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NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

TENDER NO.: BHEL/NR/SCT/RAPP KOTA/STG/UNIT # 8/1173

NAME OF WORK: ERECTION, TESTING, COMMISSIONING, TRIAL OPERATION, PERFORMANCE TESTING AND HANDING OVER OF STEAM TURBINE, GENERATOR, MSR, CONDENSER, STATIC AND ROTATING EQUIPMENT, PIPING AND AUXILIARIES OF THE SYSTEM INCLUDING RECEIPT, HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/ YARD, TRANSPORTATION TO SITE AND FINAL PAINTING OF UNIT NO. 8 OF 2 X 700 MW, RAPP-7 & 8 OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.

Bharat Heavy Electricals Limited

Ref: BHEL/NR/SCT/RAPP KOTA/STG/UNIT # 8/1173 **Date: 11/11/2019**

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

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To

Dear Sir/Madam

Sub : NOTICE INVITING E-TENDER

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

1. **Salient Features of NIT**

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHEL/NR/SCT/RAPP KOTA/STG/UNIT # 8/1173**	
ii	**BROAD SCOPE OF JOB**	**ERECTION, TESTING, COMMISSIONING, TRIAL OPERATION, PERFORMANCE TESTING AND HANDING OVER OF STEAM TURBINE, GENERATOR, MSR, CONDENSER, STATIC AND ROTATING EQUIPMENT, PIPING AND AUXILIARIES OF THE SYSTEM INCLUDING RECEIPT, HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/ YARD, TRANSPORTATION TO SITE AND FINAL PAINTING OF UNIT NO. 8 OF 2X700 MW, RAPP-7 & 8 OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN.**	
iii	**DETAILS OF TENDER DOCUMENT**		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	*Applicable*
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**ISSUE OF TENDER DOCUMENTS**	**From BHEL website (www.bhel.com) and https://bhel.abcprocure.com** Tender documents will be available at website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 22/11/2019 , Time : 1500 HRS*** ***Place : on https://bhel.abcprocure.com***	*Applicable*
vi	**OPENING OF TENDER**	***At due date / time*** ***Date : 22/11/2019 , Time : 1530 HRS*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.*	*Applicable*

		(2) Bidder may depute representative to witness the opening of tender. ***However it being an e-tender it shall be opened online***	
vii	**EMD AMOUNT**	***Rs. 21,27,000/-***	*Applicable*
viii	**COST OF TENDER**	***Rs 2,000/-.***	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	***Five days before bid submission due date****.* *Along with soft version also, addressing to contact address given below* ***1)*** *Name:* ***G.V. RAJA SEKHAR*** *Designation: Sr. Manager* *Deptt: SCT* *Address: BHEL-PSNR, PLOT NO. 25, SECTOR – 16A, NOIDA - 201301* *Phone: (Landline) 0120-2416232* *Email : gvr@bhel.in* *2) Name:* ***CHITTARANJAN SWAIN*** *Designation: MANAGER* *Deptt: SCT* *Address: BHEL-PSNR, PLOT NO. 25, SECTOR – 16A, NOIDA - 201301* *Phone: (Landline) 0120 - 2416500* *Email : cs@bhel.in*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		*Not applicable.*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	*Please refer clause no.15a.*	*Applicable*
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) & portal https://bhel.abcprocure.com **and not in the newspapers**. Bidders to keep themselves updated with all such information	
xiii	**Tender submission**	on portal https://bhel.abcprocure.com	

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

3. Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender

Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays.

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

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

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

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

For Electronic Fund Transfer the details are as below-:

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

b) Bank Particulars

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

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

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

Documents Comprising the e-Tender

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

a. Technical Tender (UN priced Tender)

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

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

b. Price Bid:

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

DO NOT"S

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

Digital Signing of e-Tender

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

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The Requirement:

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

BHEL has finalized the e-procurement service Provider-:

M/s AbcProcure, Ahmedabad

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

Ellis Bridge, Ahmedabad-380006

The contact details of the service provider are given below:

Name	Contact Nos.	e-mail ID	Role	Location
Swapnil Hamilton	+91 79 40270549	swapnil.h@eptl.in	Support Executive	HO – Ahmedabad
Hardik Oza	+91 79 40270560	Hardik.oza@eptl.in	Support Executive	HO – Ahmedabad
Ankur Bhatt	+91 79 40270590	ankur.bhatt@eptl.in	Support Executive	HO – Ahmedabad
Prashant Rajyaguru	+91 79 40270545 / 9016859416	prashant@eptl.in	Ast. Manager – Implementation & Support	HO – Ahmedabad
Dharam Rathod	+91 79 40270596 / 9374519754	dharam@eptl.in	Manager – Implementation & Support	HO – Ahmedabad
Pradip Parmar	+91 79 40270532 / 9328657215	pradip@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad
Devang Patel	+91 79 40270576 / 99983 05442	devang@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad

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

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

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

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

6. **Not Used**

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

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

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

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

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

Total number of Packages in hand = Load (P)

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

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

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

i). Calculation of Overall 'Performance Rating' for 'Similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':
This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

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

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

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

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

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

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

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

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

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No. of similar packages for all Regions = $\mathbf{P_T}$ i.e. Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$
3	Monthly performance scores for the corresponding period (as in Row 2)	$S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, … $S_{1\text{-}T1}$	$S_{2\text{-}1}$, $S_{2\text{-}2}$, $S_{2\text{-}3}$, $S_{2\text{-}4}$, … $S_{2\text{-}T2}$	$S_{3\text{-}1}$, $S_{3\text{-}2}$, $S_{3\text{-}3}$, $S_{3\text{-}4}$, … $S_{3\text{-}T3}$	$S_{4\text{-}1}$, $S_{4\text{-}2}$, $S_{4\text{-}3}$, $S_{4\text{-}4}$, … $S_{4\text{-}T4}$	$S_{5\text{-}1}$, $S_{5\text{-}2}$, $S_{5\text{-}3}$, $S_{5\text{-}4}$, … $S_{5\text{-}T5}$	.. … … … …	$S_{N\text{-}1}$, $S_{N\text{-}2}$, $S_{N\text{-}3}$, $S_{N\text{-}4}$, … $S_{N\text{-}TN}$	--------

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

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

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

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

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

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

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

III. 'Assessment of Capacity of Bidder':

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

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

Note:

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

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

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

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

IV. **Explanatory note**:

i). Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I etc. at the individual level irrespective of rating of Plant and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical,

C&I, Civil, Structure etc. is considered individual level of package. For example, in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e. the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl.no. II above, needs to be evaluated considering all the identified packages (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

Table-1

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

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

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

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

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

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

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

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

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

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

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

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

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

c. Up to Synchronization in all Balance Packages

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

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

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

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

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

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

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

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

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

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

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

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

15. Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at Clause No. 1, Salient Features of NIT, Sl. No. (xi) above.**

15a **Integrity Pact (IP)**

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

Sl. No.	IEM	Address	Email
1.	Shri Arun Chandra Verma, IPS (Retd.)	Flat No. C -1204, C Tower, Amrapali, Platinum Complex, Sector 119, Noida (U.P.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	H. No. B-5/64, Vineet Khand, Gomti Nagar, Lucknow - 226010	vbsinghips@gmail.com

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

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

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are as per **Clause No. 1, Salient Features of NIT, Sl. No. (ix) above.**

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

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

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

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

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

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

23. **Consortium Bidding** (or Technical Tie up): **Not Applicable**

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

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

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

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

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

27.1.1 **Commitment by BHEL:**

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

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

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

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

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

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

28.0 **Not Applicable**

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

30.0 **PREFERENCE TO MAKE IN INDIA:**

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

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

31.0 **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: Authorization of representative who will participate in the online Reverse Auction Process
(iv) Annexure-4: Integrity Pact
(v) Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING REQUIREMENTS

JOB	**ERECTION, TESTING, COMMISSIONING, TRIAL OPERATION, PERFORMANCE TESTING AND HANDING OVER OF STEAM TURBINE, GENERATOR, MSR, CONDENSER, STATIC AND ROTATING EQUIPMENT, PIPING AND AUXILIARIES OF THE SYSTEM INCLUDING RECEIPT, HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/ YARD, TRANSPORTATION TO SITE AND FINAL PAINTING OF UNIT NO. 8 OF 2X700 MW, RAPP-7 & 8 OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN**
TENDER NO	**BHEL/NR/SCT/RAPP KOTA/STG/UNIT # 8/1173**

SL. NO.	NAME AND DESCRIPTION OF PRE-QUALIFICATION CRITERIA	BIDDER'S CLAIM IN RESPECT OF FULFILLING THE PQR CRITERIA
A	Submission of Integrity Pact duly signed	**Applicable**
B	Assessment of Capacity of bidder to execute the work as per clause 9.0 of NIT	**Applicable – by BHEL**
C	**TECHNICAL:** Bidder should have executed **One STG job of ≥ 400 MW**.	**Applicable**
D **D-1**	**FINANCIAL:** **TURNOVER:** Bidders must have achieved an average annual financial turnover (Audited) of **Rs. 338.10 Lakhs or more** over last three Financial Years (FY) i.e. (2016-2017, 2017-2018, 2018-2019). Bidder shall submit the Audited Balance Sheet and Profit & Loss Account in support of this. In case audited financial statements have not been submitted for all the three years as indicated above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years. 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.	**Applicable**
D-2	**NET WORTH**: Net worth (only in case of companies) of the bidder should be positive. Note: Net worth shall be calculated based on the latest Audited Accounts, as furnished for 'D-1' above. Net worth = Paid up share capital* + Reserves. (* : Share Capital or Partnership Capital or Proprietor Capital as the case may be).	**Applicable**
D-3	**PROFIT:** Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'D-1' above. Note: PROFIT shall be PBT earned during any one year of last three financial years as in 'D-1' above.	**Applicable**

D-4	Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation/ BIFR, which will render him ineligible for participation in this tender and shall submit undertaking to this effect.	**Applicable**
E	**Approval of Customer** Note: Name of Successful bidder shall be forwarded to customer for approval. Work shall be awarded only after approval of customer.	**Applicable**
F	**Consortium Criteria**	**Not Applicable**

Explanatory Notes for QR 'C':

1. For evaluation of PQR, the credentials of the bidder alone, and not that of the Group Company shall be considered.
2. Completion date for achievement of the technical criteria should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work.
3. "**Executed**" means "SYNCHRONISATION" in respect of STG. The bidder should have achieved the above criteria, even if the contract has not been completed or closed.

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.

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ANNEXURE - 2

CHECK LIST

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

1	**Name of the Tenderer**	
2	**Address of the Tenderer**	
3	**Type of the Firm/ Company**	
(i)	In case of Individual Tenderer	His / her full name, address and place & nature of business shall be furnished along with the offer.
(ii)	In case of Partnership Firm	The names of all the partners and their addresses, A copy of the partnership deed/instrument of partnership dully certified by the Notary Public shall be furnished along with the offer..
(iii)	In case of Companies	a) Date and place of registration including date of commencement certificate in case of Public Companies (certified copies of Memorandum and articles of Association are also to be furnished). b) Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.
4.a	**Details of Contact person for this Tender**	Name : Mr/ Ms Designation: Telephone No: Mobile No: Email ID: Fax No:
4.b	**Details of alternate Contact person for this Tender**	Name : Mr/ Ms Designation: Telephone No: Mobile No: Email ID: Fax No:
5	**EMD DETAILS**	Mode of payment: Demand Draft/ NEFT/ RTGS/ OTHER Details of Transaction:
6	**Validity of Offer**	TO BE VALID FOR **SIX MONTHS** FROM DUE DATE

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

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

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	

BHEL-IP

INTEGRITY PACT

Between

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

and

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

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for _____

_____

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

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

Section 1- Commitments of the Principal

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Section 4 - Compensation for Damages

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

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

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

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

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

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

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

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

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

Section 8 - Independent External Monitor(s)

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

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

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

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

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

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

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

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

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

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

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

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

Section 9 - Pact Duration

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

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

Section 10 - Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

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

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

For & On behalf of the Principal

(Office Seal)

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place----------

Date----------

Witness:_____

(Name & Address) _____

_____

Witness:_____

(Name & Address) _____

_____

वी. के. गुप्ता/V. K. GUPTA
अपर महाप्रबंधक (उप संविदा एवं क्रय)
Addl.General Manager (SCP)
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Bharat Heavy Electricals Ltd., Power Sector-Northern Region
प्लॉट सं.25, सेक्टर-16ए, नोएडा/Plot No.25, Sec.16A, Noida

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No. PS: MSX: TCC)

BHARAT HEAVY ELECTRICALS LIMITED

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TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/NR/SCT/RAPP KOTA/STG/UNIT # 8/1173

FOR THE

"WORK OF ERECTION, TESTING, COMMISSIONING, TRIAL OPERATION, PERFORMANCE TESTING AND HANDING OVER OF STEAM TURBINE, GENERATOR, MSR, CONDENSER, STATIC AND ROTATING EQUIPMENT, PIPING AND AUXILIARIES OF THE SYSTEM INCLUDING RECEIPT, HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE AND FINAL PAINTING OF UNIT NO. 8 OF 2X700 MW, RAPP-7&8 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

Contents

THE TECHNICAL CONDITIONS OF CONTRACTS (TCC) ARE DEFINED AS:

CONTENTS of Part-1 of TCC

1. Project Information

Sl. No.	Title	Description
1.1	Owner	Nuclear Power Corporation of India Ltd.(NPCIL)
1.2	Project Title	**2 x 700 MWe Rajasthan Atomic Power Projects Unit-7 & 8**
1.3	Type of Project	Mega, Domestic, Negotiated basis, Consortium with Alstom
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%

2.0	**Scope of Work:** BHEL has been awarded the work of Design, Engineering, Manufacture, Supply, Erection, Testing & Commissioning, Trial operation, PG test & Handing over of TG Plant package comprising of Turbine, Generator, MSR, Condenser and auxiliaries at RAPP-7 and 8 of 2X700 MWe, NPCIL, at Rawatbhata, Kota, Rajasthan.
2.1	The scope of work under this tender for Erection ,Testing, Commissioning & Handing over of STG and auxiliaries of **Unit no. 8** of 2x700 MWe RAPP NPCIL broadly consists of:
2.1.1	The scope of work under this tender consists of receipt of erection material from BHEL/client's stores, storage yard and other places of unloading in project premises, transportation to site, inspection and preparation of foundation, erection, levelling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator, vacuum pumps and auxiliaries including BOI's, preassembly, erection, welding, NDT of water cooled Condensers and Moisture Separator Re-heater etc., steam piping, integral piping, oil piping and H_2, N_2, CO_2, Water cooling system including fixing of hangers & supports, Chemical cleaning, oil flushing, Mass/alkali flushing, hydro testing & steam blowing of piping. Supply and application of primer & finish paints / Anti corrosive / steam wash paints including labelling on equipment & piping, pre-commissioning, commissioning, trial operation, operational acceptance & handing over of Steam Turbine, Generator and Auxiliaries of **Unit-8** of **2x700 MWe** sets at RAPP Rawatbhata site.
2.1.2	Identification and development of handling, loading-unloading, pre-assembly, assembly and erection procedures for all equipment, structures 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/shifting/loading of each equipment.
2.1.3	Assembly, Erection, commissioning and Testing of HP, LP Turbines, Valves, Generator-exciter, MSR, Tanks and other associated piping. The works such as disassembly, cleaning, box-up and reassembly of equipment as per requirement are in the scope of contractor.
2.1.4	Supply of all grouting materials including ready mix special grouting materials, Grouting of foundation bolts, base plates, preparation of foundation including breaking the lean mortar cover, chipping, as required before placing base plate and final grouting of foundation bolts. Concrete/cement mortar cubes / briquettes, etc., shall be tested for their strength by the Contractor. Grouting permits will have to be cleared by BHEL/ NPCIL only, after which the contractor shall undertake grouting work.

	Secondary grouting of Equipment & Structures with related Aux., Rotating machines etc. including the associated form works like shuttering and related facilities & process for grout mixing. The supply and filling of the bolt pipe sleeves with Pea-gravel or requisite filler material as per drawing/designer/ NPCIL requirement is in the scope of this contract.
2.1.5	The piping includes HP Loop Piping, HP turbine to MSR, MSR to LP turbine piping, turbine by pass valves piping, LP Heater extraction piping (inside condenser upto dome walls), Condenser air evacuation piping, lube oil piping, lube oil treatment piping, turbine governing system piping, Jacking oil and seal oil system piping, Gland Steam Sealing piping, Generator integral piping, drain lines from turbine, MSR and GSC up to drain valves, exhaust hood spray System & all other associated piping needed to complete this work scope.
2.1.6	The contractor shall carry out necessary repairs/modifications on erected plant/equipment which are due to the contractor's own defects/faults, during the currency of the contract till the completion of warranty period.
2.1.7	Testing, Pre-commissioning, Commissioning & Hydraulic Testing of systems of this contract scope.
2.1.8	Cold pulling, adjusting, heat treatment, hydraulic test, chemical pickling, passivation, steam blowing, oil flushing, mass water/alkali flushing, air blasting, pre-commissioning tests, trial run of auxiliaries. Erection, Laying, Welding, NDE/Radiography of temporary/permanent Piping, Valves, Tanks, Supports etc. for Air Blowing, Steam Blowing, Chemical Cleaning/ Flushing, Thermal shocks etc. and their subsequent dismantling after completion of work, disposal of effluent after flushing.
2.1.9	Handling and filling of Chemicals, Lubricants/gas/ preservatives during, erection, preservation, chemical cleaning / flushing / blowing, pre-commissioning, Commissioning and subsequent topping up till Trial operation completion.
2.1.10	Insulation of temporary piping erected for commissioning work will have to be completed by the TG contractor. Further refer chapter V (Application of Insulation) of Part –II of TCC for further details. The insulation of BHEL Bhopal supplied equipment (e.g. Turbine, MSR, interconnected piping, valves etc.) and integral piping is not in the scope of this contract.Though assistance/coordination at site with the insulation party required for carrying out insulation work shall be part of this contract. The contractor has to facilitate the other party to complete insulation by giving area clearance after removal of all temporary supports, fixtures and NDT and painting of joints etc.
2.1.11	ETC of Condensers with extraction steam piping emerging from LP turbine up to the dome wall of condenser including expansion bellows with protective cover and air evacuation/ extraction piping.
2.1.12	Erection, Commissioning of Condenser water box hinge assembly arrangement including fabrication, if any. Erection and commissioning of water

	box priming pumps etc. ETC of Handling devices for steam turbines components, maintenance ,lifting beam for rotors etc.
2.1.13	Surface preparation, application of primer, final painting and labelling of all equipment, Aux. Systems, Structures, Piping with valves, fittings, supports of this contract scope etc. as per painting schedule to be provided during erection. Supply of paints as per the painting schedule requirement is in the scope of the contract.
2.1.14	Arrangement of fixing of steam blowing and hydro-test blanks and restoration in Valves/strainers including removal/restoration in HP Main Steam Valves (stop & control) & LP Valves (interceptor and control) etc.The assembly and dis-assembly of strainers is also in the scope.
2.1.15	Condenser Evacuation system for the 03 condensers of each Unit i.e. 04 x100% Vacuum pumps for 01 Unit, with associated integral piping for each condenser such as Vacuum Breaker line with Valves, evacuation piping etc.
2.1.16	Erection and commissioning of electrical motors of the equipment and auxiliaries, inclusive of CT mounting, testing etc. The greasing of these motors is in the scope of this contract. Complete Field Testing as per requirement of these motors is also in the scope of this contract including supply of the test kits and reqd. equipment.
2.1.17	Erection and commissioning of governing system (control fluid skids, piping etc.) of Main Turbine & control systems of associated auxiliaries of this contract scope.
2.1.18	Assistance during Guarantee/PG(Performance Guarantee) testing of main equipment along with all auxiliaries. Supply of Manpower during PG Test for installing of Temp and Pressure Sensors, Mounting of thermo-wells, installation of power transducers & power meter etc. Erection and welding of Tapping Points for taking performance test measurements shall be carried out by the contractor as part of this work for the equipment covered under this tender specification under the guidance of BHEL engineer.
2.1.19	The erection, commissioning and testing of actuators of valves erected in the TG and auxiliaries are also under this contract scope.
2.1.20	Completion of all punch points and assistance in handing over of unit to customer. Execution of all Mechanical jobs identified during OWNER Technical audits, check list of pre-commissioning and commissioning.
2.1.21	Unit trial operation, operational acceptance and handing over of equipment, systems, of 700 MWe Unit (s) as a whole, resolving any deficiencies observed and handing over of **Unit No. 8 of 2X700 MWe, NPCIL RAPP KOTA**
2.1.22	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.

