

TENDER SPECIFICATION No.

BHE/PW/PUR/KRSR-STG/1555

FOR

Assistance during RLA, Dismantling of parts of existing Turbine, Generator, Condenser and Auxiliaries & other components, Disposal of the same to scrap yard, Transportation of materials from Customer storage to site of work and carrying out modifications as required, Erection, Testing, Commissioning & Overhauling and Application of Insulation/cladding, painting including supply of paints for the work of Energy Efficient Renovation & Modernization & Retrofitting of existing 1x210 MW, Unit-6 TG set and auxiliaries and TG piping.

AT

**Koradi Thermal Power Station
Of
Maharashtra State Power Generation Company Limited
District: Koradi, Maharashtra**

TECHNICAL BID - VOLUME- I

Volume I Tender Specifications consists of:

- **Notice Inviting Tender**
- **Volume 1 A - Technical Conditions of Contract,**
- **Volume 1 B - Special conditions of Contract,**
- **Volume 1 C - General conditions of Contract**
- **Volume 1 D - Forms & Procedures**



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)

Power Sector – Western Region-SAS

345, Kingsway, Shreemohini complex, 5th floor -Nagpur- 440 001

Tender Specification No.

BHE/PW/PUR/KRSR-STG/1555

For

Assistance during RLA, Dismantling of parts of existing Turbine, Generator, Condenser and Auxiliaries & other components, Disposal of the same to scrap yard, Transportation of materials from Customer storage to site of work and carrying out modifications as required, Erection, Testing, Commissioning & Overhauling and Application of Insulation/cladding, painting including supply of paints for the work of Energy Efficient Renovation & Modernization & Retrofitting of existing 1x210 MW, Unit-6 TG set and auxiliaries and TG piping.

AT

Koradi Thermal Power Station
Of
Maharashtra State Power Generation Company Limited
District: Koradi, Maharashtra

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

M/s.

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PLEASE NOTE:

THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

ADDITIONAL GENERAL MANAGER (Purchase)

Place: Nagpur

Date :

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1555

NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

Bharat Heavy Electricals Limited



NOTICE INVITING TENDER (NIT)
**NOTE: BIDDER MAY DOWNLOAD FROM WEB
SITES
OR
PURCHASE TENDERS FROM THIS OFFICE ALSO**

To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION
i	TENDER NUMBER	BHE/PW/PUR/KRSR-STG/1555
ii	Broad Scope of job	Assistance during RLA, Dismantling of parts of existing Turbine, Generator, Condenser and Auxiliaries & other components, Disposal of the same to scrap yard, Transportation of materials from Customer storage to site of work and carrying out modifications as required, Erection, Testing Commissioning & Overhauling and Application of Insulation/cladding, painting including supply of paints for the work of Energy Efficient Renovation & Modernization & Retrofitting of existing 1x210 MW, Unit-6 TG set and auxiliaries and TG piping at Koradi Thermal Power station of M/s MSPGCL, Distt.- Koradi, Maharashtra
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i>
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	✓ <u>Sale from BHEL PS Regional office at :</u> Start : 27/10/2015 , Closes: 10/11/2015 ,Time : 16.00 Hrs Applicable

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		✓ From BHEL website (www.bhel.com) Tender documents will be available for downloading from website till due date of submission	
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 12/11/2015, Time 15.00 Hrs Place : <u>BHEL PS Regional office at :Nagpur</u> Tenders being submitted through representative shall be submitted at dispatch section of of PSWR HQ Office after making entry/registration at the reception. For any assistance on the matter kindly contact following officials: Pratish Gee Varghese/Sr Engineer(Purchase Shivkesh Meena / Engineer (Purchase) Nirmal PG / Asst. Engineer(Purchase)	Applicable
vi	OPENING OF TENDER	1 hours after the latest due date and time of Offer submission Notes: (1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day. (2) Bidder may depute representative to witness the opening of tender.	Applicable
vii	EMD AMOUNT	Rs 2,00,000/- (Rupees Two Lakhs Only).	Applicable
viii	COST OF TENDER	Rs 2000/-.	Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	3 days before the due date of offer submission. Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	SCHEDULE OF Pre Bid Discussion (PBD)	Date :	Not applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)		Not Applicable
xii	Latest updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) and not in the newspapers . Bidders to keep themselves updated with all such information	

<p>Registered Office : BHEL House, Siri Fort, New Delhi – 110 049, India Website : www.bhel.com</p>

