

 Bharat Heavy Electricals Limited (A Govt. of India Undertaking)	P.S. – Northern Region, Plot No. 25, Sector-16A, Noida-201301, Distt. Gautam Budh Nagar (UP)
	<p align="center">“E-NOTICE INVITING TENDER”</p> <p align="center">NIT:- BHEL/NR/SCT/ RAPP/UNIT 7 & 8/ETC OF CCIP/1085 DUE DATE & TIME OF OFFER SUBMISSION: 17/02/2018 at 1500 hrs. (IST)</p>
<p>NAME OF WORK: WORK OF ETC, HANDING OVER OF C & I WORKS FOR CONTROL CENTRE INSTRUMENTATION PACKAGE (CCIP) INCLUDING HANDLING OF MATERIALS, FOR UNIT NO. 7 & 8 OF 2 X 700 MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.</p>	
<p>NOTES:</p> <ol style="list-style-type: none"> This is an E-tender floated online through BHEL e-Procurement Portal https://bheleps.buyjunction.in. The complete tender documents can be downloaded from BHEL web page (www.bhel.com), BHEL PSNR web page (http://psnr.bhel.in) & CPP Portal (eprocure.gov.in). The bidder should respond by submitting their offer online only through BHEL e-Procurement portal at https://bheleps.buyjunction.in. Offers are invited in two-parts only. No Paper bid or bids through email/fax shall be accepted. All corrigenda, addenda, amendments, time extensions, clarifications etc. to this tender will be hosted on BHEL website (www.bhel.com) and BHEL e-Procurement Portal https://bheleps.buyjunction.in. Bidders should regularly visit website to keep themselves updated. Tender Cost and EMD to be remitted in line with clause no. 3.0 and 4.0 of NIT. 	
<p>Tel No: 0120-2416261/ 2416262, E-mail—deshraj/susmitabasu@bhel.in E-Tender Notification in English is available on www.bhel.com Sd/- Sr. DGM / SCT</p>	

Size : 8x7cm

 भारत हेवी इलेक्ट्रिकल्स लिमिटेड, पावर सेक्टर-उत्तरी क्षेत्र (भारत सरकार का उपक्रम)	मा.सं.वि.सं. एवं पा.से.-उ.क्ष. परिसर, प्लॉट नं. 25, सेक्टर-16ए, नोएडा-201301, जिला-गौतमबुद्ध नगर (उ.प्र.)
	<p align="center">“ई-निविदा आमन्त्रण सूचना”</p> <p>ई-निविदा संख्या: बीएचईएल/एनआर/एससीटी/आरएपीपी/यूनिट 7 एवं 8 / सीसीआईपी का ईटीसी/1085 जमा करने की निर्धारित तिथि: 17/02/2018 समय (आईएसटी): 1500 Hrs (भारतीय मानक समय)</p>
<p>कार्य का संक्षिप्त विवरण: “रावतभाटा, कोटा, राजस्थान में, एनपीसीआईएल के रावतभाटा अटोमिक पावर प्रोजेक्ट 2 X 700 मे.वा. की यूनिट 7 एवं 8 के कंट्रोल सेंटर इंस्ट्रुमेंटेशन पैकेज (सीसीआईपी) के लिए सी एण्ड आई कार्यों का सामग्री के रख-रखाव सहित ईटीसी के कार्य के लिए” निविदा दस्तावेज में दी गई अर्हक अपेक्षाओं को पूरा करने वाले संविदाकारों से ई-निविदा आमन्त्रित की जाती है।</p>	
<p>टिप्पणी:</p> <ol style="list-style-type: none"> यह ई-टेंडर है जो हमारी ई-प्रोक्योरमेंट साइट https://bheleps.buyjunction.in पर उपलब्ध है। सम्पूर्ण निविदा दस्तावेज बीएचईएल की वेबसाइट www.bhel.com एवं सीपीपी पोर्टल (eprocure.gov.in) से डाउनलोड किया जा सकता है। बोलीकर्ता अपने ऑफर केवल ई-प्रोक्योरमेंट साइट https://bheleps.buyjunction.in पर ऑनलाइन जमा कराएं। ऑफर केवल दो भागों में आमंत्रित हैं। कोई भी बिड/बिड्स पेपर अथवा ई-मेल, फैंक्स द्वारा स्वीकार नहीं की जाएगी। इस टेंडर से संबंधित सभी शुद्धिपत्र, अनुशेष, संशोधन, समय-विस्तार, स्पष्टीकरण इत्यादि बीएचईएल की वेबसाइट www.bhel.com व हमारी ई-प्रोक्योरमेंट साइट https://bheleps.buyjunction.in पर दर्शाए जाएंगे। बोलीकर्ता स्वयं को अपडेट करने के लिए नियमित रूप से वेबसाइट देखते रहें। निविदा लागत तथा ईएमडी की प्रेषित रकम एनआईटी के खंड संख्या 3.0 तथा 4.0 के अनुसार होगी। 	
<p>दूरभाष सं.: 0120-2416261 / 2416262, ईमेल: deshraj@susmitabasu@bhel.in E-Tender Notification in English is available on www.bhel.com</p> <p align="right">आज्ञा से /- वरि. उप महाप्रबंधक / एससीटी</p>	

Size 8 x 7 cm

Rev 01
1st Jun
2012

NOTICE INVITING TENDER

(Document No. PS:MSX:NIT)

Bharat Heavy Electricals Limited



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

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION
i	TENDER NUMBER	BHEL/NR/SCT/RAPP/UNIT 7&8/ETC OF CCIP/1085
ii	Broad Scope of job	WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR CONTROL CENTRE INSTRUMENTATION PACKAGE (CCIP) INCLUDING HOUSE KEEPING, RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 & 8 OF 2*700 MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i> Applicable
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	From BHEL website (www.bhel.com) and https://bheleps.buyjunction.in Tender documents will be available at website till due date of submission Applicable
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 17/02/2018 , Time : 15.00 HRS Place : on https://bheleps.buyjunction.in Applicable
vi	OPENING OF TENDER	At due date / time Date : 17/02/2018 , Time : 15.30 HRS Notes: (1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get Applicable

		<i>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</i>	
vii	EMD AMOUNT	Rs 6,54,000/-	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) Mrs Susmita Basu SDGM /SCT Power Sector Northern Region Plot No. 25, Sector-16A, Distt. Gautam Budh Nagar, NOIDA-201301(UP) Tel No. 0120-2416262 Fax- 01202416528 Email – susmitabasu@bhel.in 2) Mr. Deshraj Yadav Sr. Engineer /SCT Power Sector Northern Region Plot No. 25, Sector-16A, Distt. Gautam Budh Nagar,, NOIDA-201301(UP) Tel No. 0120-2416261 Fax- 01202416528 Email: deshraj@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://bheleps.buyjunction.in and not in the newspapers. Bidders to keep themselves updated with all such information	
xiii	Tender submission	on portal https://bheleps.buyjunction.in	

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at 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.

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

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

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

For Electronic Fund Transfer the details are as below:-

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

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

For other details please refer General Conditions of Contract.

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

Documents Comprising the e-Tender

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

a. Technical Tender (UN priced Tender)

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

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

b. Price Bid:

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

DO NOT'S

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

Digital Signing of e-Tender

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

The Requirement:

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

BHEL has finalized the e-procurement service Provider:-

M/s M Junction services Limited, Kolkata

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

The contact details of the service provider are given below:

1. First level:

- o MJ Helpdesk : 033-66011717, eps.customercare@mjunction.in

2. Second Level:

- o Bhaskar Chakraborty: 8584008205, bhaskar.chakraborty@mjunction.in, eps.customercare@mjunction.in
- o Santosh Kumar: 9717149600, santosh.kumar@mjunction.in

3. Third Level:

- o Rimi Ghosh: 9650044156, rimi.ghosh@mjunction.in
1. Customer care Help Desk of M/s MJUNCTION SERVICES LIMITED, Kolkata:
Tel ~ 033 - 66011717 (From 9.30 am to 5.30 pm),
Mob - 91633 48283 - 86/ 85840 08116 (From 5.30 pm to 8.30 pm)

HELPDESK email: eps.customer@junction.in,

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

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

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

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

6.0 **Not used.**

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

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

9.0 **Assessment of Capacity of Bidders:**

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) P₁, P₂, P₃, P₄, P₅, 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 = P_T (i.e. P_T = P₁+P₂+ P₃+P₄ +...P_N)
- b) Number of Months 'T₁' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P₁. Similarly T₂ for package P₂, T₃ for package P₃, etc. for the tendered scope. Now calculate cumulative total months 'T_T' for total similar Packages 'P_T' for all Regions (i.e. T_T = T₁+ T₂+ T₃+T₄ + ..T_N)
- c) Sum 'S₁' of 'Monthly Performance Evaluation' Scores (S₁₋₁, S₁₋₂, S₁₋₃, S₁₋₄, S₁₋₅.... S_{1-T1}) for similar package P₁, for the 'period of assessment' 'T₁' (i.e. S₁ = S₁₋₁+ S₁₋₂+ S₁₋₃+ S₁₋₄+ S₁₋₅+...S_{1-T1}). Similarly, S₂ for package P₂ for period T₂, S₃ for package P₃ for period T₃ etc. for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages 'P_T' for all Regions (i.e. 'S_T'= S₁+ S₂+ S₃+ S₄+ S₅+.... 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
		(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No. of similar packages for all Regions = P _T i.e. Sum (Σ) of columns (iii) to (ix)

Sl. No.	Item Description	Details for all Regions							Total
		(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = 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) = S _T

- ii). Calculation of Overall 'Performance Rating' (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:

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

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

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

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

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

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

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

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

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months from the commencement of work of first package or completion of contract or availability of 6 evaluation scores including the previous scores (if any).

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

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

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

- v). 'Under execution' shall mean works in progress as per the following:
- Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages
 - Up to Steam Blowing in case of Boiler/ESP/Piping Packages
 - 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 -
- Short hold:** Evaluation shall not be applicable for this period, however Loading will be considered.
 - 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.

- 10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.
- 11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.
- 12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.
- 13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

- 14.0 Unless specifically mentioned otherwise, bidder's quoted price shall be deemed to be in compliance with tender including PBD.
- 15.0 Not Applicable
- 15a. Not Applicable
- 16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.
- 17.0 In case BHEL decides on a 'Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.
- 18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.
- 19.0 (a) BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.
- (b) Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).
- (c) The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. **The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.**
- (d) If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).
- (e) If reverse auction process is unsuccessful, sealed envelope price bids of all the techno-commercially qualified bidders shall be opened and the tender shall be processed accordingly. However, the envelope sealed bid(s) of techno-commercially acceptable bidder(s) who had agreed to participate in the RA and had failed to submit the online sealed bid shall not be opened.
- 20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

- 22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 23.0 Not Applicable.
- 24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.
- 25.0 The bidder may have to produce original document for verification if so decided by BHEL.
- 26.0 The offers of the bidders who are on the banned/ hold list as also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com.
- 27.0 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)

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

Type under MSE	SC/ST owned	Others
Micro		
Small		

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

- a) MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either Udyog Aadhaar or EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (format enclosed as Annexure – 3) where deemed validity of EM-II certificate of five years has expired applicable for the last audited financial year. Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal.
- b) MSEs shall be exempted from payment of tender fee.
- c) MSEs shall be exempted from payment of earnest money at the time of tender deposit. However, there is no exemption of security deposit submission.
- d) Participating MSEs quoting price within price band of L1+15 % shall be considered for award of complete scope of work by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE. In case of more than one such MSE, MSE with lowest price shall be given the first option to match the L1 price. However, MSEs owned by the Scheduled Caste or the Scheduled Tribe entrepreneurs shall be given the preference for matching the L1 price irrespective of their standing in comparative statement of MSE bidders within price band of L1+15 %.

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

30.0 Order of Precedence

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

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

for BHARAT HEAVY ELECTRICALS LTD
(SCT)

Enclosure:-

- (i) Annexure-1: Pre Qualifying criteria.
- (ii) Annexure-2: Check List.
- (iii) Annexure-3: Chartered Accountant certificate for MSMED
- (iv) Annexure-4: Authorization of representative who will participate in the online Reverse Auction Process
- (v) Annexure-5: Feedback form
- (vi) Other Tender documents as per this NIT.

D	<u>FINANCIAL CRITERIA</u>	
D1	<p><u>TURNOVER</u> Tenderers should have an average annual turnover of minimum of Rs. 98.1 Lacs (Rs Ninety Eight Lacs Ten Thousands only) based on the audited accounts of last three financial years (2014-15, 2015-16 & 2016-17). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.</p> <p>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.</p> <p>If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant</p>	Applicable
D2	<p><u>NETWORTH</u> Net worth of the Bidder based on the latest Audited Accounts as furnished for 'D1' above should be positive. Note:- Net worth shall be calculated based on the latest Audited Accounts as furnished for 'D-1' above. Net worth = Paid up share capital* + Reserves (* : Share Capital OR Partnership Capital OR Proprietor Capital as the case may be)</p>	Applicable
D3	<p><u>PROFIT</u> Bidder must have earned profit in any one of the three Financial Years as applicable in the last three years as furnished in 'D1' above based on latest Audited Accounts. Note:- PROFIT shall be PBT earned during any one year of last three financial years as in 'D-1' above</p>	Applicable
E	<p><u>Approval of Customer</u> Note: Names of successful bidders shall be forwarded to customer for approval. Work shall be awarded only after approval of customer.</p>	Applicable
F	Consortium criteria	Not Applicable
<p><u>Explanatory Notes:</u></p> <ol style="list-style-type: none"> 1. Relevant documents, meeting above requirements shall be submitted by bidders. 2. For SI no 'C.1', 'Executed' means "SYNCHRONISATION" in case of power project and "WORK COMPLETION of the value as defined in PQR" in case of industry. 3. For SI no. 'C.2', 'Similar Work' means work as per SI no. 'C.1'above. 4. For SI no 'C.2', actual executed value shall be considered, irrespective of completion status of contract(s) under consideration. 5. For criteria 'C-2' and 'C.1.2' 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 the month, three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 03-Apr-17, then bid submission month shall be reckoned as April'17 and index for Jan'17 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 the month, three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 03-Apr-17, then bid submission month shall be reckoned as April'17 and index for Jan'17 shall be considered).

Y_0 = Monthly Whole Sale Price Index for All Commodities for last month of work execution

6. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, wherever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating of the same in terms of MW shall be considered for evaluation.
7. 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.

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

ANNEXURE - 2**CHECK LIST****NOTE:- Tenderers are required to fill in the following details and no column should be left blank**

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

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

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3**Certificate by Chartered Accountant on letter head**

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

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

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

RsLacs

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

RsLacs

(Strike off which is not applicable)

The above investment of RsLacs is within permissible limit of
 RsLacs forMicro / Small **(Strike off which is not applicable)**
 Category under MSMED Act 2006.

Or

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

Date:

(Signature)

Name -

Membership Number -

Seal of Chartered Accountant

ANNEXURE - 4**Authorization of representative who will participate in the on line Reverse Auction Process;**

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

ANNEXURE – 5**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

VOLUME-IA TECHNICAL CONDITION OF CONTRACT (TCC)

(Tender No. BHEL/NR/SCT/RAPP/UNIT 7&8/ETC OF CCIP/1085)

BHARAT HEAVY ELECTRICALS
LIMITED



NOT FOR PUBLICATION

ORIGINAL COPY

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/RAPP/UNIT 7&8/ETC OF CCIP/1085

FOR THE

“WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR CONTROL CENTRE INSTRUMENTATION PACKAGE (CCIP) INCLUDING HOUSE KEEPING, RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT’S STORES/YARD, TRANSPORTATION TO SITE FOR UNIT NO. 7 & 8 OF 2X700MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.”

PART-1 of TCC



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) Part-1

Contents

Contents (Part-1 of TCC: Contract specific details)

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Technical Conditions of Contract (TCC) Part-1
Chapter -1: Project Information

1. Project Information

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%

Technical Conditions of Contract (TCC) Part-1
Chapter-II: Scope of Work

2.0	<p><u>Scope of Work:</u></p> <p>BHEL has been awarded the work of Erection, Testing, Integration & Commissioning of Control Centre Instrumentation Package (CCIP) at RAPP-7 and 8 of 2X700 MWe, NPCIL, at Rawatbhata, Kota, Rajasthan.</p>
2.1	<p>The scope of work under this tender for Erection ,Testing, pre-commissioning, commissioning, integration & Handing over of CCIP of Unit 7&8 at 2x700 MWe RAPP NPCIL broadly consists of:</p>
2.1.1	<p>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 CCIP package of Unit-7&8 of 2X700 MWe sets at RAPP Rawatbhata site to BHEL's customer.</p>
2.1.2	<p>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.</p>
2.1.3	<p>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.</p>
2.1.4	<p>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</p>

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	should match requirement of sophistication involving microprocessor-based control systems.
2.1.5	The services, tests and support to be provided by the agency for the work mentioned in the various sections of this tender are indicative and not exhaustive, hence not limited to these for the completion of the work in all respects
2.2	The Scope of works consist of but not limited to the following:
2.2.1	Contractor has to carry out erection of panels/ consoles in various Buildings/ site, alignment of panels on floor cut-outs/ trenches, welding to Embedded plates/ frames, DP testing of welding ,Earthing of panel with Earth risers provided nearby (By bolting/ welding) Installation of computers/ printers and their cabling for power supply/network ,installation of LAN switches in panels/ on walls, Laying of power cables for Ethernet switches
2.2.2	Installation of JB's of BMS, Installation of floor mounted BMS sensors in field and control room. Laying of signal cables for BMS sensors to BMS JB's.
2.2.3	The wiring/cabling scope of work broadly consists of installation of MS trough as required by cutting, welding, bolting, installation of extra TB's provided by Customer, installation of inter-panel wiring through MS trough, installation of intra-panel wiring in CDF/ BTC panels, Laying of power cables for Ethernet switches
2.2.4	Installation of loose items supplied by BHEL/Customer/Customer's vendors. The Contractor shall be required to take Receipt, carry out E&C, testing and handing over of the instruments / Equipment issued by NPCIL as part of this contract scope. Details of these shall be provided at site during erection.
2.2.5	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.
2.2.6	Carrying out integration and providing required assistance in the integration work carried out by customer, testing and functional checking of logic relay panels, pre-commissioning/ commissioning of systems and handing over.