2.1.23	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 BHEL FQP/QAP/Welding manuals and drawings etc. and NPCIL guidelines. Only welders approved by BHEL and NPCIL in the welder test as per the welder test process followed in NPCIL Rawatbhata plant will be allowed to work in the TG package.
2.1.24	**ADDITIONAL PLATFORM / STRUCTURES** Erection of equipment handling systems including those supplied by MU's/ Vendors & additional platforms and approaches wherever required by the engineer/ Customer to facilitate operation are to be fabricated and installed at site. Erection of permanent Platforms (with grating, railing, toe-guards and stairs) for safe approach and operation of equipment, auxiliaries and valves of this contract scope as per BHEL and customer requirement for safe operation is part of this lump sum contract. Supply of structural materials for these platforms shall be provided by BHEL.
2.1.25	Contractor shall arrange scaffolding pipes for temporary platform required for erection & commissioning works of equipment. All Scaffolding pipes shall be painted with brown colour (or as per NPCIL req.) before use at site. The TG hall is of concrete structure, therefore for temporary support for assistance in erection of the equipment/system, auxiliaries and piping may require securing of temporary steel structures, plates to the floors, concrete columns using anchor fastening or any other alternate method, as approved by BHEL. The anchor fasteners and required installation machinery for the fasteners is to be arranged by the contractor at no extra cost to BHEL. Any arrangement for facilitating and expediting erection is in the scope of the contractor, within the lump-sum contract value.
2.1.26	The Information furnished in the Chapter-XII, Annexure-A (For item no. 1 of rate schedule) 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 manufacturing units/PEM/BOI shall also be erected and commissioned by the contractor within the quoted/accepted Lump sum rate.

	No additional payment shall be made towards any such scope addition or any variation in executed weights and quantities.
2.1.27	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.
2.1.28	The contractor shall carryout testing as per site quality plans. Any temporary piping hangers and supports, fittings, strainers, valves and blanks for hydro testing of the pipelines, valves and equipment of the TG Package shall be erected by the contractor. It is the Contractors responsibility to erect and commission all pumps, tanks, instruments and other accessories of the TG Package that would be required for testing operations.
2.1.29	The contractor under this contract shall also provide services of following manpower exclusively for use by BHEL:
2.1.29.1	**Qualified computer operators (Highly Skilled worker)-** capable of operating the material management software package/ other packages available at site or for BHEL Office work for total **30 man months.**
2.1.29.2	**Skilled workers** for **60 man months,** for working at BHEL office and site or as per BHEL discretion.
2.1.29.3	**Unskilled workers** for **90 man months,** for working at BHEL office and site or as per BHEL discretion.
2.1.29.4	Even after 30 months or actual completion date of contract (but before final billing), BHEL reserves its rights to consume these manpower up to the extent as mentioned in clause no. 2.1.29.1, 2.1.29.2, 2.1.29.3.
2.1.29.5	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's roll only and all the legal/ statutory issue regarding these deployment shall be in contractor`s scope.
2.1.29.6	In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor.

2.1.29.7	In case these services are not utilized for any reason whatsoever, fully or partly, the charges for unutilised man-months shall be recovered from contractor`s final bill at the following rates. These rates for recovery in case of non-utilisation of man-months of different category workers are inclusive of all BHEL and statuary overheads : **Sl. No.** — **Manpower Type** — **Recovery/man-month** 1. Highly Skilled worker — Rs.30,000/- 2. Skilled worker — Rs.25,000/- 3. UnSkilled worker — Rs.20,000/-
2.2	**Final Painting of the finished Works**
2.2.1	**Procurement/Supply of Paints** Contractor has to supply all paints, primers and other consumables for painting of relevant area of STG of Unit No 8, as per the NPCIL/BHEL painting schedule. Contractor has to supply paints required for painting the total scope of work as envisaged in this contract.
2.2.2	The contractor has to obtain BHEL prior approval for procurement of paints, primers etc. These shall be procured from BHEL approved suppliers, with prior approval from BHEL site.
2.2.3	Contractor shall produce manufacturer's test certificate. BHEL reserves the right to reject any material not found satisfactory.
2.2.4	Material will be supplied by contractor within the lump sum price quoted by the contractor in the rate schedule.
2.2.5	**Application of paints for final painting** includes surface preparation, cleaning, marking of identification marks, colour bands, direction of rotation / flow marks, legends etc. is to be completed as per NPCIL/ BHEL site requirement.
2.3	**Tentative detailed scope for ETC of Equipment/Systems covered under this specification of Work for Unit no.8 is described hereafter:** However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices. Below mentioned details are general and some sub-systems 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 TG package as per customer contract of the TG scope.

2.3.1	**Steam Turbines (1 HP and 3 LP turbines)**
2.3.1.1	Erection and site assembly of High Pressure(01 HP), and Low pressure (03 LP's) steam turbine complete with sole plates, foundation bolts, holding down bolts, casings, bearings, bearing pedestals, rotors, couplings, steam gland seals, electric/hydraulic turning gear etc.
2.3.1.2	LP exhaust hoods with rupture disks. Pressure control valves, filters and isolating valves, LP spray valves and piping etc.
2.3.1.3	Erection & commissioning of Turbine acoustic enclosure for Turbine, steam chests, valves, all bearings etc. as per BHEL supervision. This covers all electrical and mechanical works including fabrication works, if any.
2.3.1.4	Steel structures with platforms, walkways, supports, handrails, for structural items chequered plates for access between the LP turbines, HP and LP valves and for access to other valves, tanks and other auxiliaries etc.
2.3.1.5	Foundation parts of pedestals, shaft driven MOP etc.
2.3.1.6	HP & LP turbine casing & rotor, diffusers, diaphragms, pins and bolts shall be supplied separately and are to be assembled at site by the contractor.
2.3.1.7	HP stop and control valves (04 no.'s each for 04 HP inlet valve assembly) and LP Reheat steam interceptor and control valves (06 nos. valve each for 04 LP Inlet assembly), along with respective servo motors and supports.
2.3.2	**Turbine steam and drains piping**
2.3.2.1	HP turbine loop pipes (main steam from inlet valves to HPT) along with all fittings, supports etc.
2.3.2.2	Cold reheat steam piping from turbine HP casing to MSR with supports and fittings.
2.3.2.3	Hot reheat steam piping from MSR to LP turbine including valves and bellows with supports, platform, fittings etc.
2.3.2.4	Necessary fittings like stand pipe, isolation valves, vent, drains, safety diaphragms, level gauges, thermowells etc.
2.3.2.5	Pressure control valve, filters and Isolating valves, nozzles on LP spray, pressure breakdown orifice, pressure control instrumentation etc.
2.3.2.6	Drain piping from turbine, heat insulation, valves, and pipe support standard items.
2.3.2.7	LP exhaust spray valves and piping.
2.3.2.8	Gland seal steam condenser and exhaust fans and piping.
2.3.2.9	Piping, valves, pipe supports up to turbine.
2.3.3	**Lube oil system & accessories**

2.3.3.1	Lube oil tank skid, lube oil vapour extraction fans, filters, oil pumps, jacking pumps and system piping, calibrated orifices and check valves etc.
2.3.3.2	Oil tank drain valves, three way temperature control valves, Oil coolers
2.3.3.3	Turning gear, clutch, auxiliary turning gear, lube oil cubicle
2.3.3.4	Oil tank level gauges and switches
2.3.3.5	Inter-connecting pipe work between oil tank, oil coolers, thermostatic three-way valves, oil duplex filters
2.3.3.6	Oil supply and return piping, valves, pipe support up to Turbine pedestals
2.3.3.7	Oil supply and return piping, valves, pipe support up to Generator & Exciter pedestals
2.3.3.8	Fixed oil purifier skid local to main oil tank piping
2.3.3.9	All interconnecting pipe work between oil purifier, lube oil tank, valves & pipe supports ,coolers and pumps etc.
2.3.4	**Turbine governing & other systems**
2.3.4.1	Turbine governing control fluid cubicle and piping
2.3.4.2	Vacuum breaker valves, complete trip block
2.3.5	**Turbine control oil system**
2.3.5.1	HP Control fluid skid including control panel
2.3.5.2	Erection, welding, NDT of Stainless steel/carbon steel piping, valves, fittings supporting steel structures, pipe support standard items.
2.3.6	**Generator, Exciter & Auxiliaries**
2.3.6.1	Erection and placement of Generator Stator on foundation and Rotor threading.
2.3.6.2	Generator cooler housing assembly/enclosure, end-shields (Lower and upper) and bearing assemblies, terminal box and bushings.
2.3.6.3	Generator base plate and anchoring bolts, generator foundation pit closing plates
2.3.6.4	Generator Oil catchers, baffle ring, air catcher rings
2.3.6.5	Acoustic enclosure of exciter including its electrical and mechanical equipment erection and commissioning, fabrication and insulation.
2.3.6.6	All erection commissioning works of exciter. Exciter with base frame, coolers and other accessories.
2.3.6.7	Generator excitation and voltage regulation cubicle
2.3.6.8	Seal oil skid , SOST and piping, Vent pipe seal oil tank to outside turbine building

2.3.6.9	Pipe work between skid, generator and turbine lubrication circuit and other generators sub-systems, valves, support steel structures, pipe support standard items including extraction fans.
2.3.6.10	Vacuum Pumping system , Dry air blowers, etc.
2.3.6.11	Generator front & rear seal oil racks
2.3.6.12	GHE terminals cubicle, GRV terminal cubicles
2.3.6.13	Hydrogen coolers & control valves for hydrogen control temperature
2.3.6.14	Generator Hydrogen cooling piping and support for hydrogen temperature control valve
2.3.6.15	First H_2 expansion skid, CO_2 expansion and distribution skid, N2 distribution, generator gas skid, gas dryers, LLD racks etc.
2.3.6.16	Interconnecting pipe work between gas skids, valves, support steel structures, pipe support.
2.3.6.17	Waste fluid system, waste gas system piping.
2.3.6.18	Piping and valves from gas storage (H_2 and CO_2) to first gas expansion skids, support steel structures, pipe support.
2.3.6.19	Piping and valves from first gas expansion skids to Turbine building, support steel structures, pipe support
2.3.6.20	Piping and valves from Turbine building to generator gas skids, support steel structures, pipe support
2.3.6.21	Vent pipes from gas unit from TP to outside turbine building
2.3.6.22	Stator primary water cooling skid with frame and platforms, stator primary water tank with Alkaliser Unit/Demineraliser Unit (Ion Exchange Unit), PW pumps and Filter Units and all associated piping and auxiliaries.
2.3.6.23	Vent piping to atmosphere and drain to sewer downstream of water cooling skid
2.3.7	**Condenser – 3 Nos. & Moisture Separator Re-heater (MSR) – 2 Nos.**
2.3.7.1	**Condenser:** Assembly mainly comprises of the following parts: For further details regarding items and weight etc. of condenser, refer chapter XI.
2.3.7.1.1	Bottom Plate (in 4 parts– to be assembled at site), Spring supports etc.
2.3.7.1.2	Hot Well – to be assembled at site
2.3.7.1.3	Turbine & Generator End side Wall
2.3.7.1.4	Dome Walls – Lower and upper
2.3.7.1.5	Front & Rear Water Boxes with Tube Plates
2.3.7.1.6	Tube Support Plates

2.3.7.1.7	All extraction NRV's and drain system
2.3.7.1.8	Steam Dump/Throw devices and piping for dumping bypassed steam
2.3.7.1.9	Air Extraction Pipe, evacuation piping, vacuum breaker valves and piping
2.3.7.1.10	Stiffening/Support Pipes/Rods, Bars etc.,
2.3.7.1.11	The Bottom plates, hot-well ,end walls, dome-walls and stiffening structure etc. will be supplied in parts and has to be assembled, erected, welded and Tested(NDT) for erection of the condenser. Cutting, edge preparation, preassembly, fitting is required and form part of this contract.
2.3.7.1.12	Condenser Water removal system for maintenance/ withdrawal of tubes and structures, steel columns, beam, bracing, foundation bolts etc.
2.3.7.1.13	Condenser, special supports and its stand pipes.
2.3.7.1.14	All extraction piping emerging from LPT up to dome walls of condenser, including expansion bellows, sheathing in the extraction lines
2.3.7.1.15	LP1 necked heaters inside the condenser neck, Bled steam pipe work inside the condenser neck (LP1 heater)
2.3.7.1.16	Misc. Fittings & Loose items as isolation valves ,water expansion release valves, liquid level gauge, vacuum gauge, thermostat, vent orifice plates etc.
2.3.7.1.17	Local Instrumentation and Fittings for LP Heater No. 1.
2.3.7.2	**MSR consists of-**
2.3.7.2.1	Moisture separator re-heater upper half and lower half with supports (assembly, fit-up, welding , NDT & Hydro test is covered in the scope of this contract)
2.3.7.2.2	MSR 1'st and 2'nd stage condensate re-heater drain tanks, separator drain recovery tanks
2.3.7.2.3	MSR safety valves and / or bursting diaphragms
2.3.7.2.4	MSR associated piping and fittings
2.4	**Important Notes:**
2.4.1	**a.)** The Generator Stator weighing about 312 MT (approx.) is unloaded in the vicinity of the TG building of Unit 8 on hard stand. **Suitable capacity crane for erection of Generator stator from hard stand to the TG deck will be provided free of charge to the contractor.** Arrangement of all required slings and devices for lifting & placement of stator on TG deck is in the scope of this contract. **b.) Suitable capacity crane for loading on the trailer and erection of MSR on its foundation will be provided free of charge to the contractor**.

	Arrangement of all required slings and devices for lifting & placement of MSR on TG deck is in the scope of this contract. Transportation of MSR (supplied in 02 pieces) from place of unloading (hard stand and in yard) to the area from where it will be erected by crane is in the scope of contractor. Location from where erection by crane will be done shall be finalised by BHEL and contractor will have to arrange for transportation of MSR pieces to this location at its own cost.
2.4.2	The contractor scope of work includes handling, shifting and placement of the generator stator from the location of unloading to the TG Deck. The contractor will have to carry out blue matching of mating surfaces of generator foundation plate, erection of cooler housing, terminal boxes and related works as required, before shifting the same to its foundation on TG deck and before lowering the stator on foundation base plates. NPCIL will provide their mobile heavy duty crane for erection of Generator Stator. Any help / assistance as required for movement / handling of this crane shall be rendered by contractor as a part of scope of work.
2.4.3	Contractor shall take specific note of the aspect and shall arrange all required T&P and lifting/ handling/loading/ transportation arrangements (of higher capacity other than what is being provided as per chapter-V of TCC Part1) for transportation from stores/yard, loading on trailer etc.
2.4.4	For the initial period of the contract, the EOT crane may not be available for erection of equipment in TG hall. The contractor has to make arrangement for pre-assembly of condenser components inside or outside TG hall as per space provided by BHEL and carry on erection works of condensers on foundation, in absence of the TG hall EOT crane. Up to the time of availability of the EOT crane in TG Hall, BHEL shall provide crane (135MT or suitable capacity) for condenser/equipment erection on sharing basis free of charge as per availability as per chapter V (TCC Part-1) and in line with following:
2.4.4.1	Contractor shall be assisted with BHEL/NPCIL cranes, till the EOT is made available, only for erection of large assemblies and heavy weight components of condenser which are beyond capacity of the contractor's cranes.
2.4.4.2	Erection/placement of equipment/auxiliaries on required foundation where the foundation will be out of approach/inaccessible of the safe working limit of EOT crane (Floors at elevation below TG floor etc.) contractor has to arrange the crane/lifting arrangement/winches etc. for erection on its own.

2.4.4.3	There is space constraint at rear of condenser foundation, as Condensate Storage Tank and pump foundations have already been constructed by NPCIL. Due to this, it may be difficult to transport / shift condenser tubes to rear side of condenser from this area for condenser tubing. Contractor shall make all required preparations/ arrangements for shifting condenser tubes to rear side of condenser for condenser tubing, within the quoted lump sum price.
2.4.4.4	For making hanging arrangement of temporary movable platform required for condenser tubing , the contractor needs to make openings on concrete floor (at 11 meter elevation). All arrangements required for making opening on concrete floor, using core cutting machine or as per BHEL/NPCIL site requirement, are to be done by contractor within the lump-sum quoted rate.
2.5.0	**SITE VISIT** – The bidder must visit site, to acquaint themselves with the working conditions prevailing at NPCIL site and in & around the plant premises, together with all statutory, obligatory and mandatory requirements of various authorities and NPCIL before submission of bid.
2.6.0	**SITE ORGANISATION**
2.6.1	The contractor shall provide adequate staff in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL: 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 without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.
2.6.3	On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data/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.
2.6.6	**Deployment of Skilled/semi skilled Tradesmen by the contractor at site in line with Pradhan Mantri Kaushal Vikas Yojna :** The contractor shall, at all stages of work deploy skilled/semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/ Industrial Training Institute/ National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/ semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs.100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of Compensation in case of default shall be final and binding.
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 Site In-Charge/Project Manager-Noida. 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 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. Other requirements are as per Clause No. 2.9 of GCC.

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.
2.9	The contractor scope of work includes availability of emergency vehicle at site at all times during execution of work. Contractor shall be liable for penalty for non-availability of emergency vehicle at site during execution. Contractor has to follow the applicable provisions of AERB safety guide for work contracts at site during execution.