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- 2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & stamped on each page, as part of offer. Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.
- 3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur 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 Nagpur, Sundays and second/ last Saturdays
- 4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Nagpur. For other details and for 'One Time EMD' please refer General Conditions of Contract.
- 5.0 **Procedure for Submission of Tenders:** The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:
- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
 - PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
 - One set of tender documents shall be retained by the bidder for their reference
- 6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped)**

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:	

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CONTAINING THE FOLLOWING:-		
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	<p>Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.</p> <p>Note:</p> <p>a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained.</p> <p>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.</p> <p style="padding-left: 40px;">i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL</p> <p style="padding-left: 40px;">ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender</p>	
iii.	<p>Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria.</p> <p>It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.</p>	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/ Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : <u>Technical</u> Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

PART-I B	
	<p>ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:-</p>
i.	<p>1. Earnest Money Deposit (EMD) in the form as indicated in this Tender</p> <p style="text-align: center;">OR</p> <p>Documentary evidence for ‘One Time EMD’ with the Power Sector Region of BHEL floating the Tender</p> <p>2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)</p>

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

OUTER COVER	
	<p>ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:</p>
i	o Envelopes I

	<ul style="list-style-type: none">○ Envelopes II○ Envelopes III	
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SPECIAL NOTE : All documents/ annexures submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

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

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

9.0 **Assessment of Capacity of Bidders:**
Bidders capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

I. **LOAD:** Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The 'Load' is the sum of the unit wise identified packages (refer Table-1) for contracts with BHEL Regions. The cut off month for reckoning 'Load' shall be the month, two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if latest bid submission is in Aug 2011, then the 'load' shall be calculated upto and inclusive of June 2011)

i). Total number of Packages

Total number of Packages in hand = P

Where

- 'P' is the sum of all unit wise identified packages under execution with BHEL Regions as of the cut off month defined above, including packages yet to be commenced, excepting packages which are on HOLD due to reasons not attributable to Bidder..

II. **PERFORMANCE:** Here 'Monthly Performance' of the bidder for all the packages (**under execution**/ executed during the 'Period of

Assessment' in all the Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the month two (2) months preceding the month corresponding to the 'latest date of bid submission', in the following manner:

(Note: For example if 'latest date of bid submission' is in Aug 2011, then the 'performance' shall be assessed for a 6 month period upto and inclusive of June 2011, for all the unit wise identified packages (refer Table I)

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

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

- a) $P_1, P_2, P_3, P_4, P_5, \dots, P_N$ etc be the packages (**under execution**/ executed during the 'Period of Assessment' in all Regions) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = P_T (i.e $P_T = P_1 + P_2 + P_3 + P_4 + \dots + P_N$)
- 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 ' T_T ' for total similar Packages ' P_T ' for all Regions (i.e $T_T = T_1 + T_2 + T_3 + T_4 + \dots + T_N$)
- c) Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, S_{1-5}, \dots, S_{1-N}$) for similar package P_1 , for the 'period of assessment' ' T_1 ' (i.e $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots + S_{1-N}$). Similarly S_2 for package P_2 for period T_2 , S_3 for package P_3 for period T_3 , etc for the tendered scope for all Regions. Now calculate cumulative sum ' S_T ' of 'Monthly Performance Evaluation' Scores for total similar Packages ' P_T ' for all Regions (i.e ' $S_T = S_1 + S_2 + S_3 + S_4 + S_5 + \dots + S_N$.)
- 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):

Aggregate of Performance scores for all similar packages in all the Regions

= -----

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Aggregate of months for each of the similar package for which performance should have been evaluated in all the Regions

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

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

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

Sl n o	Item Description	Details for all Regions							Total
		(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P ₁	P ₂	P ₃	P ₄	P ₅	...	P _N	Total No of similar packages for all Regions = P_T ie Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment for corresponding similar Package	T ₁	T ₂	T ₃	T ₄	T ₅	...	T _N	Sum (Σ) of columns (iii) to (ix) = T_T

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	(as in row 1)								
3	Monthly performance scores for the corresponding period (as in Row 2)	S ₁₋₁ , S ₁₋₂ , S ₁₋₃ , S ₁₋₄ , ...	S ₂₋₁ , S ₂₋₂ , S ₂₋₃ , S ₂₋₄ , ...	S ₃₋₁ , S ₃₋₂ , S ₃₋₃ , S _{3-T2} , ...	S ₄₋₁ , S ₄₋₂ , S ₄₋₃ , S ₄₋₄ , ...	S ₅₋₁ , S ₅₋₂ , S ₅₋₃ , S ₅₋₄ ,	S _{N-1} , S _{N-2} , S _{N-3} , S _{N-4} , ...	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S ₁	S ₂	S ₃	S ₄	S ₅	...	S _N	Sum (Σ) of columns (iii) to (ix) = S_T