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	Provide support during overall commissioning of the system and attend the equipment/system for any problem.
2.2.7	Protection of erected instruments/equipment from damages, deposition of dirt/dust, splash of water etc.
2.2.8	Supply of consumables and hardware such as Hilti bolts/Fisher anchor (seismically qualified and approved), welding electrodes, nuts, bolts, screws, paints, wire lugs, PVC wire sleeves (suitable for thermal printing) and any other such material required for completion of erection works , as per erection procedure or otherwise deemed necessary for completion of work.
2.2.8.1	<p>All the consumables required for successful completion of the scope of work are to be supplied by the contractor, other than the consumables which are specifically provided/supplied by the MU's. An indicative list of the consumables to be provided by contractor is as given below:</p> <ol style="list-style-type: none"> 1. PVC Ties 2. Insulation Tapes 3. GI Clamps 4. Free Wheeling Diode 5. Power Supply extension board 6. Ribbon for Sleeve typing machine 7. Black Sleeve 8. Heat Shrinkable Sleeve of different sizes and colour. 9. PVC wire nos. Sleeve of Yellow, White, Red, Sky Blue, Green colour etc. 10. Solder wire (General and for CTM system use) 11. Flux, welding consumables 12. Insulated Copper Lugs of different sizes (U, Ring, Pin type) 13. Paints: Wire Brush (hand and motor driven) Paints
2.2.9	Providing testing instruments, work shop tools inclusive of their maintenance. Providing all erection tools and machinery including special tools/machinery required to be used for completion of jobs.
2.2.10	<p>Descriptions of certain items of the systems appearing in the rate schedule are available in this section to give general idea to bidder about the type of equipment to be erected, calibrated, tested and commissioned.</p> <p>Control Centre Instrumentation Erection work broadly covers following systems:</p> <ol style="list-style-type: none"> 1. SAFETY TEST & MONITORING SYSTEM(STMS) 2. REACTOR CONTROL & MONITORING SYSTEM (RCMS) 3. REACTOR PROCESS CONTROL & MONITORING SYSTEM (RPCMS)

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	<ol style="list-style-type: none">4. CONTAINMENT, VENTILATION AND COMMON SERVICES, CONTROL AND MONITORING SYSTEM (CVCSCMS)5. DIGITAL RECORDING SYSTEM (DRS), RADIATION DATA ACQUISITION SYSTEM (RADAS)6. RADIATION DATA ACQUISITION SYSTEM (RADAS)7. ELECTRICAL SUPERVISORY CONTROL AND DATA ACQUISITION (ESCADA)8. PERSONAL CONTAMINATION INFORMATION SYSTEM (PCIS)9. FUEL HANDLING CONTROL COMPUTERS10. EMERGENCY TRANSFER SYSTEM (EMTR)11. MAIN ANNUNCIATION SYSTEM PANELS (MAS)12. BEETLE MONITORING SYSTEM (BMS)13. FUEL HANDLING MAIN CONTROL ROOM PANELS, OPERATOR CONSOLES, FUELING MACHINE AND SIMULATOR PANEL14. FUEL HANDLING CONTROL CABINETS, FIELD ISOLATION RELAYS, SOLENOID DRIVERS15. MANUAL AND SAFETY LOGIC (M&SAL) PANELS16. LVDT TRIP UNITS FOR FUEL HANDLING CONTROLS17. SHUT DOWN SYSTEM#1 (SDS#1)18. SHUT DOWN SYSTEM#2 (SDS#2)19. MAIN AIRLOCK SYSTEM AND AUX. AIRLOCK SYSTEM20. ECCAS ALARM SYSTEM (EAS) AND LOGIC RELAY PANEL21. PHT INSTRUMENT PANEL22. LOGIC RELAY PANELS23. CONTAINMENT ISOLATION SYSTEM (CIS) AND CONTAINMENT SPRAY SYSTEM (CSS)24. ADJUSTER RODS & CONTROL RODS (AR/CR) CONTROL SYSTEM25. FIELD FUEL MONITORING (FFM) AND DATA COLLECTION PANELS26. CLASS II 240VAC MAIN CONTROL CENTER POWER SUPPLY DISTRIBUTION PANELS27. CLASS III 240VAC MAIN CONTROL CENTER POWER SUPPLY DISTRIBUTION PANELS28. 24V DC MAIN CONTROL CENTRE POWER SUPPLY DISTRIBUTION PANELS29. 220V DC MAIN CONTROL CENTRE POWER SUPPLY DISTRIBUTION PANELS30. 240 VAC BACKUP CONTROL CENTRE POWER SUPPLY DISTRIBUTION PANELS31. 24 VDC BACKUP CONTROL CENTRE POWER SUPPLY DISTRIBUTION PANELS32. MAIN CONTROL ROOM PANELS33. OPERATOR CONSOLES34. BACKUP CONTROL ROOM PANELS
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	<p>35. CONTROL DISTRIBUTION FRAME (CDF) 5 BAY MODULE 36. BUFFER TERMINAL CABINETS (BTC) 37. N-16 AND O-19 MONITORING PANELS 38. SIMULATOR MAIN CONTROL ROOM PANELS (MCRPs) 39. SIMULATOR OPERATOR CONSOLES 40. SIMULATOR BACKUP CONTROLROOM PANELS 41. SIMULATOR MCB STATUS MONITORING SYSTEM 42. FUEL HANDLING MAIN CONTROL ROOM PANELS, OPERATOR CONSOLES FOR SIMULATOR 43. NETWORK COMPONENTS AND MOUNTING CABINETS</p>
2.2.11	<p>Works required to be carried out for this scope, though not limited to but are generally as per BOQ cum Rate schedule. All works shall be carried out as per the technical specification / procedure and any additional stipulations at site provided by BHEL/NPCIL, during the course of erection.</p> <p>Any work, which is not mentioned in BOQ cum rate schedule but required to be carried out as per technical specifications for satisfactory completion of BOQ Item, shall be carried out within the quoted rates and no extra payment to the contractor shall be admissible for such work.</p> <p>For any items or class of work not specified in BOQ cum Rate schedule but is required for total completion of work, the same shall be carried out as per the approved technical specification/procedure and any other stipulations at site provided by BHEL/NPCIL, during the course of erection. However the payment of these items/class of work shall be regulated as per the General Condition of the contract, Clause No. 2.15.</p>
2.2.12	<p>The Information furnished in the Chapter-XII, Annexure-A is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components/ items / systems according to the site requirements/ customer requirements to complete various systems in all respects. Any other systems / components which are integral to the equipment and whose details may have been missed in this tender (including chapter XI) but are supplied by the BHEL manufacturing units, NPCIL/customer shall also be erected, tested and commissioned by the contractor.</p>
2.2.13	<p>During the course of erection, testing and commissioning of C&I work, certain rework/ modification/ rectification/ repairs/ fabrication etc., may be necessary on account of feedback from various sources and/or units and manufacturing defects and site operation/ maintenance requirements. Contractor shall</p>

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	<p>carryout such rework / modification / rectification / fabrication repairs etc. promptly and expeditiously.</p> <p>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 work will be dealt as per Clause 2.15 of General Conditions of Contract in case the work carried out comes under extra work. Decision of BHEL site in this regard will be final and binding on the contractor.</p>
2.2.14	<p>Tentative Scope for ETC of Equipment/Systems covered under this specification of Work for Unit no.7&8 is described hereafter:</p> <p>Below mentioned details are general and some sub-systems/processes may have been left out. Omission of any system/process/work will not absolve contractor from erection, testing and commissioning work of such systems or carrying out the work, which are required for the completion and smooth running of the CCIP package.</p>
2.3	<p>Brief description of work to be carried out for this scope are given below. These specifications shall be read in conjunction with technical specification in Part-2 of TCC and other tender conditions.</p>
2.3.1	<p><u>ERECTION:</u></p> <p>Electrical control panels, electronic control panels, etc., are normally supplied in suite 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. Installation of panel shall include fixing of base frame, fabrication of base frame (if required), levelling, alignment, welding and grouting of panels and base frames, final painting, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware, bus bar jointing, wiring interconnection, mounting of panel canopy wherever supplied as part of panel, etc.</p> <p>In certain case where canopies are not supplied but have to be fabricated out of MS sheets, MS Sheets and other structural materials required shall be provided by BHEL, however fabrication of canopies, including supplies of consumables, manpower, T&Ps etc. shall be in scope of the contractor.</p>
2.3.1.1	<p>All tools, tackles, fixtures, equipment, materials, manpower, supervisors/ engineers, consumables, welding 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</p>

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	<p>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.</p> <p>All consumables to be used for the work shall have prior approval of BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.</p>
2.3.1.2	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.
2.3.1.3	<p>The contractor's scope includes:</p> <ul style="list-style-type: none"> A. Drawl of material from store, verification, inspection as per shipping drawings and documents. B. Preservation, up-keeping, safe custody of the issued / stored / erected equipment till handing over to the customer. C. Verification of installation as per drawing and document for the correctness of cabling, MJBs, panels, instruments etc. D. Continuity check and IR value check of cables. E. Verification of correction of cable termination with respect to instrument, electrical hook-up diagram, panel interconnection diagram, JB schedule, any other similar document F. Checking earthing of the equipment and cable shield wire continuity. G. Energizing the functional group control panels and field devices
2.3.1.4	While moving various equipment like control panels, control desks etc. on the finished floor or otherwise, contractor shall take adequate care not to damage floor or other things in the vicinity. For this if required suitable fork lifts or other similar means to be used for equipment movement.
2.3.1.5	Implementation of Engineering Change Notices (ECNs) and Field Change Notices (FCNs) involving additions/deletion of wires, instruments and their terminations in Panels, JB's, instruments etc. Removal of items from panels/ consoles/ field including their wiring as per ACN, DCN, This may involve Re-fixing/ rewiring / re-ferruling.
2.3.1.6	Installation of cable trough (only for cabinets in the same row)

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2.3.1.7	Various types of sheet metal, galvanized cable trough, 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.
2.3.1.8	Installation of cable trough shall include cutting, laying, jointing, supporting, drilling holes in the support, providing tees/reducers/bends/clamps as per 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). <i>Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.</i>
2.3.1.9	Cable troughs have to be routed over head on panels etc. for various application such as wire routings etc.
2.3.1.10	All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipment/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, wiring, 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.
2.3.1.11	It is the responsibility of contractor to make erection, calibration/testing protocols for various C&I equipment/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. Sometimes recalibration of equipment 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. Such works shall be carried out By contractor within the quoted rates. The contractor shall keep record of such instrument with the reason for recalibration and certified by the BHEL Engineer.
2.3.1.12	For the very few cases where required, the contractor shall carry out reorientation 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

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	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
2.3.1.13	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. 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.
2.3.1.14	Unit control desk and components Unit control desk will be supplied in a single shipping section for erection at site. Console Inserts shall be supplied either mounted on console grid or supplied loose. Also, the items (indicators, pushbuttons, etc.) of the console insert may be supplied mounted in the console insert or may be supplied loose. The rates quoted for console should take the above into consideration. No separate payment will be done for the erection of individual components of console. Alarm facia on the control desk may be supplied mounted or loose. Mounting these, if required, will not attract any extra payments. The commissioning of these will constitute a part of the panel commissioning from where the alarm is driven.
2.3.1.15	Wherever control desk / panel is not supplied by BHEL or is in customer scope of supply, loose item supplied by BHEL if any, shall have to be mounted by the contractor. Console / console tiles shall have plug-in / screwed / soldering / crimp snap-on, connection. Interconnecting cable between console and process control panel shall be either of pre-fabricated plug-in cable or plugs are required to be made at site with crimp insertion type of pins. Various types of lugs, solder wire etc. required for the work shall be arranged by contractor. Generally, 0.5 sq.mm multi pair shielded cables are envisaged for console Cabling. Cable may have to be terminated at different console tiles, spliced wire of individual cable need to be routed through PVC sleeves upto the plug end of the tiles.
2.3.1.16	Misc. Other instrument / equipment erection, calibration and Commissioning. Dimension / weights as mentioned against control panels etc. in rate schedule are only approximate and there may be changes in dimension and

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	weight in actual supply of the equipment and no rate variation shall be applicable on this account.
2.3.1.17	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. 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. Sealing of gland holes not used, is to be done by contractor.
2.3.1.18	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. The cable laying and termination charges will be paid as per applicable rate schedule.
2.3.1.19	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 <i>printed ferrules</i> and will be glanded properly. Suitable and sufficient no. of equipment and consumables for ferrule printing has to be arranged by the contractor at his own cost. Contractor's scope includes Cross connection wiring for Buffer Terminal Cabinets (BTD), Control Distribution Frames (CFD) and Inter / Intra panel wires including tinning of both ends of the wire.
2.3.1.20	Earthing of installations <ul style="list-style-type: none"> • Earthing connections shall be free from tinning scale paint, enamel, grease, rust or dirt at the time of making joint. • Metallic sheaths, screens/shields and armour of all multicore cables shall be bonded and earthed at a single point. • Earthing conductors along their run on columns, beams, walls etc. shall be supported by suitable cleats at intervals of 750 mm. <p>Welded joints on GI earthing conductors shall be coated with one coat of bituminous paint in case of buried earth grid or earth flats to be laid in cable trench. For site welded GI strips/wires which are exposed these are required to be painted with one coat of cold galvanizing zinc paint. Contractor to arrange the required paints and other items at his cost.</p>

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2.3.1.21	<p>Instruments and equipment</p> <ul style="list-style-type: none"> • 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. • 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 equipment are positioned, at no extra cost. • Contractor shall arrange for own firefighting equipment, i.e. fire extinguishers, sand buckets etc. for the materials stored under contractor's custody.
2.3.1.22	<p>Erection, Calibration, testing & commissioning activity as specified in this technical specification and rate schedule against various equipment, devices, Systems etc. are broadly classified in technical specifications. 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.</p>
2.3.1.23	<p>Erection of 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.</p>
2.3.1.24	<p>Filler Panels, Main Control Room Panels, EWS, OWS, Field Multiplexer Units (FMUs), Floor Mounted Moisture Elements with Integrated Cables are to be erected as per the tender specifications / additional technical specifications provided during erection.</p>
2.3.2	<p><u>Termination:</u> Wire terminations in Main Junction Boxes (MJB), Field Panels and Field Junction Boxes (FJBs) is in the scope of this contract. (Installation of JBs/Field Panels and Cable laying and glanding etc. will be done by other agency)</p>
2.3.2.1	<p>The termination works broadly consists of : Peeling off glanded cables at both ends, Dressing of wires, Ferruling with coloured sleeves as per details provided by NPCIL, Installation of Lugs/ Soldering etc., Insulation resistance test of wires, Continuity test of wires,</p>

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	Termination / connectorisation / RJ-45 connectorisation, Functional Check of each cable.
2.3.2.3	In case of fiber optic cables, the work includes splicing of Fiber optic cable and connection to network switches.
2.3.3	<u>Testing:</u> Testing of the panels broadly consists of disconnecting required wires from panels for panel charging, Charging of panel, Measurement of voltages, accordingly calibration of cards, Re-connection of wires and re-measurement of card voltages, Function check of all signals in cards/ alarms window/ historian by simulation in field/ control room panels etc.
2.3.3.1	HITP (hardware integration test Procedure) as per approved test procedure of NPCIL is to be conducted on Computer Based Systems (CBS) panels. For other panels IR and functional test etc. are to be conducted.
2.3.4	<u>Documentation:</u> Documentation forms an important part in the NPCIL project. The work will broadly cover preparation of procedures and getting them approved from BHEL / NPCIL before start of erection, testing, pre-commissioning commissioning of the systems / panels, preparing As-built drawings. Giving inputs as desired for technical, safety audits, inspections by customer/BHEL. Planning and preparation of schedules/programmes etc. and providing inputs along with DPR's, MPR etc.
2.3.4.1	The contractor has to take all work permits for erection/hot works etc. Preparation of Gate passes, SIV's, RIV's, providing inputs for preparation of insurance claims etc. is also an integral part of contractor's scope.
2.3.4.2	Preparation / assistance in preparation of Construction completion documents and System Transfer Documents
2.3.4.3	Preparing and documenting all formats for recording observations / data during erection / testing, requisitioning for QS, billing, measurement etc.
2.3.4.4	The terminal points as decided by BHEL shall be final and binding on the contractor.
2.3.4.5	Implementation of all safety and QA related guidelines as per site practice, AERB guidelines and approved QA manual.
2.3.5	<u>Planning and Monitoring-</u> Contractor has to provide progress reports vis a vis scheduled/planned milestones as per reporting frequency desired by NPCIL / BHEL and assist in planning and monitoring of the package. Planning and Monitoring procedures are detailed in TCC Part-2 "Technical Specifications"

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2.3.5.1	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, BHEL uses its own software for total project execution and billing. The contractor shall provide adequate and suitable manpower for Planning, Monitoring and updating / entries into BHEL computers at site for the duration of the contract.
2.3.5.2	Preparation and Issue of as-built drawings (ED/WD/TL etc.) including corrections using AutoCAD, printing, Xeroxing of required nos. of copies.
2.3.6	<p><u>MATERIAL HANDLING</u></p> <p>Material handling from BHEL/NPCIL stores/yards, including issue of documents connected with material receipt, inspection, verification, damages, if any, during transit etc.</p> <p>It would be responsibility of the contractor to examine the packages, consignments etc. immediately on issue/ receipt from BHEL / client stores and bring to the notice of BHEL authorities regarding loss / damage / shortage / discrepancy, if any, observed in the consignments.</p> <p>Any discrepancy / shortage / damage found in the consignment after taking clean delivery shall be the responsibility of contractor and the resultant loss to BHEL on such account shall be recoverable from the contractor.</p>
2.3.6.2	Issue of materials from BHEL's Store, preservation of issued materials as per approved procedure, re-stacking / re-handling as necessary, progressive and final reconciliation with BHEL's store and preparation of necessary document / record in respect of these activities
2.3.6.3	All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the engineer. The equipment from the Store/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.
2.3.6.4	Contractor shall prepare, maintain and update various issued/receipt/returned material records from BHEL at project site.
2.3.6.5	Two systems of record keeping /capturing information & data at various stages are Manual ledger records and Computerized database application using BHEL's own software application program that captures all the data in

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	the entire chain of transactions starting with master list of project materials, records of issue/ receipt, inspection, return, consumption etc.
2.3.6.6	The Contractor shall make arrangements for moving all the materials/equipment required for erection to the place of erection from the storage yard/ stores/sheds of BHEL. The Contractor shall also make arrangements for verification of equipment/panels, 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 to erection site should be done by the prescribed route in the most professional manner without disturbing other ongoing works of various contractors 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 and no extra payment shall be done in this regard. It shall be the contractor's responsibility to arrange necessary cranes/tractors, trailer, trucks, fork lifts, slings, labour, etc., for Unloading/Loading and transport of equipment.
2.3.6.7	The contractor shall take delivery of the components, equipment and special consumables from the Store/storage area/sheds of BHEL after getting the approval of the BHEL engineer on standard indent forms to be specified by BHEL
2.3.7	<u>COMMISSIONING AND HANDING OVER</u> Completion of all punch points, testing, commissioning and assistance in integration, operational acceptance and handing over of unit to customer. Execution of all jobs, resolving any deficiencies identified, during OWNER Technical audits, check list of pre-commissioning and commissioning. Detailed Specifications are mentioned in TCC, Part-2.
2.3.8	<u>SAFETY:</u> Following of safety norms for working at site and requisite documentation as per AERB guidelines. The AERB guidelines for safety may be downloaded from Atomic Energy Regulation Board website. Copy of same may also be obtained from BHEL Site during course of erection.
2.3.8.1	All works shall be performed in strict conformity with all applicable local codes/international codes/specific procedures developed for the job and safety regulations.