S. No.	Description	Scope		Remarks
		BHEL	Contrac -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	**YES**		As and where made available by customer M/s NPCIL /BHEL.
3.2	**FOR LABOUR ACCOMODATION**			
3.2.1	House		**YES**	As per clause No. 3.9.3
3.3	**ELECTRICITY**			
3.3.1	a. Electricity for construction purposes	**YES**		Chargeable. (As per clause 3.9.6)
	b. Electricity for EOT crane in TG Hall	**YES**		Free of cost
	c. 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
3.3.6	Supply, Installation & connection of energy meter including operation & maintenance		**YES**	

3.3.7	Duties & deposits including statutory clearances for above		**YES**	electricity for construction and accommodation, the contractor has to follow directions of M/s NPCIL
3.3.8	Demobilization of the facilities after completion of works		**YES**	
3.3.9	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above lines		**YES**	**Chargeable** (As per clause 3.9.7)
3.4	**WATER SUPPLY**			
3.4.1	**FOR CONSTRUCTION:**			
3.4.1.1	Making the Service water available at single point		**YES**	Chargeable, As per clause no. 3.10
3.4.1.2	Potable water for the workers at site		**Yes**	To be arranged by Contractor
3.4.1.3	Further distribution as per the requirement of work including supply of materials & Execution		**Y ES**	As per clause no. 3.10
3.4.2	**LABOUR ACCOMODATION:**			
3.4.2.1	Making the SERVICE/POTABLE water Available.		**YES**	As per clause No. 3.10
3.4.2.2	Further distribution as per the requirement of work including supply of materials & execution		**YES**	
3.5	**LIGHTING**			
3.5.1	For construction work (supply, erection and arrangement of all materials) 1. At office storage area 2. At preassembly area 3. At construction site/area		**YES**	Related NPCIL instruction and norms to be followed
3.5.2	Providing the necessary consumables like bulbs, Switches etc. during the course of construction		**YES**	Related NPCIL instruction and norms to be followed
3.6	**Communications facilities for site**			

	Operations of the bidder			
	Telephone, fax, internet, intranet, email etc.		**YES**	
3.7	**Compressed Air for Construction work**			
3.7.1	Supply of compressor and all other equipment required for compressor & compressed air system including pipes, valves, storage system etc.		**YES**	
3.7.2	Installation of the above system and operation & maintenance of the same		**YES**	
3.7.3	Supply of all the consumables for the above system during the contract period.		**YES**	
3.8	**ERECTION FACILITIES**			
3.8.1	Providing erection drawings for all the equipment covered under this scope	**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 as provided herein below, the Contractor shall be a licensee subject to the following and such other terms and conditions as may be imposed by licenser/Engineer-in-charge:			
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. The issue of vacation of land and the time period permitted for it shall be mutually discussed and agreed upon by both Purchaser 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 Engineer-in-charge. In case, he is allowed to construct any structure he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.			
3.9.1.5	On completion of work, the Contractor shall handover the land duly cleaned(made vacant after demolishment of any establishment, leveling and clearing of debris) to the Purchaser. Until and unless the Contractor has handed over the vacant land allotted to him for the above purposes, the payment of his final bill shall not be made.			
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, magazine for explosives in isolated locations, etc. required for execution of the Contract. Levelling and dressing of site, any construction of temporary roads, offices, workshops etc. as per plan approved by the Engineer-in-charge shall be done by the Contactor at his own cost.			
3.9.3	**Land for Contractor's Colony**			

3.9.3.1	Land will be given as available, by the Engineer-in-charge for the Contractor's colony. The Contractor may indicate the requirement of land for the colony along with his tender. 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 Purchaser's personnel shall be used as labour colony.
3.9.4	**Possession of Site**
3.9.4.1	The Contractor shall be permitted to enter on (other than for inspection purposes) or take possession of the site only when instructed to do so by the Engineer-in-Charge in writing. The portion of the Site to be occupied by the Contractor shall be defined and /or marked on the Site Plan, failing which these shall be indicated by the Engineer-in-Charge at site and the Contractor shall on no account be allowed to extend his operations beyond these areas. The Contractor shall provide, if necessary or if required on the Site, all temporary access thereto and shall alter, adapt and maintain the same as required from time to time and shall take up and clear them away as and when no longer required and as and when ordered by the Engineer-in-Charge and make good all damage done to the Site.
3.9.5	**Site Workshop/fabrication 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, clean shop, and general fabrication shop shall be got approved from Engineer-in-charge. The pre-fabrication of SS pipelines, which are to be cleaned prior to installation, shall be done in clean workshop and this area shall have storage space for prefabricated pipes.
3.9.6	**Electricity**
3.9.6.1	Construction Power Supply shall be made available on chargeable basis to the contractor of this work scope. All power use by the contractor for

	construction purpose and for office, store etc. shall be on chargeable basis only. The contractor shall install energy meters for metering their actual use of construction power. **The Construction Power requirements shall be provided to contractor on chargeable basis at the prevailing rates of NPCIL (customer).** The present rate of power is approx Rupees 4.74 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. **The power utilized for the EOT crane in the TG hall for the ETC of this package is free and not chargeable to the contractor.** **The required power for commissioning of the equipment of TG package shall be provided free of charge.**
3.9.6.2	Construction Power Supply will be from NPCIL substation and will be made available to the Contractor at a nominal system voltage of 415 volts 3 phase 4 wire 50 cycles.
3.9.6.3	Construction Power Supply to the contractor will be made available subject to the following terms and conditions and other guidelines laid down by NPCIL:
3.9.6.3.1	This power supply shall not be used for any unauthorized purposes.
3.9.6.3.2	The power will be supplied at 01 point for the said contract at 415V 3 Phase 50 cycles or 230 V single phase 50 cycles as the case may be. The contractor shall install his own switch controls, cables etc. of adequate capacity of suitable type complying with all relevant regulations to receive control and distribute the power involved. The exact location and further details about the supply point will be decided by BHEL/NPCIL whose decision in the matter will be final and binding.
3.9.6.3.3	The connected load shall not be less than 75% of the estimated load and the contractor shall have the option to make changes in the connected load on max 6 (six) occasions at each point during the entire period of contact. For the purpose of calculating minimum BHP calculation, loads connected at various points will be taken into consideration.
3.9.6.3.4	The Purchaser shall meter the supply of power to the contractor at the point at which the supply is given. For this purpose, the energy meter will be installed by the contractor on their distribution panel. Contractor shall be required to install actual Maximum Demand Meter on the incoming

	panel to ensure that demand does not exceed the demand requested by the Contractor and Minimum BHP calculation shall be done on Maximum Demand Meter reading. If any dispute on accuracy of meter, the meter in dispute will be checked in the standard laboratory of the State Government and the meter will be replaced if required. The fees levied by the Standard laboratory for testing the meter shall be charged to the contractor. The Engineer may at his discretion replace any meter installed at the cost of contractor, if found defective/faulty. It would be the contractor's responsibility to ensure the safety of the meter and to ensure protection so that the meter is not tampered with. In case, it is found that the meter has been tampered with, the supply will be disconnected and re-connection charges at State Electricity Board rates per BHP will be charged. In case the meter is found faulty, the charges will be recovered on the basis of average consumption for the preceding 6 months.
3.9.6.3.5	The contractor shall make his own arrangements for the distribution of power to all his works from the points of supply mentioned above.
3.9.6.3.6	It shall be the responsibility of the contractor to provide and maintain complete installation on the load side of the supply with due regard to safety requirements at site. All cabling and installations shall be subject to the approval of the NPCIL Engineer/ Safety Engineer and shall comply in all respects to the appropriate statutory requirements given in the following: - Indian Electricity Act, 1910 (as amended) - Electricity Supply Act, 1910 (as amended) - Indian Electricity Rules 1956 (as amended) - Latest State Electricity Board regulations It is to be clearly understood that disturbance in power supply or non-availability of electricity shall not entitle the Contractor for any claim for compensation either in time or money. The Contractor is advised to make his own arrangements of diesel generators to meet his requirements of electrical power during interruption in power supply and keep electrically operated equipment to the minimum in view of uncertainty of 24 hours power supply. Temporary power supply as arranged by the contractor on his own shall be provided for the bonafide construction purposes limited to the extent required for the job. For this purpose, the contractor shall provide full specifications of the equipment and the layout drawings. Approval of the Engineer-in-charge

	does not absolve the contractor from complying with any or all other conditions laid down in this section. Contractor shall have to follow all the safety and statutory guidelines regarding electrical installation for construction and domestic supply as per Customer (NPCIL), Electricity Department, AERB (Atomic Energy Regulatory Board) and other related departments. Any decision of BHEL/NPCIL in this regard shall be final and binding on contractor.
3.9.6.3.7	The power supply shall be subject to all such restrictions and regulations as are in existence now and as may be enforced by the BHEL/ Government/ State Electricity Board/NPCIL or by any other competent authority from time to time for which the contractor will not have any claim whatsoever.
3.9.6.3.8	**The contractor shall maintain a power factor of not less than 0.9 by installing, if necessary at his own cost suitable corrective devices/capacitor banks etc.** The contractor's failure in this regard within a period as stipulated by the Engineer-in-charge shall lead to penalty and may further lead to disconnection of Power Supply. The individual, single-phase loads shall be suitably connected so that the total load at the supply point balances as much as possible.
3.9.6.3.9	BHEL will not be liable for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions planned or unplanned in power supply. BHEL will also not be liable for any loss to the contractor arising from any interruption, failure or stoppage of works and any attendant delays consequent on such failure, interruption or stoppage of power supply or variation voltage or frequency. The contractor shall install all safety devices for such purpose as deemed fit by him.
3.9.6.3.10	After completion of the works, the contractor shall at his own cost promptly dismantle the distribution and other facilities he may have erected.
3.9.7	**Domestic/Contractor's colony 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.
3.9.7.3.9	For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads. 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. In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

3.10	**Water**
3.10.1	**Unfiltered Water Supply/Construction water** The contractor shall make his own arrangements for water required for the work and labour camp and nothing extra will be paid for the same. This will be subject to the following conditions:
3.10.1.1	The contractor shall construct suitable storage tanks to meet at least 7 days requirement of water at work site. To ensure adequate water supply at all levels on the facilities for the purpose of construction, he shall install necessary pumps, for delivery of water at all levels with requisite pressure. To ensure uninterrupted water supply in the event of power failure, contractor is directed to install diesel pumps as a stand by measure. The contractor shall at his own cost arrange to receive and distribute the water and shall lay and maintain water supply lines to his construction site.
3.10.1.2	The water used by the contractor shall be fit for construction purposes to the satisfaction of the Engineer –in –charge.
3.10.1.3	The Engineer in-charge shall make alternative arrangements for supply of water at the risk and cost of the contractor if the arrangements made by the contractor for arrangement of water are in the opinion of the Engineer –in – charge, unsatisfactory.
3.10.1.4	**Water if available, may be supplied to the contractor at one point, on chargeable basis. In this case, water requirements can be provided on chargeable basis at the rate of Rs.12.10 per 1000 liters, this rate is subject to revision from time to time.**
3.10.1.5	<u>Water Supply to Labour Camp</u> The contractor shall make his own arrangement to receive, treat, test, pump and distribute the water required for the labour camp. He shall construct at his own cost storage tank(s) of adequate capacity to meet 4 days requirement. He shall also lay at his own cost the distribution lines and maintain the same during the currency of the contract.
3.10.1.6	The contractor shall ensure availability of potable quality of water required for all his requirements at all times at site and in labour accommodation. In case, it is arranged from Customer, the charges levied by the customer has to be borne by the contractor.

4.0	**INDICATIVE LIST OF T&P/MMD TO BE DEPLOYED BY THE CONTRACTOR**				
S. No.	**EQUIPMENT /T&P**	**Capacity**	**Tentative deployment schedule**	**Indicative Qty.**	**Remarks for deployment schedule and quantity**
4.1	**4.1.1)** Tyre Mounted Crane	40 MT	On APR basis, (From start of generator work till Turbine Box-up)	01 No.	Deployment schedule to be mutually decided in Form-14
	4.1.2) Mobile Hydra crane	12-14 MT	Start of Work till material reconciliation.	01 No.	
4.2	Trailer with pulling unit	30 MT	From start of work till Synchronisation of TG	1 No.	After synchro, contractor to arrange suitable capacity trailer on APR basis.
4.3*	Low Bed Trailer with pulling Unit and Crane of required capacity	APR of weights to be handled as per Chapter **XI**	APR	APR	
	*The scope of shifting of material from yard to site is in the scope of Contractor. Contractor has to arrange appropriate capacity trailer (as per requirement) for 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 are to be arranged as per handling requirement for the equipment detailed in chapter XI (of TCC Part-1). Cranes shall be provided for loading on trailers, only for material beyond handling capacity of 40 MT crane of the contractor.				
4.4	Pallet Trolley	2 MT	APR	01no.	For material fetching from closed shed
4.5	Air compressor (electric or diesel operated)	140/210 CFM	APR	APR	
4.6	Hydraulic Jack (Low Height)	25/50/100T	APR	APR	
4.7	Screw Jacks	5/10/25/50 T	APR	APR	
4.8	Chain Pulley blocks	02 MT-20 MT	APR	APR	
4.9	Slings of various capacity	APR	APR	APR	For handling of equipment of chapter XI

4.10	Wire Rope, D-Shackles, Belt Slings, Hook Chooks	APR	APR	APR	For handling of equipment of chapter XI
4.11	Electric winch with wire rope 2T/ 3T etc.	APR	APR	APR	
4.12	Concrete Mixer for Grouting	APR	APR	APR	For grouting of the equipment on
4.13	Theodolite of required accuracy	APR	APR	APR	
4.14	Dumpy level	0 to 350 mm(LC-0.01)	APR	APR	
4.15	Condenser tube expander set (Electrical/Pneumatic type)	APR	APR	APR	APR to match the schedule
4.16	Hydraulic Pipe Bending Machine (Manual & Motorized)	APR	APR	APR	
4.17	Weld Gauge, Temperature Gun/chalk, Taper Gauge	APR	APR	APR	
4.18	Welding Generators, Rectifiers & TIG Welding Machine and ovens for welding backing and holding of electrode	APR	APR	APR	
4.19	Orbital welding machine for seal welding of condenser tube	APR	APR	APR	APR to match the schedule
4.20	Plasma cutting m/c (if required for cutting SS piping)	APR	APR	APR	Deployment to be decided by BHEL, APR
4.21	Radiography film viewer	APR	APR	APR	
4.22	NDT test kits (DPT/MPT)	APR	APR	APR	
4.23	Pre heating / stress relieving set (heating control panel, cables, heating elements, thermometers, thermal chalks etc.)	APR	APR	APR	

4.24	a.) Radiography arrangement with radioactive isotope source b.) UT kit as per requirement	IRIDIUM-192(of adequate strength not less than 10 curie)	APR	APR	NPCIL guidelines to be adhered to
4.25	Chemical circulation pumps to handle solution for chemical cleaning, with drive motors, starter panel, cable, switch fuse unit	Adequate Capacity	APR	APR	To be mobilised only on requirement, after BHEL confirmation.
4.26	Vacuum Cleaner (Industrial type)& Blowers	APR	APR	APR	
4.27	Hand tools, cutting Tools, grinding machines	APR	APR	APR	
4.28	Tube/ Pipe chamfering machine	APR	APR	APR	
4.29	Torque Tension Wrench Up to 4000 NM Range (Hydraulic)	APR	APR	APR	
4.30	Surface Grinder and other Workshop Equipment	APR	APR	APR	
4.31	Ratchet Square insert (MM size and Inch size)	APR	APR	APR	
4.32	Nibbling machine	APR	APR	APR	
4.33	Shearing machine, Profile making M/C	APR	APR	APR	
4.34	Portable grinding m/c	APR	APR	APR	
4.35	Anchor fasteners with anchoring machines	APR	APR	APR	For supports, platforms for erection, preassembly etc.
4.36	Portable drilling m/c	APR	APR	APR	
4.37	Dial Gauges of different ranges and types including lever	APR	APR	APR	Each with calibration certificates

	dial gauges(with LC 0.01mm)				
4.38	Self-drilling cum tapping machine for fixing of sheeting work screws	APR	APR	APR	
4.39	Allen Key sets, Tape and die sets	APR	APR	APR	
4.40	Inside - Outside Calipers, Precision Depth Gauges	APR	APR	APR	Valid calibration certificates
4.41	Surface plate(From 1.0 Sq. mtr and above)	(Grade 1,2,3)	APR	APR	Valid calibration certificates
4.42	Straight Edge (Up to 2 mtr. Long)	(Grade 1,2,3)	APR	APR	Valid calibration certificate
4.43	Long and short feeler Gauge set. Special long feeler gauges for radial clearance checking	(of width approx. 5 mm- 10mm)	APR	APR	These are to be arranged APR for assembly of HPT and LPT
4.44	Tools for Reaming and Honing	APR	APR	APR	
4.45	Taper Pin and straight Pin Reamers	APR	APR	APR	
4.46	Double End, Single End, Ring, Box, Hammering spanners	APR	APR	APR	
4.47	Magnetic Base Drilling Machines, Cutting Machines, Argon Sets, Gas Cutting Machines	APR	APR	APR	
4.48	Hand operated Megger (500V/1000V)	Up to 200 MOhms	APR	APR	
4.49	Motorized Megger	5 KV	APR	APR	
4.50	Digital Micro-ohm meter	APR for Generator stator and Rotor	APR	01	Measurement of winding resistance of the Generator stator and Generator Rotor

4.51	Digital Multi-meter (4½ /3½ digit) Tong tester (AC and DC)	APR	APR	APR	
4.52	Micro-meter (both inside and outside) Three Pin Micro-meters	Size decided by OD of LP coupling for outside micrometre	APR	APR	(With Calibration certificates and LC-0.01mm)
4.53	6/12 points temperature recorder for 0-1000C with thermocouples / rods and compensating cable	APR	APR	APR	
4.54	Master pressure gauge	0-40 Kg/cm2, 0-600Kg/cm2 etc.	APR	APR	For hydro test, with calibration certificate.
4.55	Fire retardant Tarpaulins		APR	APR	
4.56	Fire Extinguisher	APR	APR	APR	
4.57	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
4.58	Power cable for drawl of construction power	APR	APR	APR	From start of contract
4.59	Scaffolding materials scaffolding pipes with Clamps etc.	APR	APR	APR	APR of the site
4.60	DFT measurement (Alco meter)	APR	APR	APR	
4.61	Formaldehyde Gas Analyser	APR	Rotor threading till Unit synchro.	APR	Entry in confined space, Generator Set required
4.62	Portable Gas Detector (Oxygen Analyser)	APR	Start of work till synchro.	APR	Entry in confined space such as MSR, Generator
4.63	Auto Continuous variable Transformer - VARIAC (measuring	minimum 310 V and 100 Amp rating	APR	APR	Measuring impedance of generator rotor

	impedance of generator rotor)				
4.64	Hand held Jack Hammer machine and Core cutting Machine	APR	APR	APR	Chipping/breaking of concrete foundations
4.65	Temperature Gun-Hand held	APR	APR	APR	
4.66	The arrangement for Hydro Test of low pressure systems like piping, MSR, condenser (Calibrated Master pressure gauges and hydro test pump) has to be arranged by the contractor. For high pressure system testing, the calibrated pressure gauges has to be arranged by the contractor, BHEL will provide high pressure hydro-test pump.				
4.67	**"APR"** is defined as **:-** Contractor has to deploy T&P **AS PER REQUIREMENT of BHEL** site as decided by BHEL Engineer In-charge. **The capacity, quantity, duration of deployment shall be decided by Engineer In-charge as per site requirement in view of the front availability and erection program.** The requirement of the T&P/Crane etc. shall be recorded in the respective month Form-14 and accordingly deployment/non-deployment shall be recorded in next month's Form-14 of the contractor. Decision of BHEL Engineer In-charge with respect to requirement of particular T&P shall be final and binding on the contractor.				
4.68	**Notes** The above list specifies only major T&P/MMD (may not be complete) to be deployed by the contractor for this package This list is only indicative/suggestive in nature 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.				
4.68.1	Any special testing kit/ MME/ T&P/ precision equipment, other than supplied by the MU/manufacturer (in case of BOI's) as special equipment for erection/testing or provided by BHEL, has to be arranged by the contractor within final accepted rates.				
4.68.2	All additional/ other tools and plants which are required for satisfactory & timely completion of work of this package shall be deployed by the contractor within finally accepted rate/ price.				

	If works gets delayed due to non-availability of T&P and MMD, BHEL reserves the right to procure/hire the equipment/T&P and get work done at the risk & cost of contractor, without prejudice to rights of BHEL, as in GCC.
4.68.3	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.
4.68.4	Other terms and conditions regarding above items shall be as per T&P clause in SCC.
4.68.5	Special T&P or IMTE's requirement for tests like Helium leak detector test for Generator Leak test, Micro-ohmmeter for generator stator and rotor winding resistance measurement ,VARIAC for impedance measurement, UV lamps for fluorescent dye Test/alternate arrangement for water fill test of condenser etc. shall be arranged by contractor as per requirement or jointly agreed program.
4.68.6	Any T&P's, slings, D-shackles and other lifting tackles required for shifting of material from store to site and erection/handling shall be arranged by contractor. The cranes above 40 MT shall be provided by BHEL. The contractor has to arrange for trailers (Low Bed and normal) of required capacity for shifting of the material from stores, yard and any other place of unloading of material/equipment.
4.68.7	If any of the T&P (excluding major T&P mentioned at 4.1 and 4.2) mentioned above is not needed for proper execution of scope of work, no recovery from contractor shall be applicable for non-deployment of the T&P, provided contractor has not utilized BHEL free issued T&P for completing such work.
4.68.8	T&P Deployment schedule shall be decided at site on monthly basis (to be recorded in Form-14) in consultation with BHEL Engineer based on the work fronts/work requirement. BHEL decision shall be final and binding regarding the T&P deployment schedule.