- ii) Calculation of Overall ‘Performance Rating’ (**R_{BHEL}**) in case ‘similar Package/Packages’ for the tendered scope ARE NOT AVAILABLE, during the ‘Period of Assessment’:

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

- a) ‘Period of Assessment.
- b) 12 months preceding the cut-off month
- c) 24 months preceding the cut-off month
- d) 36 months preceding the cut-off month

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

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

Sl no	Overall Performance Rating (R _{BHEL})	Corresponding value of ‘L’
1	=60	NA
2	> 60 and ≤ 65	0.4
3	> 65 and ≤ 70	0.35
4	> 70 and ≤ 75	0.25

5	> 75 and < 80	0.2
6	≥ 80	NA

III. ‘Assessment of Capacity of Bidder’:

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

Max number of packages $P_{Max} = (R_{BHEL} - 60)$ divided by corresponding value of ‘L’

i.e. $(R_{BHEL} - 60)/L$

Note:

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

The Bidder shall be considered ‘Qualified’ as per ‘Assessment of Capacity of Bidder’ for the subject Tender if $P \leq P_{Max}$ (where P is calculated as per clause 9.I)

IV. Explanatory note:

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

Table-1

	Civil	Electrical & CI	Mechanical
	i). Enabling works	i). Electrical	i). Boiler & Aux (All types including CW Piping if applicable)
	ii). Pile and Pile Caps	ii). CI	ii). Power Cycle Piping/Critical Piping
	ii). Civil Works including foundations	iii). Others (Elec & CI)	iii). LP Piping

	<ul style="list-style-type: none"> v). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower ii). Others (Civil) 		<ul style="list-style-type: none"> iv). ESP v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux iii). Turbo Blower (including Steam Turbine) ix). Material Handling x). Material Management xi). Material Handling & Material Management xii). Others (Mechanical)
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c) Bidders who have not been evaluated for at least six package months in the last 36 months in the online BHEL system for contractor performance evaluation in BHEL PS Regions, wef July'2010 shall be considered "NEW VENDOR".

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

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

The "FIRST TIMER" tag shall remain till execution of work for a period of not less than 09 months, from the commencement of work of first package

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

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

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- d) In the unlikely event of all bidders shortlisted against Technical and Financial Qualification criteria not meeting the criteria on 'Assessment of Capacity of Bidders' detailed above, OR leads to a single tender response on applying the criteria of 'Assessment of Capacity of Bidders' or due to non-approval by Customer, then BHEL at its discretion reserves the right to consider the further processing of the Tender based on the **Overall Performance Rating 'R_{BHEL}'** only, starting from the upper band.
- e) 'Under execution' shall mean works in progress as per the following:
- i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries
 - ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)
 - iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.
- Note : BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (i), (ii) and (iii) above, depending upon the balance scope of work to be completed.
- f) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work

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

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking

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clarification may not be normally entertained by BHEL and no time extension will be given.

- 12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.
- 13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.
- 14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.
- 15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**
- 16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.
- 17.0 In case BHEL decides on a 'Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.
- 18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.
- 19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be

intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDS' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.

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

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

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

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

23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.

23.2 'Stand alone' bidder cannot become a **'Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected.

23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR

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

23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre

.....
Qualifying Requirements' specified for the respective package, (ii)
"Assessment of Capacity of Bidder' as specified in clause 9.0

- 23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'
- 23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified
- 23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.
- 23.9 Prime Bidder shall be responsible for the overall execution of the contract
- 23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats
- 23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.
- 23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.
- 23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.
- 23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

-
- 23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also
- 24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.
- 25.0 The bidder may have to produce original document for verification if so decided by BHEL.
- 26.0 Order of Precedence
In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:
- a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
 - b. Notice Inviting Tender (NIT)
 - c. Price Bid
 - d. Technical Conditions of Contract (TCC)—Volume-1A
 - e. Special Conditions of Contract (SCC) —Volume-1B
 - f. General Conditions of Contract (GCC) —Volume-1C
 - g. Forms and Procedures —Volume-1D

It may please be noted that guidelines/rules in respect of suspension of business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', etc may undergo change from time to time and the latest one shall be followed.