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2.3.8.2	Contractor to note that in addition to BHEL requirements of safety, occupational health and environmental management, contractor shall strictly follow & abide by the safety laws/rules & regulation requirements of NPCIL at site and in the event of any deviation/ dispute, the requirements of NPCIL in this regard shall be final and binding on contractor.
2.3.9	<u>QUALITY:</u> Quality in the executed works is non-negotiable and of utmost importance to BHEL. To maintain high standards of quality the workmen, consumables and erection methods / processes shall be in line with approved FQP / QAP / Welding manuals and drawings etc. and NPCIL guidelines. It is further detailed in Chapter-IX of Part-1, TCC.
2.3.9.1	The customer M/s. NPCIL and / or their Consultant may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.
2.3.10	The contractor under this contract shall also provide services of following manpower exclusively for use by NPCIL/BHEL:
2.3.10.1	Engineer (BE with 2-3 years of experience in erection and commissioning of C&I systems) for NPCIL's use
2.3.10.2	Supervisor (Diploma with 3 years of experience in erection and commissioning of C&I systems) for NPCIL's use
2.3.10.3	Technician (ITI with 3 years of experience in erection and commissioning of C&I systems) for NPCIL's use
2.3.10.4	Draftsman (with 3 years of experience) for NPCIL's use
2.3.10.5	Persons so deployed may have to work in extended hours whenever required at no additional cost to BHEL. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed. The person so employed shall solely be in the contractor roll only and all the legal/ statutory issue regarding these deployment shall be in contractor's scope.
2.3.10.6	Tentative quantity of manpower requirement as per '2.3.10.1' to '2.3.10.4' is given in the BOQ cum Rate schedule. Quantities are liable to change as per actual site requirement. Contractor shall provide manpower as per actual site

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	requirement, as decided by Package In-charge. The quoted prices shall remain firm irrespective of any quantity variation.
2.3.11	<p><u>HOUSEKEEPING</u></p> <p>House Keeping of assigned area along-with supply of specified equipment and consumables. Housekeeping forms important part of this contract and includes provision of housekeeping machinery, manpower, consumables etc. The detailed specification for Housekeeping in line with NPCIL requirement is defined in TCC Part-2 “Technical Specifications).</p> <p>Note: The payments for housekeeping services as per technical specification shall be made as per item no. 15 of BOQ cum rate schedule, which includes supply of all consumables, equipment, PPEs etc., as specified in the tender and as per actual site requirement.</p>
2.3.12	<p><u>Dress code and use of clean overalls</u></p> <p>Contractor shall have dress code and shall provide and maintain proper and clean uniform for his staff and workers during the entire period of contract. The colour of the uniform shall be got cleared from NPCIL. The Contractor shall ensure that his workmen are always in the uniform during their presence in plant premises.</p>
2.3.13	<p><u>Interruption during reactor building test</u></p> <p>Reactor Building pressure test is conducted to prove design and leak tightness of Reactor Building. During the tests, no work shall be permitted inside Reactor Building. Works in other buildings will continue and Contractor shall plan the works in such a manner that the work force is utilised in works in other buildings. Total cumulative duration of these tests of Reactor Building would be approx. fifteen days for each Reactor Building. The prices quoted by Contractor shall include the cost of such interruptions.</p>
2.4	<p>TRAINING OF WORK FORCE</p> <p>The contractor shall arrange induction safety training for all employees before assigning work. In addition, awareness programme, mock drill at regular intervals and daily tool box meetings shall be arranged. Monthly report of the above to be given to BHEL safety Officer as per prescribed BHEL formats. All the contractor’s supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Contractor should nominate his supervisor to coordinate and implement the safety measures.</p>
2.6.0	<p>SITE ORGANISATION</p>
2.6.1	<p>The contractor shall provide adequate staff in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:</p>

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	<ol style="list-style-type: none"> 1. Overall planning, monitoring & control. 2. Quality control and quality assurance. 3. Materials management. 4. Safety, fire & security as per AERB guidelines. 5. Industrial relations and fulfilment of labour laws and other statutory obligations.
2.6.2	The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.
2.6.3	On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data/deputation have been approved by BHEL, are to be posted at site and deviations in this regard will not be permitted.
2.6.4	The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc. prior to commencement of site activities. These tools & tackles shall have valid calibration certificates/load test certificates etc. and shall not be removed from site without written permission of BHEL.
2.6.5	The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc. as applicable.
2.7	ERECTION SCHEDULE
2.7.1	Contractor shall submit within 30 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning, for approval to BHEL Site In-Charge. L2 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the tender specification. These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring. The quarterly rolling program with the first month's program being tentative

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	based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilization plan over the period of time of the contract matching with the performance targets.
2.8	WATCH AND WARD SERVICES:
2.8.1	Contractor shall deploy suitably qualified and separate staff for Watch and Ward services. Watch and Ward staff will be responsible for various security related activities of equipment / materials/ tools and tackles deployed by BHEL and Contractor in the area where regular work is being carried-out and also where equipment are already erected and further activities are in progress/pending
2.8.2	Contractor to ensure that sufficient no. of manpower is deployed to carryout above mentioned activities on round the clock basis (24x7x365 days). All the arrangements including any logistics, safety and appropriate lighting in work place for safe working at nights etc. is responsibility of the contractor and has to be taken care by the contractor. Any contingency requirement due to any unforeseen reason, shall also be taken care by contractor by arranging additional suitable man power.
2.8.3	Contractor shall ensure that at no point of time work area in plant as well as office/stores are left unattended. Contractor to ensure that at any given point of time minimum one watch and ward staff is present at Office/Stores area and one person at the plant.
2.8.4	It will be required for Watch and Ward staff to continuously move from one work spot to other while discharging their assigned duties. These work spot may be spread over to various floors and also buildings. Contactor to take note of this while planning for manpower deployment.

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

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	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

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3.3.6	Supply, Installation & connection of energy meter including operation & maintenance		YES	electricity for construction and accommodation, the contractor has to follow directions of BHEL / NPCIL
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		YES	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	

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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:			

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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 demolition 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 Contractor 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

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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	<p>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. Rupees 4.28 per kWh. This rate is subject to revision from time to time and subject to minimum chargeable unit@30 kWh per BHP connected load or maximum demand per month whichever is higher. Recovery towards power, utilized by the contractor shall be made from running account bills.</p> <p>The required power for commissioning of the equipment's of CCIP package shall be provided free of charge.</p>
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:

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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)

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	<ul style="list-style-type: none"> - Electricity Supply Act, 1910 (as amended) - Indian Electricity Rules 1956 (as amended) - Latest State Electricity Board regulations <p>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.</p> <p>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.</p> <p>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.</p>
3.9.6.3.7	<p>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.</p>
3.9.6.3.8	<p>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.</p>
3.9.6.3.9	<p>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.</p>

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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. Also, NPCIL may provide Domestic low tension power supply required for the contractor's colony at a at a single point, at a location as allotted by the Engineer at a nominal system voltage 415V 3 phase 4 wire 50Hz and 230V single phase 50Hz etc. In this case, the contractor shall make his own arrangements for distribution of power to the occupants of the colony. After completion of works, the contractor shall at his own cost, promptly dismantle the distribution and other facilities he may have erected. As the power for the labour camp/ contractor's colony will be supplied at one point and adequate lighting facilities such as flood lights, hand lights and area lighting will have to be arranged by the contractor at his own cost at contractor's colony/ labour camp.
3.9.7.2	The charges for power supply to contractor's colony shall be recovered at the prevailing rate from the running account bills of the contractor.
3.9.7.3	The contractor while drawing construction/ domestic power supply from Distribution Board should strictly adhere to following points.
3.9.7.3.1	All electrical installations should be as per Indian Electricity rules.
3.9.7.3.2	All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.
3.9.7.3.3	Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.
3.9.7.3.4	All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
3.9.7.3.5	Contractor has to make their own earthing arrangement for their equipment / DB earthing.
3.9.7.3.6	All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
3.9.7.3.7	Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DB's.
3.9.7.3.8	Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.

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3.9.7.3.9	<p>For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.</p> <p>ELCB will be tested on a regular basis or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.</p> <p>In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.</p>
3.10	Water
3.10.1	<p>Unfiltered Water Supply/Construction water</p> <p>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:</p>
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	<p><u>Water Supply to Labour Camp</u></p> <p>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</p>

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	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.

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Chapter-IV: T&Ps and MMEs to be deployed by Contractor

4.0 INDICATIVE LIST OF T&P/MMD TO BE DEPLOYED BY THE CONTRACTOR						
S.NO.	EQUIPMENT /T&P		Indicative Capacity	Tentative deployment schedule	Indicative Qty.	Remarks for deployment schedule and quantity
4.1	Mobile crane*	Hydra	12 - 18 MT	APR	APR	To be decided by BHEL as per site requirement (APR)
4.2	Trailer with pulling unit*		10-15 MT	APR	APR	To be decided by BHEL as per site requirement (APR)
4.3	Fork Lift/ Trolley*	Pallet	5 MT	APR	APR	(For material fetching from store/ closed shed) APR
<p>*The scope of shifting of material from yard to site is in the scope of Contractor. Contractor has to arrange for the trailer and Cranes of appropriate capacity, as per the requirement of shifting of the material from stores/Yard/ place of unloading to site and vice versa (in case of material reconciliation and return to stores). The trailers/cranes are to be arranged by contractor as per requirement as decided by BHEL.</p>						
4.4	Uncrating tool			APR	APR	APR
4.5	Air compressor (electric or diesel operated)		140/210 CFM	APR	APR	
4.6	Skid roller			APR	APR	APR
4.7	Screw/Hydraulic Jacks			APR	APR	APR
4.8	Chain Pulley blocks			APR	APR	APR
4.9	Slings of various capacity and quantities for handling of equipment's			APR	APR	APR
4.10	Wire Rope, D-Shackles, Belt Slings, Hook Chooks			APR	APR	APR
4.11	Electric winch with wire rope 2T/ 3T			APR	APR	APR

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Chapter-IV: T&Ps and MMEs to be deployed by Contractor

4.12	Soldering Iron	APR	APR	APR	
4.13	De-Soldering Pump	APR	APR	APR	
4.14	Copper tube bender and cutter sizes 6mm, 8mm, 1/2", 1/4"	APR	APR	APR	
4.15	Hand and Bench Vice	APR	APR	APR	
4.16	Hydraulic Pipe Bending Machine(Manual & Motorized)	APR	APR	APR	
4.17	Crimping tools up to all size of cables, wires under scope of work	APR	APR	APR	
4.18	Welding Generators, Rectifiers & TIG Welding Machine and ovens for welding electrodes backing and holding	APR	APR	APR	
4.19	Nylon Mallets, Hammer	APR	APR	APR	
4.20	Drill Machines, dye sets, of required size with HSS and special drills	APR	APR	APR	
4.21	Digital temperature cum Humidity meter	APR	APR	APR	
4.22	NDT test kits (DPT)	APR	APR	APR	
4.23	Computer based Sleeve Printing Machine with all Consumables as per NPCIL requirement	APR	APR	APR	
4.24	Special Tools and Test Equipment required for Special cable including OFC , UTP etc.	APR	APR	APR	NPCIL guidelines to be adhered to
4.25	Hilti Bolt/Fisher Anchor (Seismically qualified and approved type with anchor machines	Adequate Capacity	APR	APR	Adequate size and qty.
4.26	Vacuum Cleaner	APR	APR	APR	

Technical Conditions of Contract (TCC) Part-1
Chapter-IV: T&Ps and MMEs to be deployed by Contractor

	(Industrial type)& Blowers				
4.27	Hand tools, cutting Tools, grinding machines	APR	APR	APR	
4.28	Phase sequence indicator	APR	APR	APR	
4.29	Torque Tension Wrench	APR	APR	APR	
4.30	Tong Testers AC 5/10,25/60/300 ,Amp Range ,of reputed make	APR	APR	APR	
4.31	Ratchet Square insert (MM size and Inch size)	APR	APR	APR	
4.32	Cleaning consumable for Contact/Rust	APR	APR	APR	1.Contact cleaner 2.Rustolene 3. Grease etc. 4.Colin cleaner
4.33	Manometers with water column With hand bulb for lab and small manometers for field purpose.	APR	APR	APR	These are to be arranged for ranges APR
4.34	6/12 points temperature recorder for 0-1000C with thermocouples / rods and compensating cable	APR	APR	APR	
4.35	Tong Testers DC 30/60/300 A	APR	APR	APR	with calibration certificate
4.36	Ferrule printing machine	APR	APR	APR	
4.37	Hot Air Blower, Hot air gun	APR	APR	APR	
4.38	Motorized Megger (500V,1kV) and Digital Megger (upto 5KV)	APR	APR	APR	
4.39	Tong tester (AC and DC)	APR	APR	APR	

Technical Conditions of Contract (TCC) Part-1
Chapter-IV: T&Ps and MMEs to be deployed by Contractor

4.40	Allen Key sets, Tape and die sets	APR	APR	APR	
4.41	Cutting Machines, Argon Sets, Gas Cutting Machines				
4.42	Digital Multi-meter (6½ , 4½ digit)	APR	APR	APR	
4.43	Digital Multi-meter (3½ digit)	APR	APR	APR	
4.44	Pico ampere set		APR	APR	
4.45	Dead Weight Tester rated 400 Kg/cm2 with weights & test gauge facility	APR	APR	APR	
4.46	Taper Pin and straight Pin Reamers	APR	APR	APR	
4.47	Electrometers, Calibrators	APR	APR	APR	
4.48	Magnetic Base Drilling Machines,	APR	APR	APR	
4.49	Hand operated Megger (500V/1000V)	APR	APR	APR	
4.50	Fire retardant Tarpaulins		APR	APR	
4.51	Fire Extinguisher	APR	APR	APR	
4.52	3-phase distribution board with complete set up for drawl of construction power & fitted with energy meter and Maximum Demand Meter	APR	APR	APR	Energy meters and maximum demand meter shall be calibrated
4.53	Power cable for drawl of construction power	APR	APR	APR	
4.54	Scaffolding materials scaffolding pipes with Clamps etc.	APR	APR	APR	APR of the site
4.55	Watch Maker	APR	APR	APR	

Technical Conditions of Contract (TCC) Part-1
Chapter-IV: T&Ps and MMEs to be deployed by Contractor

4.56	Oil temperature bath suitable to calibrate the instruments range 0-400 deg. C with standard temp. gauges & thermostatic control	APR	APR	APR	
4.57	Standard milliamps / millivolts source of reputed make. Range 0to 50 ma and 0 to 100 mv	APR	APR	APR	
4.58	DC power supply 0-50 VDC, 5 A make "Aplab" or equivalent (variable source)	APR	APR	APR	
4.59	Screwdrivers of reqd. size	APR	APR	APR	
4.60	Variac (1 phase & 3 Phase)	APR	APR	APR	
4.61	Secondary Injection Kit	APR	APR	APR	
4.62	Continuity tester	APR	APR	APR	
4.63	<p>*APR- Contractor has to deploy T&P,MMD, IMTE AS PER REQUIREMENT of BHEL site as decided by BHEL Engineer In-charge. The capacity, quantity, duration of deployment will be decided by Engineer In-charge as per site requirement. Decision of BHEL in this regard shall be final and binding on the contractor.</p> <p>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.</p> <p>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.</p>				
4.64	<p><u>Notes</u></p> <p>The above list specifies only major T&Ps / MMDs (may not be complete) to be deployed by the contractor for this package This list is only indicative/suggestive and neither exhaustive nor limiting. All the tools and plants required for this scope of work, except the tools & plants provided by BHEL are to be arranged by contractor within the quoted rates.</p>				

Technical Conditions of Contract (TCC) Part-1
Chapter-IV: T&Ps and MMEs to be deployed by Contractor

4.64.1	Any special testing kit/ MME/ T&P/ precision equipment, other than supplied by the MU/ manufacturer as special equipment for erection/ testing, has to be arranged by the contractor within final accepted rates.
4.64.2	If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to procure/hire the equipment/T&P whenever required and get work done at the risk & cost of contractor without prejudice to right of BHEL as in GCC.
4.64.3	Contractor has to submit the Calibration certificates of all the precision equipment to BHEL. BHEL may ask for recalibration of the MME's /precision equipment for ensuring quality of work. Contractor must re-ascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.
4.64.4	Other terms and conditions regarding above items shall be as per T&P clause in SCC.
4.64.5	Special T&P or IMTE's requirement for testing/calibration shall be arranged by contractor as per site requirement.
4.64.6	No recovery will be effected from the contractor, if any of the listed T&P/IMTE in this chapter is not needed for proper execution of the work, provided contractor has not utilized BHEL free issued T&P for completing the work.
4.64.7	In case T&P as per this chapter or as per any additional requirement as decided by BHEL is required for proper execution of work, contractor will be communicated in writing regarding such requirement by giving 15 days of notice for deployment of the T&P/IMTE etc. The same may also be mutually decided in monthly Form F-14. If the respective work is completed before the schedule deployment period as provided by site, then no recovery shall be applicable.
4.64.8	In case of requirement (given by site), if the T&P is delayed or deployed for shorter period or had abnormal down time and BHEL had to deploy either its own T&P or from outside for completion of work, the recovery shall be done from the contractor. The method of recovery shall be as under: i.) In case BHEL had to deploy its own T&P, hire charges of T&P applicable for Outside agencies as per extant BHEL guidelines for "Hire charges on issue of Capital Tools & Plants" shall be recovered. ii.) In case BHEL had to deploy the T&P from outside, actual hiring cost plus applicable overheads shall be recovered.