4.68.9	In case deployment of T&P w.r.t requirement/schedule, is delayed or deployed for a shorter period or abnormal down time of T&P or ii) in case T&P w.r.t requirement was not deployed by the contractor as per instruction of BHEL and BHEL had to deploy either its own T&P or iii.)BHEL had to deploy the T&P from outside agency, then recovery shall be done from the contractor as under: In case the contractor does not deploy or delays deployment of major T&P with reference to schedule specified or T&P deployed is out of service for continuous more than 5 days, BHEL will recover non-refundable penalty per day in the following manner- In respect of each 40MT crane - @ Rs. 9000/- per day In respect of each hydra Crane 12-14 MT- @ Rs. 4000/- per day In respect of each trailer 30 MT - @ Rs. 3000/- per day For the daily recovery rate for other T&P/IMTEs. BHEL Engineer decision shall be final and binding on the contractor.
4.68.9.1	In case BHEL had to deploy its own T&P, hire charges of T&P applicable for outside agencies as per extant guidelines for "Hire Charges on issue of Capital Tools & Plants" shall be recovered.
4.68.9.2	In case BHEL had to deploy the T&P from outside agency, actual hiring cost plus applicable overheads shall be recovered.
4.68.10	If the work related to T&Ps mentioned above is completed then, BHEL can release that T&P during contract period / extended period if any. However, written permission shall be taken by contractor from BHEL construction Manager for releasing of the T&P.

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	135 MT Crane	1	Free issue and on sharing basis depending on availability - For loading of material on contractor's trailer at store yard. - For erection (as per requirement in line with clause 2.4.4 of chapter 2, TCC part 1).
5.2	EOT Crane (125/25 MT) in TG Hall	1	For handling and erection in TG Hall on free issue basis. The electricity for EOT shall also be on free of cost basis and will not be charged from the contractor.
5.3	Hydraulic Test Pump	600 KG	1 No.
5.4	Industrial Air Blower	20,000 m^3/hr	1 No.
5.5	Suitable Capacity Crane (1300 MT)	(APR)	Free issue basis for erection of Generator stator and loading of MSR on trailer and its erection to foundation.
5.6	**Notes governing the provision of the above T&P for use by Contractor for execution of this contract:**		
5.6.1	**Cl.4.2.2.16 c) of SCC shall be read as:-** **a. For BHEL's cranes 75 MT & above:-** Day-to-day upkeep and running maintenance like filling topping up of lubricants, changing filters, etc. including repair of self-starter, batteries and dynamo of these cranes shall be excluded from the scope of the contractor. **b. For BHEL's cranes below 75 MT capacity**:- Day-to-day upkeep and running maintenance like filling topping up of lubricants, changing filters, etc. including repair of self-starter, batteries and dynamo of these cranes shall be responsibility of the contractor. If on checking it is found that the same is not followed, BHEL shall exercise its right to get the job/works done at the risk and cost of the contractor. **Common for above Sl. No. (a) & (b):-** In case of breakdown of crane, contractor shall provide the necessary manpower for maintenance of the BHEL owned crane to maintenance agency (deployed by BHEL), failing to do so BHEL will get the job done at the risk and cost of contractor. BHEL may also provide cranes through crane hiring agencies in which case the day-to-		

	day upkeep and running maintenance shall also be excluded from scope of contractor.
5.6.2	**Cl.4.2.2.16 e) of SCC shall be read as:-** **a. For BHEL's cranes 75 MT & above: -** The operator, helper & maintenance personal (Engineer/Technician/OEM) for BHEL's cranes 75 MT & above capacity being provided by BHEL free of cost. The contractor shall provide fuel for the operation of hired & BHEL owned cranes for its scope of work, without any extra cost. **b. For BHEL's cranes below 75 MT capacity:-** The operators for BHEL's cranes 75 MT below capacity shall be provided by the contractor free of cost. These operators should possess valid license for heavy vehicle. The contractor shall provide fuel for the operation of hired & BHEL owned cranes for its scope of work, without any extra cost.
5.6.3	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.
5.6.4	Any other special T&P, if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition. However low height jack may not be made available and will have to be arranged for by the contractor.
5.6.5	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.
5.6.6	Other terms and conditions regarding above items shall be as per T&P clause in SCC.
5.6.7	Cranes / Handling arrangement other than that which are provided by BHEL as per this chapter and are required for loading, transportation and erection of the equipment under scope of this contract, has to be arranged/brought by the contractor as per the site requirement at no extra cost to BHEL.

5.6.8	EOT crane of capacity 125 MT will be provided by BHEL/NPCIL for erection of TG equipment in TG hall. The power for this EOT in TG hall is free of cost and not chargeable to the contractor. Contractor shall make use of this EOT crane for erection of equipment in TG hall subject to its capacity, accessibility & approachability. Any other lifting device / attachments as required for erection & handling of heavy equipment will be arranged by contractor as part of scope of work.
5.6.9	Though the customer shall operate and maintain the EOT's during construction, the contractor may also be required to arrange for skilled EOT operators for ensuring uninterrupted flow of work, separately for day and night to meet project schedule, within the quoted rates. The contractor may also be required to extend help during the maintenance/upkeep of the EOT.

6.0 TIME SCHEDULE for Unit # 8

6.1 After receipt of LOI, contractor shall discuss with Project Manager/Construction Manger regarding initial mobilization at site and erection work schedule.

The erection work shall commence on a mutually agreed date between the bidder and BHEL site construction manager, based on the availability of fronts. The decision of BHEL in this regard shall be final and binding on the bidder.

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.

6.2 **Zero Date of the contract:** Erection / placement of first major permanent equipment / component covered in the scope of these specifications shall be recognized as start of Contract Period for ETC portion as defined in the scope of works in the tender specifications. The start date shall be taken as Zero date of the contract.

Similar items like packers, plates, shims, anchors, inserts etc. will not be considered as start of contract period.

6.3 The various milestones dates to be achieved under this tender for Unit no.8 are as below. The milestone schedule is calculated from the Zero date as reference:

MILE STONES	**Months(U#8)**
Generator Erection Start	**Zero**
Condenser Erection Start	**1st**
MSR Erection Start	**2nd**
TG Erection Start	**3rd**
Turbine Box Up **(M1)**	**18th**
Oil Flushing Completion **(M2)**	**20th**
Commissioning of TG on Barring Gear	**21st**
First Synchronization of TG with Nuclear Steam	**24th**
Full Loading and Trial Operation of TG	**27th**
Guarantee Test, Operational acceptance and Handing Over	**27th**

6.3.1	**There is a provision for grace period of 03 months after operational acceptance for completion of any pending/punch point, handing over/completion of facilities.**
6.4	Entire work of this Package as detailed in the tender specifications shall be completed within **30 months (27 months + 03 months grace period)** from the **Zero date** of the package, as per programme/ milestones indicated by BHEL Engineer.
6.5	**Provision of Penalty in case of slippage of Intermediate Milestones:**
6.5.1	M1 & M2 as indicated in Sl. No. 6.3 are the intermediate LD milestones. Milestones LD shall be applicable if the delay in achieving the milestone is solely attributable to the contractor.
6.5.2	In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones
6.5.3	In case delay in achieving M1 Milestone is solely attributable to the contractor,0.5% per week of executable contract value*, limited to maximum 2% of executable contract value, will be withheld.
6.5.4	In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 3% of executable contract value , will be withheld.
6.5.5	Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.
6.5.6	Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment (corresponding RA Bill) and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
6.5.7	Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion/ closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
6.5.8	In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery

6.5.9	* Executable Contract Value - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.
6.6	The work under the scope of this contract shall be deemed to be complete in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.
6.7	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.
6.8	**COMMENCEMENT OF PERFORMANCE GUARANTEE FOR WORKMANSHIP** 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 by the customer or handing over of the facilities to the customer, whichever occurs earlier.**
6.9	**Operational Acceptance-** Operational acceptance shall occur in respect of the facilities when: a). The guarantee test has been successfully completed and the functional guarantees are met b). All items relevant to the facilities have been completed. c). Completion of all technical documentation by the contractor and acceptance of the same by NPCIL.

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 and detailed billing breakup shall be approved by BHEL before raising invoices. Contractor on certificate of the Engineer at site be entitled for payment for the service and supply portion as explained here under:
7.3	These payments are subject to any deduction, which BHEL may be authorized to make under the contract.

7.4	**PROGESSIVE PAYMENT ON PRORATA BASIS**	
	Total lump sum rate, mentioned in rate schedule item no. 12.1, of this package is divided as below-	
	CONDENSER	36% (12% for each condenser)
	HP TURBINE	7%
	LP TURBINE	21 % (7% for each LP turbine)
	GENERATOR and EXCITER	10%
	MSR and AUXILLIARIES	10% (5% for each MSR)
	PUMPS AND ROTATING AUXILIARIES	4%
	STATIC AUXILIARIES	4%
	PIPING	8%
	TOTAL	**100%**
	85% of this lump sum amount for each item will be divided for erection activities and 15% is for milestone activities.	
7.4.1	**Broad distribution of 85% of Lump sum price** (Item No. 12.1 of Rate Schedule) **for Erection Activities**	

7.4.1.1	**CONDENSER (36% = 3 x 12% for each condenser)**	**Percentage**
7.4.1.1.1	Preparation of Foundation ,Erection, Placement, Alignment and Final grouting of condenser spring supports	3%
7.4.1.1.2	Placement, Alignment, Pre-Assembly and welding of Bottom Plate segments, Hotwell and NDT	6%
7.4.1.1.3	Assembly and positioning of water chamber, side walls, , Welding and NDT	6%
7.4.1.1.4	Assembly, Erection, alignment, welding and NDT of Tube support plates and condenser internals like Baffle Plates, Air Evacuation pipes etc.	12%
7.4.1.1.5	Transportation, Hole cleaning, Insertion of Condenser Tubes	10%
7.4.1.1.6	Expansion, Cutting, orbital welding etc. of Condenser Tubes	20%
7.4.1.1.7	Assembly, Erection, Welding & NDT of Lower and Upper Dome Walls and Dome Stiffeners, Extraction Piping and Steam Dump Device, Erection of LP heater inside condenser with Supports and all fittings etc.	10%
7.4.1.1.8	Water fill Test up to Tube Nest area and Hydro Test of Water side of condensers	6%
7.4.1.1.9	Condenser Floating, Welding of Condenser Neck Joint and NDT & Completion of Balance works as erection of stand pipes and vacuum breaker valves, Condenser Water Box Hinge assembly etc.	10%
7.4.1.1.10	Completion of misc. erection works and submission of all documentation and protocols of condenser.	2%
	Sub-Total for Condenser	**85%**
7.4.1.2	**HP TURBINE (Weightage - 7%)**	
7.4.1.2.1	Preparation of Foundation, Placement, Alignment and Grouting of Screw and Wedge Jacks of front and rear pedestals of HP Turbine.	10%

7.4.1.2.2	Placement and alignment of HP rotor with lower casing, boxing up of inner casing after checking of clearances with diaphragms etc.	10%
7.4.1.2.3	Final Boxing up of HP turbine after completing all checks as per FQP	15%
7.4.1.2.4	Alignment of HP shaft and LP1 rotor shaft and associated checks	3%
7.4.1.2.5	Installation of HP inlet valves (04 no.'s) along with supports ,strainers etc.	10%
7.4.1.2.6	Preassembly, Cleaning, Erection, welding and NDT of HP lower and upper Inlet pipes from valves(HP Loop pipes) Erection of supports and hangers	18 %
7.4.1.2.7	Preparation and carrying out pre-commissioning activities e.g. assembly of hydro test, steam blowing devices and normalization	2%
7.4.1.2.8	Final boxing up of pedestals after oil flushing completion and final key fixing of casing	5%
7.4.1.2.9	Assembly, Erection of Acoustic enclosure of Turbine	10%
7.4.1.2.10	Completion of misc. erection works and submission of all documentation and protocols of HP Turbine	2%
	Sub- Total for HP Turbine	**85%**
7.4.1.3	**LP TURBINE (21%= 3 X 7% for each LP's)**	
7.4.1.3.1	Preparation of Foundation, Placement, Alignment and Grouting of Screw and Wedge Jacks of LP Turbine Exhaust Bottom Halves.	5%
7.4.1.3.2	Placement ,alignment and readiness of LP outer casing (exhaust hood) bottom portion and associated works	7%
7.4.1.3.3	Placement of LP rotor and alignment with inner casing and checking of blade clearances	10%
7.4.1.3.4	Boxing up of LP inner casing after completion of all checks	8%

7.4.1.3.5	Assembly, alignment & welding of LP outer casing outer half (Exhaust hood)and final box up of outer casing	12%
7.4.1.3.6	Alignment of all LP rotors including reaming, honing and fixing of coupling bolts.	7%
7.4.1.3.7	Completion of CRO of the rotor train, swing checks etc.at exciter and HP end.	4%
7.4.1.3.8	Installation of LP inlet valves assembly (02 each for 01LP) with servomotors.	6%
7.4.1.3.9	Erection, alignment, welding and NDT of LP-MSR piping of Left and Right side along with all fittings ,bellows, hanger and supports etc.	10 %
7.4.1.3.10	Erection, alignment, welding and NDT of HP – MSR Piping along with safety diaphragms, hangers and fittings	10 %
7.4.1.3.11	Pre-commissioning activities etc. as Assembly and preparation of hydro test, steam blowing devices and normalization	1%
7.4.1.3.12	Final boxing up of pedestals after oil flushing completion	3%
7.4.1.3.13	Completion of misc. erection works and submission of all documentation and protocols of LP Turbine.	2%
	Sub- Total for LP Turbine	**85%**
7.4.1.4	**GENERATOR and EXCITER (10%)**	
7.4.1.4.1	Preparation of Foundation, Levelling, Matching and Grouting of packers, Foundation Plates.	5%
7.4.1.4.2	Lifting and erection, Levelling, centering and Alignment of STATOR after completion of preliminary works	12%
7.4.1.4.3	Erection of End Shields on the Foundation Beams	5%
7.4.1.4.4	Rotor Insertion, Supporting on bearings and air gap checking	8%
7.4.1.4.5	Final Boxing up of generator after completion of all checks and assembly of seal ring holder and seal rings , all labyrinths and oil catchers	15%

7.4.1.4.6	Alignment of Generator Rotor with LP Turbine Rotor, Run-out checks and Reaming, Honing of Coupling holes and Fixing of Coupling Bolts	7%
7.4.1.4.7	Erection of Excitation Equipment & Alignment of Gen-Exciter Rotors including swing check and completion of Balance Works of exciter, including completion of acoustic enclosure.	10%
7.4.1.4.8	Completion of Generator PW system including of erection, of PW tank, PW pump and piping system, hydro test of stator winding system, exciter and generator cooler piping etc.	8%
7.4.1.4.9	Final Grouting of generator/ exciter with all auxiliaries and bolt stretching	4%
7.4.1.4.10	Assembly of terminal bushing, completion of leak test/ final gas tightness test of stator with complete system, helium leak test etc.	9 %
7.4.1.4.11	Completion of misc. erection works and submission of all documentation and protocols of Gen-Exciter	2%
	Sub- Total for Generator	**85%**
7.4.1.5	**MOISTURE SEPERATOR REHEATER (2X5% = 10%)**	
7.4.1.5.1	Assembly and erection of foundation plates/ load bearings	5%
7.4.1.5.2	Placement, levelling , alignment of lower half including welding of support frame, separator of MSR	10 %
7.4.1.5.3	Placement, fit-up, alignment of MSR upper half and assembly/ welding of condensate pipes, stiffeners, backing strips and other loose items.	16%
7.4.1.5.4	Welding, NDT of MSR with protocols	16%
7.4.1.5.5	Hydro test of MSR with protocols	16%
7.4.1.5.6	Erection and completion of all works of 1st and 2nd stage of Re-heater condensate tanks(Total 04 for 01 unit), MS drain recovery tanks, safety vent circuits, safety diaphragm of MSR's and other fittings etc.	15%

7.4.1.5.7	Erection, testing and commissioning of gland steam condenser and other auxilliaries etc.	5%
7.4.1.5.8	Completion of misc. erection works and submission of all documentation and protocols of MSR and associated auxiliaries	2%
	Sub Total for MSR	85%
7.4.1.6	**PUMPS & AUXILIARIES (4%)**	
7.4.1.6.1	Erection, testing, commissioning of Main Oil Pump, JOP, EOP, AOP, Oil coolers, oil vapour exhauster, oil MIST filter, strainer, lube oil duplex filter, lube oil skid unit , lube oil centrifuge, Seal Oil Unit- Part 1 & 2, other pumps and filter unit and valves related to oil system and all other rotating auxiliaries	40%
7.4.1.6.2	Erection, grouting, testing and commissioning of vacuum pumps. E&C, welding, NDT of Air evacuation piping, drain and vent piping	43%
7.4.1.6.3	Completion of misc. erection works and submission of all documentation and protocols of Pumps & auxiliaries	2%
	Sub-Total for Pumps & Auxiliaries	**85%**
7.4.1.7	**Static Auxiliaries (4%)**	
7.4.1.7.1	Erection, testing and commissioning of CO2 vaporiser, H2 distributor, CO2 distributor, drain oil collector, LLD racks, hydrogen dryer, dry air blowers, gas unit ,N2 distributor etc.	20%
7.4.1.7.2	Erection, testing and commissioning of main oil tank, seal oil tank with accessories	18%
7.4.1.7.3	Erection, testing and commissioning of hydrogen coolers, exciter coolers, cooler housing frames and other loose items of generator and exciter.	10%
7.4.1.7.4	Placement and ETC of Governing oil skid and associated equipment of control system.	15%
7.4.1.7.5	Erection of support platforms, walkways, ladders etc. of the packages (supplied by MU's) and also as required for O&M of the equipment of this scope (not envisaged as	20%

	per drawing), but required by NPCIL for operation of the plant.	
7.4.1.7.6	Completion of misc. erection works and submission of all documentation and protocols of static auxiliaries	2%
	Sub-Total for Static Auxiliaries	**85%**
7.4.1.8	**Piping (8 %)** Turbine integral piping, generator integral piping consisting of lube oil, jacking oil, seal oil, control oil(governing), steam condensate spray/ exhaust hood spray, turbine water drainage, gas piping, seal steam including all the accessories like valves, hangers and supports, thermo wells, probes, orifices etc.	
7.4.1.8.1	Pre-assembly	10%
7.4.1.8.2	Placement in position	10%
7.4.1.8.3	Alignment	10%
7.4.1.8.4	Welding/ Bolting/ Fixing	25%
7.4.1.8.5	Completion of non-destructive examination and stress relieving, heat treatment	15%
7.4.1.8.6	Hangers and supports as per drawing	5%
7.4.1.8.7	Mass Flushing, cardboard blasting, acid prickling, alkali flushing Hydro testing/ pneumatic test wherever applicable for all the piping of TG scope	8%
7.4.1.8.8	Completion of all misc. erection works and submission of all documentation and protocols of Piping	2%
	Sub-Total for Piping	**85%**
7.4.1.9	**NOTES:**	
7.4.1.9.1	Further break-up of above terms of payment shall be carried out at site entirely at the discretion of BHEL.	
7.4.1.9.2	BHEL Construction Manager, at his discretion, shall further divide the total breakup for the progressive payment of the Lump-sum amount, and the same will be binding to the contractor.	

7.4.1.9.3	The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.
7.4.1.9.4	Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor.