for BHARAT HEAVY ELECTRICALS LTD

AGM Pur

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
04. Annexure-3: Important Information.
- 05 Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	Assistance during RLA, Dismantling of parts of existing Turbine, Generator, Condenser and Auxiliaries & other components, Disposal of the same to scrap yard, Transportation of materials from Customer storage to site of work and carrying out modifications as required, Erection, Testing, Commissioning & Overhauling and Application of Insulation/cladding, painting including supply of paints for the work of Energy Efficient Renovation & Modernization & Retrofitting of existing 1x210 MW, Unit-6 TG set and auxiliaries and TG piping at Koradi Thermal Power station of M/s MSPGCL, Distt.- Koradi, Maharashtra.		
Tender NO	BHE/PW/PUR/KRSR-STG/1555		
SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document. Bidder must fill up this column as per applicability
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium/Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	NOT APPLICABLE	
B	<p><u>Technical</u></p> <p><u>Bidder must have achieved B.1 or B.2 or B.3 or B.4</u></p> <p>B.1 Executed Erection Testing & Commissioning (E T & C) of One STG/GTG job of one unit of 100 MW or higher.</p> <p style="text-align: center;">OR</p> <p>B.2 Executed Erection Testing & Commissioning (E T & C) of One GTG job of one unit of 190 MW or higher.</p> <p style="text-align: center;">OR</p> <p>B.3 Executed E T & C of Atleast One Boiler (With Rotating Machines up to synchronization) of 190 MW or higher, under direct order of BHEL subject to:-</p> <p>a) Experience of (Executed) E T & C of STG of atleast 60 MW.</p> <p style="text-align: center;">OR</p> <p>b) Entering into a technical tie up with an agency who has experience of (Executed) E T & C of STG of 60 MW or above.</p> <p style="text-align: center;">OR</p>	APPLICABLE	

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	<p>B.4 Executed '<u>E T & C of STG</u>' / '<u>R&M of STG</u>' of 100 MW or higher unit, as per the criteria below:-</p> <p>a) One job of Value not less than Rs 265 Lakhs against Single Work Order. OR</p> <p>b) Two jobs, each of Value not less than Rs 165 Lakhs against maximum two Work Orders OR</p> <p>c) Three jobs, each of Value not less than Rs 135 Lakhs against maximum three Work Orders.</p>		
C	<p><u>Financial TURNOVER</u></p> <p>Bidders must have achieved an average annual financial turnover (audited) of Rs 100 lakhs or more over last three Financial Years (FY) i.e. 2012-2013, 2013-14, 2014-15.</p>	APPLICABLE	
C-2	<p><u>NETWORTH</u> (only in case of Companies)</p> <p>Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive</p>	APPLICABLE	
C-3	<p><u>PROFIT</u></p> <p>Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three Financial Years defined in 'C-1' above based on latest Audited Accounts.</p>	APPLICABLE	
D	<p>Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)</p>	APPLICABLE	By BHEL
E	<p>Approval of Customer (if applicable)</p> <p>Note: Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.</p>	APPLICABLE	BY BHEL
F	<p>Price Bid Opening</p> <p>Note: Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E</p>		BY BHEL
F	<p>Technical Tie up criteria (if applicable)</p>	applicable	
<p><u>Explanatory Notes for the PQR (unless otherwise specified in the PQR):</u></p>			

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1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures
2. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e total divided by three.
3. 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.
4. C-2:-NETWORTH : Shall be calculated based on the latest Audited Accounts as furnished for C-1 above. Net worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies)
5. C-3:- PROFIT : shall be NET profit (PAT + Non cash expenditure viz depreciation) earned during any one of the three financial years as in C-1 above
6. ~~'Additional' Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified:~~
 1. ~~Bidder should have executed similar work of any one of the following:~~
 - a. ~~One (1) work of value not less than Rs XXX~~
 - b. ~~Two (2) works of not less than Rs YYY~~
 - c. ~~Three (3) works of not less than Rs ZZZ~~

(Value XXX, YYY, ZZZ shall be as indicated by BHEL
 2. ~~'Similar' work for criteria 5 above means~~
 - a. ~~Civil or Structures or Civil & Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works~~
 - b. ~~Electrical works in respect of 'ELECTRICAL'~~
 - c. ~~CI works in respect of 'CI' Works~~
 - d. ~~Material Handling and/or Management works in respect of 'MM' works~~
7. Time period for achievement of the 'Technical' criteria of PQR (as in 'B' above) will be the last 7 years ending on the 'latest date' of Bid submission
8. 'EXECUTED' means the Vendor should have achieved the criteria specified in the Technical criteria of PQR (as in 'B' above) even if the Contract has not been completed or closed unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:
 1. ~~"BOILER LIGHT UP" in respect of Boiler & Aux and ESP~~
 2. ~~"SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG~~
 3. ~~"STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping~~
 4. ~~"HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping~~
 5. ~~"CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears~~
 6. ~~"Completion of RCC Shell and liner (steel or brick as per tendered scope) up to the HEIGHT specified using slip form" in case of RCC Chimney.~~
 7. ~~Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works~~

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8. 'Readiness for coal Filling" in respect of Bunker Structure Work.