Technical Conditions of Contract (TCC) Part-1
Chapter-V: T&Ps and MMEs to be deployed by BHEL on sharing
basis

5: LIST OF T&P TO BE PROVIDED BY BHEL ON SHARING BASIS

S. No	Description and capacity of T&P	Quantity	Remarks
5.1	20 MT Crane	1	On chargeable basis subject to availability of crane as per prevailing hiring rates at the time of issue.
5.2	135 MT Crane	1	1. On free issues basis, for erection works which cannot be carried out by Hydra/ T&P of contractor scope. 2. It shall be provided, subject to availability of crane on sharing basis as per requirement. 3. BHEL decision regarding requirement shall be final and binding on the contractor.
5.2	Notes governing the provision of the above T&P for use by Contractor		
5.2.1	Cl.4.2.2.16 e. of SCC shall be read as- The operators for BHEL's 100 MT & above capacity cranes shall be provided by BHEL free of cost. The operators for cranes, below 100 MT capacity cranes, shall be in contractor's scope. Further, fuel for operation of all BHEL cranes, shall be provided by contractor within the final accepted rates.		
5.2.2	The contractor shall make necessary arrangement like laying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.		
5.2.3	Any other special T&P if supplied by the manufacturer and available with the customer may also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.		
5.2.4	For T&P other than cranes, mentioned above and any other provided by BHEL for erection and commissioning purposes, contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores in working condition.		
5.2.5	Other terms and conditions regarding above items shall be as per T&P clause in SCC		

Technical Conditions of Contract (TCC) Part-1
Chapter-VI: Time Schedule

6.0	TIME SCHEDULE for CCIP package of RAPP 7&8
6.1	<p>After receipt of Letter of Intent (LOI), Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of LOI or as per the directions of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones as directed by BHEL Engineer.</p> <p>The actual date of start of work i.e. zero date of the contract, shall be certified by BHEL Engineer in line with clause no.6.2</p>
6.2	<p>START DATE / ZERO DATE:</p> <p>The schedule date of start of work shall be the date after 2 weeks of issue of LOI.</p> <p>The Actual Date of Start of Contract Period (Zero Date) shall be the date of handing over of site for works to the contractor and shall be certified by the BHEL Engineer.</p>
6.3	<p>COMPLETION PERIOD:</p> <p>The entire work for this contract is to be completed within 30 months from the actual date of start of contract period (Zero Date).</p> <p>There is a phase gap of 06 months in completion schedule of Unit 7&8 respectively; accordingly entire work of Unit 7 is to be completed in 24 months from Zero date and entire work of Unit#8 is to be completed in 30 months from Zero date of the contract.</p> <p>Detailed Schedule for carrying out the works shall be prepared by the contractor as per availability of materials and fronts at site in consultation with BHEL and in line with Customer's project requirement.</p>
6.4	<p>The work under the scope of this contract shall be deemed to be completed in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor. Conditions for completion of work of this contract scope are defined in clause 6.5:</p>
6.5	<p>The customer has specified conditions with respect to completion of works in their contract. Accordingly BHEL's contractor shall abide by the following</p>

Technical Conditions of Contract (TCC) Part-1

Chapter-VI: Time Schedule

conditions and should complete their scope as specified in these stipulations as directed by BHEL Engineer.

The terms of the contract which are relevant to the contractor are mentioned below:

A. Erection Completion of Facilities shall have meaning as under:-

1. Completion of erection of all Instrumentation Items by Contractor as per system requirement in all respects in accordance with Drawings, ISS, Test Procedures, Erection Procedures, QAP and Specification, subject to passing all the examination, inspections and test requirements.
2. Commissioning & Integration and Independent verification & validation (IV&V) of the systems by contractor in all respects as per the contractor's scope of work of this contract.
3. All the construction Completion Certificate (CCC) and all the System Transfer Documents (STD) are submitted after completion of 1&2 above to NPCIL attaching all relevant documents in acceptable form needed for verification and acceptance of the same.
4. A certificate "Erection Completion Certificate" certifying above is issued by NPCIL.

Technical Conditions of Contract (TCC) Part-1
Chapter-VI: Time Schedule

6.6	<p>In case the work gets delayed and scheduled completion gets extended, time extension will be accordingly granted by BHEL in line with terms of GCC.</p>
6.7	<p>In order to meet above schedule and other intermediate targets/activities as set by BHEL Engineer in charge at site & to meet customer requirements/project schedule, contractor shall arrange all necessary resources and work force in consultation with BHEL Engineer at site to undertake works concurrently in all possible fronts as made available to contractor.</p> <p>Contractor shall be prepared to adjust with the tight schedule of project and plan for 3 shift working. Slippages in meeting the project schedule shall be reviewed seriously and penalty thereof shall be in line with relevant clause in GCC.</p>
6.8	<p style="text-align: center;"><u>COMMENCEMENT OF PERFORMANCE GUARANTEE FOR WORKMANSHIP</u></p> <p>The performance guarantee period 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 operational acceptance of facilities/handing over to the customer for the respective unit.</p> <p>In the event the unit is operated commercially, for reason other than testing before purchaser has issued Operational Acceptance certificate, the guarantee period shall commence from the date of completion of facilities as certified by BHEL.</p>
6.9	<p><u>CONSEQUENCE OF DELAY:</u></p> <p>In case of delay in completion is attributable to the contractor, BHEL may impose LD on the contractor as per GCC.</p>

Technical Conditions of Contract (TCC) Part-1
Chapter-VI: Time Schedule

6.10 KICK OFF MEETING:

The successful bidder is required to participate in the kick-off meeting in 02 weeks from the date of LOI but before actual site mobilization.

The presentation shall include all the points relevant to execution of this contract such as:

- 1) Execution / Construction Methodology
- 2) Site organization
- 3) Action plan
- 4) QA System
- 5) Safety System
- 6) Training
- 7) Plant and camp infrastructure
- 8) Plant and machinery
- 9) Resource management

Technical Conditions of Contract (TCC) Part-1
Chapter-VII: Terms of Payment

7.0	TERMS OF PAYMENT
7.1	The 'Engineer' will certify the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.
7.2	Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.
7.3	Contractor on certificate of the Engineer at site be entitled for payment for the service and supply portion as explained here under. These payments are subject to any deduction, which BHEL may be authorized to make under the Contract.
7.3.1	Interest bearing recoverable advance: Applicable as per Clause No. 2.13 of GCC.

7.3.2	PROGRESSIVE PAYMENT ON PRORATA BASIS		
7.3.2.1	Progressive Payment for the Works mentioned in BOQ cum rate Schedule of this package is divided as below-		
	BOQ Items	Description	(%) of Unit price in BOQ cum Rate Schedule
	Item No. 1.1 to 1.5	Unpacking, Verification, Transportation from Stores ,Erection, Alignment & Welding, DPT of Welding and completion of Installation Works in all respects	50%
	Item No. 1.1 to 1.5	Fixing of loose items/ instruments wherever applicable	5%
	Item No. 1.1 to 1.5	Pre commissioning checks, Charging of panels and applicable testing etc.	15%
	Item No. 1.1 to 1.5	Implementation of ECNs/FCNs and Design Modifications (if any),Commissioning and completion of Integration	15%
	Item No. 2	Termination of Wires/cables including Peeling off of cable cores, dressing,	65%

Technical Conditions of Contract (TCC) Part-1
Chapter-VII: Terms of Payment

		ferruling, supply and installation of lugs/ soldering / connectors etc.																						
	Item No. 2	IR measurement, continuity check, functional check of cables/wires. Implementation of ECNs/FCNs and Design Modifications, if any	20%																					
	Item No. 3 to 14	On completion of Works, mentioned in BOQ cum rate schedule	85%																					
	Item No.15	Submission of Monthly Bill along with Attendance certificate of various Manpower deployed, supply of consumables and Satisfactory completion of work	85%																					
7.3.2.2	The progressive payment terms as defined in the clause No. 7.3.2.1 above, may further be divided at site to facilitate work progress by the site/package In-charge. Decision of BHEL in this regard shall be final and binding on the contractor.																							
7.3.2.3	85% of the unit rates for each item shall be released for erection and commissioning activities and 15% is for milestone activities.																							
7.3.2.4	<p><u>Stage/Milestone Payment:</u></p> <p>Balance 15% of the Item Rates shall be paid on completion of following milestones</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sl. No.</th> <th style="text-align: center;">Milestone</th> <th style="text-align: center;">Percentage Payment</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Issuance of "Erection Completion Certificate" by NPCIL.</td> <td style="text-align: center;">7%</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Operational acceptance and Handing Over to Customer</td> <td style="text-align: center;">3%</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Area Cleaning, temporary structure cutting, removal and return of scrap(Packing and other)</td> <td style="text-align: center;">1%</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Final Painting, Punch List points/ pending points liquidation, Submission of As built drawings</td> <td style="text-align: center;">2%</td> </tr> <tr> <td style="text-align: center;">5</td> <td>Material Reconciliation</td> <td style="text-align: center;">1%</td> </tr> <tr> <td style="text-align: center;">6</td> <td>Completion of Contractual Obligation</td> <td style="text-align: center;">1%</td> </tr> </tbody> </table>			Sl. No.	Milestone	Percentage Payment	1	Issuance of "Erection Completion Certificate" by NPCIL.	7%	2	Operational acceptance and Handing Over to Customer	3%	3	Area Cleaning, temporary structure cutting, removal and return of scrap(Packing and other)	1%	4	Final Painting, Punch List points/ pending points liquidation, Submission of As built drawings	2%	5	Material Reconciliation	1%	6	Completion of Contractual Obligation	1%
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Technical Conditions of Contract (TCC) Part-1
Chapter-VII: Terms of Payment

7.3.2.4.1	<p><u>Notes for Stage/Milestone Payment:</u></p> <p>If the milestone 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 up to 50% of milestone payment on completion of work, after withholding the amount required for carrying out that particular milestone/ commissioning activity, as decided by BHEL Site-In-charge,.</p>
7.3.3	<p>Payment/release of retention amount and final bill shall be as per clause No. 2.22 and 2.23.2 of GCC.</p>
7.3.4	<p><u>Recoveries from RA/Final Bills on account of safety lapses during contract execution at RAPP</u></p> <p>Any recoveries/deduction/penalties effected/levied on BHEL by NPCIL for non-compliance of “NPCIL’s Contract Conditions for Industrial safety”, due to negligence/ lapses in safety at project site premises by the contractor of this work scope shall be recovered from the contractor’s monthly RA bills, in line with BHEL rules.</p> <p>These recoveries shall be in addition to the penalties levied on pro-rata basis by BHEL on contractor for non-compliance of the safety protocols at site during working as per the clause no.16 of HSEP-14 document (Part of SCC of the tender document) for safety non-compliances and respective penalties.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

8.0	TAXES & DUTIES
8.1	Price quoted should be inclusive of all applicable Taxes/ charges Excluding GST. The Contractor shall pay all other taxes, fees, royalty, commission etc. which may be levied on the contractor in executing the contract. In case BHEL is forced to pay any of such taxes, it shall be recovered from Contactor's bills or otherwise as deemed fit.
8.2	<p>GST shall be payable extra as per following:</p> <p>8.2.1 Vendor has to issue correct HSN/SAC code wise bill indicating therein description, value, rate, due tax and other particulars in compliance with the provisions of relevant GST Act and Rules.</p> <p>8.2.2 Vendor has to submit GST compliant invoice within 7 days from the due date of invoice as per GST Law.</p> <p>8.2.3 GST portion of invoice shall be released only when all the following conditions are satisfied by the Contractor:</p> <p>8.2.3.1 Supply of goods and services have been received by BHEL.</p> <p>8.2.3.2 Original Tax Invoice has been submitted to BHEL.</p> <p>8.2.3.3 Contractor has declared such invoice in his applicable GST return.</p> <p>8.2.3.4 Documentary evidence or undertaking regarding discharge of GST liability in respect of supplies made by vendor has been furnished.</p> <p>8.2.4 For the purposes of claiming GST from BHEL, invoice issued by contractor should be in line with provisions of GST Act & Rules. Special care should be taken in case of month end transactions.</p> <p>8.2.5 The taxes and duties referred in this chapter or elsewhere in the NIT/contract is limited to direct transactions between BHEL & its Sub-Contractor. BHEL is not responsible for any liability that may arise due to any transaction beyond the direct transaction between BHEL & its Sub-Contractor.</p>
8.3	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.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

	<p>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 contractor only and within the contractual delivery period only.</p> <p>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.</p>
8.4	Modalities of Tax Incidence on BHEL:
	<p>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</p> <p>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.</p>
8.5	<p>Any loss to BHEL due to non-compliance of above noted clauses and/or provisions of the GST Act and/or Rules by the contractor shall be to his account.</p>
8.6	<p>BUILDING & OTHER CONSTRUCTION WORKER (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICES) ACT , 1996 (BOCW ACT) AND RULES OF 1998 READ WITH BUILDING AND OTHER CONSTRUCTION WORKERS CESS ACT, 1996 & CESS RULES, 1998</p> <p>In case any portion of work involve execution through building or construction workers, then compliance to the above title act 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 : -</p>
8.6.1	<p>It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the competent authority under the BOCW act and obtain proper certificate thereof by specifying the scope of work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

	/ permission to BHEL within a period of one month from the date of award of contract.
8.6.2	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligation 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.
8.6.3	It shall be the sole responsibility of the sub – contractor to furnish the receipt / challans towards deposit of the cess together with the number, name and other detail of beneficiaries (building workers) engaged by the sub-contractor during preceding month.
8.6.4	It shall be the sole responsibility of the sub – contractor to make payment of all statutory payment and compensations to its workers including that is provided under the Workmen’s Compensation Act, 1923.
8.6.5	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.
8.6.6	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.
8.6.7	In case of failure in above mentioned compliances, BOCW Cess @ 1% as well as applicable penalty as specified in BOCW Act / Rule shall be deducted from the contractor.