7.4.2	**STAGE/MILESTONE PAYMENT (15%)** (15% of Item No. 12.1 of Rate Schedule- XII)								
Sl. No.	**Milestone/ Stage**	**Conde nser**	**HP Turbine**	**LP Turbine**	**Genera -tor**	**MSR**	**Pump & Aux.**	**Static Aux.**	**Piping**
7.4.2.1	TG Oil Flushing Completion	1%	1%	1%	1%	1%	1%	1%	1%
7.4.2.2	TG Barring Gear	1%	1%	1%	1%	1%	1%	1%	1%
7.4.2.3	Rolling & Synchronization	2%	2%	2%	2%	2%	2%	2%	2%
7.4.2.4	Full Loading	1%	1%	1%	1%	1%	1%	1%	1%
7.4.2.5	Trial Operation	2%	2%	2%	2%	2%	2%	2%	2%
7.4.2.6	Operational acceptance of unit and Handing Over to Customer	2%	2%	2%	2%	2%	2%	2%	2%
7.4.2.7	Finish Painting (Supply and Application of paints)	2%	2%	2%	2%	2%	2%	2%	2%
7.4.2.8	Area cleaning, temporary structure cutting/ removal and return of scrap	1%	1%	1%	1%	1%	1%	1%	1%
7.4.2.9	Punch list points/ pending points liquidation	1%	1%	1%	1%	1%	1%	1%	1%
7.4.2.10	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%	1%

7.4.2.11	Completion of contractual obligations	1%	1%	1%	1%	1%	1%	1%	1%
	Total for Milestones / Stage payments (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**

7.4.3 **Notes for Stage/Milestone Payment:**

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

7.4.5 **PAYMENT FOR SUPPLY AND APPLICATION OF PAINTS**

The payment for supply and application of paints shall be released as per the completion of finish painting and labelling of all equipment, systems of each package of this contract scope, as certified by BHEL Engineer. The payment for this milestone 7.4.2.7 (Finish Painting - Supply and Application of Paints) may be regulated as:

Payment Term Item No.	Description of partial milestone of 7.4.2.7	Payment to be released on completion
7.4.2.7.1	Completion of Painting and labelling of Turbines and Generator- Exciter.	0.40 %
7.4.2.7.2	Completion of Painting and labelling of Condensers	0.40 %
7.4.2.7.3	Completion of Painting and labelling of Piping, static and rotating auxiliaries	0.40 %
7.4.2.7.4	Completion of painting and Labelling of complete contract scope in all respects	0.80 %

There is no separate provision for release of payments based on supply of paints and primer etc.

7.4.6 Payment of retention amount and final bill shall be as per clause No. 2.22 and 2.23.2 of GCC.

7.4.7	**<u>Recoveries from RA / Final Bills on account of safety lapses during contract execution at RAPP</u>** 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. 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) for safety non-compliances and respective penalties.

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

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

8.2.1	It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a licence to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of licence / permission to BHEL within a period of one month from the date of award of contract.
8.2.2	It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on gross payment made for value of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.
8.2.3	It shall be the responsibility of the sub-contractor to furnish the receipts /challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.
8.2.4	It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.
8.2.5	The contractor shall, however ensure before deposit of any BOCW Cess, that customer is not depositing the same in order to avoid excess deposit of cess.
8.2.6	The contractor shall bear cost of BOCW cess either by way of deposit or through recovery by BHEL in case the same is deposited by the customer.
8.2.7	In case of failure in above mentioned compliances, BOCW Cess @ 1% as well as applicable penalty as specified in BOCW Act/Rules shall be deducted from the contractor.

9.0	**The inclusions and exclusions to this contract are listed below. These are general in nature.** It may be specifically noted that it should not be construed or claimed by the contractor that with the technical specification and "exclusions and/or inclusions" detailed in this tender specification, BHEL has covered the entire scope of work and/or the details thereof to be executed by the contractor.
9.1	**INCLUSIONS**
9.1.1	All terminal connections for equipment & piping are covered in this specification. Contractor shall carry out the alignment and welding of terminal points/ interface/ matching & connected flanges joints, pipe joints etc. of other system & other agencies as scope of work. The decision of BHEL Engineer with regard to decision on the terminal point shall be final and binding on contractor.
9.1.2	The welding of reducers at both ends of extraction NRV is in the scope of this contract. Similar works as required to be executed at the terminal points are to be completed within the quoted lump sum price.
9.1.3	Impulse/ pneumatic piping between customer's battery limit and equipment.
9.1.4	Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers etc. is the part of scope of work.
9.1.5	Supply of grouting material as per specifications under scope of Work (chapter 2 of TCC Part -1) and CIVIL Works (chapter 2 of TCC Part -2)
9.1.6	Most of the Misc. Pumps with drive motors, base frame, fittings etc. will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The delivery of these will be taken from BHEL stores/storage yard and will be assembled/ installed at different locations as per drawing and instruction of BHEL Engineer at site. The work involved is preservation, assembly, installation, erection, alignment, Pockets / base frames / foundations grouting including providing non-shrink free flow grout mix material, fixing of loose items, filling of lubricants, greasing, commissioning, no load/ load trial run of motors & pumps. All the works shall be carried out as part of scope of work.
9.1.7	**Consumables:** The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope. TG special consumables like Hylomar / golden Hermetite / stag-b / Molykote/ Anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor.

9.1.8	**WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES** All welding consumables including welding electrodes, gases, filler wires etc. are in the contractor's scope. The contractor shall provide all consumables required for carrying out the work covered under this scope of work including TIG wires etc. for welding of piping joints. All the required gases/consumables for carrying out welding, stress relieving/pre-heating/PWHT like argon, oxygen, and acetylene etc. shall be arranged by the contractor at his cost.
9.2	**EXCLUSIONS** The following works are specific exclusions from the scope of work under erection, testing & commissioning of tender specification.
9.2.1	Civil works except to the extent specifically indicated elsewhere in this tender.
9.2.2	Sub-delivery items and electrical components such as push-buttons, junction boxes etc. However, Turbo Generator and all Motors related to the equipment covered under these specifications are specifically included in the scope of contractor under these tender specifications.
9.2.3	E&C work of cable trays, cables and earthing, control panels, EPMS, MCC etc. except to the extent specifically indicated elsewhere in this tender.
9.2.4	Pneumatic copper tubing and fittings thereof. Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.
9.2.5	Impulse piping and fittings beyond the root wall and nut & tail is excluded from the scope of contractor under these specifications. It is to mention that impulse piping and fitting from tapping point upto nut & tail (including nut & tail) is specifically included under the scope of work of contractor under these tender specifications.
9.2.6	Supply of materials for temporary piping (pipe, valve, structural steel etc.) required for chemical cleaning of the pipelines.
9.2.7	Supply of chemicals and lube oil as required for chemical cleaning and oil flushing operations during pre-commissioning, commissioning and trial operations activities.

10	**Safety guidelines to be followed by contractor at site**
10.1	**General Note:** 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.
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.
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 a the project within 15 days of their placement at the project at the cost of the contractor and then only he/she would be given permanent entry pass and considered in required strength of the safety professionals.
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 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 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.

Equipment's weight, dimension and system details (BHEL Bhopal, Hardwar's and other MU's scope) provided in this Chapter-XI are applicable for Unit#8, RAPP, Rawatbhata.

11. Tentative weight schedule summary for 01 Unit

S.No.	EQUIPMENT / PACKAGE	APPROX.WT. for 01 Unit (in MT)
1.	Condenser (for 3 nos. in one unit)	**1295.96**
2.	Condenser Tubes (for 3 nos. in one unit)	**490.50**
3.	MS Drain Tank (for 1 nos. in one unit)	**4.83**
4.	MSR (for 2 nos. in one unit)	**392.64**
5.	Vacuum Pump (for 4 nos. in one unit)	**32.60**
6.	Re-heater Condenser Tank Stage-1(for 2 nos. in one unit)	**7.48**
7.	Re-heater Condenser Tank Stage-2(for 2 nos. in one unit)	**7.68**
8.	LP Heater (for 3 nos. in one unit)	**54.77**
9.	HP Turbine Module including valve	**242.3**
10.	LP Turbine Module (for 3 nos. in one unit)	**579.60**
11.	LP Valve (for 6 nos. in one unit)	**90.00**
12.	Auxiliary Equipment	**79.01**
13.	Turbine Piping	**232.31**
14.	Piping Hanger Support, Platforms, governing Oil piping etc.	**115**
15.	Generator, Exciter and auxiliaries	**568.9**
16.	Coolers	**10.21**
	Sub-Total (Approx. Metric Tonnes)	**4203.790 MT**

11.1 BHOPAL SUPPLY

11.1.1 CONDENSER

There are 3 nos. condensers in each unit.

S. No.	Name of package	Box Qty. (Nos.)	Size of packages (tentatively)			Weight (kg)
			L (mm)	B(mm)	H(mm)	
1a	CONDENSER (HOTWELL) FRONT	1	7400	1700	1100	4250
1b	CONDENSER (HOTWELL) REAR	1	7000	2000	1200	3975
2	BOTTOM PLATE (FRONT)	1	7250	3600	750	7085
3	BOTTOM PLATE-(REAR)	1	7250	3600	750	7085
4a	BOTTOM PLATE (MIDDLE) 1	1	7250	4000	750	7510
4b	BOTTOM PLATE (MIDDLE) 2	1	7250	3500	750	5640
5	BOTTOM PLATE: LOOSE ITEMS. (BACKING STRIPS AND STIFF.)	1	2000	500	500	726
6	CONDENSER SPRING SUPPORT ASSY.(8 SET)	1	1800	1700	1000	3088
7	CONDENSER SPRING SUPPORT ASSY.(8 SETS)	1	1800	1700	1000	3088
8	CONDENSER SPRING SUPPORT ASSY.(6 SET)	1	1800	1400	1000	2316
9	CONDENSER SPRING SUPPORT ASSY.(6 SETS)	1	1800	1400	1000	2316
10	CONDENSER SPRING SUPPORT ASSY.(6 SETS)	1	1800	1400	1000	2316
11	CONENSER SPRING SUPPORT (LOOSE-ITEMS)BASE-PLATES-PACK	1	1000	500	500	16654
12	FRONT WATER CHAMBER : (LHS) GENERATOR SIDE	1	7500	3750	350	7610
13	FRONT WATER BOX (LHS) GENERATOR SIDE	1	7850	3650	2200	21568
14	FRONT WATER CHAMBER(RHS)TURBINE SIDE	1	7500	3750	350	7610
15	FRONT WATER BOX (RHS) : TURBINE SIDE	1	7850	3650	2200	21568
16	REAR WATER	1	7500	3750	350	7610

	CHAMBER(RHS) GENERATOR SIDE					
17	REAR WATER BOX (RHS) : GENERATOR SIDE	1	6900	3650	2100	14210
18	REAR WATER CHAMBER(LHS) TURBINE SIDE	1	7500	3750	350	7610
19	REAR WATER BOX (LHS) :TURBINE SIDE	1	6900	3650	2100	14210
20	SIDE WALL (TURBINE SIDE) : FRONT	1	7600	2800	16	2294
21	SIDE WALL (TURB. SIDE) : MIDDLE	1	7600	2800	16	2328
22	SIDE WALL (TURB. SIDE) : MIDDLE	1	7600	2800	16	2328
23	SIDE WALL (TURB. SIDE) MIDDLE	1	7600	2800	16	2328
24	SIDE WALL (TURB. SIDE) REAR	1	7600	1700	16	1429
25	SIDE WALL (TUR SIDE) LOOSE ITEMS (STIFFENERS)	1	500	250	500	267.8
26	SIDE WALL (TURB SIDE) LOOSE ITEMS (STIFFENERS)	1	6000	500	500	664
26a	SIDE WALL (TURB. SIDE) : MIDDLE	1	7600	2800	16	2328
27	SIDE WALL GEN.SIDE FRONT BOX	1	7600	1700	16	1429
28	SIDE WALL GEN. SIDE MIDDLE BOX	1	7600	2800	16	2328
29	SIDE WALL GEN.SIDE MIDDLE BOX	1	7600	2800	16	2328
30	SIDE WALL GEN. SIDE MIDDLE BOX	1	7600	2800	16	2328
31	SIDE WALL GEN. SIDE REAR BOX	1	7600	1700	16	2294
32	SIDE WALL (GEN SIDE) LOOSE ITEMS (STIFFENERS)	1	500	250	500	267.8
33	SIDE WALL (GEN SIDE) LOOSE ITEMS	1	6000	500	500	664
33a	SIDE WALL GEN. SIDE MIDDLE BOX	1	7600	2800	16	2328
34	SHELL INTERNALS: STIFFENING BARS DIA.100 mm	1	4000	500	500	7297

35	SHELL INTERNALS :STIFFENING BAR-DIA.100 MM)	1	4000	500	500	7297
36	SHELL INTERNAL DETAILS (STIFFENING BAR 100 DIA.)	1	4000	500	500	7297
37	SHELL INTERNALS STIFFENING BAR -100 DIA.	1	4000	500	500	7297
38	SHELL INTERNALS: PLATES AND LANDING BARS	1	1000	500	500	7371
39	SHELL INTERNALS: STIFFENING BARS DIA. 28MM	1	4000	500	500	18393
40	AIR EXTRACTION PIPING	1	4200	500	500	4488
41	SHELL INTERNAL:(TUBE SUPPORT PLATES):5 NOS	1	7000	3350	100	7650
42	SHELL INTERNAL:(TUBE SUPPORT PLATES):5 NOS	1	7000	3350	100	7650
43	SHELL INTERNAL:(TUBE SUPPORT PLATES):5 NOS	1	7000	3350	100	7650
44	SHELL INTERNAL:(TUBE SUPPORT PLATES):5 NOS	1	7000	3350	100	7650
45	SHELL INTERNAL:(TUBE SUPPORT PLATES):5 NOS	1	7000	3350	100	7650
46	SHELL INTERNAL:(TUBE SUPPORT PLATES):5 NOS	1	7000	3350	100	7650
47	Shell Internals: Baffle Plate-Landing Bars Flats	1	4000	1000	500	7371
48	SHELL INTERNALS: BAFFLE PLAT ES-JOINING PLATES	1	5000	500	500	7636
49	SHELL INTERNALS:MAKEUP BARS :DIA.28& 100 mm	1	4000	500	500	1258
50	LOWER DOME WALL (TURB. SIDE) :LOWER PORTION LEFT	1	13500	5000	500	9153
50a	LOWER DOME WALL (TURB. SIDE) :LOWER PORTION RIGHT	1	4660	240	300	2028
51	LOWER DOME WALL (TURB. SIDE): UPPER PORTION	1	10740	3500	500	6480
52	LOWER DOME WALL (TURB. SIDE): LOOSE ITEMS	1	9350	200	500	350
53	LOWER DOME WALL GENERATOR SIDE) LOWER PORTION	1	13500	5000	500	9153

53a	LOWER DOME WALL GENERATOR SIDE) LOWER PORTION RIGHT	1	4660	240	300	2028
54	LOWER DOME WALL (GEN.SIDE):UPPER PORTION	1	10740	3500	500	6480
55	LOWER DOME WALL (GEN.SIDE):LOOSE ITEMS	1	9350	200	500	350
56	LOWER DOME WALL(FWB SIDE) :LOWER PORTION	1	7200	5000	1000	6050
57	LOWER DOME WALL(FWB SIDE) :UPPER PORTION	1	6680	4115	1000	5664
58	LOWER DOME WALL(FWB SIDE)LOOSE ITEMS	1	6400	200	500	600
59	LOWER DOME WALL(RWB SIDE) : LOWER PORTION	1	7200	5000	1000	6323
60	LOWER DOME WALL (RWB SIDE); UPPER PORTION	1	6675	4000	1000	6231
61	LOWER DOME WALL (RWB SIDE): LOOSE-ITEMS (STIFF/CATCHMENT/DISPER.	1	6400	200	500	200
62	DOME INTERNAL STIFEENING (Set-1)	1	2000	500	500	7050
63	DOME INTERNAL STIFEENING (Set-2)	1	2000	500	500	3576
64	DOME INTERNAL STIFEENING (Set-3)	1	2000	500	500	2160
65	DOME INTERNAL STIFEENING (Set-4)	1	2000	500	500	1830
66	DOME INTERNAL STIFEENING (Set-5)	1	2000	500	500	2352
67	DOME INTERNAL STIFEENING (Set-6)	1	2000	500	500	1992
68	DOME INTERNAL STIFEENING (Set-7)	1	2000	500	500	2987
69	DOME INTERNAL STIFEENING (Set-8)	1	2500	500	500	2985
70	UPPER DOME WALL (TURB. SIDE)	1	8000	1860	500	3621
71	UPPER DOME WALL (GENERATOR SIDE)	1	8000	1860	500	3621
72	UPPER DOME WALL (FWB SIDE)	1	6500	1900	500	3280
73	UPPER DOME WALL (RWB SIDE)	1	6500	1900	500	3280

74	UPPER DOME WALL:(LOOSE ITEMES)	1	1500	600	600	412
74 a	UPPER DOME WALL:RWB SIDE (LOOSE ITEMES)	1				23
75	WATER BOX REMOVAL DEVICE:SWIVEL PIPE ASSEMBLY Front	1	2500	1000	500	1298
75 a	WATER BOX REMOVAL DEVICE:SWIVEL PIPE ASSEMBLY Rear	1	2500	1000	500	1298
76	WATER BOX REMOVAL DEVICELOOSE ITEMS-SHORT/LONG BRKT /SUPP. BLOCKS)	1	2000	500	500	4697
77	WATER BOX REMOVAL DEVICE: FRAME ASSEMBLY	1	2000	500	500	1463
78	WATER BOX REMOVAL DEVICE: FRAME ASSEMBLY	1	2000	500	500	1463
79	STEAM THROW DEVICE -U1	1	1800	610	610	1196.9
80	STEAM THROW DEVICE -U2	1	1800	280	280	103.45
81	CONDENSER LOOSE ITEMS : FASTENERS	1	500	500	500	1500
82	CONDENSER LOOSE ITEMS: ASME BASKET, NAME PLATE ETC.	1	500	500	500	200
83	CONDENSER LOOSE ITEMS :LPH-3 EXT. PIPE	1	3000	1000	500	700
84	CONDENSER LOOSE ITEMS : TOOLS & TACKLES	1	1000	500	500	25
85	STAND PIPE - LOOSE ITEMS	1	4000	1000	500	200
	Total for 1 No. Condenser(Kg)					431986
	Total for 3 nos. condenser of 01 Unit **(MT)**					1295.96

11.1.2 CONDENSER TUBES

S.NO.	**Name of package**	**Qty. per condenser**	**Weight (kg)**
1	Condenser Tubes (SS Welded to SA 249 TP 316L)	22864	**163500**
2	**TOTAL (for 1 no. condenser)**		**163500**

3	**Total (for 3 nos. Condenser)**		**490500**

Condenser Tube Material: SS welded to SA 249 TP 316L

Tube OD x Thickness x Qty.:

For top two rows: Approx. 28.575 mm x 1.244mm x 464 no.'s/ condenser
Air cooled zone: Approx. 28.575 mm x 0.711mm x 1726 nos. /condenser
Remaining Bundle: Approx. 28.575 mm x 0.711 mm x 20674 nos. /condenser
TOTAL QTY: Approx. 22864 no.'s /condenser

11.1.2.1 Notes for condenser:

1. TTP mock-up for tube to tube-sheet end joint qualification is to be performed by contractor on 2744 nos. mock-up blocks identical to tube sheet material with suitable size each having 5 numbers tube holes along with 13720 numbers tube pieces each of 250mm length.
2. Condenser tubes are to be seal welded at site through orbital welding. For orbital welding BHEL welding schedule/ specification will be followed at site.