- B) Boiler means HRSG or WHRB or any other types of Steam Generator
- ~~C) Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines~~
- D) For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating in terms of MW shall be considered for evaluation.
- ~~E) In case the experience/PO/WO certificate enclosed by bidders do not have separate break up prices for the E&C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply and erection of Electrical & CI and other works if any), then value of Erection and Commissioning for the Electrical & CI portion shall be considered as 15% of the supply & erection of Electrical & CI, unless otherwise specifically indicated in the PQR.~~
- ~~F) Scope for capital overhaul of STG shall cover Bearing Inspection work and overhauling of all cylinders of the Turbine unless otherwise specifically indicated in the PQR.~~
- G) In case the tendered scope is not a Pulverized Fuel Boiler, experience of Oil/Gas Fired Boilers also can be considered unless otherwise specifically indicated in the PQR.
- H) The value of work (Experience submitted against PQR B) shall be updated as per the PVC indices for "All India Avg. Consumer Price Index for Industrial Workers" with base month as date of execution (completion of contract/work) and indexed upto two months prior to bid opening month.

I) **Explanatory Notes for PQR 'B.3.b'**

- Agency with BOILER Experience shall be called as 'Prime Bidder' and the agency satisfying B.2.b shall be called as 'Tie-up Partner'
- Prime bidder and Tie-up Partner shall meet their respective technical Pre qualifying Criteria.
- Prime bidder shall meet all other Pre-Qualifying Criteria of the Tender
- Prime Bidder shall be responsible for overall execution of the Contract.
- Tie-up partner shall provide Technical Supervision and support to the Prime Bidder for execution of job.
- Tie-up Partner shall submit Security Deposit (SD) equivalent to 2 % of Total contract value in addition to the SD to be submitted by the Prime Bidder for the Contract Value.
- Prime bidder and the Tie-up partner are required to enter into a Tie-up Agreement with a validity period of Six months initially (During submission of tender). Thereafter both the agencies shall extend the validity of the agreement for the entire contract period, if the work is awarded.
- In case Tie-up partner backs out, another Tie-up partner meeting the QR shall be engaged by the Prime Bidder.
- In case Prime bidder backs out, the whole contract shall be considered cancelled and short closed

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

Registered Office : BHEL House, Siri Fort, New Delhi – 110 049, India
Website : www.bhel.com

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

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17	Capacity Evaluation of Bidder for current Tender	Applicable	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Applicable for PQR B.3.b	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable	YES/NO
20	Analysis of Unit rates	Applicable	YES/NO

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

DATE :

**AUTHORISED SIGNATORY
(With Name, Designation and Company seal)**

Annexure-3

IMPORTANT INFORMATION

1. Sealed Tenders shall be submitted at following address to AGM /Purchase BHEL PSWR NAGPUR:
BHEL PSWR, SRIMOHINI COMPLEX , 345 KINGSWAY, NAGPUR 440001, INDIA

All correspondences regarding this tender shall be addressed to AGM / PURCHASE BHEL PSWR at above address. Bidders may also opt to correspond with following BHEL officials regarding this tender through email at following email ids . However please be informed that sealed tenders shall necessarily be submitted in original at above address:

AGM Purchase, Email id: rajeebc@bhhelpswr.co.in. Ph: +91 - 712 - 3048633

Sr Engineer Purchase, Email: pgv@bhhelpswr.co.in, Ph: +91 - 712 - 3048713

Asst Engineer Purchase, Email id: nirmalpg@bhhelpswr.co.in , Ph: +91 - 712 - 3048732

1. **The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site (www.bhel.com ---> Tender Notification -> List of Banned Firms)**
- 2.
2. **Refer Chapter XII of Volume IB Special Conditions of Contract regarding Suspension of Business Dealings: The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' has now been uploaded on www.bhel.com on "supplier registration page" at the following link: http://www.bhel.com/vender_registration/pdf/Suspension-of-Business-Dealings-with-Supplier-issued-Sept13_abridged.pdf**
- 3.
3. **All Statutory Requirements as applicable for this project shall be complied with.**
- 4.
4. **BHEL Fraud Prevention Policy, "The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."**
5. **Following clause shall form part of the HSE documents issued under Chapter IX of Volume IB 'Special Conditions of Contract'**

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

6. Please take note of following Revised Tender Clauses:

- i. Notice Inviting Tender: Sl No 9
- ii. General conditions of Contract: Clause 2.12, 2.14, 2.17, Clause No 1.15.13 (New), Clause No 2.8.3, 2.8.4 and 2.8.5
5.
- iii. Special Conditions of Contract: Clause No 4.2.1.7
6.
7.
8.