Technical Conditions of Contract (TCC) Part-1
Chapter-IX: Quality

9.0	Quality
9.1	<p><u>Quality system</u></p> <p>Assuring reliability and quality of workmanship carried out under this package is the responsibility of the contractor. Contractor shall have a documented quality system addressing the mechanism to achieve the required quality level and the work carried out conforming to the best work practices prevailing at the time of execution of this contract:</p> <p>Contractor shall have a well-structured organization of Personnel and resources to specify, achieve, verify and document all work. This should also include the approval from BHEL/NPCIL wherever required. Quality system can be in line with National/International standards/models and shall address following areas.</p> <ul style="list-style-type: none">A. Conformance of the work carried out meeting specified requirements.B. Procurement of Consumables.C. ConstructionD. Special processesE. Measuring and testing equipmentF. Inspection and test including Non-destructive Testing and other examination of the supplied consumables and materials.G. Handling, storing, preservation, re-packing.H. Item identification and traceability.I. Documentation and quality records.J. Disposition of non-conformances and corrective action and demonstrate.
9.2	<p>The Contractor shall have an Quality Control Inspection, testing Facility and system. Personnel working in this group shall not have any other responsibility such as Erection, commissioning etc. This department shall work in close coordination with the Quality Assurance Department of NPCIL/BHEL and abide by their instructions in all aspects of work. The Quality personnel performing all the package works are to be academically qualified to have suitable professional experience in their relevant field.</p>

Technical Conditions of Contract (TCC) Part-1
Chapter-IX: Quality

9.3	The Contractor on mobilization shall furnish an organization chart, which also includes the structure and size of Manpower of the Quality Department for approval and acceptance of BHEL. Contractor's quality Personnel shall be evaluated by BHEL. Contractor Personnel found not suitable for performing the works shall be replaced immediately with efficient quality performers to ensure speedy execution of works without sacrificing quality.
9.4	Wherever found essential the contractor may have to provide for hiring outside inspection agency <ol style="list-style-type: none">1.) To comply with the BHEL/NPCIL requirements as specified in the contract.2.) To initiate corrective measures promptly when any workmanship quality problems are identified or deviations from established requirements are noticed.3.) The contractor shall plan, establish, implement and maintain a quality assurance program during the course of execution of this tender.
9.5	Plan the inspection and test activities for all such individual activity as listed above. <ul style="list-style-type: none">• Identify inspections and tests to be performed on the items listed in the FQP/drawings in compliance with technical requirements.• Submit the plan for the Engineer's concurrence/approval before the work starts. The work is to be executed in view of the witness points and hold points at appropriate stage as per the quality plan.
9.6	<u>QUALITY ASSURANCE PROCEDURES</u> The contractor shall have procedures for the following specific requirements should they apply to the contract: <ul style="list-style-type: none">• Document control• Procurement of consumables• Measuring and testing equipment- Calibration records• Inspection and test of systems erected• In-process inspection of procedures• Final inspection• Identification and traceability• Preservation, handling and storage during construction• Special processes• Quality records• Non-conformances

Technical Conditions of Contract (TCC) Part-1
Chapter-IX: Quality

	<ul style="list-style-type: none"> • NPC-supplied items • Corrective actions. <p>Each QA procedure shall define, as applicable, such things as: its purpose and scope; who is responsible for what; how all steps are to be performed; what materials, equipment and documentation are to be used; how it is all controlled.</p>
<p>9.7</p>	<p><u>QUALITY RECORDS</u></p> <p>The contractor shall</p> <p>a) Maintain quality records as evidence that:</p> <ul style="list-style-type: none"> • The quality assurance meets the requirements of these Quality Management Requirements ((manual, procedures, and Field quality plan), • The items or services meet applicable technical requirements, specifications, drawings, calculations, manufacturing, inspection and test procedures. • Personnel and procedures for special processes are qualified. • Measuring and testing equipment is calibrated. • The procurements meet the requirements and are approved. • Corrective actions are being taken and are effective as required. • Audits are performed as required and results documented for corrective actions, if any. <p>b) Maintain final quality records which include as appropriate:</p> <ul style="list-style-type: none"> • As built records • Material/consumables test reports or certificates • Non -destructive examination records or certificates • Inspection and test records • Non-conformance reports • Lab. Calibration reports • SS tube welding machine printout <p>c) Identify, index and file quality records for easy retrieval.</p> <p>d) Retain quality records for the contractual period for handing over to customer.</p> <p>e.) Provide a suitable environment for storing of records to minimize deterioration or damage and to prevent loss (the use of a double filing system is an acceptable method).</p>
<p>9.8</p>	<p>Construction completion certification is an important part of this contract package. In order to give full meaning to this requirement all quality records shall be generated, got authorized by all agencies at appropriate</p>

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	<p>stages, documented and preserved. Periodic audits by competent authority shall be performed on these documents to establish the efficiency. These audits reports are to be submitted to the Engineer to provide an effective feedback so that corrective action can be initiated on time.</p> <p>Construction completion document has to be prepared incorporating all the essential requirements and records, giving justification that all the requirements of drawings, specification are met and this document shall be made available to the Engineer-in-charge at the time of completion.</p>
9.9	<p>The contractor shall:</p> <p>A. Investigate the causes of significant or recurring non-conformances and take appropriate action to prevent repetition.</p> <p>B. Examine NPCIL supplied items on receipt for completeness and proper type and to detect transit damage. Further receiving inspection is not required unless the contractor needs actual characteristics for subsequent work or unless specified in the contract. Examination may be deferred until further processing is scheduled if items are in sealed containers or have special preservation or packaging.</p> <p>C. Report promptly in writing to the quality assurance representative, any NPCIL supplied items found damaged, lost, non-conforming, or otherwise unsuitable or unnecessary for use either on receipt or while in the contractor's custody.</p> <p>D. Control NPCIL supplied items from receipt onwards according to the requirements of Quality Management Requirements of NPCIL applicable for items supplied and certifying that these items are consistent with the quality requirements of the final items.</p>
9.10	<p>Contractor shall have a well-structured organization of personnel and resources to specify, achieve, verify and document all work. QA organization at site shall comprise of Senior Level QA in-charge supported by adequate QA engineers and QC inspectors. All these quality personnel shall be subjected to the assessment by NPCIL/BHEL. The contractor shall inform by written letter indicating area of responsibility supported by bio-data.</p> <p>After successful assessment, engineer will be authorized by letter to carry out specified QA / QC function.</p> <p>All QA persons shall maintain non-conformance register at specified area (System / QA engineer wise) and enter all the non-conformances observed and intimated concerned contractor erection engineer. This non-conformance shall be cleared by corrective action by contractors erection engineer and subject the same for inspection by Contractor QA. Reports</p>

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	are to be filled and available in computer under the folder Nonconformance control. NPCIL erection Group and QA Group shall undertake random checks on activities being performed and verify the documents / inspection reports/ nonconformance log book.
9.11	<p>The personnel working in QA set up shall have adequate professional experience and qualification in the relevant field of work.</p> <p>Capability of Contractor's Quality personnel to execute the work efficiently shall be duly evaluated by BHEL. Delay in execution of work due to non-deployment of efficient and duly qualified Quality personnel shall be to the account of the Contractor.</p> <p>Contractor's Quality personnel not found suitable for performing the works shall be replaced immediately with efficient quality performers for ensuring suitable performance and also required pace of work.</p>
9.12	<p>To cope with fast pace of work and to obtain high quality and minimum rejection in works executed by the Contractor, the Contractor shall train adequately all the personnel/employees (Permanent & Temporary) deployed at site. To fulfill this contractor shall have following:</p> <ul style="list-style-type: none"> • A separate training coordinator/ in-charge for imparting training. • Training procedure covering training set-up, list of training module, training schedule, assessment criteria, certification program, provision of quality I-Cards, retraining, updating training etc. • List of activities under the scope of work and training module for each activity, covering activity specific information, work instruction, dos and don'ts, quality requirement, housekeeping, safety requirement, usage of proper tool, plant specific information, working with other groups, waste collection, clean-up, non-conformance control. • Training assessment questionnaire / assessment sheet / qualification requirements (Excellent> 95%, Good> 85%, Average> 70%, Poor < 70%). • Independent assessment group comprising of QA in-charge. • Provision for external faculty for specialized areas or provision for external training for specialized areas. • Training room / demonstration material (defective and acceptable work pieces). audio-video material. • Erection engineers shall be made adequately knowledgeable for activities / area under them, and then they shall give training to workers covering skilled / semi-skilled helper categories. • For the better spread of knowledge and continuous reference, work instruction / safety instruction / house-keeping instruction in bold letter on A4 sheet shall be written and displayed in all areas of work (Hanging boards shall be used in main plant to avoid pasting on walls / structures).

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9.13	All jobs executed by Quality group are subject to regular technical Audit by NPCIL Corporate Quality Assurance Directorate and also by Atomic Energy Regulatory Board (AERB), a Statutory Authority for ensuring all work at the Nuclear Installation to meet the specified Quality Standards. The applicable AERB codes, guides and rules are : 1) AERB code of Practice on Quality Assurance for Safety in Nuclear Power Plants" (AERBISC/QA). 2) AERB Safety Guide for Works Contract 3) AERB Regulatory Document 4) AERB factory Rules 1996 Contractor shall also have provision for hiring outside inspection agency.
9.14	All the required welding electrodes as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes
9.14.1	The Contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability of the welds shall be final.

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10	Safety guidelines to be followed by contractor at site
10.1	<p>General Note:</p> <p>The contractor shall comply with all provisions of “AERB Safety Guide for Works Contract” Document No. AERB/SG/IS-1 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-1914 (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 at the time of mobilization, before execution of work.</p>
10.2	SAFETY GUIDLINES
10.2.1	The contractor shall ensure minimum first aid arrangements available at all times at site and other arrangements in collaboration with local health authorities.
10.2.2	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.
10.2.3	The contractor shall comply with the instructions given by departmental safety officer or his representative regarding safety precautions, protection measures and housekeeping etc.
10.2.4	The contractor shall comply with all provisions of AERB Safety Guide for Works Contract Document no. AERB/SG/IS-1 and other safety requirements as applicable to this specific site.
10.2.5	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.
10.2.6	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.
10.2.7	The contractor shall meet statutory 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-1006 or latest version available at the time of work execution) safety guidelines for Job Hazard Analysis (JHA) & AERB notifications on Industrial & Fire safety. The copies of the same can be obtained from BHEL/NPCIL on request.

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10.2.8	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 at 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.
10.2.9	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.
10.2.10	Contractor working at the height of more than 2.5 meters 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.
10.2.11	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.
10.3	SAFETY PLAN
10.3.1	Contractor at his cost shall perform following tasks for the job having high risk as identified by Department Safety Group:
10.3.1.1	Prepare Safe Working Procedures and ensure its implementation in field.
10.3.1.2	Carry out Job Hazard Analysis (JHA) and implement in field.
10.3.1.3	Based on JHA, the safe working procedures should be modified especially to include checklists as necessary checkpoints for job safety supervision.
10.3.1.4	Worker (s) must be trained based on safe working procedure and explained about DOs and DON'Ts prior to assigning him the job.
10.3.1.5	The workers must adhere to the safe working procedure for the job.
10.3.1.6	Contractor shall ensure that all Tools, Appliances, erecting equipment 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

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	tools and equipment for their healthiness and safe use with a copy to departmental safety group.
10.4	Employees Safety & Workmen Compensation
10.4.1	Contractor shall be responsible for safety of all his employees during execution of the contract work. As per Workmen's Compensation Act, 1923 (Amended in 2000), the contractor will ensure the payment of compensation to his employees in case of an accident as early as possible within the time frame permitted by the law of land
10.5	Job Supervision at Site
10.5.1	The contractor must ensure adequate job supervision through educated, qualified and Experienced supervisors - at least one supervisor for each hazardous job activity to ensure safety during work execution. Similarly, there should be adequate on-site engineering support ensuring coverage of at least one experienced engineer for every ten supervisors and part thereof.
10.6	Training requirements
10.6.1	Contractor must build all necessary infrastructure for imparting induction safety training, mock-up trainings and job specific training at plant site at his cost. The required space will be provided free of cost by NPCIL. The Training matters will be guided by Head, IS&F and will be monitored by Training Superintendents. The training evaluation for its effectiveness, will be assessed by nominee of Training Superintendent, QA and/or Head IS&F. The contractor site-in-charge should arrange induction safety training of four hours duration to all workmen prior to engaging them to work and refresher training on monthly basis covering 20% of the workman in a month with 100% coverage within 6 months. This training should be given with necessary Audio, Visual, Posters aids and as per syllabus approved by NPCIL safety group, under the guidance of Training Superintendent or Head IS&F or his representative. The training should be in the language understandable to workmen. This training shall include mock trials of wearing of helmet, use of safety belt and it's hooking up to an independent lifeline etc. The safety-training instructor must certify the workmen for having understood safety aspects and use of PPEs successfully in mock-up trial. To ensure proper understanding of safety instructions and safety training, the contractor shall employ literate (at least able to read safety instructions) workers only. In exceptional cases of not meeting literacy requirement the workers shall be imparted supplementary training.
10.6.2	The job supervisors and the engineers will have to undergo detailed safety training of at least three days duration at the plant in safety supervision and accident prevention techniques. This training would at

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	the cost of the contractor and then only he/she would be given permanent entry pass to plant
10.6.3	Contractor must note that in case the industrial safety induction training as per 10.6.2 is not conducted within 3 days his workmen shall not get plant entry pass.
10.7	Requirements and specification of PPEs Tools and Tackles
10.7.1	Every contractor must keep adequate stock of ISI certified (or of relevant) personal protective equipment (PPE), safe working tools and safe like platforms and access ladders, guard railing etc. and shall ensure these are used during the job for safe execution of the work. These PPE, Tools and Appliances must be inspected quarterly. Contractor on demand by BHEL authorities shall produce the record of such inspections.
10.7.2	All implements being used for height work like scaffold, access stairs/ladders, platform, railings etc. should be of ISI marked material meeting requirements of AEFR-1996 and should be certified by contractor safety professional prior to its safe use and to the effect that each implement should have display showing it can be safely used. If any workman is found using sub-standard or damaged PPE, tools & appliance, or any unsafe condition/practices is observed it will be recorded for regulation of payment. The decision of the Engineer-in-charge, in regards to the regulation of payment shall be final and binding.
10.8	<u>EMERGENCY PREPAREDNESS DRILL</u> The adjacent operating plant(s) and project site perform mock-up emergency exercises regularly in line with stipulations defined by regulatory bodies as a part of emergency preparedness. All the Contractor's workmen shall have to undergo awareness programme on emergency preparedness which shall be arranged by NPCIL. The Contractor's workmen may be required to assemble in the identified assembly areas/emergency shelters and register their presence for accounting purpose. The prices quoted by Contractor shall include the cost of such interruptions. For RAPP-7&8 such assembly areas /emergency shelters shall have closable doors & windows and shall be maintained by the contractor. The prices quoted by Contractor shall include the cost of such interruption.

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The equipment description with system details provided in this Chapter-XI are for 02 units i.e. Unit 7&8 at 2X700MW,RAPP- Rawatbhata.

Tentative summary of CCIP systems their respective panels,cabinets etc.

Item.No.	Item Description	Total Qty of panels, cabinets etc. for the systems of 2 Units	Measuring Unit
RAPP-7 & 8			
1.1	Safety Test and Monitoring System (STMS)	38	Number
1.2	Reactor Control and Monitoring Systems (RCMS)	24	Number
1.3	Reactor Process Control and Monitoring System (RPCMS)	34	Number
1.4	Containment, Ventilation and Common Services, Control and Monitoring Systems (CVCSCMS)		
1.4.1	CVCSCMS Panels	26	Number
1.4.14	24V AC/DC Power Supply	68	Number
1.5	Plant Information Systems		
1.5.1	Digital Recording System (DRS) 66450-PL-1A/1B/1C	2	Number
1.5.2	Radiation Data Acquisition System (RADAS)		
1.5.2.1	67800-PL-1 (I/O Node panel)	2	Number
1.5.2.2	67800-PL-2 (Server Panel)	2	Number
1.5.3	Electrical Supervisory Control and Data Acquisition (ESCADA)	27	Number
1.5.4	Personal Contamination Information System (PCIS)		
1.5.4.1	Historian Server PC	1	Number
1.5.4.2	Patch Panel (24 port)	5	Number
1.5.4.3	Wall Rack Unit	5	Number
1.6	Fuel Handling Control Computers	12	Number
1.6.7	Test Computer	1	Number
1.7	Emergency Transfer System (EMTR)	28	Number
1.9	Test Computer	1	Number
2.1	Plant Information Systems		
2.1.1	Main Annunciator System Panels (MAS)	12	

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2.1.1.7	Speaker Boxes (8 Ohms, 6 Watts)	24	Number
2.1.1.8	MAS Special tool kit including test jig and extender cards	1	Set
2.1.1.9	MAS Functional Testing switch panel	1	Number
2.1.2	Beetle Monitoring System (BMS)	2	
2.1.2.2	Line Mounted Moisture Elements	120	Number
2.1.2.3	Floor Mounted Moisture Elements	486	Number
2.1.2.4	Field Multiplexer Units (FMU)	58	Number
3.1	Fuel Handling Control System		
3.1.1	Fuel Handling Main Control Room Panel (MCRP) , Operator Console (OC) & Fuelling Machine (FM) Simulator Panels		
3.1.1.1	6610-PL-8N - Fuelling Machine MCRP	2	Number
3.1.1.2	6610-PL-8S - Fuelling Machine MCRP	2	Number
3.1.1.3	6610-PL-9 - Fuel Transfer MCRP	2	Number
3.1.1.4	6610-OC-11N- Fuelling Machine Operator Console	2	Number
3.1.1.5	6610-OC-11S - Fuelling Machine Operator Console	2	Number
3.1.1.6	6610-OC-12 - Fuel Transfer Operator Console	2	Number
3.1.1.7	63500-PL-3025N - Fuelling Machine Simulator Panels	2	Number
3.1.1.8	63500-PL-3025S - Fuelling Machine Simulator Panels	2	Number
3.1.1.9	63500-PL-3026 - Fuel Transfer Simulator Panel	2	Number
3.1.2	Fuel Handling Control Cabinets, Field Isolation Relays, Solenoid Drivers		
3.1.2.1	63500-PL-3007N - Electronic Cabinets for Field Isolation Relays	2	Number
3.1.2.2	63500-PL-3007S - Electronic Cabinets for Field Isolation Relays	2	Number
3.1.2.3	63500-PL-3019 - Electronic Cabinets for Field Isolation Relays	2	Number
3.1.2.4	63500-PL-3006N - Electronic Cabinets for Solenoid Drivers	2	Number
3.1.2.5	63500-PL-3006S - Electronic Cabinets for Solenoid Drivers	2	Number
3.1.2.6	63500-PL- 3018 - Electronic Cabinets for Solenoid Drivers	2	Number
3.1.2.7	63500-PL-3001N - Electronic Cabinets for Field Signal Termination	2	Number
3.1.2.8	63500-PL-3001S - Electronic Cabinets for Field Signal Termination	2	Number