11.1.3 MS DRAIN TANK

There is 1 No.MS Drain tank for each unit

S. No.	**Name of package**	**Qty.** (Nos.)	**Size of packages** (Tentative)			**Weight** (kg)
1	MSR Drain Tank Assy.	1	4000	2500	2600	4000
2	Stand Pipe Assemblies (3 Nos.)	1	3200	700	700	300
3	Bottom Base Plate with fasteners (2 Sets)	1	1600	500	500	125
4	Magnetic Level Indicator	1	2200	400	400	50
5	Set of Root Valves (50NB,	1	1000	1000	1000	300

	25NB, 15 NB SW) & Safety Relief Valve					
6	Rating Plate	1	500	500	100	2
7	Set of Level Transmitters (5 Nos.)	1	1000	1000	1000	50
TOTAL (1 No. MS Drain Tank)						**4827**

11.1.4 MSR

There are 2 No.'s MSRs for each unit

S. No.	**Name of package**	**Box Qty**(Nos.)	**Size of packages** (tentatively)			**Weight** (kg)
1	MSR (lower half)	1	5300 Dia.	10800 Height	--	59300
2	Base Plate - Lower	1	1300 Dia.	450 Height	--	1350
3	Base Plate - Upper	1	1200 Dia.	100 Height	--	900
4	Bearing Housing Forging - 1	1	950 Dia.	350 Height	--	700
5	Bearing Housing Forging - 2	1	650 Dia.	100 Height	--	170
6	Neopot Bearing	1	600 Dia.	150 Height	--	250
7	Set of Fasteners + NPT Plugs (Lower Half)	1	500 Long	500 Wide	500 Height	50
8	Set of Plate Shims, Fillers & Lugs for Foundation	1	900 Dia.	125 Height	--	300

9	MSR (Upper Half)	1	5300 Dia.	12500 Height	--	125000
10	Rating Plate	1	500 Long	500 Wide	100 Height	10
11	Set of Snubbers (Tie Rods) with Brackets with Fasteners	1	1000 Long	1000 Wide	2000 Height	750
12	Manhole Gaskets (Grooved Metal)	1	700 Long	700 Wide	200 Height	10
13	Set of Fasteners (Upper Half)	1	300 Long	300 Wide	350 Height	30
14	Table Top Structure for Snubber Support	1	6000 Long	2000 Wide	3000 Height	1000
15	MSR Lifting Beam Assy.(common)	1	5500 Long	3200 Wide	1000 Height	6500
TOTAL (1 No. MSR)						**196320**
TOTAL (2 No. MSRs for 01 unit)						**392640**

11.1.5 VACUUM PUMP

There are 4 No. vacuum pumps for each unit

S. No.	Name of package	Box Qty. (Nos.)	Size of packages (tentatively)			Weight (kg)
1	Vacuum Pump	1	6650	2266	3008	8150
TOTAL (1 No. vacuum pump)						**8150**
TOTAL (4 nos. vacuum pump)						**32600**

11.1.6 RE-HEATER CONDENSER TANK (STAGE-1)

There are 2 no. Re-heater Condenser Tanks (Stage-1) for each unit

S. No.	Description	Qty.	Size of packages			Weight(kg)
1	Re-heater Cond. Tank Assy. (Stage-I)	1	4500 Height	1400 Dia.	---	3200
2	Stand Pipe Assemblies (2 Nos.)	1	3000 Long	1000 Height	1000 Wide	200
3	Magnetic Level Indicator	1	2200 Long	400 Height	400 Height	50
4	Set of Root Valves (50NB, 25NB, 15 NB SW)	1	1000 Long	500 Height	500 Height	250
5	Rating Plate	1	500 Long	100 Height	500 Wide	2
6	Set of Level Transmitters (2 Nos.)	1	600 Long	600 Height	600 Wide	20
7	Set of Fasteners (FDN Bolts & Nuts)	1	500 Long	500 Height	300 Wide	20
TOTAL (1 nos. Re-heater Condenser Tank(Stage 1))						**3742**
TOTAL (2 nos. Re-heater Condenser Tank(Stage 1))						**7484**

11.1.7 RE-HEATER CONDENSER TANK (STAGE-2)

There are 2 No.'s Re-heater Condenser Tanks (Stage-2) for each unit

S. No.	Description	Qty.	Size of packages			Weight(kg)
1	Reh. Cond. Tank Assy. (Stage-I)	1	4500 Height	1400 Dia.	---	3300
2	Stand Pipe Assemblies (2 Nos.)	1	3000 Long	1000 Height	1000 Wide	200
3	Magnetic Level Indicator	1	2200 Long	400 Height	400 Height	50
4	Set of Root Valves (50NB, 25NB, 15 NB SW)	1	1000 Long	500 Height	500 Height	250
5	Rating Plate	1	500 Long	100 Height	500 Wide	2
6	Set of Level Transmitters (2 Nos.)	1	600 Long	600 Height	600 Wide	20
7	Set of Fasteners (FDN Bolts & Nuts)	1	500 Long	500 Height	300 Wide	20
TOTAL ((1 nos. Re-heater Condenser Tank(Stage 1))						**3842**
TOTAL ((2 nos. Re-heater Condenser Tank(Stage 1))						**7684**

11.1.8 LP HEATERS

There are 3 nos. LP Heater for each unit

S. No.	Name of package	Box Qty (Nos.)	Size of packages (Tentatively)			Weight (kg)
			L (mm)	W (mm)	H (mm)	
1	ASSY. OF LP HEATER NO.1	1	10400	1750	1800	17000
2	LOOSE ITEMS (SHOP FABRICATED)	1	1000	500	500	100
3	LOOSE ITEMS (BOUGHT OUT)	1	500	500	250	20
4	LOOSE ITEMS (FRAGILE)	1	500	250	250	10
5	FOUNDATION ITEMS	1	500	500	500	200
6	RELIEF VALVES	1	500	500	250	100
7	*BUNDLE REMOVAL TROLLEY	1 per unit	1500	1200	350	825
	TOTAL (1 No. LP Heater)					**18255**
	TOTAL (3 No. LP Heaters / Unit)					**54765**

11.1.9 HP TURBINE MODULES

No.	Description	Dimensions			
		Unit Weight (MT)	L (mm)	W (mm)	H (mm)
1*	HP Main steam valves* (1 complete set)	23.8	4943	3074	2155
	Total weight for HP Main steam valves* (4 complete assembly of stop and control valves)	95.2			
2	HP Bladed Rotor	22	7416	1735	1735
3	Upper HP Casing	29.7	5770	4240	1635
4	Lower HP Casing	34.6	5195	4240	2110
5	HP1 and HP2 diaphragms (1)	2.7	1694	1694	310
6	HP3 and HP4 diaphragms (1)	3.5	1934	1934	383

7	HP5 and HP6 diaphragms + diffuser (1)	4.4	2100	2100	654
8	HP Gland carrier (1 set)	1.1	1275	1275	685
9	HP Front Pedestal (including. journal bearing but w/o main oil pump and turning gear)	10.1	2530	3800	1525
10	HP Rear pedestal (including journal bearing and thrust bearing)	15.2	1295	4590	1540
	Total for HP Turbine(MT)	**242.3**			

'1* - There are 04 Main steam HP inlet valve assembly for 01 unit.

11.1.10 LP TURBINE MODULES- 3 Nos

Sl. No.	**Description**	**Dimensions**			
		Unit Weight (MT)	**L (mm)**	**W (mm)**	**H (mm)**
1	LP Bladed Rotor	61.2	8528	3720	3720
2	Complete upper Exhaust Hood (including Inlet steam box and closings)	33	7010	8140	3190
3	Complete lower Exhaust Hood (incl. Bolting and pedestal cover)	56	7760	8660	3770
4	Upper inner Casing (including Thermal screen)	12.3	2870	4500	2260
5	Lower Inner Casing (including Thermal screen)	12.2	3000	4260	2350
6	LP1 and LP2 Diaphragms	2.8	2470	2470	333
7	LP3 Diaphragms	2	2470	2470	233
8	LP4 Diaphragms	3.4	3076	3076	349
9	LP5 Diaphragms + diffuser	8.3	4580	4580	936
10	LP Gland carrier (1 set)	1.1	1490	1700	1030
11	LP Journal bearing	0.9	1000	1000	420
	Total (for One LP Turbine) Total (for Three LP Turbine)	**193.2** **579.6**			

11.1.11 LP Valves- 6 No.'s

Sl. No.	Description	Unit Weight (MT)	Dimensions		
			L (mm)	W (mm)	H(mm)
1	LP Valves		1650	1500	3000
	Weight of 01 Valve	**15**			
	Total for One Unit (6 No.'s Valves)	**90**			

11.1.12 AUXILIARIES EQUIPMENT

Sl. No.	EQUIPMENT	QTY	VOL (m3)	TOTAL WT. FOR 1 UNIT (kg)
1	Main Oil Tank and Strainer	1 no	85	24750
2	Auxiliary Oil Pump and motor	1 no	4.6	2375
3	Emergency Oil Pump and motor	2 no's	6.9	1900
4	Jacking Oil Pump and motor and Duplex Filter	2 no's	9.1	2600
5	Oil Vapour Exhauster, oil mist filter	2 no's	2.9	1645
6	Misc. Equipment (Valve, accessories, Instrument rack)	1 SET	-	2500
7	Duplex filter Lube Oil	1 no.	5.1	1900
8	Lube oil cooler assembly	1 Set	14.6	12075
9	Oil purifier	1 no.	26.5	5200

10	Gland steam control Valve	1 no.	0.9	450
11	MSR line check valve	1 no.	2.7	1700
12	HP heater 5 Check Valve	1 no.	3.5	1750
13	Deaerator check Valve	1 no.	6.3	4810
14	LP heater 3 Check Valve	1 no.	7.2	4810
15	Other gland steam line valves	1 set		300
16	Thermostatic Valve	1 Set	0.1	145
17	Control Oil Skid Unit	1 set		3600
18	Gland Steam Condenser	1 set		2000
19	Gland Steam Condenser Extractor Fan	1 Set	32	4500
	TOTAL			**79010**

11.1.13 TURBINE PIPING

Sl. No.	SYSTEM	QTY	VOL (m3)	TOTAL WT. (kg)
1	CRH Piping, Bellows, Support Ring and Hanger and Support and Snubbers	1 set	230	76000
2	HRH Piping, Bellows, Support Ring and Hanger and Support and Tie Rod and Snubbers	1 set	180	92000
3	HP Loop Pipe	1 set	10	9500
4	Extraction Pipe Inside Condenser (To Heater 1)	1 set	-	5190
5	Extraction Pipe Inside Condenser (To Heater 2)	1 set	-	2100
6	Extraction Pipe Inside Condenser (To Heater 3)	1 set	-	1170

7	Lube Oil and Jacking Oil System	1 set	-	10972
8	Control Oil, Protection and main steam and Drain Piping	1 set	-	4353
9	Gland Steam piping	1 set	-	21025
10	Condenser to Vacuum Pump Pipe	1 Set	-	9000
11	Gland Steam Condenser to Extractor Fan Pipe and Support	1 Set	-	1000
	TOTAL			**232310**

Note:
CRH piping consists of Stainless Steel material and HRH & HP Loop (MS) piping consists of Carbon Steel material.

11.1.14 PIPING HANGER SUPORTS

Sl. No.	Name of package	Box Qty. (Nos.)	Weight (kg)
1	Bearing Housing Forging - 2	1	45500
2	Neopot Bearing	1	5000
3	Set of Fasteners + NPT Plugs (Lower Half)	1	2100
4	Set of Plate Shims, Fillers & Lugs for Foundation	1	350
5	Aux. for MSR (Upper Half)	1	200
	TOTAL		**53150**

11.1.15 Stairs, platforms, walkways, etc.

Approx. quantity = 35 MT (supplied by MU's).

11.1.16 Turbine governing system

Approx. quantity =26.4M

11.2 BHEL-HARIDWAR SUPPLY

11.2.1 GENERATOR

Sl. No	Description	Size of packages/Qty.	Weight(kg)
1	FOUNDATION PLATES	6400X1680X950	11915

2	FOUNDATION BOLTS	2540X655X600	960
3	FOUNDATION ITEMS	5800X1120X520	2170
4	GENERATOR STATOR	9860X4440X4260	312000
5	GENERATOR ROTOR WITH SKID PLATE	14125X1790X1740	85315
6	END SHIELD LOWER HALF (TE)	3800X1500X2240	9883
7	END SHIELD UPPER HALF (TE)	3800X1500X2240	8883
8	END SHIELD LOWER HALF (EE)	3800X1500X2240	9933
9	END SHIELD UPPER HALF (EE) END SHIELD UPPER HALF (EE)	3800X1500X2240	8933
10	GENERATOR BEARING (EE & TE)	1180X1050X1170	1906
11	BAFFLE RING CARRIER & AIR GAP SEAL ASSY.	2035X1885X1200	1315
12	TERMINAL BUSHINGS	2200X1830X610	1523
13	TERMINAL BUSHING BOX	3500X2600X1740	7337
14	SHAFT SEALS (EE & TE) &OIL CATCHER (INNER & OUTER)	2140X1140X965	1435
15	BAFFLE RING ASSY	2070X1870X1080	1218
16	GENERATOR ACCESSORIES	2140X2140X1240	700
17	FLEXIBLE TERMINAL CONNECTIONS	1350X950X400	592
18	GENERATOR ACCESSORIES	950X950X450	550
19	GENERATOR ACCESSORIES	1000X1000X750	810
20	GENERATOR ACCESSORIES	1700X1200X250	140
21	PRIMARY WATER TANK	10500X2400X1200	2040
22	PW TANK PIPE LINES	4500X1800X500	830
23	PW TANK PIPE LINES	3000X600X500	680
24	PLATFORM FOR PW TANK	5000X1200X600	1190

25	COOLER HOUSING FRAME	4290X4450X1428	21500
26	SEAL RINGS	750X750X200	90
27	CONNECTION PIECE ASSEMBLY	1650X1100X450	858
28	GENERATOR TERMINAL BOXES	2000X1200X600	400
29	DRY AIR BLOWER	1100X1000X700	80
30	ROTOR INSERTION DEVICES	2460X1170X1240	2410
31	ERECTION PEDASTALS	5300X1500X940	5900
32	WIRE ROPES FOR ROTOR	1800X1800X400	330
33	GENERATOR ERECTION DEVICES	3300X1555X1140	1455
34	SPECIAL TOOLS AND TACKLES	800X700X300	145
35	BRUSHLESS EXCITER SET	5750X2350X3400	30400
36	DRY AIR BLOWER AND ACCESSORIES	1800X1500X1100	592
37	EXCITER BED PLATE ACCESSORIES	3900X1250X1150	3000
38	EXCITER ACCESSORIES	2200X1200X1100	1100
39	EXCITER ACCESSORIES (FOUNDATION ITEMS)	1700X1000X800	640
40	RR WHEEL AIR GUIDE COVER	2000X1500X2000	1315
41	SEAL OIL STORAGE TANK	5000X1800X1700	3255
42	PW PUMP AND FILTER UNIT	4000X4000X3000	7065
43	SINGLE FLOW S.O.U. - PART I	4000X2500X3000	5300
44	SINGLE FLOW S.O.U. -PART II	2500X2500X3400	4525
45	LIQUID DETECTOR RACK	2000X600X2000	660
46	GAS UNIT	1980X1640X2420	1205
47	CO2 VAPORISER	1520X840X840	250
48	H2 DISTRIBUTOR	3480X1540X440	333

49	CO2 DISTRIBUTOR	4860X1240X440	353
50	N2 DISTRIBUTOR	1400X1240X440	143
51	DRAIN OIL COLLECTOR	2000X550X550	139
52	RESINS	1200X600X600	100
53	TG SYSTEM INTEGRAL PIPING (VALVES)	2750X1400X1400	2486
54	TG SYSTEM INTEGRAL PIPING (INSTRUMENTS)	1000X940X900	354
55	FRAME FOR SEAL OIL UNIT(JB)	960X940X1950	200
56	CONSUMABLE	800X400X200	55
	TOTAL for ONE UNIT (MT)		**568.896**

11.2.2 Coolers

Sl. No.	**Name of package**	**Weight (kg)**
1	HYDROGEN COOLER	2750
2	HYDROGEN COOLER	2750
3	LOOSE ITEMS (HYDROGEN COOLERS)	750
4	EXCITER AIR COOLER	1980
5	EXCITER AIR COOLER	1980
	TOTAL	**10210**

11.3 NOTES:

- The list is tentative and has been given to enable the contractor to study the nature of work to be done in this contract. There may be variation in size, weight etc. and no claim on this account will be admissible.
- Some of the packages may be sent in parts (knocked down position) to suit the site conditions/transportation. The same is to be assembled at site without any extra cost. Likewise, the package may be assembled together and sent as a single assembly. Contractor may have to dismantle and erect as a single assembly as per the instructions of BHEL engineers without any extra cost to BHEL.

"ANNEXURE-A"

RATE SCHEDULE FOR UNIT No. 8 (RAPP- Rawatbhata)

Sr. No.	Work Description	Quantity	Rate	Total Amount in Rupees
	TG Package of UNIT-8			
12.1	**LUMPSUM PRICE** FOR COMPLETE SCOPE OF WORK FOR **"ERECTION, TESTING, COMMISSIONING, TRIAL OPERATION, PERFORMANCE TESTING AND HANDING OVER OF STEAM TURBINE, GENERATOR, MSR, CONDENSER, STATIC AND ROTATING EQUIPMENT, PIPING AND AUXILIARIES OF THE SYSTEM INCLUDING RECEIPT, HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE AND FINAL PAINTING OF UNIT NO. 8 OF 2X700 MW, RAPP-7&8 OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN"** **(Items as per chapter XI)**	1		
	Grand TOTAL in Rupees			

Notes:

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.

TECHINICAL CONDITIONS OF CONTRACT (TCC)

TENDER NO. BHEL/NR/SCT/RAPP KOTA/STG/UNIT # 8/1173

FOR

"WORK OF ERECTION, TESTING, COMMISSIONING, TRIAL OPERATION, PERFORMANCE TESTING AND HANDING OVER OF STEAM TURBINE, GENERATOR, MSR, CONDENSER, STATIC AND ROTATING EQUIPMENT, PIPING AND AUXILIARIES OF THE SYSTEM INCLUDING RECEIPT, HANDLING OF MATERIALS FROM BHEL/CLIENT'S STORES/YARD, TRANSPORTATION TO SITE AND FINAL PAINTING OF UNIT NO. 8 OF 2X700 MW, RAPP-7&8 OF NPCIL, AT RAWATBHATA, KOTA, RAJASTHAN"

PART-2 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)

Contents of TCC (Part-2)

1.0	**GENERAL REQUIREMENTS**
1.1	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 activity, in such form as may be required by BHEL/NPCIL, the order of procedure in which he proposes to carry out the works as to erection, testing and commissioning activities. The submission to and approval by BHEL/NPCIL of such programme shall not relieve the Contractor of any of his duties or responsibilities under the contract. Detailed procedure for carrying out erection, testing and commissioning, shall be submitted by Contractor for BHEL/NPCIL's approval prior to start of these activities, in a format and contents to be approved by BHEL/NPCIL.
1.2	After submission to and approval by BHEL/NPCIL of such programme 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.
1.3	The contractor shall submit well in advance his scheme for movement/lifting/handling of heavy 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.
1.4	**The contractor shall submit the load test certificate of all the T&P planned to be deployed at site as per BHEL requirement.** Load test of cranes are to be carried out minimum at three points. (Maximum load minimum boom, minimum load at maximum boom and any other point as desired by BHEL)
1.5	The contractor shall submit a third party inspection report, fitness certificate etc. for the T&P planned to be used at site. All the T&P should have all the safety requirements like safe load indicator, back horn, back light and test certificates etc.
1.6	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.
1.7	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.
1.8	The workers employed for special jobs like welding etc. will be tested at site as per BHEL/NPCIL requirement before deployment at job.
1.9	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 on units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/ rectification/ fabrication/ repairs etc. promptly and expeditiously. Daily log sheets indicating the details of work carried out,

	man hours; consumables used etc., shall be maintained by the Contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per relevant clauses of General Conditions of Contract.
1.10	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.
1.11	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.
1.12	Contractor shall erect and commission all the equipment and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.
1.13	It may so happen that certain components like manhole doors, hanger etc. may be supplied in loose items. 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.
1.14	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.
1.15	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.
1.16	The Contractor shall perform any services, tests etc., which may not be specified but nevertheless, required for the completion of work within quoted rates.
1.17	The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.
1.18	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.

