b. Based on JHA, the safe working procedures should be modified especially to include checklists as necessary checkpoints for job safety supervision.
c. Worker (s) must be trained based on safe working procedure and explained about DOs and DON‘Ts prior to assigning him the job.
d. The workers must adhere to the safe working procedure for the job.
e. Contractor shall ensure that all Tools, Appliances, erecting equipments and their safe use by the contractor work force shall be meeting Indian Standards. The contractor must ensure that necessary authorization exist with workmen prior to their deployment on a particular appliance/tool/equipment. The workmen would be required to acquire additional authorization for crane operation, crane signaling,

blasting operation, welding and cutting operation, electrical work etc. And then only workmen shall be deployed for such job. He shall maintain all record of tools and equipment for their healthiness and safe use with a copy to departmental safety group.

Annexure-A

Rate Schedule Of C&I System For RAPP UNIT#7						
SL. NO.	**DESCRIPTION**	**UOM**	**Qty**	**Factor**	**Rate per Qty= Factor X quoted Value(A) /10000 (Round off to two place after decimal)**	**Amount= Rate * Qty**
I1.0.1	Perforated cable tray and accessories (with or without cover) 50mm	Mtr	100	0.06893		
I1.0.2	Perforated cable tray and accessories (with or without cover) 100mm	Mtr	100	0.07798		
I1.0.3	Perforated cable tray and accessories (with or without cover) 150mm	Mtr	50	0.08852		
I2.0	**Cable laying including earthing wires**					
I2.0.1	Screened Copper Cable 1P x 0.75 sqmm armoured / unarmoured	Mtr	33550	0.01122		
I2.0.2	Screened Copper Cable 2P x 0.75 sqmm armoured / unarmoured	Mtr	55180	0.01179		
I2.0.3	Screened Copper Cable 4P x 0.75 sqmm armoured / unarmoured	Mtr	121774	0.01335		
I2.0.4	Screened Copper Cable 6P x 0.75 sqmm armoured / unarmoured	Mtr	27240	0.0142		
I2.0.5	Screened Copper Cable 8P x 0.75 sqmm armoured / unarmoured	Mtr	68752	0.01478		
I2.0.6	Screened Copper Cable 12P/14P x 0.75 sqmm armoured / unarmoured	Mtr	16810	0.01612		
I2.0.7	Screened Copper Cable 16P x 0.75 sqmm armoured / unarmoured	Mtr	38960	0.01787		
I2.0.8	Screened Copper Cable 25P x 0.75 sqmm armoured / unarmoured	Mtr	2585	0.02465		
I2.0.9	Screened Copper Cable 36P x 0.75 sqmm armoured / unarmoured	Mtr	275	0.03018		
I2.0.10	Screened Copper Cable 3C/4C x 1.5 sqmm armoured / unarmoured	Mtr	4000	0.01368		
I2.0.11	Screened Copper Cable 5P x 1.5 sqmm armoured / unarmoured	Mtr	1585	0.01409		
I2.0.12	Screened Copper Cable 10P x 1.5 sqmm armoured / unarmoured	Mtr	13900	0.01879		
I2.0.13	Screened Copper Cable 2C/3C x 2.5 sqmm armoured / unarmoured	Mtr	1880	0.01214		
I2.0.14	Screened Copper Cable 5C x 2.5 sqmm armoured / unarmoured	Mtr	19060	0.01469		
I2.0.15	1Cx16 sqmm Copper Cable armoured / unarmoured	Mtr	50	0.01446		
I2.0.16	1Cx35 sqmm Copper Cable armoured / unarmoured	Mtr	50	0.02328		
I2.0.17	1Cx70 sqmm Copper Cable armoured / unarmoured	Mtr	100	0.03295		
I2.0.18	1Cx240 sqmm Copper Cable armoured / unarmoured	Mtr	1200	0.06194		
I2.0.19	2CX6 Sqmm Copper Cable armoured / unarmoured	Mtr	150	0.01278		
I2.0.20	2CX35 Sqmm Copper Cable armoured / unarmoured	Mtr	800	0.02111		
I2.0.21	2Cx70 Sqmm Copper Cable armoured / unarmoured	Mtr	250	0.02828		
I2.0.22	3Cx50 sqmm Copper Cable armoured / unarmoured	Mtr	800	0.03365		
I2.0.23	Compensating cable 1P/2P x 0.75 sq mm type Tx/Sx/Kx unarmoured/armoured	Mtr	11200	0.01168		
I2.0.24	Laying, etc of Optical fibre cables on cable trays, HDPE conduits, etc with minor civil works	Mtr	4100	0.02192		