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3.1.2.9	63500-PL-3003N - Electronic Cabinets for Field Signal Termination	2	Number
3.1.2.10	63500-PL-3003S - Electronic Cabinets for Field Signal Termination	2	Number
3.1.2.11	63500-PL-3013 - Electronic Cabinets for Field Signal Termination	2	Number
3.1.2.12	63500-PL-3014 - Electronic Cabinets for Power Supplies and Power Supply Distribution Modules	2	Number
3.1.2.13	63500-PL-3015 - Electronic Cabinets for Field Signal Termination	2	Number
3.1.2.14	63500-PL-3016 - Electronic Cabinets for Field Signal Termination	2	Number
3.1.2.15	63500-PL-3005N - Electronic Cabinets for Field Connectors	2	Number
3.1.2.16	63500-PL-3005S - Electronic Cabinets for Field Connectors	2	Number
3.1.2.17	63500-PL-3017 - Electronic Cabinets for Field Connectors	2	Number
3.1.3	Manual & Safety Logic (M&SL) Panels with FPGA Based M&SL Cards for Fuel Handling Controls		
3.1.3.1	Electronic Cabinets for Manual & Safety Logic	12	Number
3.1.3.7	M&SL Daughter Board using Flash / SRAM FPGA (Type-II)	78	Number
3.1.3.8	M&SL Testing Jig compatible with daughter boards of type-I & type -II	2	Set
3.1.4	LVDT Trip Units for Fuel Handling Controls	4	Number
3.1.5	Power Supplies for Fuel Handling Controls	12	Number
3.1.6	<u>Test Facility</u> - Table top test facility for testing various modules and cards as mentioned in 3.1.2, 3.1.3 & 3.1.4 above.	1	Number
3.2	Shut Down System #1 (SDS#1)	10	Number
3.3	Shut Down System #2 (SDS#2)	6	Number
3.4	Main Airlock System & Auxiliary Airlock system	12	Number
3.5	ECCS Alarm System (EAS) and Logic Relay Panel	18	Number
3.6	PHT INSTRUMENT PANEL	4	Number
3.7	Logic Relay Panels (LRPs)	10	Number
3.8	Containment Isolation System(CIS) & Containment Spray System (CSS)	12	Number
3.9	ADJUSTER RODS & CONTROL RODS (AR/CR) CONTROL SYSTEM		
3.9.1	63140-PL-1	2	Number
3.9.2	63140-PL-2	2	Number
3.9.3	Three Phase Step Down Transformer Units (DELTA/STAR, 415V/220V, 7.5 KVA)	8	Number

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3.10	Failed Fuel Monitoring (FFM) Manual Data Collection Panel 63132-PL-3	2	Number
3.11	Control Power supply Distribution Panel		
3.11.1	240V AC Main Control Centre Power Supply Distribution Panels		
3.11.1.1	Class II 240V AC Main Control Centre Power Supply Distribution Panels	20	Number
3.11.1.2	Class III 240V AC Main Control Centre Power Supply Distribution Panels	10	Number
3.11.2	24V DC Main Control Centre Power Supply Distribution Panels	38	Number
3.11.2.19	Bus bars and insulators for I&C signal grounding		
3.11.2.19.1	Tin coated copper bus bars of size 25mm (W) x 6mm (D) x 539mm (H)	55	Number
3.11.2.19.2	Tin coated copper bus bars of size 25mm (W) x 6mm (D) x 175mm (H)	30	Number
3.11.2.19.3	Porcelain insulators with mounting nuts and bolts. Insulation resistance of 100M ohm at 500V DC	105	Number
3.11.3	220V DC Main Control Centre Power Supply Distribution Panels	24	Number
3.11.4	240V AC Back-up Control Centre Power Supply Distribution Panels		
3.11.4.1	65610-PL-1	2	Number
3.11.4.2	65610-PL-2	2	Number
3.11.4.3	65610-PL-3	2	Number
3.11.5	24V DC Back-up Control Centre Power Supply Distribution Panels		
3.11.5.1	65620-PL-1	2	Number
3.11.5.2	65620-PL-2	2	Number
3.11.5.3	65620-PL-3	2	Number
3.12	Main Control Room Panels(MCRPs)		
3.12.1	6610-PL-1	2	Number
3.12.2	6610-PL-2	2	Number
3.12.3	6610-PL-3	2	Number
3.12.4	6610-PL-4	2	Number
3.12.5	6610-PL-5	2	Number
3.12.6	6610-PL-6	2	Number
3.12.7	6610-PL-7	2	Number

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3.12.8	Large Video Screen (LVS) Panels 6610-LVS-PL-1, 2, 3, 4 & 5 suitable for mounting 70" LVS, along with Graphic Controller and hardwired windows	10	Number
3.12.9	Fabricated M.S filler panels with mounting arrangement	200	SQ. MTR.
3.13	Operator Console		
3.13.1	Operator Consoles with Hard wired components (6610-OC-1)	2	Number
3.13.2	Operator Consoles with Hard wired components (6610-OC-10)	2	Number
3.13.3	Operator Consoles (6610-OC-13) Located in computer room	2	Number
3.13.4	Operator Consoles located in MCR (6610-OC-2 THRU 9 & 6610-OC-14 THRU 31)	54	Number
3.14	Backup Control Room		
3.14.1	Backup Control Room Panel (6690-PL-1)	2	Number
3.14.2	Backup Local Control Panels (66920-PL-1A)	2	Number
3.14.3	Backup Local Control Panels (66920-PL-1B)	2	Number
3.15	Control Distribution Frame(CDF) 5 Bay Module	36	Number
3.15.1	1 Core, 0.75 sq. mm wire (LHLS Wire)	365	Kms
3.16	Buffer Terminal Cabinets (BTC)		
3.16.1	Standard electronics cabinet	46	Number
3.16.2	18 AWG PTFE wire	360	Kms
3.17	MS Trough (C Type Channel) for bridging the panel for internal wiring of size 180 mm (W) X 112 mm (H)	400	Meters
3.18	N-16 and O-19 MONITORING PANELS		
3.18.1	Standard Electronics Cabinets	4	Number
3.19	SIMULATOR SYSTEM		
3.19.1	Simulator Main Control Room Panels(MCRPs)		
3.19.1.1	6610-PL-1	1	Number
3.19.1.2	6610-PL-2	1	Number
3.19.1.3	6610-PL-3	1	Number
3.19.1.4	6610-PL-4	1	Number
3.19.1.5	6610-PL-5	1	Number

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3.19.1.6	6610-PL-6	1	Number
3.19.1.7	6610-PL-7	1	Number
3.19.1.8	Large Video Screen (LVS) Panels 6610-LVS-PL-1, 2, 3, 4 & 5 for mounting 70" LVS, its Graphic Controller and hardwired windows	5	Number
3.19.1.9	Fabricated M.S filler panels with mounting arrangement	100	SQ. MTR.
3.19.2	Simulator Operator Console		
3.19.2.1	Operator Consoles with Hard wired components (6610-OC-1)	1	Number
3.19.2.2	Operator Consoles with Hard wired components (6610-OC-10)	1	Number
3.19.2.3	Operator Consoles (6610-OC-13) Located in computer room	1	Number
3.19.2.4	Operator Consoles for mounting Monitors and Keyboards located in MCR (6610-OC-2 THRU 9 and 6610-OC-14 THRU 6610-OC-31)	27	Number
3.19.2.5	Operator Work Station (OWS) PC	28	Number
3.19.2.6	Engineering Work Station (EWS) PC	4	Number
3.19.2.7	SERVER / HISTORIAN (Pre-installed Red Hat Enterprise Linux latest Server)	2	Number
3.19.3	Simulator Backup Control Room Panel (6690-PL-1)	1	Number
3.19.4	Simulator IO system Cabinets	18	Number
3.19.4.19	Simulator IO System Panel 13A for FH PL-8 (N&S)	-	Number
3.19.4.20	Simulator IO System Panel 13B for FH PL-8 (N&S)	-	Number
3.19.4.21	Simulator IO System Panel 14A for FH PL-9	-	Number
3.19.4.22	Simulator IO System Panel 15A for OIC-11&12	-	Number
3.19.5	Simulator MCB Status Monitoring System		
3.19.5.1	MCB Status Central Controller	1	Number
3.19.5.2	MCB Status Remote Display for Main Control Room	1	Number
3.19.5.3	MCB Status Remote Display for Backup Control Room	1	Number
3.19.6	Contactors for Simulator Control Room	6	Number
3.19.7	Microprocessor based PID Controllers TYPE-II (with tracking) for simulator	2	Number
3.19.8	Simulator LAN Setup		
3.19.8.1	Standard electronics cabinet	2	Number
3.19.8.2	Ethernet Switch Type-2	8	Number
3.19.8.3	Industrial RJ-45 Connectors	1000	Number

Technical Conditions of Contract (TCC) Part-1
Chapter- XI: Systems Information

3.19.8.4	Surface Mounting Board (SMB) for terminating STP cable with RJ-45 Connectors	100	Number
3.19.8.5	STP Patch Cord	50	Number
3.19.9	Simulator Fuel Handling Control System		
3.19.9.1	Fuel Handling Main Control Room Panel (MCRP) , Operator Console (OC) for Simulator		
3.19.9.1.1	6610-PL-8N - Fuelling Machine MCRP	-	Number
3.19.9.1.2	6610-PL-8S - Fuelling Machine MCRP	-	Number
3.19.9.1.3	6610-PL-9 - Fuel Transfer MCRP	-	Number
3.19.9.1.4	6610-OC-11N- Fuelling Machine Operator Console	-	Number
3.19.9.1.5	6610-OC-11S - Fuelling Machine Operator Console	-	Number
3.19.9.1.6	6610-OC-12 - Fuel Transfer Operator Console	-	Number
3.20	Common Network Printing Facility		
3.20.1	Network printers	29	Number
3.21	Network Components and Mounting cabinets		
3.21.1	Standard electronics cabinet	12	Number
3.21.2	Biscuit PC, DIN Rail mountable	153	Number
3.21.3	KVM (Keyboard Video Monitor) (19" rack mountable keyboard and monitor of 1U size)	163	Number
3.21.4	Media Converters (MC)	370	Number
3.21.5	Light Interface Unit (LIU)	287	Number
3.21.6	Ethernet Switch Type-1	43	Number
3.21.7	Ethernet Switch Type-2	97	Number
3.21.8	Industrial RJ-45 Connectors	3400	Number
3.21.9	Surface Mounting Board (SMB) for terminating STP cable with RJ-45 Connectors	1900	Number
3.21.10	Multipurpose Intelligent Module (MIM)	31	Number
3.21.11	Patch Panel(24 Port)	22	Number
3.21.12	Wall Rack Unit (504.65mm (H), 600mm (W), 500mm (D), Suitable for mounting 19"rack panel accessories)	18	Number
3.21.13	D LAN Switch	8	Number
3.21.14	Switch IO LAN	8	Number
3.21.15	Switch IED LAN (24 fiber port)	10	Number
3.21.16	Switch IED LAN (8 fiber port)	2	Number
3.22	LAN Cables		
3.22.1	Shielded twisted pair (STP) CAT-6, 4 Pair, 23 AWG, Bare Copper	61.95	Km
3.22.2	STP Patch cord	2954	Number
3.22.3	Fiber Optic cable (6 core, Multi-Mode, Clad Dia-125 um)	30	Km

Technical Conditions of Contract (TCC) Part-1
Chapter- XI: Systems Information

3.22.4	Fiber optic cable (6 core out door)	12	Km
3.22.5	Fiber optic cable (4 core out door)	0	Km
3.22.6	Fiber Optic cable Patch cords of 2 meter length (Multi-Mode, Clad Dia-125 um)	807	Number
3.22.7	RS485 cable	3	Km
3.23	SERVER / HISTORIAN (Pre-installed Red Hat Enterprise Linux latest Server)	37	Number
3.23.1	Standard electronics cabinet for historian to be mounted in computer room	4	Number
3.24	Operator Work Station (OWS) PC	118	Number
3.25	Engineering Work Station (EWS) PC	17	Number
3.26	Test Computer	1	Number
3.27	Miscellaneous Items	2	
3.27.1	Microprocessor based PID Controllers TYPE-II (with tracking)	4	Number
3.27.2	Microprocessor based PID controllers TYPE-I (without tracking)	37	Number
3.27.3	Analog input signal Isolators with single output	127	Number
3.27.4	Analog input signal Isolators with two isolated outputs	10	Number
3.27.5	Digital output relay modules for F/M supply controllers (2A at 24 VDC, 2 W, Electromagnetic, 4 channel with 1 changeover per channel)	49	Number
3.27.6	Relay Module for SIGMAS	4	Number
3.27.7	Laptops	3	Number

Note:

This is tentative and indicative but neither exhaustive nor limiting list of panels, cabinets, accessories of the system mentioned herein and in chapter-2(Scope of work). Along with these, there may be other items, loose items supplied by MU's, customer which are required to be erected, tested, commissioned in the panels/MJB's/FJB's/cabinets etc. for completion of the system.

Technical Conditions of Contract (TCC) Part-1
Chapter- XI: Systems Information

Tentative List of equipment/materials to be issued by NPCIL for E&C, testing and commissioning under this scope of work

The following materials will be supplied / handed over by various other package vendors. These materials are to be stored in proper place and installed at field as per the construction schedule. This is a tentative list, if required; some more materials may be added on latter date by Engineer in-charge.

1	PHT Pumps condition Monitoring system (CHANNEL N) to be mounted on 63300-PL-1 (from PCP Motor Package)	02 nos.
2	Seal Leak monitoring and Analyzing Device (SLMAD) to be mounted on 63300-PL-1 (from PCP Pump package)	02 nos.
3	PHT Pumps condition Monitoring system (CHANNEL X) to be mounted on 63300-PL-2 (from PCP Motor Package)	02 nos.
4	Seal Leak monitoring and Analyzing Device (SLMAD) to be mounted on 63300-PL-2 (from PCP Pump package)	02 nos.
5	Neutronic Alarm Unit for SDS-1 and SDS-2 (from Nuclear Instrumentation Package (NIP))	12 nos.
6	Power supply Unit for Neutronic Alarm Unit for SDS-1 and SDS-2 (from NIP)	12 nos.
7	Regional Over-power Protection (ROP) Amplifier units for SDS-1 and SDS-2 (from NIP)	24 nos.
8	Hand switches for reactor trip (from Piping Package)	06 nos.
9	OLTC Tap position indicators (from Electrical Transformer package)	08 nos.
10	Start-up dolly connector panel (from NIP)	02 nos.
11	Heat Shrinkable Cross Linked Radiation and High Temperature Resistant Polyolefin 4.8 mm diameter size sleeve for wire identification (White, Red, Sky blue and Yellow colour) (from Field Instrumentation Package)	09 km
12	Heat shrinkable cross linked Radiation and high temperature Resistant polyolefin 6.4 mm diameter size sleeve for wire identification (White, Red, Sky blue and Green colour) (from Field Instrumentation Package)	03 km
13	ICA for Backup Control Room	02 No.

Technical Conditions of Contract (TCC) Part-1

Chapter- XII: BOQ CUM RATE SCHEDULE

BoQ cum Rate Schedule For Unit No.7&8 CCIP (RAPP- RAWATBHATA) is attached as Annexure-A

Notes for BOQ cum Rate Schedule:

12.1.1 Tender shall be evaluated on Grand Total Amount.

12.1.2 Contractor shall fully understand equipment description and scope of work before quoting. The scope of work and responsibility of the contractor as mentioned under these specifications shall be covered within the quoted price. The contractor has to handle / erect / commission all the items indicated by BHEL for achieving the milestones and completion of work.

12.1.3 The contractor while quoting the above rates, categorically confirms having understood the fullest implications of price escalation provisions contained in tender. Accordingly taking into consideration all aspects thereof quoted above rates. Further contractor confirms that he will not come with any other claim/compensation on account of any increase whatsoever during the entire period of execution including extended period if any.

12.1.4 The Total Amount shall consider Taxes and Duties as per chapter VIII of the TCC.

12.1.5 The tenderer shall quote the price as per the rate schedule only, in price bid (Original). Conditional price bids or price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.

12.1.6 Evaluation of bids shall be done on the total price of this Package, against this Rate Schedule / BOQ.

Technical Conditions of Contract (TCC)
Part-2 “Technical Specifications”

TECHNICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/ NR/SCT/RAPP/UNIT 7&8/ETC OF CCIP/1085

FOR THE

“WORK OF ERECTION, TESTING, COMMISSIONING, HANDING OVER OF CONTROL & INSTRUMENTATION WORKS FOR CONTROL CENTRE INSTRUMENTATION PACKAGE (CCIP) INCLUDING HOUSE KEEPING, RECEIPT AND HANDLING OF MATERIALS FROM BHEL/CLIENT’S STORES/YARD, TRANSPORTATION TO SITE OF UNIT NO. 7 & 8 OF 2X700MW, RAWATBHATA ATOMIC POWER PROJECT OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.”

PART-2 of TCC “Technical Specifications”



**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)
Part-2 “Technical Specifications”
Contents

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Technical Conditions of Contract (TCC) Part-2

Chapter- I: GENERAL REQUIREMENTS

1.0	GENERAL REQUIREMENTS
1.1	<p>The Contractor shall prepare and submit procedure for each activity and overall programme within a reasonable period to BHEL/NPCIL for their prior approval before commencement of any activity, in such form as may be required by BHEL/NPCIL.</p> <p>The submission and approval by BHEL/NPCIL of such programme shall not relieve the Contractor of any of his duties or responsibilities under the contract.</p>
1.2	<p>After submission to and approval by BHEL/NPCIL of such procedure the Contractor shall adhere to the order of procedure and method stated therein unless he obtains the written permission of BHEL/NPCIL to vary such method or order.</p>
1.3	<p>The contractor shall submit well in advance his scheme for movement/lifting/handling of equipment/ components also indicating the tools, tackles and equipment with due calibration, testing certificates, which he proposes to employ for the same, for approval by BHEL and NPCIL prior to actual undertaking of such work.</p>
1.4	<p>The contractor shall complete all the requirements for obtaining gate pass for labour as well as for T&P from NPCIL. Police verification for workmen may be required to be submitted for obtaining gate pass from NPCIL.</p>
1.5	<p>The contractor shall obtain permits for working at height from NPCIL/ BHEL. A safety training will be conducted for workers planned to work at height.</p>
1.6	<p>The workers employed for special jobs like welding etc. will be tested at site as per BHEL/NPCIL requirement before deployment at job.</p>
1.7	<p>During the course of execution of this 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 manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/ rectification/ fabrication/ repairs etc. promptly and expeditiously. Claims of contractor, if any, for such works will be dealt as per relevant clauses of General Conditions of Contract.</p>
1.8	<p>The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipment issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.</p>
1.9	<p>All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc., shall be used for handling of the equipment without the specific permission of the engineer.</p>
1.10	<p>Contractor shall erect and commission all the panels and items of work scope as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No</p>

Technical Conditions of Contract (TCC) Part-2

Chapter- I: GENERAL REQUIREMENTS

	claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.
1.11	It may so happen that certain components may be supplied in loose items for erection, testing, commissioning by BHEL/NPCIL. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.
1.12	All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.
1.13	The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, 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 by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.
1.14	The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.
1.15	Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.
1.16	BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor.
1.17	All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc., except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.
1.18	The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement as per BHEL engineer's instructions.
1.19	The Contractor shall take delivery of the components, equipment's, chemicals, and lubricants etc. from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL.