1.19	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.
1.20	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.
1.21	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 and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered
1.22	All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipment / components for checking and cleaning, surface preparation, fabrication of structures, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc. as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the Contractor as part of the work within the quoted rates.
1.23	The Contractor shall take delivery of the components, equipment, chemicals, and lubricants etc. from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipment after usage shall be submitted to the BHEL and reconciled periodically.
1.24	For flushing of all primary elements such as orifice plates etc. which can be damaged in the process of cleaning, shall be removed. Orifice plates shall be replaced by suitable dummy plates .For online instruments, bypass lines shall be used for flushing. The on line instruments, which have no bypass, shall be replaced by suitable spool pieces while flushing. All safety and relief valves shall be removed and their stubs blanked. Contractor shall carryout cleaning operations after erection and hydro static test. The piping shall be mass flushed, in addition to specific cleaning operations such as Alkaline flushing operation which shall be carried out for all piping of Turbine cycle as called for.
1.25	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 req. to work.
1.26	Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.
1.27	The details of equipment to be erected under this contract are generally as per the schedule given in relevant appendices. 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 equipment will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.
1.28	Hangers & suspensions, supports etc. for tubes, piping, & ducts etc. will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required. All auxiliary steel brackets required for locating the hangers shall be fabricated and installed by the contractor at no extra cost to BHEL. The material for the same shall be supplied by BHEL
1.29	Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc. have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.
1.30	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 shall carry out the same without any extra cost to BHEL.
1.31	Welding of necessary instrumentation tapping points, thermo-well, thermocouple pad, metal temp pad and clamps, root valve upto nut & tail including reducer (to suit Control & Instrumentation Impulse Piping requirements), condensing vessel, flow metering & measurement devices, and control valves to be provided on main equipment & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be Contractor's responsibility even if:
1.31.1	Items are not specifically indicated under the respective product groups as

	given in the technical specifications.
1.31.2	Items are supplied by an agency other than BHEL.
1.31.3	Pre-heating, NDE, and Post weld heat treatment for above shall be done as per the specifications as part of work.
1.32	Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc. are received in assembled condition as integral part of equipment. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C&I erection agency may do the storage / re-erection calibration etc.
1.33	Fixing and seal welding of thermo-wells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo-wells after hydro test/steam blowing of lines as part of work.
1.34	Actuators/drives of valves, dampers, gates, powered vanes etc. may be required to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
1.35	All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed.
1.36	In installation of various equipment it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipment to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements may be provided by BHEL on free -returnable basis which shall be returned to BHEL after the use.
1.37	The work shall be carried out strictly in accordance to the “Field Quality Plan” approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.
1.38	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.
1.39	**PRELIMINARY WORKS**
1.39.1	The contractor shall, as a first field activity check the foundations for turbine, generator and all auxiliaries for the correctness of the same as per the drawings and satisfy himself in all aspects. He should ensure location of foundations, their consolidation, absence of voids, levels,

	correctness of bolt holes, pockets levels and center lines etc. All measurements should be recorded and submitted to Engineer for approval before erection
1.39.2	Before starting erection job, contractor shall ensure that TG 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.
1.39.3	**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.** Material for above work, if available can be issued by BHEL on returnable basis.
1.39.4	The contractor shall provide his tool stores for special tools and instruments at a convenient location near to the place of working in TG hall. 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.
1.39.5	The contractor shall set up longitudinal and transverse axes and two or more level bench marks accurately on TG floor. BHEL Engineer shall certify these. The certified TG-center lines and datum level shall be the reference for TG and all auxiliaries' erection and alignment work. The contractor shall transfer these axes to all the floors to facilitate further execution.
1.39.6	All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filing and blue matched wherever required. Wherever necessary sealing/ lubricating/ anti-seize compounds shall be applied as per recommendation of Engineer. Machining/ grinding/threading required for fitting of keys, pins, packers, bolts & dowels etc. shall be carried out by contractor at his cost. The contractor is expected to have his own arrangements for machining activities.
1.39.7	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 cost.
1.39.8	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. TG special consumables like hylomar / golden hermetite / stag-b / molykote/ anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor. 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.

2.0	**CIVIL WORKS, FOUNDATION, GROUTING**
2.1	BHEL/NPCIL shall provide all equipment foundations. 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 shall be checked with respect to benchmark. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 75 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.
2.2	While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with Prussian blue to get the required contact with frames.
2.3	The contractor shall ensure perfect matching of packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer. If required the packer plates may have to aligned and fixed on the foundations using special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 20 mm. The material required for this has to be arranged for by the contractor at his cost.
2.4	The Grouting of TG and other equipment will have to be carried out by the Contractor. Arranging all labour, building materials including cement, fresh Portland cement confirming to IS:269 as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra GP1/GP2 or as per technical specification), form work, shuttering, and any other requirements is in the Contractor's scope. All the rotating equipment shall have to be necessarily grouted with quick setting-free flow non-shrink grout mix. Contractor shall obtain approval of BHEL/NPCIL for cement (fresh Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use.
2.5	The contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor
2.6	The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing

	pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check-up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.
2.7	Besides grouting as above, any civil works required for safe and efficient operation of tools and tackles like grouting / excavation/ casting of foundation / anchor points for derricks, winches, guy ropes fastening etc. / foundations required for chemical cleaning pumps, tanks and any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.
2.8	BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL, will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiseling / grinding and de-burr the same. However, machining of the packers wherever necessary shall be arranged by contractor.
2.9	When the base is to be flow grouted, forms shall be built and securely anchored outside the base plate so as to completely confine and withstand the pressure of liquid grout under working and rodding conditions without leaking and high enough to ensure the grout is in contact with the underside of the base plate, provide a head of minimum 100mm above the underside of the base plate. Provisions of grout holes in base plate, rodding arrangements shall be checked prior to commencement of grouting.

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:
3.1.1	Scaffolding and rigging operations
3.1.2	Machine / flame / electric/plasma cutting, grinding, welding, radiography, UT,DPT and MPI testing and stress relieving etc.
3.1.3	Fitting, filing, straightening, chamfering, chipping, scrapping, reaming, as cleaning, checking, levelling, blue matching, aligning and assembly.
3.1.4	Machining, surface grinding, doweling, shaping, threading, filling, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the scope.
3.1.5	Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.
3.2	Any fixtures, scaffolding materials, approach ladder, concrete block supports, anchors steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.
3.3	No members of any ladder / structure / platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost.
3.4	The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion & removed from work site.
3.5	Corrections like straightening of ladders, tube support plates adjustment / removal of ovulates in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carry out such work within finally accepted price / rate as per instructions of Engineer.
3.6	The contractor shall carry out assembly and erection of condenser components normally on the condenser foundation or some of the preassemblies on platform outside TG building. This includes
3.6.1	Assembly and welding of bottom plate, side plates, hot well, springs and steam throw device.

3.6.2	Complete fabrication and welding of shell out of loose side-walls dome walls, and stand pipes.
3.6.3	Assembly and welding of water chambers and water-boxes.
3.6.4	Assembly and welding of support plates, baffles and stiffening structure,
3.6.5	Tubes insertion, expansion and cutting/ trimming and orbital welding. The tubes shall be expanded using an Automatic Electronic Torque Controlled Tube Expanding unit or Pneumatic Tube Expander. Tube expansion shall be checked with dial bore gauge. The total set up including tube expanders and tube cutting tools etc. for carrying out the complete condenser tube expansion works shall be provided by the contractor.
3.6.6	Hydraulic test and water fill test and any other fitting/ assemblies required to complete the assembly.
3.7	The contractor shall carry out the condenser tube insertion and expansion at site after the installation of condenser on its foundation. Condenser tubes shall be handled strictly as per instructions of BHEL Engineer. Before installation of tubes, the contractor shall check for any dents, mechanical damages or any other defects of tubes caused during storage. These should be thoroughly internally and externally cleaned for all extraneous matter as per the directions of the engineer.
3.8	Before insertion of tubes, the contractor shall clean the surface of the holes in the main tube plates and tube support plates for paint, corrosion spots oxide scale etc. as per the instructions of the engineer. Even reaming of support plate holes if required for smooth insertion of tubes, increasing of dia. is to be carried out by contractor at his cost and reaming and its arrangement is to be arranged by contractor.
3.9	The contractor shall carry out the tube insertion & expansion of the condenser strictly in accordance with the instructions issued by the BHEL/NPCIL. Tubes may require adjustment of length on both ends.
3.10	**The welding of expanded joint of the tube end shall be done with the help of single pass automatic gas tungsten arc welding process without using filler material for all positions by means of rotating electrode in an automatic Orbital welding machine after completion of expansion. The necessary orbital welding machine and consumables/gases etc. including qualified welder has to be arranged by contractor within the quoted rates.**
3.11	LP Heater No. 1 is to be erected inside the condenser in rear side, for which contractor may require to cut open the condenser dome plate already erected. After erection, condenser plates have to be strengthened / stiffened as per the instruction of BHEL Engineer
3.12	The contractor shall carry out the condenser neck welding with casing only after final installation of casing. However the contractor shall adjust the gap between condenser neck and LP exhaust hood uniformly by suitably lifting the condenser as directed by engineer. Also the makeup

	pieces required for this purpose shall be fabricated and welded to the dome walls by the contractor.
3.13	Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with petrol or some other suitable reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants for the same will, however, be supplied free of cost by BHEL.
3.14	All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.
3.15	All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to as perfect and as accurately as practicable. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.
3.16	All the motors and equipment shall be suitably doweled after alignment of shafts with tapered/parallel machined dowels. The contractor at his own cost shall arrange for the machining of dowel pins required for the same. However the materials for dowel pins shall be issued by BHEL free of cost.
3.17	The bearings shells will be blue matched at site and checked for bearing clearances. The contractor shall carry out scraping of bearing housing, if required to any extent. No extra claim for blue matching of any two surfaces up to 2mm initial gap will be entertained. The contractor shall also check air gap and adjustment of stator/ rotor to magnetic centre shall be carried out as part of erection.
3.18	The contractor shall fabricate/re-adjust and weld pipes, special bends, as required for installing lube oil systems. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers and piping systems as required.
3.19	The contractor as part of the scope of work if required or if directed by BHEL shall carry out the servicing and realignment of skid-mounted equipment. Decoupling and trial of skid mounted motors is to be done as part of the scope of work.
3.20	All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR value, before they are installed and energized. Bearings, slip rings commutators and other exposed parts shall be protected against ingress of moisture and corrosion during storage and periodically inspected.

3.21	The contractor shall completely erect and test all the piping systems including their hangers, supports, valves, insulation, and accessories including sampling lines and coolers as per specifications and drawings. The services will include welding, pre-heating, stress relieving, bolting, testing, cleaning insulation and painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.
3.22	**MSR INSTALLATION**
3.22.1	The contractor shall arrange suitable capacity trailer and crane, well in advance, to transport MSR components from storage yard to site. At site, BHEL/NPCIL shall provide suitable capacity crane on chargeable basis for placement/erection of MSR. Contractor to provide necessary support, T&P(slings, d-shackles etc.) and manpower assistance in erection.
3.22.2	MSR installation shall be carried out as per the instruction of BHEL engineer at site. The general procedure involved in installation of MSR shall be as follows:
	A. Upper section
3.22.3	Check as built dimensions of concrete support including embedded plate and level.
3.22.4	Mount the bearing support in position.
3.22.5	Lift lower section of MSR in the loading bay to operating floor horizontally using lifting beam.
3.22.6	Tilt lower section to vertical position as per detail shown for upper section of MSR.
3.22.7	Ensure proper orientation of nozzles and lower the lower section in position and support at concrete base at elevation 2.02m position.
3.22.8	Install and fix the bearing support.
3.22.9	Install the support brackets at 11.0 m floor.
	B. Lower Section
3.22.10	Lift upper section of MSR in loading bay horizontally up to operating floor using lifting beam.
3.22.11	Tilt upper section to vertical position.
3.22.12	Ensure nozzles orientation and lower the upper section in position.

3.22.13	Install temporary support brackets at 18.0 m level.
3.22.14	Align both sections of MSR circumferentially and weld approximately 1/3 of the circumference while holding upper section by crane.
3.22.15	Install tie rods and shock absorber at 16.45m and 17.3 m respectively in position as shown in G.A drawing.
3.22.16	Weld the remaining circumferential weld and hydro test shell side as per procedure.
3.23	Most of the pipes shall be supplied un-fabricated in running lengths without beveling. It shall be responsibility of contractor to carry out fabrication by cutting to size, bevel / prepare edges, fabricate support pads, drill holes for drains, vents and other stubs, welding, carryout NDT & SR as per site requirement & as directed by BHEL. Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends upto 100 mm NB will be fabricated at site wherever required.
3.24	The connection to the pipes terminal points including edge preparation, fit-up, welding applicable NDE etc. are in the scope of work. Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh at no extra cost. Minor adjustment like removal of ovality in pipes is in the scope of work. All drains / vents / relief tubes / escape pipes / air relief valves/ safety valve/ piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc. from the piping and equipment erected by the contractor is completely covered in the scope of work.
3.25	Certain adjustments in length may be necessary while erecting high-pressure pipelines. The contractor should remove the extra lengths/ add extra lengths to suit the final layout after preparing edges a fresh by adopting specified heat treatment procedures, at no extra cost.
3.26	It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.
3.27	The contractor shall be responsible for any modifications of shop fabricated pipes prior to installation to accommodate minor site alteration in pipe routing at no extra cost
3.28	All vents and drains for piping equipment covered in the scope whether shown in the drawings or not, shall be terminated outside the TG hall in atmosphere and at sump-pit as directed by the engineer.

3.29	Wherever piping erected by the contractor is connected to equipment/ piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor of this specification.
3.30	Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes/valves for welding.
3.31	The valves will have to be checked, cleaned or overhauled (including lapping of seat) in full or in part before erection and/or after chemical cleaning and during commissioning at no extra cost to BHEL.
3.32	The contractor shall be responsible for correct orientation of all valves so that seats, stems & hand wheels are in desired direction. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.
3.33	Steel for suspensions for piping, will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement.
3.34	No temporary supports should be welded on the piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases heat treatment, if required, shall be carried out by the contractor.
3.35	All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and erected by the contractor. The raw materials required for fabricating such supports shall be supplied by BHEL free of cost and contractor shall be eligible for payment of such additional supports as per applicable rate for item No 5 of rate schedule.
3.36	Spring suspensions/ constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrestors / lockers etc., have to be carried out as and when required.
3.37	Contractor shall install piping in such a way that no excessive or destructive expansion forces exist either in the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.
3.38	The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the

	calibrated torque wrench method or the turn of part method. The procedure to be followed, the tools and the equipment deployed shall be subject to the approval of Engineer. All the torque wrenches shall be calibrated as per requirement and before they are put in use on any job.
3.39	The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer. The contractor shall inspect the hangers associated with the piping systems as follows: a.) After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and complete in all respect ready for start-up. b.) Piping in the hot position with the unit operating at the maximum load. c.) Piping in the cold position during the first complete shut- down.
3.40	The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Separate temporary supports shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the building structure.
3.41	Layout of small bore piping as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out.
3.42	Erection, testing and commissioning of power cylinders, electrically operated valves and their actuators etc. coming under various groups is covered under the scope of this specification
3.43	All valves, including valves, flap valves, dampers and actuators, shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates
3.44	The contractor shall also grind the valve seat, if required, to ensure satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost.
3.45	Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on TG, auxiliaries and pipe lines covered within the scope of this specification, will also be the responsibility of the contractor. The welding of all the above items will be contractor's responsibility even if the:

	Product groups, under which these items are released, are not covered in the scope of this tender. Items may be supplied by any agency other than BHEL.
NOTE:	Additional thermo-wells as required for conductance of the performance guarantee test are to be installed by the contractor.
3.46	Erection of CO_2 and H_2 systems complete in all respects, including cylinders stands, connecting piping, valves, distribution headers, main control panels etc. is in the scope of contractor. The delivery of filled gas cylinders is to be taken from BHEL / its client stores, their handling and filling of gases in the system as and when required, till unit is handed over to the customer, shall be the responsibility of the contractor. The loading/transportation of empty cylinders to be returned to BHEL/its client stores/ for refilling, is in contractor scope.
3.47	Additional platforms and ladders of permanent nature incidental to the job for approaching different equipment / valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor. The materials required will be supplied by BHEL free of cost. Lumpsum rate quoted by the vendor includes the fabrication & installation of these platforms.
3.48	The contractor shall carry out Kerosene oil / dye penetration tests of all the bearing housing of turbine & generator. The Kerosene oil DPT kit for the tests shall also be arranged by the contractor at his cost.
3.49	The contractor is strictly prohibited in using the TG / Aux. Components for any temporary supporting or scaffolding woks etc. In case of such misuse a sum determined by Engineer will be recovered from contractor's bills as penalty.
3.50	The calibration of skid mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will do the erection of the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package.
3.51	The contractor shall assist BHEL in preparation of as built piping drawing.
3.52	The terminal points decided by BHEL shall be final and binding on the Contractor for deciding the scope of work and effecting payment for the work done.
3.53	During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc. or for accommodating erection, rigging etc., the cutting of platforms and grills should be minimum and as approved by BHEL engineer. After completion

	of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.
3.54	Adjustment of spring hangers for piping shall be done by the contractor during initial erection. After initial commissioning trials, it is possible that the spring hangers have to be adjusted repeatedly till the correct spring compression is achieved. Contractor shall do the same to the satisfaction of BHEL engineer. The marking of cold and hot positions on the hangers shall be done by the contractor.
3.55	The lubricants and chemicals required for chemical cleaning, oil flushing, and the lubricants, gases etc. for trial runs of the equipment and trial operation of the unit will be supplied by BHEL free of charges.
3.56	The work on various piping systems will include cutting to required length, edge preparation, laying, fixing & welding of the pipes / elbows / fittings/ valves etc. in the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineers instructions and / or as per approved drawings / documents. The cutting of such excess length & subsequent edge preparation during erection, pre-commissioning / commissioning & normalization of system shall be part of scope of the work of contractor.
3.57	Aligning, matching and welding of piping to the terminal points (such as stubs, on terminal equipment, stubs on headers, battery limits etc.), even if these terminal equipment/point do not form part of this scope of work / specification, and stress relieving and NDE of joints so made is also within the scope of work / specification. Also, where the piping connection to the terminal points involves flanged joints, mounting and welding of flanges on piping as well as terminal equipment matching of flanges as specified elsewhere herein, fixing of gaskets, bolting and tightening as per BHEL engineer's instruction is also in this scope of work / specifications. Required fasteners and gaskets will be supplied by BHEL free of cost.
3.58	Following items of work shall also form part of piping erection: 1) Installation & removal, as applicable, of isolating devices/ NRVS and removal & re-fixing of internals required for hydraulic testing, pre-commissioning and commissioning activities. Required gaskets will be supplied by BHEL free of cost. 2) Matching of flanges for achieving parallelism and alignment resorting to heat correction or other suitable methods as per instructions of BHEL Engineers. 3) To locate the cause of vibrations in pumps or other auxiliaries and to carry out necessary corrections in piping and its supports. This may involve cutting, fresh edge preparation, welding, radiography, stress relieving, etc., of suction, discharge, re-circulating and other connected piping and its supports at number of places.