7. Following Notes are added to Form F- 15 of Volume I D ‘Forms & procedures’

- i. It is only indicative and shall be as per the online format issued by BHEL time to time.
- ii. No request will be entertained after specified date of the current month w.r.t the changes requested in the scores of immediate previous month.

8. PRICE VARIATION CLAUSE

Revision in Price Variation Compensation Clause no. 2.17 of Vol I C GCC:

Clause No. 2.17.9 of Vol IC GCC is revised as below:-

PVC shall be applicable only during the extended period of contract (if any) after the schedule completion date for the portion of work delayed / backlog for the reasons not attributable to Contractor. However total quantum of Price Variation amount payable/recoverable shall be regulated as follows:

- i. For the portion of backlog attributable to the contractor and for the portion of backlog due to force majeure condition during contract period, PVC shall not be paid.
- ii. For the period of force Majeure during extended contract period, PVC will be as per the indices applicable at the beginning of the force majeure period.
- iii. void
- iv. The total amount of PVC shall not exceed 20% of the cumulatively executed contract value during the extended contract period. Executed contract value for this purpose is exclusive of PVC, ORC, Supplementary/Additional Items and Extra works.

Clause No. 2.17.5 of is modified as below:-

Base date shall be the calendar month of the (schedule completion date of the contract). Schedule Completion date shall be the actual start date plus contract period as defined in Chapter VI ‘Vol IA TCC’

9. Acceptance of Bank Guarantee (BG)

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

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

“Bank Guarantee issued by:

- a. Any of the BHEL consortium bank listed below :

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

- b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that it is enforceable at Nagpur, Maharashtra
- c. Any private sector banks, with a clause in the text of Bank Guarantee that it is enforceable by being presented at any branch of the bank

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

10. VOID

11. Broad Terms & Conditions of Reverse Auction

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

- 11.1. Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING

.....
(THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

- 11.2. BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids. In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid“ in the Reverse Auction. Non-submission of „online sealed bid“ by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
- 11.3. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
- 11.4. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit ‘online sealed bid’ in the Reverse Auction. Non-submission of ‘online sealed bid’ by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
- 11.5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
- 11.6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
- 11.7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
- 11.8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
- 11.9. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for noncompliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

-
- 11.10.Reverse auction will be conducted on scheduled date & time.
- 11.11.At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
- 11.12.The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.
- 11.13.In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL’s standard practice.
- 11.14.Bidders shall be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the “Business Rules of Reverse Auction”, which will be communicated before the Reverse Auction.
- 11.15.If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.
- 11.16.The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
- 11.17.In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

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VOLUME – IA
Part I & II
TECHNICAL
CONDITIONS OF
CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER – I: Project details

KORADI THERMAL POWER PROJECT

MAHARASHTRA STATE POWER GENERATION COMPANY LTD. (MSPGCL) KORADI THERMAL POWER PROJECT LOCATED AT KORADI, DISTT. NAGPUR IN MAHARASHTRA STATE COMPRISING OF 07 UNITS OF DIFFERENT CAPACITIES. THE WORK/TENDER IS FOR UNIT-6 OF 210 MW. IN THIS UNIT, THE BOILER IS BHEL DESIGN AND TURBINE IS LMZ DESIGN MANUFACTURED BY BHEL AND COMMISSIONED IN YEAR 1982.

APPROACH TO SITE:

SITE IS LOCATED AT KORADI IN NAGPUR DISTRICT OF MAHARASHTRA STATE. ON NAGPUR-CHINDWARA HIGHWAY AT 12 KMS NORTH FROM NAGPUR RAILWAY STATION AND ABOUT 18 KMS NORTH FROM NAGPUR AIRPORT. THE NEAREST BROAD GAUGE RAIL LINK IS AT NAGPUR WHICH IS ABOUT 12 KMS.