I2.0.25	Network UTP Cables (special termination using UTP connectors involved)	Mtr	7625	0.01162		
I2.0.26	Profibus System Cable	Mtr	2000	0.01162		
I2.0.27	Flexible pipe/GI Conduit pipe 1"	Mtr	50	0.05869		
I2.0.28	Flexible pipe/GI Conduit pipe 2"	Mtr	50	0.08497		
I4.0	**Junction box/Push Button station**					
I4.0.1	IP54 FRP Junction boxes upto 48 way	No	96	1.06483		
I4.0.2	IP54 FRP Junction boxes above 48 way	No	20	1.03537		
I4.0.3	IP65 FRP TT Junction boxes upto 48 way	No	13	0.96997		
I4.0.4	IP65 FRP TT Junction boxes above 48 way	No	10	0.99742		
I4.0.5	2PB or 3PB Pushbutton box	No	5	0.70773		
I4.0.6	Fire protection switch in IP65 box	No	4	0.96593		
I5.0	**Impulse pipe/tubes**					
I5.0.1	Seamless SS Tube, Size 1/2"X0.065	Mtr	1063	0.14353		
I5.0.2	Seamless SS Tube, Size 1"X0.049"	Mtr	35	0.17864		
I5.0.3	Seamless SS Tube 12MM OD x 1.5MM THK	Mtr	2100	0.14164		
I5.0.4	Seamless SS Tube 25MM OD	Mtr	100	0.16916		
I5.0.5	Seamless SS tube 6 x 1.5 mm	Mtr	25	0.09893		
I5.0.6	Copper tube 6mm/8mm / 1/4" (Sheathed / bare)	Mtr	25	0.08161		
I6.0	**Miscellaneous Structural steel including frames for Panels/Racks/Instruments,supports for cable tray/pipes/tubes, Canopies etc**					
I6.0.1	Structural steel for fabrication	MT	1	18.8572		
I6.0.2	Radiographic test of weld joints	No	200	0.45528		
I6.0.3	25 x 6 mm GI Strip/Flat	Mtr	50	0.04209		
I6.0.4	50 x 6 mm GI Strip/Flat	Mtr	50	0.05456		
I6.0.5	8 SWG GI wire (solid/stranded)	Mtr	50	0.03001		
I6.0.6	16 SWG GI wire (solid/stranded)	Mtr	50	0.03423		
I7.0	**Panels/Cubicles/Racks/Enclosures/Monitors/Computer/ Computer peripheral/PLCs/UPS/Batteries**					
I7.0.1	Assembly of local gauge board (1400 x 450 x1900 mm)	No	1	6.55983		
I7.0.2	Control Panel (approx. weight 400kg, approx. dimension 1000(L) X 1000(B) X2500(H) mm) - one panel	No	7	9.26962		
I7.0.3	Control Panel (approx. weight 800kg, 1500(L) X 1000(B) X 2500(H) mm) - suit of two panels	No	2	14.3592		
I7.0.4	Control Panel (approx. weight 1200kg, approx. dimension 2250(L) X 1000(B) X2500(H) mm) - suit of three panels	No	8	21.0086		
I7.0.5	Network Panels (approx. dimension 750x800x2415 mm, Wt-400kgs per panel),power distribution panel cum links	No	1	9.15277		
I7.0.6	Alstom make DCS Panel (approx. dim. 1280(L) X 1180(B) X 2720(H) mm, approx.weight 800 Kg)	No	6	12.6707		
I7.0.7	Profibus Remote I/O System Panel	No	1	10.8305		
I7.0.8	Local Instrument Racks (LIR)	No	36	6.9443		
I7.0.9	max Engineering / operator / storian / LAN / WAN / Shift in charge / stn in charge/ gateway / interface PC / HART etc., PC/Server Station with ASCII Keyboard,Mouse & 21" Colour Monitor, individual UPS/LVS	Set	13	3.5384		
I7.0.10	Printers (80/132 col Dot Matrix, A3 Inkjet, A3 Laserjet, A4 size etc)	Set	4	1.56372		
I7.0.11	Computer furniture for all Servers, PCs, Printers	Set	1	15.7074		