	4) Increase or decrease in length of piping including change in layout to suit site conditions. 5) Erection, welding, NDE and stress relieving of certain equipment, e.g. flow nozzles, control valves etc., after completion of certain activities e.g. chemical cleaning, steam blowing etc. is part of work. This may involve removal of portions from the already erected pipelines in order to introduce these equipment and resultant edge preparation etc. shall be incidental to work. No separate/ additional payment is envisaged for cutting, welding and edge preparation in this regard. The removed pieces of pipes shall be returned to BHEL stores with proper cleaning, dressing and identification marking. 6) Matching of all fittings like tees, bends, flanges, reducers, valves, socket fittings, etc. with pipes for welding. This may involve weld build up, edge preparation, etc. 7) Cleaning of all pipes, pipe fittings etc. The pipes shall be thoroughly cleaned as prescribed, flushing by compressed air etc. before starting erection. 8) Welding of root valves including reducer (to suit Control & Instrumentation Impulse Piping requirements) with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping. 9) Welding of weld blanks with due NDE & PWHT, if required, on a temporary basis. 10) Opening of valve actuators, dismantling of actuators from the valves, refitting and rendering assistance connected with the electrical and mechanical problems. 11) Fixing and welding including due NDE & PWHT etc. of carrier plates on to the pipes.
3.59	Certain pipe lines of oil, air, steam and water will be field routed as per schemes approved at site or as per the instructions of BHEL engineer, and will be supplied in random lengths / running lengths. The contractor shall lay the piping according to instructions at sites, after carrying out the necessary fabrication, edge preparation, routing, supporting etc., in best professional manner and as per instructions. The supports for field-routed piping shall be fabricated and erected as per the requirement of the work. The steel required for the supports will be provided by BHEL free of cost at their stores.
3.60	All pipelines shall be given proper slope towards the drain points during erection.
3.61	The contractor shall be responsible for correct orientation of all valves so that flow direction, seats, stem and hand wheel are in desired locations. Information regarding orientation of valves, not fully located on drawings, may be obtained from the BHEL engineers.

3.62	It may become necessary to make & install temporary spool pieces for certain process requirements. Contractor's scope shall include preparation, erection, fit-up, welding, NDE etc. and dismantling of such spool pieces at appropriate stage without any additional payment.
3.63	In pipelines like re-heater lines, CRH lines, extraction lines, HP/IP & LP bypass lines etc., the NRVS and valves will also be erected by contractor under this tender specifications. though these NRVS & valves may be supplied from different units / different sources, the erection, alignment, welding, NDE test, heat treatment, radiography, supporting etc. along with their control/ governing oil system piping with tanks, pumps, power cylinders etc. including the oil flushing & commissioning of these valves shall be carried out by contractor as per instruction of BHEL engineer and drawings / documents requirement. Similarly erection / fixing, welding etc. of strainers, dummy devices in various lines, valves and their subsequent removal & re-fixing during pre-commissioning / commissioning stages of steam blowing, flushing etc. shall be carried out by contractor under these tender specifications.
3.64	All temporary lines required for chemical cleaning, hydraulic testing, steam blowing, etc., shall be supplied in 'as is where is' condition. The contractor shall arrange to carry out the required fabrication, dressing, grinding, cleaning, cutting, edge preparation etc., while carrying out erection. No extra claim on this account will be entertained. For human protection, temporary insulation over piping to be applied at no extra cost.
3.65	Before laying the piping on supports, the coordinates and elevations of all supports shall be checked by the contractor for correctness. Discrepancies from the execution drawings, if any, shall be promptly brought to the notice of BHEL engineer in writing and correction shall be carried out as per his instructions.
3.66	Normally, hangers setting in cold condition are done by simulation adding additional temporary weight, which will be roughly equal to the weight of the insulation. Attachment of temporary weights and floating of the joints in the simulation test to be treated as part of job. Hanger settings have to be repeated for achieving free-floating joints. Hanger adjustments to be repeated for steam blowing by resetting hot and cold values if required. This may have to be repeated several times after steam blowing and synchronization. The weights will be supplied by BHEL. Contractor has to transport from BHEL stores and return the same after completion of work. No extra claim on this account will be entertained.
3.67	The weld grooves of MS line, HRH line, CRH line and other pipes will be as per BHEL standard specifications. Further, the edge preparation shall be done as per instruction of BHEL site engineer and same shall be binding on the contractor.
3.68	For the skid mounted equipment, the checking and realignment required at site is in the scope of work.

3.69	Overhauling, cleaning, servicing of pumps, governing system, equipment, valves etc. During erection and commissioning stages, are in the scope of work. Gaskets/packing for replacement will be provided by BHEL free of cost. All equipment shall be preserved and protected periodically before and after erection as per the advice of BHEL engineer at no extra cost. All motors should be, if necessary, serviced and reassembled before erection as per the advice of BHEL engineer.
3.70	Contractor shall provide the following for STG set and other related equipment with auxiliaries' erection: 1) Temporary bolts of required size for honing of generator and turbine couplings. 2) Spanner & torque wrench/bolt stretching device for stretching / tightening of load and accessories coupling bolts.
3.71	All jack bolts that are required during erection for carrying out roll-check, grouting of packers etc. will have to be arranged by the contractor. No jack bolts will be provided by BHEL.
3.72	The equipment such as rotors, casings, HP module, valve assembly etc. are stored in closed/semi-closed/open sheds. For shifting and loading of these equipment onto trailers from closed/open storage sheds, a portion of shed may be required to be dismantled for providing approach to trailer and crane. The dismantled portion of the stores will be required to be reinstated. Such needful dismantling and reinstating of the closed/open sheds for shifting, loading and transportation of the material is covered in the scope of this contract with no extra cost to BHEL.
3.73	The scope of erection/welding/assembly works in the condenser is enormous. There are 03 no.'s condenser in each unit. The start and progress of LP turbine works is directly linked to completion of the condenser works. Therefore, to meet project schedule and for the sake of uninterrupted works of Turbine, it is recommended that there shall be parallel working in the 03 condensers with requisite no. of gangs, welders, foreman and supervisor deputed individually for each condenser. The contractor has to plan parallel erection of the 03 condensers of this unit and submit erection plan for the same with requisite manpower and T&P deployment details to BHEL site/package In-charge. Any further augmentation in these shall be decided by BHEL site in line with the requirements of the project schedule/rolling plan/customer requirement. The decision of BHEL with regards to augmentation in deployment for achieving progress in line with project requirement, shall be final and binding on contractor.

4.0	**WELDING, HEAT-TREATMENT, RADIOGRAPHY AND NDT**
4.1	Contractor shall carry out field welding of piping as per relevant sections under these specifications in conjunction with NPCIL specifications for Field Welding of Piping . In case of any conflict between these two, NPCIL specifications for Field Welding of Piping shall be binding on the contractor. The method of welding (arc, gas, TIG or other method) may be indicated in the detailed drawings / schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.
4.2	Welding of equipment, piping, high tensile structural steel shall be done by certified high pressure welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall not be utilized for any works.
4.3	All welders like structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.
4.4	Engineer may stop any welder from the work if his performance is unsatisfactory for any reason or if there is a high percentage of rejection in the joints welded by him. The welder having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.
4.5	Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor’s expense. The Engineer, prior to any repair being made, shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the engineer.
4.6	The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas. All arrangements required for the above shall be the responsibility of the contractor at no additional cost. In this regard, the welding manual/drawing

	and WPS shall be referred and BHEL engineer's decision in this regard shall be final and binding on contractor.
4.7	All expenses for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of raw material required for making test pieces may be supplied by BHEL free of cost.
4.8	The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.
4.9	**Only BHEL/ CUSTOMER approved electrodes and filler wire are to be arranged and used by the contractor, within the finally quoted price.** BHEL/ NPCIL reserve the right to test from the certified lab of approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number/ batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven shall also be calibrated and test certificate from Govt. approved/ accredited test house traceable to National/ International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same.
4.10	All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost to BHEL.
4.11	The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final.
4.12	The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer.
4.13	All welds shall be painted with anticorrosive red oxide paint once radiography and stress relieving works are over. Necessary consumables and scaffolding etc. including paints shall be provided by contractor at his own cost.

4.14	Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.
4.15	Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. The contractor should take a note of the following:
4.15.1	Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
4.15.2	All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.
4.15.3	The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.
4.16	The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test/Ultrasonic testing etc. as required as per welding schedules / drawings within the finally accepted price / rates.
4.17	The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL/NPCIL.
4.18	Contractor for radiography work shall use iridium-192/cobalt-60/any other source as may be required/ specified. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).
4.19	Low speed high contrasts, fine grain films (D-7 or equivalent) in 10 cm width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.
4.20	All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrometer as per ASME or ISO must be used for each exposure.

4.21	Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.
4.22	Lead intensifying screens for front and back of the film should be used as per the above-referred ASME specification.
4.23	The joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down streamside of the weld.
4.24	For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.
4.25	Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.
4.26	All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.
4.27	The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.
4.28	Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule / IBR / Customer's requirements. **The percentage may be increased depending upon the quality of joints and at the discretion of BHEL**. However, on LP piping joints other NDT test as called for in the FQP including LPI,UT, MPI and HT will have to be carried out as per customer and BHEL requirement.
4.29	All the Radiographs shall be properly preserved with proper documentation and shall become the property of BHEL after submission. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.
4.30	Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.

4.31	Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.
4.32	Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation at his cost.
4.33	However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.
4.34	If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.
4.35	Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of progress. The contractor shall make all necessary arrangements including labour, supervisors/ Engineer required for the work as per directions of BHEL.
4.36	The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.
4.37	Check shots as per the requirement of BHEL/ NPCIL will be taken at the contractor’s cost.
4.38	All weld joints on piping shall be ground or filed on completion of welding and before radiography as per instructions BHEL engineer so as to achieve smooth surface free of notches, ripples, undulations, etc. and to limit the reinforcement as per the codes.

5.0	**APPLICATION OF INSULATION**
5.1	Application of red oxide paint including supply of paint on welded portions, before insulation as directed by BHEL is also included in scope of work.
5.2	Application of insulation on STG, piping etc. is not covered in this scope of work. However, necessary assistance for carrying out insulation of equipment and systems covered in this package will be in the scope of contractor. The contractor shall facilitate the insulation agency in carrying out the insulation work by providing fronts which are cleared of temporary supports, clits and any other fittings. All the required testing (e.g. NDT, UT and other checks) of the area cleared for insulation shall be completed as per the quality plans.
5.3	All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated by the TG contractor, as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost.
5.4	After completion of insulation by the insulation agency, if due to reasons attributable to the TG contractor, the insulation is required to be removed /dismantled, and then the TG contractor will be responsible for the re-application of the insulation at his cost. If the contractor fails to do so to the satisfaction of the engineer, then BHEL reserves its right to get it done on risk and cost basis of the TG contractor.

6.0	**PAINTING INCLUDING FINAL FINISH PAINTING**
6.1	BHEL Specification for Shop & Field Painting with regard to surface preparation and final painting with colour codes and scheme for surface preparation and finish paints coating including primer coating for shop and field painting will be given at site at the time of painting work. Contractor shall carry out surface preparation and final painting works as per BHEL specification and instruction of BHEL engineer at site.
6.2	Paints and painting work carried at site shall confirm to the following codes and standards: IS:5 – Colour for ready mixed paints and enamels IS : 101 Part 1 to 9 – Methods of sampling and test for paints, varnishes and related products IS : 1477 Part I&II – Code of practice for painting of ferrous metals in building IS : 2932 – Specifications for enamel, synthetic and exterior, a) Under Coating b) Finishing IS: 9407 – Colour code for identification of pipelines used in thermal power plants. Contractor shall satisfy himself, availability of all information in the specifications for proper selection of the paints and ensure their applications as per Codes.
6.3	All the primer, thinner & paints for final painting and all other consumables like brush, cleaning agents etc. and all T&P including scaffolding materials, manpower, supervision is in contractor's scope.
6.4	Primer Painting: a) After surface preparation, two coats of epoxy resin based zinc primer shall be applied. Dry film thickness of each coat shall be as per the recommendations of primer or paint manufacturer. Primer shall be applied by either spraying or brushing ensuring a continuous film without "holidays". Primer coat shall be immediately applied without any time lag after the surface preparation. b) Any equipment shall be carefully examined and where ever the primer coat is damaged shall be recoated with primer. However over the field welds, bolts and nuts etc. two primer coats as per a) shall be applied.

6.5	Final Finish Painting 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. 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 (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.
6.6	Components of TG and auxiliaries will in general be supplied painted by BHEL manufacturing units as per their standard applicable painting schemes. Contractor shall carry out primer and finish painting coats and DFT requirement with colour codes & specifications as per requirement of customer. All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.
6.7	Touch-up painting on damaged areas after completion of finish painting – a) For coatings damaged up to metal surface -Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer 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.

6.8	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 bidder. (a.) Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
6.9	The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc. of approved colour as per the standard colour codes and specifications specified in tender specification or as advised by BHEL or Customer engineer at site for the equipment or components covered in these specifications. Supply of applicable paints and primer is in Bidder's scope.
6.10	The condenser main tube plates will be dispatched to site from the works with surface protection only on water box side. The same shall be removed adopting any of the suitable methods as approved by BHEL. The Main Tube plates are having SS cladding on the outer side and may not require separate surface protection. The water box/Chamber has to be surface protected. The surface shall be first painted with at least two or more coats of approved quality chemical resistant epoxy zinc chromate primer after thoroughly cleaning all such parts of al dirt, rust scales greases, oils and other foreign materials by adopting suitable methods as approved by BHEL. Afterwards the above parts shall be finished with two or more coats of approved quality high build black coal tar coating. Before the painting is taken up, the contractor shall plug all the holes with suitable tapered plastic / wooden plugs to avoid any damage to the tube ends. The plastic / wooden plugs and paints required for the above operations shall have to be arranged by the contractor at his cost. **The above paints are also to be applied on water chamber / box.** The thickness is to be confirmed by suitable measurement. **The inside of water box has to paint with High build Black Coal Tar epoxide paint of thickness DFT= 0.25mm.**
6.10.1	The condenser steam space shall be surface protected with at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces to be coated by adopting suitable methods. The contractor at no extra cost shall provide steam washable paint to BHEL.
6.11	In certain isolated instances where it is not possible to clean the equipment as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.
6.12	Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The Contractor at his own cost shall provide all the consumables and application implements.

6.13	During the preparation of surface, if the shop coat is damaged by chemical cleaning or by mechanical means, contractor shall repair the same free of cost. Also, due to long storage, the surface may get damaged due to rusting, pitting etc., the contractor will have to repair the surface and apply primers, painting and finish painting as per painting schedule, within this scope of work and no extra cost to BHEL.
6.14	This work requires working at higher altitudes from ground level to as high as 30m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc. and climber used should be of standard quality for safe and smooth execution of work.
6.15	Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.
6.16	Contractor shall take due care to cover or protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.
6.17	In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc. will be carried out by brush painting. However, areas/equipment inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.
6.18	Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions
6.19	Supply of Paints/Primer/Thinner and application of paints for final painting and all other consumables like brush, cleaning agents etc and all T&P including scaffolding materials, manpower, and supervision is in contractor's scope.
6.20	**Final Painting Scheme for the equipment of this package scope at RAPP shall be issued during execution.**

7.0	**TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING**
7.1	The contractor shall carry out the following tests & activities for commissioning of Steam Turbine Generator & its auxiliaries:
7.1.1	Trial run of vacuum pumps, Oil pumps and other pumps of various auxiliaries and various rotating machineries/ pumps.
7.1.2	Trial run of motors/ drives of various auxiliaries.
7.1.3	Hydraulic test of pipe lines, closed systems, tank & vessels.
7.1.4	Flushing of all pipelines/tanks by air/ oil/ water/ chemicals/ steam as per requirement.
7.1.5	Servicing of all valves, Hydraulic Power cylinders, HP Valves (ESV&CV) 04 No.'s, LP Valves- 06 no.'s, LP Bypass valves and fittings.
7.1.6	Manual/ mechanical cleaning of oil tanks, suction strainers, filter elements of pumps & other various equipment and tanks, vessels as per requirement till handing over of the machine.
7.1.7	Chemical/Alkali cleaning of piping systems. (Vulnerable components like spray nozzles, gauges, instruments etc. shall be dis-assembled and re-assemble as per requirement)
7.1.8	Putting turbine on barring gear
7.1.9	Rolling and synchronization
7.1.10	Full load operation.
7.1.11	Trial Operation, Operational acceptance and Handing Over.
7.2	These shall include hydraulic test of condenser, MSR, Heaters and tanks, land flow test, chemical cleaning, alkali flushing and water flushing of piping, oil flushing of oil system and seal oil system etc. as instructed by BHEL.
7.3	All the chemicals required for carrying out these pre-commissioning/commissioning activities will be supplied by BHEL free of cost.
7.4	All required tests (Mechanical and electrical),Motor testing(HT&LT) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. All the test equipment other than provided by BHEL as per clause no. 5.1 of TCC, has to be arranged by contractor at no extra cost to BHEL.

7.5	Any Specialized test equipment other than that specified in clause no. 5.1, may be provided by BHEL / its client free of hire charges. However contractor has to take proper care of the equipment issued to him.
7.6	The contractor shall carry out the air-tightness test on assembled generator to the satisfaction of BHEL Engineer. The necessary arrangement for testing with dry-clean air shall be made by the contractor at his cost. **Helium Leakage Test- The contractor shall carry out the Helium Leakage Test on assembled generator to the satisfaction of BHEL Engineer. The necessary arrangement/ test kit for carrying out the Helium Leakage test shall be made available by the contractor at his own cost.** The contractor may have to repeat the test, if BHEL/NPCIL is not satisfied with the results, at no extra cost to BHEL. This is a standard test for all 660 MW generators and shall be conducted at site as per procedure provided by BHEL during execution.
7.7	All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall repairs all joints (shop welded or site welded) failed during testing.
7.8	All chemicals/oil/pipes required for conducting Detergent flushing, oil flushing, steam blowing etc. of the pipelines of this scope, will be supplied by BHEL / its customer.
7.9	Contractor shall lay temporary pipelines with fittings and accessories etc. as instructed by BHEL engineer for the purpose of pre-commissioning and commissioning activities like Hydraulic testing, chemical cleaning, oil flushing, steam blowing etc. of piping and other equipment as part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this technical specification
7.10	Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipment and valves and handing over to BHEL/customer. No separate payment on this account shall be entertained.
7.11	Thermal shocks may be required during oil flushing operations. The contractor is required to make all arrangements for the same. This would include fabrication of heating tank with nozzles and requisite piping with supports. Complete erection with pumps, tanks, electrical fittings including and other accessories is to be carried out. The equipment shall be provided on returnable basis by BHEL.
7.12	The scope of pre-commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, steam blowing or for any other tests as the case may be and will

	carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off-site disposal of effluents.
7.13	It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.
7.14	The pre-commissioning activities will start prior to lube oil flushing of the TG and various trials, commissioning operations shall continue till the TG is handed over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, Chemicals etc.
7.15	All these works need specialized gangs including electricians, instrument technicians, and fitters, in each area to render assistance to BHEL commissioning staff. 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 sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.
7.16	Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
7.17	It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL/Customer Engineers and hence overtime payment by the contractor may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.
7.18	In case, any rework is required because of contractor’s faulty erection that is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle/open up the equipment / part and reassemble / redo the work without any extra claim.
7.19	During commissioning, opening / closing of valves, changing of gaskets/seals of equipment/pumps, realignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. This is included in the scope of work.
7.20	The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping equipment covered in the specification at no additional cost.
7.21	The water boxes of the condensers will be tested hydraulically to 1.5 times the design pressure after its assembly at site. The arrangement of all the blanking for carrying out the hydraulic test shall be the responsibility of the contractor at no additional cost. However, only the main blanking flanges

	with fasteners for CW inlet and CW outlet of the condenser shall be provided by BHEL free of cost. Fabrication of blanks will be carried out by the contractor.
7.22	The water-fill test of the steam space shall be carried out by filling the water upto 1 Meter or as required above the top row of tubes to facilitate leak detection. Hydraulic testing shall be carried out on the condenser water boxes i.e. of the water side of the condenser. Dummy plates shall be provided by BHEL.
7.23	The contractor shall fill the condensers upto the specified level as many times as called for by the Engineer for checking of the turbine at no additional cost.
7.24	In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any re-adjustment and realignment including repair, rectification and replacement work are necessary, the contractor shall carry out the same as per Engineer's instructions. The parts to be replaced shall be provided by BHEL.
7.25	During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.
7.26	The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced.
7.27	Cleaning & servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor till the completion of trial operation and handing over of the unit within the quoted price.
7.28	The contractor shall incorporate all the changes / decisions proposed by BHEL Engineer at no additional cost.