METROLOGICAL DATA

- A) MEAN OF DAILY MAX TEMP: 40 DEG.C
- B) MEAN OF DAILY MIN TEMP: 20 DEG.C
- C) HIGHEST TEMP. RECORDED: 47 DEG.C (in MAY)
- D) LOWEST TEMP. RECORDED: 15 DEG.C (in DEC-JAN)
- E) RELATIVE HUMIDITY: VARIES FROM 15 % TO 40 %
- F) ANNUAL AVERAGE RAINFALL: BETWEEN 5 MM to 30 MM
- G) WIND LOAD: 16 KM/HR (IN THE MONTH OF MAY)
- H) SEISMIC ZONE: ZONE III

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PREAMBLE:

Unit-6 of Koradi Thermal Power Station is a 210 MW unit of MSPGCL (Maharashtra State Power Generation Corporation Ltd.) commissioned in 1982. The Boiler is BHEL design and Turbine is LMZ design manufactured by BHEL.

The performance data up to 2006-07 indicates that the output from Unit-6 has been declining and it is now operating below its original designed performance rating. The fact that the unit was commissioned over 25 years ago, MSPGCL wants to evaluate the condition of different sub-systems before operating further. Also, it is clear that in the present condition, it is not possible to run unit-6 reliably within safety limits without major renovation.

Energy Efficient Renovation & Modernization

The objective of Energy Efficient Renovation & Modernization of Steam Turbine and Auxiliaries are as below:

- a) Up-rating capacity to level of 215MW with same steam input of existing design.
- b) Improve heat rate.
- c) Modernize Turbine control system with state of art technology.
- d) Extending unit life by 15-20 years of reliable operation.
- e) Reduce auxiliary power consumption.

2.0 SCOPE OF WORK

The scope of work is divided as follows:

- 1. RLA (Residual Life Assessment) study of parts of Turbine, Condenser and piping etc.
- 2. Dismantling
- 3. Erection, Commissioning, Testing and painting

2.1 DETAILED SCOPE OF WORK FOR ENERGY EFFICIENT RENOVATION & MODERNIZATION FOR 210 MW (U#6)

2.1.1. RLA (Residual Life Assessment) study of parts of Turbine, Condenser and Piping:

A) Piping systems for which RLA is to be carried out:

- a) Steam admission pipe from ESV to HPC

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- b) Steam admission pipe from IV to IPC
- c) Steam supply to front seals of HPT and IPT
- d) Pipeline for heating flange and stud of HPT & IPT
- e) Pipeline for sealing & suction

Following to be done on piping under RLA:

- a) Visual Inspection
- b) Replica and Hardness
- c) Wall Thickness (UT) and Diameter check specially at bend
- d) At weld joints: DP/MPI

B) Schedule of type of testing:

No	Component	Qty	Vis	MPI	DPT	Hard	Rep	Remarks
1	Emergency stop valve	2						
1.1	Steam chest & seat	2	✓		✓	✓	1	
1.2	Steam chest cover	2	✓	✓		✓	1	
2	Interceptor valve	2						
2.1	Steam chest & seat	2	✓		✓	✓	1	
2.2	Steam chest cover	2	✓	✓		✓	1	
3	Steam chest for side control valve IPC	2						
3.1	Steam chest & seat	2	✓		✓	✓	1	
3.2	Steam chest cover	2	✓	✓		✓	1	
4	Cross over pipes	2	✓		✓			Water fill test also to be done

Abbreviation:

Qty- Quantity

Vis- Visual

MPI- Magnetic Particle Inspection

DPT- Dye Penetration Test

Hard- Hardness

Rep- Replica

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C) RLA and type of testing for following area:

- a) Condenser spring: Visual Inspection
- b) Steam Throw device casing: DP of casing
- c) Weld seams of condenser: DP and Hydro fill test

Scaffolding arrangement, cleaning and washing of areas, chemicals for replica and DP/NDT, grease, cotton waste, grinding, buffing, insulation removal, required testing etc. required for RLA shall be in the scope of Bidder.

2.1.2 Dismantling, Erection, Commissioning, Testing and Painting:

Dismantling and transportation of old materials/components to BHEL/customer store/yard and collection of new materials/components from BHEL/customer stores/storage yard, to site of work (including its receipt from trailer and handling), Energy Efficient Renovation & Modernization and, Testing, Commissioning, Overhauling, Painting etc and handing over of 1X210 MW, Unit # 6, TG set and its auxiliaries and TG piping.