I7.0.12	Plant Control Desk / CRT desk (approx. dim. 1500 x 1100 x 765 mm)	Set	1	17.7882		
I7.0.13	LVS (Large Video Screen) - 70" diagonal rear projection display with LED Illumination display, 1920 x 1080 resolution, along-with LVS mounting stand,graphic controller	Set	1	19.2649		
I7.0.14	Wall Mounted Network Enclosure (approx. 500 x 600 x 600 mm)	No	2	1.50657		
I7.0.15	Condenser vacuum pump system	Set	4	5.73766		
I7.0.16	Generator Instrumentation cabinet including annunciator (approx. weight 450 Kg,1000 x 800 x 2550 mm)	No	1	11.8838		
I7.0.17	Vibration Monitoring System, Analysis & Diagnostic for Steam Turbine including its HMI & printers	Set	1	50.2084		
I7.0.18	Condition Monitoring System (VMS) Panels	No	6	11.9567		
I7.0.19	Generator End Winding Vibration Monitoring System	Set	1	22.0555		
I7.0.20	Control Panels for Oil Purifier	No	3	10.1357		
I7.0.21	24 VDC / 625A Battery Charger Dual FCBC alongwith DCDB (approx. overall dimension 2800 x 800 x 2300 mm) - 2 nos., Standy Charger (approx. overall dimension 2100 x 800 x 2300 mm) - 2 nos., Battery Bank alongwith stand including BHMS (approx. overall dim. 1910 x 1210 x 1010 mm, approx. weight 2 MT) - 2 nos.	Set	1	201.896		
I7.0.22	220 VDC /90A Battery Charger Dual FCBC alongwith DCDB (approx. overall dimension 1800 x 800 x 2300 mm) - 2 nos., Battery Bank alongwith stand including BHMS (approx. overall dim. 6015 x 1730 x 847 mm, approx. weight 4.26 MT) - 2 nos.	Set	1	215.04		
I7.0.23	2x30 KVA UPS System alongwith ACDB (approx. dim. 3200 x 1000 x 2500 mm, approx. wt. 2.5 MT) with Battery Bank (2x110 cells, @500 AH, approx. dim. 6005 x 866 x 2022 mm per set, approx. total weight. 11.11 MT)	Set	1	267.28		
I7.0.24	SWAS system consisting of Dry Panel, Wet Panel, Chiller & Sample Handling	Set	1	106.187		
I7.0.25	Lab Items Setup for Customer	Set	1	89.525		
I8.0	**Instruments/Devices including sensors/Cells/Probes etc**					
I8.0.1	Heavy Duty Limit Switch	No	9	0.56756		
I8.0.2	Speed switch / Speed detector/Speed Sensors	No	9	0.73303		
I8.0.3	Pressure Switch / DP Switch / DP indicating switch	No	10	0.80491		
I8.0.4	Temperature Switch / Thermostat	No	2	0.79067		
I8.0.5	Float /Vibrating Fork Type/Magnetic Level Switch	No	31	1.41691		
I8.0.6	Electronic Level Switch (with amplifier, etc), Capacitance or conductivity type	No	17	1.93944		
I8.0.7	Pressure / DP / Flow (DP type) / Level -Transmitter	No	143	1.4993		
I8.0.8	Flow Transmitter (Vortex / Pulse / Mass flow / target type) including flanges	No	16	1.56825		
I8.0.9	Electronic Level Transmitter (with amplifier, etc), Capacitance or conductivity type / Guided Wave Radar(GWR) transmitter / Magnetostrictive level transmitter	No	18	2.08205		
I8.0.10	Speed transmitter	No	3	1.17954		
I8.0.11	Position Transmitters	No	4	1.00908		
I8.0.12	Pressure Gauge / DP gauge/DP Indicator	No	41	0.71914		
I8.0.13	Temperature Gauge (all types)	No	44	0.73043		
I8.0.14	Flow indicator / Flow Gauge / Flow meter/Flow Switch	No	5	1.36529		
I8.0.15	Level Indicator / Level Gauge/Magnetic Level Indicator	No	21	1.37925		