Technical Conditions of Contract (TCC) Part-2

Chapter- I: GENERAL REQUIREMENTS

	Complete and detailed account of the materials and equipment's after usage shall be submitted to the BHEL and reconciled periodically.
1.20	Contractor shall plan and transport equipment, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as required to work.
1.21	Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.
1.22	The details of equipment to be erected under this contract are generally as per the schedule given in relevant chapters. These details are approximate and meant only to give a general idea to the bidder about the magnitude of the work involved. Actual quantum and type of work will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection. The quantity as per the relevant engineering documents will only be admissible for the billing purpose.
1.23	Contractor shall lay/install the field-routed/small-bore pipelines to suit site condition/ requirement. Before laying/installing such pipelines, the contractor shall prepare necessary sketch for routing these pipe lines and get the same approved by BHEL. Contractor must take care of the location/layout of other systems and equipment before preparing such sketch to avoid interference. There is a possibility of minor changes in routing such pipelines even after completion of erection. Contractor has to prepare As built drawings for the same.
1.24	Pre-heating, NDE, and Post weld heat treatment for above shall be done as per the specifications as part of work.
1.25	The Contractor shall perform any services, tests etc., which may not be specified but nevertheless, required for the completion of work as per the work scope. No extra payment is admissible for such work.
1.26	The work shall be carried out strictly in accordance to the "Field Quality Plan" and procedures approved by NPCIL. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.
1.27	Interconnection/ hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours.
1.28	PRELIMINARY WORKS

Technical Conditions of Contract (TCC) Part-2

Chapter- I: GENERAL REQUIREMENTS

1.29	The contractor shall, as a first field activity check the foundations/cutouts PANELS etc. for the correctness of the same as per the drawings and satisfy himself in all aspects. All measurements should be recorded and submitted to Engineer for approval before erection
1.30	Before starting erection job, contractor shall ensure that area is sufficiently enclosed against ingress of dust and water, and all debris have been cleared off from the floor to a designated area as per instruction of Engineer. The contractor shall arrange to get the working area and surroundings cleaned daily to ensure a dust free atmosphere for working.
1.31	Contractor shall first cover all openings on operating floor and put temporary hand railings on all sides of the floor to avoid any accident to the personal working.
1.32	The contractor shall provide his tool stores for special tools and instruments at a convenient location near to the place of working. Necessary area shall be provided to contractor by BHEL. This is to be cleared after completion of the work. If so required he will have to shift the same if required to give fronts to other agencies engaged at site.
1.33	The accuracy of all equipment/ instruments and their functioning shall be established before they are permitted for use on the job. If the Engineer doubts the accuracy of the precision tools, any time during erection, the contractor shall arrange the checking/ calibration of tools/ equipment/ instruments at his own cost.
1.34	The contractor shall provide all consumables for Erection and Testing required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope. All consumables to be used for the work shall have prior approval of BHEL/NPCIL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

Technical Conditions of Contract (TCC) Part-2
Chapter- II: SURPLUS MATERIAL AND SCRAP

2.1	Surplus material and scrap
2.2	Any Surplus material that the customer has agreed to accept / retain shall be delivered, unloaded and placed at a designated place in NPCIL's stores at site. No payment on account of loading, carting transportation, unloading, stacking, hoisting and hauling shall be made. This shifting of scrap to NPCIL designated areas shall be done after weighing/ documentation etc. Further any excess/defective materials are to be returned to BHEL's Store with information to concerned Engineer.
2.2	The contractor shall handover all parts/materials remaining extra over the normal requirement with proper identification tags in 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 by contractor. Decision of BHEL engineer in this regard will be final and binding on the contractor
2.3	Definition of Scrap for this scope of work: Items and materials of the following limiting dimensions shall be treated as scrap: (i) CS/GI pipes 50 mm dia. and below – pipe pieces less than 2 meters in length shall be treated as scrap. (ii) SS pipes 50 mm dia. and below – SS pipe pieces less than 0.5 meter in length shall be treated as scrap. (iii) Structural Steel less than 1 meters in length shall be treated as scrap. (iv) In respect of plates having thickness 20 mm & below, the size of plate having dimension 1mtr x 1mtr & below will be considered as scrap. (v) CS/GI/SS pipes, all sizes above 50 mm dia. Pipe pieces less than 0.5 meter in length shall be treated as scrap. (vi) GI Sheet - less than 2mtr x 2mtr size. (vii) GI Conduit/ SS tubes of various sizes – of lengths less than 3 meters shall be treated as scrap. (viii) Power and Control Cables of various types and sizes of length less than 50 meters shall be treated as scrap. (ix) Wires of different types and sizes of length less than 20 meters shall be treated as scrap. (x) Pipe Fittings & valves, lighting fixtures & receptacles and other similar items shall not be accepted as scrap. However, the welded fittings and valves etc. above 50 mm dia., which are rendered surplus by virtue of change in layout, drawings, errors, etc. shall be deposited to the Engineers' stores after the edges have been prepared by the contractor without any extra charges. (xi) For any other item / material not covered above, the sizes of scrap will be mutually agreed as per the industry practices.

Technical Conditions of Contract (TCC) Part-2
Chapter- II: SURPLUS MATERIAL AND SCRAP

2.4	<p>Permissible wastage/ scrap (Accountable + unaccountable) to be allowed for following items towards cutting and fabrication of pipes/structures are as follows:-</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sr.No.</th> <th style="width: 30%;">Item</th> <th style="width: 15%;">Accountable</th> <th style="width: 15%;">Unaccountable (max.)</th> <th style="width: 10%;">Total</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">a</td> <td>GI Conduit/ SS Tube</td> <td style="text-align: center;">4%</td> <td style="text-align: center;">1%</td> <td style="text-align: center;">5%</td> </tr> <tr> <td style="text-align: center;">b</td> <td>GI Sheet</td> <td style="text-align: center;">4%</td> <td style="text-align: center;">1%</td> <td style="text-align: center;">5%</td> </tr> <tr> <td style="text-align: center;">c</td> <td>Cables</td> <td style="text-align: center;">2%</td> <td style="text-align: center;">1%</td> <td style="text-align: center;">3%</td> </tr> </tbody> </table> <p>Wastage shall be accountable by weight in case of structural, plates and by running length in case of other items.</p> <p>In case the scrap generated is more than the permissible limits defined above or there is a deficit in the material reconciliation, than the recoveries to be effected from the contractor, by BHEL shall be derived from penalties/recoveries effected by NPCIL from BHEL plus BHEL overheads.</p>	Sr.No.	Item	Accountable	Unaccountable (max.)	Total	a	GI Conduit/ SS Tube	4%	1%	5%	b	GI Sheet	4%	1%	5%	c	Cables	2%	1%	3%
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a	GI Conduit/ SS Tube	4%	1%	5%																	
b	GI Sheet	4%	1%	5%																	
c	Cables	2%	1%	3%																	
2.5	<p>The packing scrap of the panels, cables, wirings and other items of this contract scope has to be carefully removed, collected and returned to customer designated place after weightment. The contractor has to maintain all the records for this exercise in line with customer requirements.</p>																				
2.6	<p>Also the scrap of the cables, which are to be terminated by the contractor, has to be collected, weighed and returned to the customer. This is also to be done at the termination ends for the cable laid by other vendor(Customer) but terminated by the contractor</p>																				

Technical Conditions of Contract (TCC) Part-2
Chapter- III: ERECTION

3.0	ERECTION																
3.1	All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include:																
3.2	NPCIL shall provide all equipment foundations/cutouts. For the correctness of these foundations as per drawings, the contractor shall check the dimensions & locations of the foundations, pockets, anchor-bolt pitch. Further, top elevation of foundations/cutouts/frames shall be checked with respect to benchmark. All minor adjustments/rectification of foundation level, dressing, grinding of foundation surfaces, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.																
3.3	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.																
3.4	The contractor shall get approval from BHEL of the vendors before placing the orders for consumables. BHEL may reject the Vendor not meeting the requirements and propose alternate Vendors. Contactor shall supply whenever asked for free samples of the material for testing. Failure of any sample to pass the specified requirements for a particular use will be sufficient cause for rejection. Rejected material shall be removed immediately from site by the contractor.																
3.5	The works to be carried out under this contract are to be carried in line /governed by NPCIL approved procedures for each activity. Some of the defined procedures are as:																
	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">S.No.</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>C3-6/IEP-1</td> <td>- General Instructions for Erection part</td> </tr> <tr> <td>C3-6/IEP-2</td> <td>- Procedure for Installation of Panels</td> </tr> <tr> <td>C3-6/IEP-3</td> <td>- Procedure for Installation of Floor Mounted Moisture Elements (FMMEs) And Field Multiplexer Units (FMUs) of Beetle Monitoring system</td> </tr> <tr> <td>C3-6/IEP-4</td> <td>- Procedure for Screwed Termination in JB's and Panels</td> </tr> <tr> <td>C3-6/IEP-5</td> <td>- Procedure for Solder Terminations</td> </tr> <tr> <td>C3-6/IEP-6</td> <td>- Procedure for Installation and Termination of Optical Fiber Cable (OFC)</td> </tr> <tr> <td>C3-6/IEP-7</td> <td>- Procedure for Grounding and Shielding Practices</td> </tr> </tbody> </table>	S.No.	Description	C3-6/IEP-1	- General Instructions for Erection part	C3-6/IEP-2	- Procedure for Installation of Panels	C3-6/IEP-3	- Procedure for Installation of Floor Mounted Moisture Elements (FMMEs) And Field Multiplexer Units (FMUs) of Beetle Monitoring system	C3-6/IEP-4	- Procedure for Screwed Termination in JB's and Panels	C3-6/IEP-5	- Procedure for Solder Terminations	C3-6/IEP-6	- Procedure for Installation and Termination of Optical Fiber Cable (OFC)	C3-6/IEP-7	- Procedure for Grounding and Shielding Practices
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Technical Conditions of Contract (TCC) Part-2

Chapter- III: ERECTION

	C3-6/IEP-8 - Procedure for Filing, Indexing of Drawings, Specifications and Manuals
	C3-6/IEP-9 Procedure for Storage, Material Management and Control System
	C3-6/IEP-10 Procedure for Preservation of C&I field installed items
3.6	<p>SPECIAL PROCESSES</p> <p>The contractor shall</p> <p>a) Identify special processes. These special processes shall include welding, heat-treatment and non-destructive examination, as applicable.</p> <p>b) Establish documented procedures to assure that these processes are accomplished under controlled conditions by qualified personnel using qualified documented procedures and suitable equipment in accordance with applicable codes, standards, specifications, criteria and contractual requirements.</p> <p>c) Maintain documentation for currently qualified personnel and processes according to the requirement of pertinent codes and standards.</p> <p>d) Define the necessary qualifications of personnel and procedures for special processes not covered by existing codes or standards, or where item or service quality requirements exceed the requirements of established codes or standards.</p>
3.7	<p>The contractor shall clearly define the responsibilities for the documented preparation of works.</p> <p>This written preparation shall consist of instructions or work assignments. It shall be established in accordance with the construction schedules and be available to the works and inspection personnel prior to commencement of work. This work instruction will document the following.</p> <ul style="list-style-type: none"> • Work methods • Sequence of operations • Workmanship criteria • Type of equipment needed • Special working environment, if any. <p>The contractor shall ensure that prior to release for construction all jigs, fixtures, tooling masters, templates, and patterns used for verifying quality are controlled and calibrated.</p>
3.8	<p>Painting</p> <p>Painting of welded areas and painting of areas exposed after removal of temporary supports and touch-up painting on damaged areas of employer's structures, where inter-connection, welding or modification etc. has been carried out by the him has to be done by the contractor.</p>

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3.8.1	The frames, angles, structural steel items which are used by the contractor for erection of the panels, cabinets etc. has to be painted as per specifications provided to the contractor by BHEL/NPCIL.
3.8.2	<p>For Welding of the welded surface/or exposed metal in the erection, the painting has to be carried by the contractor.</p> <p>The contractor has to clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper before carrying out primer coat and then intermediate and finish coats. The procedure for applying touch up paint and finish paint are defined in below clauses:</p>
3.8.3	<p>Procedure for Touch-up painting on damaged areas to be followed</p> <p>For coatings damaged up to metal surface -Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation. Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.</p>
3.8.4	<p>Procedure for Final Finish Painting on damaged areas to be followed</p> <ol style="list-style-type: none"> a) After the primer coat has dried out, the surface shall be cleaned of dust without scratching or in any way damaging the primer coat. Over this, dry surface finish painting shall be carried out. b) Finish painting shall be carried out in two coats. Dry film thickness of each coat shall be as per the recommendation of the primer or paint manufacturer. Minimum thickness including primer and paint coating shall be 400 microns or as defined by NPCIL. c) Paint shall be applied either by brushing or spraying. It shall be ensured that brush marks are a minimum and the requirements of workmanship are as specified in IS: 1477 or other NPCIL approved standard (for site painting works on systems, structures and components). d) Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of ready mixed type in original sealed containers as packed by the paint manufacturer. Addition of thinners shall not be permitted. e) No painting shall be done in frost or foggy weather or when the humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is 5 deg. C or below
3.8.5	The consumables, machines for painting including paints, primers etc. has to be supplied by vendor as per the approved specification (to be provided

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	during erection) of NPCIL. All equipment painting will be done by spray painting
3.8.6	All the weld joints of GI cable trays and GI structural members shall be applied with a coat of cold galvanizing zinc paint. Paint, etc. shall be arranged by contractor at his cost
3.8.7	There is no separate payment for the painting to the contractor, otherwise as defined in the payment terms.
3.9	CABLE LAYING (PLUG-IN CABLES / COAXIAL / UTP / STP / DATA HIGHWAY, OPTICAL FIBRE)
3.9.1	Cable laying/wiring as per the scope of work 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 conduits.
3.9.2	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.
3.9.3	Glanding as per scope of work- Wherever cable glanding is required to be done but 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.
3.9.4	Copper tinned lugs of various types (pin, ring, fork, snap-on), 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. Contractor shall arrange suitable and adequate no. of Ferrule printing machines with all consumables for printing of Ferrules.

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3.9.5	All care should be taken to avoid abrasion, tension, twisting, kinking, and stretching of cables during installation.
3.9.6	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.
3.9.7	Looping wire at terminal block of panels and electrical actuator, if required, as shown in the inter-connection diagrams or as required is to be done by contractor at no extra cost.
3.9.8	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.
3.9.9	Contractor shall carefully plan the cutting schedule of each cable drum in consultation with site engineer such that wastage are minimized.
3.10	Control panels and connected devices The entire work of erection, testing, commissioning of the connected devices/equipment 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.
3.11	Field instrumentation 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. 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.
3.12	Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have

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	adequate qualification on the above works. All the expenditure in testing/qualification of the Contractor's welder shall be borne by Contractor.
3.13	Before any welder is engaged on work, he shall be tested and qualified by BHEL/ customer, though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.
3.14	Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in various control rooms/simulator room etc.
3.15	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.
3.16	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.
3.17	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.
3.18	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.
3.19	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.
3.20	Fitting, filing, straightening, chamfering, chipping, scrapping, reaming, cleaning, checking, levelling, drilling, grinding, etc. may be required to be undertaken by the contractor for work completion.
3.21	Guidelines for handling and storage of electronic cubicles /subassemblies / loose items. <ul style="list-style-type: none">• 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

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	<p>be strictly followed as electronic equipment may get damaged due to vibration and shock.</p> <ul style="list-style-type: none">• 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 immediately.• Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.• After opening the case, all supports provided for transport are to be removed with due care. After preliminary Inspection/testing, all cases/packages to be repacked.• 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.
3.22	Guidelines for handling of electronic modules <ul style="list-style-type: none">• All the modules shall be handled by qualified persons only.• Electronic modules should only be touched when it is absolutely essential to do so.• Before touching any electronic module, the operator should discharge the static electricity by earthing himself or better still, ensure constant discharge by wearing an earthed wrist strap.• The operator should not wear clothing made entirely from synthetic fibres, but a mixture containing at least 65% cotton.• The PCB should always be held by front panel or by module frame and electronic components / connectors should never be touched.• The electronic modules should not be placed close to television sets or CRT units.• Soldering irons and any other tools used must be grounded.• All modules using CMOS components are packed in antistatic bags when transported loose to avoid ESD failures. The antistatic bags must always be used to transport modules at site from one place to the other.