I8.0.16	Thermocouple / RTDs with thermowell (all types) along with converters wherever	No	264	0.85679		
I8.0.17	MTM Thermocouple upto 17 M length	No	7	1.95463		
I8.0.18	Temperature Transmitters	No	96	0.79163		
I8.0.19	PW Conductivity System (Sensor and Transmitter etc)	No	20	1.96792		
I8.0.20	Hydrogen Purity analyser	No	2	4.60827		
I8.0.21	Moisture Sensor probe and dew point monitor	No	1	2.62178		
I8.0.22	Reverse Rotation Indication System (Rack, Sensors, etc)	Set	1	2.7362		
I8.0.23	I/P Converter	No	5	0.88646		
I8.0.24	Air filter regulators / Lubricators (1/2", 1", 0-6KG, 0-10 KG)	No	6	0.5006		
I8.0.25	Solenoid valves (3 way, AC/DC, 1/4", 1/2", 1", NPT/BSP, single/dual coil)		7	0.53634		
I9.0	**Commissioning and Testing activities for Equipments erected by other agencies,like control valves, on/off valves, electrical/pneumatic valves, actuators,solenoid valves, valves, limit switches, ERV controllers, power cylinders,Pressure & Temperature Guages/Transmitters,etc**					
I9.0.1	Electrical regulating drives: (Valve, damper, scoop)	No	2	1.64821		
I9.0.2	Pneumatic regulating drives: (Valve, damper)	No	5	1.48947		
I9.0.3	Pneumatic On/Off drives: (Valve, damper)	No	4	1.50607		
I9.0.4	Commissioning of Hydraulic actuators	No	4	1.94442		
I9.0.5	Only healthiness checking of embedded RTD / T/C	No	121	0.35046		
I9.0.6	Limit Switches (checking and adjusting only).	No	10	0.38494		
I9.0.7	Testing and commissioning of HT Motors including dry out.	No	1	6.83363		
I9.0.8	Testing and commissioning of 415 V LT Motors including dry out.	No	20	2.89736		
I9.0.9	Electrically (LT) Operated Valves, Dampers and Gates with Actuators, Limit Switches etc. (Regulating & ON/OFF Type).	No	5	1.7435		
I9.0.10	Electrical Hoists	No	1	4.91862		
I9.0.11	Refrigeration Gas Dryer	No	2	4.04593		
I9.0.12	Rack mounted instruments commissioning	Set	1	5.2104		
I11.0	**Miscellaneous items (items not covered under above heads)**					
I11.0.1	Master Slave Clock System (approx. dim. 800 x 800 x 2100 mm)	Set	1	18.3649		
I11.0.2	Erection, Assembly, Testing & Commissioning of Digital Excitation Equipments /System for STG. System consist of DAVR panels & accessories as per tender specification. 4053(W) X 2415(H) X 800(D), approx. weight -2 MT.	Set	1	78.4485		
I11.0.3	Generator System Testing	Set	1	92.831		
	Total Amount					**A**

UNPRICED RATE SCHEDULE

ITEM NO.	DESCRIPTION OF WORK	TOTAL VALUE "A" IN INR (IN FIGURES AND WORDS)
1.0	**TOTAL PRICE FOR "WORK OF ERECTION,TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR TURBINE ISLAND SECONDARY CYCLE SYSTEM (TISCS) INCLUDING RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 OF 2X700MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN"**	A
Notes:		
a.	**The rates of individual item for the entire scope of work shall be arrived as per Calculation defined in Annexure-A.**	
b.	**The derived item rate will remain firm throughout the contract period.**	

Notes:

i. Bidder's quoted price above shall be complete in all respect for the full scope defined in specification and in accordance with all terms & conditions of tender.

ii. Contractor shall fully understand description and specifications of items mentioned in BOQ.

iii. Conditional price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.

iv. Quantities mentioned in BOQ Cum Rate Schedule are approximate only and liable for variation on either side depending upon site / design requirement. The tentative contract value (CV) of entire scope of work shall be calculated as per finally quoted / accepted rates & the Quantities indicated in BOQ cum Rate Schedule.

v. Contractor's total quoted price as per BOQ Cum Rate Schedule will be taken as tentative only. The contractor undertakes to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually executed at site and payments will also be regulated for the same.

vi. In case of any mis-match in rate and amount on price discrepancy, the same will be dealt as per clause no. 1.4 of GCC.

vii. Taxes (GST) shall be payable extra as per relevant clauses in Technical Conditions of Contract.