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3.33	<p><u>Cabling guidelines</u></p> <ul style="list-style-type: none">• All electrical connections shall be tested for polarity and proper connections.• Insulation test of the various circuits shall be done.• Sharp bends of cable trough shall be avoided in all type of cable trough• Cable racks in the trenches and control room are to be shared with other contractors installing cables in different areas wherever required. Contractor shall cooperate with the other contractors in sharing the cable trays and proper dressing and clamping the cables.• Where power and control cables are to be laid in the same route, suitable barriers to segregate them physically shall be employed.• Space equal to the diameter of cable shall be provided between power cables of six over 50 mm in diameter.• When cables pass through floors, walls etc., it shall be passed through a pipe for mechanical protection and the pipe ends sealed suitably.• Care shall be taken to avoid short bending and kinking of conductor damaging insulation and stressing the cable beyond pulling force recommended by the manufacturer. Cable shall be protected at all times from mechanical damage• No cable shall be laid in ducts or trenches where other services such as oil pipes, steam or water pipes are laid.• The layout of all cables shall be arranged to give adequate clearance from other services and cables shall be routed to avoid hot zones. <p>The cable schedules indicating cable sizes, tentative cables routing information will be furnished by BHEL at site to the contractor.</p>
3.34	<p><u>Structural steel fabrication and installation</u></p> <p>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, etc.</p> <p>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</p>

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	<p>procedures. 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.</p>
3.35	<p>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.</p> <p>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.</p>

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Chapter- IV: TESTING, COMMISSIONING AND INTEGRATION

4.0	TESTING, PRE-COMMISSIONING, COMMISSIONING, POST-COMMISSIONING and INTEGRATION.
4.1	The work covered by this contact shall be subjected to inspection and testing. The contractor shall provide all services to establish and maintain quality of workmanship in his works and that of his sub-contractors to ensure the mechanical and electrical performance of components, in compliance with drawings, identification and acceptability of all materials, parts and equipment.
4.2	The contractor shall perform his internal inspection and testing before offering to the Purchaser for random checks. The Contractor shall carry out the various tests as per QA plan. Contractor shall submit test certificates for all these test instruments certified by National standard / Institutions. The date of certificates shall not be earlier than 3 months before start of the actual use. No test instrument with expired calibration validity shall be used. All results of inspection and tests shall be recorded in inspection reports / pro-forma, approved by the Engineer. These reports shall be submitted along with completion documents.
4.3	Contractor shall carry out the integration and commissioning of each system supplied by him. The contractor shall fully demonstrate the functioning of these systems to the satisfaction of BHEL / NPCIL. The commissioning procedures shall be prepared by the contractor and got approved by NPCIL/BHEL. The contractor shall generate all the reports in required formats. Any consumables, special tools and test equipment as well as trained and qualified manpower in adequate number required for commissioning shall be arranged by the contractor.
4.4	After erection of panel and assembling of the items in the panel at site, contractor shall carry out following tests / checks before termination of field wiring. i) Insulation Resistance (IR) Tests. ii) Ground Resistance and ground leakage currents. (Safety Ground and Signal Ground separately) iii) 5V DC voltages at different points (bus bar and mother board / back planes) in No load and full load conditions to be noted and ensured that the drop is within limits. iv) Confirmation of proper sense wire terminations. v) Response checking of all Panel temperature monitoring sensors with multimeter. vi) Response checking of all Panel Door and Fan monitoring switches with multimeter. vii) Hardware Integration Test.

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	<p>viii) Functional tests after termination of field wiring.</p> <p>Where a group / set of panels are involved, further tests shall include the following:</p> <p>i) Testing of Inter-Panel wiring</p> <p>ii) Testing of losses in the communication links if any and generate reports for the same. (Losses and other parameters in each segment of LAN and Losses in each connector are to be noted separately).</p> <p>iii) Testing of communication links through ping commands.</p> <p>iv) Functional tests of communication links.</p> <p>The Contractor shall attend to all tests or inspection as called upon by the Engineer and shall supply such manpower as may be required to assist in the execution of the various tests and shall without delay, rectify and make good without any extra cost to BHEL, any of his work which does not satisfy the requirements of any such inspection and/or tests.</p>
<p>4.5</p>	<p>The work is also inclusive of assistance during various commissioning activities of the Control Centre Instrumentation Package (CCIP). The various activities, tests, trial runs may have to be repeated till satisfactory results are obtained and also to satisfy the requirements of customer/ statutory authorities.</p>
<p>4.6</p>	<p>In case any malfunctioning and/or defects are found during tests, trial runs, such as loose components, undue noise or vibration, strain on connected equipment 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.</p>
<p>4.7</p>	<p>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. The parts to be replaced shall be provided by BHEL in line with contract clauses.</p>
<p>4.8</p>	<p>The pre-commissioning activities will start and various trials, commissioning operations shall continue till the unit is handed over to customer. Simultaneous commissioning activities will be in progress in various areas, like checking of equipment erected, making ready for trial runs. 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, 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</p>

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	make alternate arrangements and necessary recoveries with overhead cost will be made from the bills of the contractor.
4.9	Contractor shall open/dismantle 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.
4.1	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 section-2.15 of General Conditions of Contract.
4.11	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.
4.12	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
4.13	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 commissioning months there could be requirements of separate commissioning gangs simultaneously in even upto 12 to 15 areas. Contractor has to augment the manpower as and when required as per work demand and necessity at site. The quoted rates shall include this.
4.14	It shall be specifically noted that contractor manpower may have to be engaged round the clock simultaneously at different areas and hence considerable number of personnel and their overtime payment may be involved. This aspect must be considered by the contractor while quoting their rate. No additional compensation for the same shall be payable, irrespective of number of persons engaged or no. of working hours per day.
4.15	For electrical works, 415 volts and above, the contractor has to bring qualified electricians.
4.16	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,

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Chapter- IV: TESTING, COMMISSIONING AND INTEGRATION

	<p>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</p>
<p>4.17</p>	<p>Preparation of computerized calibration certificates in the formats specified by BHEL Engineers and getting those signed by the customer is in the scope of the contractor.</p> <p><u>Testing, Commissioning & Trial Operation</u></p> <p>Checking/verification of binary/analogue input and output signal from field and panel and up to recording/indicating instrument/HMI monitors.</p> <ul style="list-style-type: none"> • 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 processes by simulation of field devices/process changes. • Contractor shall prepare calibration/testing report/protocols as per applicable format. • During trial run of various systems, if the performance of any instrument/ system is found erratic, un-satisfactory and requires readjustment, re-calibration etc.; the defect shall be attended by contractor. • Check the operation of various controls in manual/auto mode for smooth functioning or as per any other requirement. • Providing necessary assistance for Commissioning of the unit is in scope of this specification. Smooth operation and availability of all instrument/controls of the systems installed under the scope herein, shall be ensured by the contractor. Contractor shall provide adequate number of skilled manpower and T&P for this purpose. • 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.
<p>4.18</p>	<p><u>Post-commissioning</u></p> <ul style="list-style-type: none"> • Contractor shall rectify the defect observed/informed by customer during the course of commissioning. • 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 reasons, certain works crop up, the contractor shall provide all the assistance.
<p>4.19</p>	<p>Troubleshooting during plant operation</p> <p>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 both electrical and C&I area. The bidder must also take this aspect into consideration.</p>

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Chapter- V: PLANNING AND REPORING

5.0	Planning and Reporting
5.1	<p>The contractor shall submit the following reports to the Engineer daily / weekly / monthly as required by BHEL/NPCIL.</p> <ol style="list-style-type: none"> 1. Daily plan with manpower deployment schedule and progress achieved on previous day in mutually agreed format. 2. Contractor shall report, reporting site events and progress made with respect to work planned. Weekly reports shall include: <ol style="list-style-type: none"> i) Area/Job wise number of personnel engaged. ii) Unusual events/Non-conformances. iii) Services connected / disconnected iv) Stoppages, delays, shortage, losses or unavailability of work fronts. v) Accidents/Near-Miss Incidents vi) Progress made vii) Work plan for next week 3. Monthly actual progress report in relation to scheduled. 4. Monthly safety report 5. Monthly manpower deployed, man-days worked 6. Monthly accounting report in mutually agreed format for the equipment/materials issued by NPCIL for erection. 7. Wage disbursement certificate in approved format, duly signed by the Engineer.
5.2	<p>RECORDS</p> <ol style="list-style-type: none"> i.) All the works shall be executed as per approved procedures, Quality Assurance Plans, FQP's and checklists etc. ii.)The contractor shall maintain records as per documents pertaining to the quality of work, duly inspected and attested towards compliance of all technical requirement. iii.)The Contractor shall submit three copies of such records to the Engineers within 7 days from completion of any particular work. iv.)For material supplied by him, the contractor shall forward to the Engineer two copies of test certificates, if applicable, pertaining to the origin and specification of materials.
5.3	<p>PREPARATION OF "AS BUILT" INSTALLATION DRAWINGS:</p> <p>As built drawings are to be prepared wherever "Suite to Site" has been mentioned in DD/GA drawings, showing details like Installation of instruments, routing of Interconnected tubing etc. Also, the detailed drawings i.e. Circuit testing drawings, Drawings for making swaging joints & auto tube welding joints to get details of fittings used, Conduit routing details including marking of accessories etc. will have to be prepared by the Contractor.</p> <p>Adequate nos. (Minimum 2 Nos.) of draftsmen (Auto CAD) shall be deployed continuously for this job.</p>

6.0	<p><u>HOUSEKEEPING</u></p> <p>Housekeeping is very essential to provide safe working area for construction personnel and for movement of the machineries. In order to achieve this objective; a two part housekeeping policy is adopted in each project. As first part Contractor has to maintain housekeeping practices for his own works. In addition to this, for up keeping of overall plant area and areas where multiple agencies work simultaneously, different package Contractors shall be responsible for maintaining general housekeeping in the allocated area to them.</p> <p>Scope of work under these two parts is detailed as below. The payment for housekeeping scope as detailed herein (including manpower, supervision, service, supply of consumables and machinery) will be guided as per item no. of 15 of BOQ cum rate schedule. No separate payment shall be made for this housekeeping works.</p>
6.1	<p>Housekeeping of own works:</p> <ol style="list-style-type: none"> I. The Contractor shall at all-time keep his work spot, site office, stores, workshops and surroundings clean and tidy from rubbish, scrap, surplus materials and unwanted tools and equipment. II. Welding and other electrical cables shall be so routed to allow safe traffic by all concerned. Cables shall not be spread on floor; it shall be properly supported and clamped along the wall. III. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. NPCIL may require the Contractor to remove any materials which are considered to be of danger or cause of inconvenience to the public. In case, Contractor fails to comply with the instruction of NPCIL/BHEL, he may get the work done at the risk and cost of Contractor. IV. The Contractor on day to day basis shall remove from the work place all unwanted scaffoldings, surplus materials, rubbish, etc. V. BHEL/NPCIL has the right to stop work if the Contractor fails to improve upon the housekeeping after having been notified. VI. The contractor shall have overall responsibility of maintaining housekeeping and maintaining clean conditions at all the areas
6.2	<p>After the completion of major civil works by NPCIL, area/fronts will be released to the Contractor in phased manner for maintaining and up keeping. While handing over the area from the NPCIL 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</p>

	<p>the agencies working in the same area and he shall also extend all cooperation to other Contractors for such works.</p> <p>However, overall responsibility of housekeeping of the below mentioned areas shall lie with the Contractor of this work scope.</p> <ol style="list-style-type: none"> 1. Control Building 2. All elevations 106 meters and above (Approx. Area = 20000Sq Meter) 																					
6.3	<p>The various housekeeping activities to be carried out by contractor are indicated below with the frequency of carrying out work.</p> <table border="1"> <thead> <tr> <th>Sl. No.</th> <th>Description</th> <th>frequency</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Cleaning and Sweeping of all floors, staircase, platform, lifts and wiping of handrails, equipment, JBs, pipes, cable shafts, etc.</td> <td>Twice Daily</td> </tr> <tr> <td>2</td> <td>Wet mopping of floors</td> <td>Daily</td> </tr> <tr> <td>3</td> <td>Vacuum cleaning of Panels, JBs, and ceilings.</td> <td>Weekly</td> </tr> <tr> <td>4</td> <td>Cleaning of Glass panels, doors and polished surfaces with NPCIL approved cleaning agents.</td> <td>Weekly</td> </tr> <tr> <td>5</td> <td>Vacuum cleaning of Cable Trays</td> <td>Monthly</td> </tr> <tr> <td>6</td> <td>Debris removal from dust bin, baskets placed in the respective building.</td> <td>Daily or as and when required</td> </tr> </tbody> </table>	Sl. No.	Description	frequency	1	Cleaning and Sweeping of all floors, staircase, platform, lifts and wiping of handrails, equipment, JBs, pipes, cable shafts, etc.	Twice Daily	2	Wet mopping of floors	Daily	3	Vacuum cleaning of Panels, JBs, and ceilings.	Weekly	4	Cleaning of Glass panels, doors and polished surfaces with NPCIL approved cleaning agents.	Weekly	5	Vacuum cleaning of Cable Trays	Monthly	6	Debris removal from dust bin, baskets placed in the respective building.	Daily or as and when required
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6.4	Procedures for execution of work:																					
6.4.1	Cleaning and sweeping of floors, staircase, platform, anything and everything up to ceiling height and ceiling, as per the frequency indicated in the table. Cleaning activity shall start in the morning at 7.00 AM so as to complete all the cleaning/ moping work as per schedule to be worked out jointly at site.																					
6.4.2	Putting the collected debris other than structural materials in the dustbin kept at the specified location on every day basis. Collection and Disposal of collected structural materials within a lead distance of 1.5 Km on daily basis.																					
6.4.3	Lifting, carrying and disposal of all generated debris such as structural pieces, cable sheath, cable trays, ducts, wooden pieces, packing materials, piping material etc. and all other generated scrap from allotted building within a distance of 1.5 Km on daily basis.																					
6.4.4	In order to maintain quality services and minimize operational problems, the Contractor may rotate the staff once in six months with prior written intimation to BHEL/NPCIL.																					
6.4.5	The Contractor shall arrange his own equipment and tools required for this work like trolleys, ladders, buckets, dust bins, brooms, industrial vacuum cleaner, brushes, wiping cloths or any other material required for the cleaning.																					

6.4.6	The storage and security of his materials and equipment shall be the sole responsibility of the Contractor and shall have no right to claim for any loss/ theft or damage of the same.		
6.4.7	The exclusive work force shall be deputed for this work and the work force deployed for this general housekeeping shall not be diverted to works other than housekeeping.		
6.4.8	All deployed work force shall be provided with dress (with proper code as decided by NPCIL/BHEL) by the contractor, safety and cleaning gears and in no case work should stop for want of gears		
6.5	List of materials: List of equipment and consumables to be deployed / maintained for housekeeping work.		
6.5.1	Sl. No.	Description	Minimum Qty. required/available at any given time (in numbers)
	1	Industrial vacuum cleaner with wet mopping facility	4
	2	Cob webs remover	10
	3	Brooms	30
	4	CS Dustbin	15
	5	Trolley	4
	6	Ladders (3mtrs), Ladders (6mtrs)	3,1
	7	Waste carrying baskets	20
	8	V type ladders	1
	9	Cleaning brushes	30
	10	Caution board (wet cleaning and cleaning in progress)	12
	11	Wet and dry cleaning duster/cloths	50
	12	Cleaning Agents/Disinfectants	As required
6.5.2	Additional quantity of above equipment and any other item required for works shall be arranged by Contractor without any extra cost.		
6.6	The Contractor shall deploy adequate manpower (minimum ten sweepers and one House Keeping Supervisor) at his own cost. At the time of allotment of the area for upkeeping, the name of NPCIL officials in charge for housekeeping, herein after referred as "Area in charge" (AIC) of the area will be conveyed to the Contractor by BHEL.		
6.6.1	1) The Housekeeping Supervisor(s) should report daily to the AIC & take day-to-day instructions.		

	<p>2) The Contractor shall make sure that Housekeeping Supervisor(s) is necessarily available during working hours for receiving & implementing the Instructions of the AIC.</p> <p>3) It shall be the responsibility of the Contractor to get the attendance of the housekeeping staff verified by AIC.</p> <p>4) The weekly/fortnightly/monthly jobs should be planned by Housekeeping Supervisor(s) in consultation with AIC in such a manner that these are spread over the entire week and done during office hours.</p> <p>5) Occasional intensive cleaning shall be carried out on Sundays/holidays, as per the schedule jointly arrived at.</p> <p>6) Proper registers/records of the jobs carried out on daily, weekly, fortnightly and monthly basis will be maintained by the Housekeeping Supervisor(s) and shall be submitted to AIC.</p> <p>7) Housekeeping Supervisor shall remain in his area most of the time and shall have information about agencies working/ material stacked in his area. Suitable administrative procedure may be devised for the same.</p> <p>8) All equipment deployed shall be of good quality to NPCIL/BHEL satisfaction.</p> <p>9) Housekeeping Supervisor shall ensure non-stacking of fire hazard materials like wooden planks, drums, and packing materials.</p>
6.6.2	<p>Before commencement of job the Contractor shall submit procedure, manpower list and work plan on housekeeping of respective area allotted to him and he will follow the same. Monitoring of the levels of Quality of the housekeeping services shall be done on regular basis by AIC. In the event of unsatisfactory service or any failure at any time on the part of Contractor as reported by AIC (who shall be the sole judge and whose decision shall be final and binding), the Contractor shall be liable to be penalized as follows on every occasion on the sole discretion of NPCIL/BHEL.</p>
6.6.3	<p>Following penalties shall be imposed for Area House Keeping Work:</p> <p>1. Non deployment of housekeeping worker shall be liable for penalty of 1.5 times of the normal wage rate prevailing at site for unskilled worker per man day of absence. Absence of supervisor will be counted as two man days for this purpose.</p> <p>2. The Contractor shall at all times ensure that his performance is satisfactory, failing which, BHEL shall be at the liberty to get the affected work done through any other agency, at the risk and cost of the Contractor and all expenses incurred on this account shall be recovered from RA bill with applicable overheads.</p>