A. TURBINE GENERAL

1. Removal of Turbine cladding and insulation of turbine casing, valves and pipelines as required. This covers complete cleaning of the insulation also.
2. Removal of pedestal covers and opening of bearing 1 to 6.
3. Decoupling of HP-MOP, HP-IP, IP-LP and LP Generator.
4. Checking of pedestal elevation, shaft center/catenary of machine.
5. Dismantling removal of MOP and Governing piping.
6. Assistance for conducting condition assessment of various equipment/components including T&P and consumable as required for DPT, MPI UT etc. Subsequent rectification/replacement of components for TG Auxiliaries and valves etc.
7. Replacement of bearings 1-6. Checking, matching and adjustment of bearing, top oil clearances, side oil Clearances, interferences and corrections if required .
8. Bearing No. 2 pedestal cleaning, sole plate cleaning by lifting pedestal.
9. Sling check on journal 1 and couplings face correction if required.
10. Final Alignment correction of HP/IP, IP/LP, LP/GEN and HP/MOP

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11. Coupling, CRO check & reaming/honing of HP/IP, IP/LP, LP/GEN and HP/MOP coupling.
12. Bearing pedestal key, palm key cleaning and lubrication.
13. Servicing / replacement of cams and cam shaft of HPT and IPT
14. Servicing of Barring Gear this covers repair & replacement components.
15. Replacement of all flange joint gaskets of Turbine oil system.
16. Condenser spring height checking & visual inspection. Repair / replacement of any spring if required.
17. Assistance in C&I work.
18. All pedestal box up & Oil flushing. (Cleaning of all filters & MOT strainers)
19. Carryout oil flushing of pipelines including pedestals and bearing and restore the lines and box up the bearing pedestals after installation of relevant new supplied instrumentation pick-ups including thermocouples.
20. Normalizing of all bearings.
21. Putting machine on barring.
22. Assistance during commissioning , valve characteristics setting, steam rolling & synchronization, till machine reaches full load.
23. Assistance in PG Test

B. HP TURBINE

1. Insulation removal of top and bottom.
2. Dismantling of HP casing & Removal of HP Rotor, Liners, Diaphragms, nozzle segments and shaft seals. Complete dismantling & shifting of existing HP Turbine.
3. Removal of HP bottom casing from its position after cutting the pipelines connected with the casing. The pipelines must be suitably locked before taking up the cutting job.
4. Colour matching of front & center pedestal palms and key surfaces..
5. Receipt of new HP casing HP rotor, Guide blade carriers and shaft seals. Cleaning & Blue matching of all contact surfaces.
6. Checking of rotor coupling faces for convex/concavity.
7. Installation of the new HP casing lower half in its position and aligning with pedestals.
8. Installation of new HP rotor, Guide blade carriers having and shaft seals. (Position & Erection of new HP turbine by adjusting axial & radial clearances as per design).
9. Fitting & Matching Nozzle segments of first stage.

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10. Erection of suitable gland steam sealing lines and lube oil lines.
11. Alignment of HP casing, centering and Steam flow path adjustment by cutting/machining/welding steam-flow path elements.
12. Final shaft alignment, catenary and coupling of HP Turbine rotor with IP Turbine rotor after Honing and reaming as per site conditions.
13. Carrying out oil flushing of pipe lines including pedestals and bearing and restore the lines and box up the bearing pedestals after installation of relevant new supplied instrumentation pickups including thermocouples.
14. Trial box up of HP Turbine.
15. Final box up of HP Turbine.
16. Align and Welding of relevant inlet & exhaust pipe connections
17. Thermal Insulation & cladding of HP Turbine and associated steam pipeline.

C. IP TURBINE

1. Insulation removal of top and bottom cylinder.
2. Dismantling of IP casing & Removal of IP Rotor, Liners, Diaphragms, nozzle segments and shaft seals. Complete dismantling & shifting of existing IP Turbine
3. Removal of IP bottom casing from its position after cutting the pipelines connected with the casing. The pipelines must be suitably locked before taking up the cutting job.
4. Checking of rotor coupling faces for convex/concavity.
5. Erection of suitable gland steam sealing lines and lube oil lines.
6. Installation of the new IP casing lower half in its position and aligning with pedestals.
7. Installation of new IP rotor, Guide blade carriers having reaction blading and shaft seals. (position & erection of new IP Turbine by adjusting axial & radial clearances as per design)
8. Alignment of IP casing, centering and Steam flow path adjustment by cutting/machining/welding steam-flow path elements.
9. Final shaft alignment and coupling of HP Turbine rotor with IP Turbine rotor after honing and reaming as per site conditions.
10. Trial box up of IP Turbine.
11. Final box up of IP Turbine.
12. Align and Welding of relevant inlet & exhaust pipe connections
13. Thermal Insulations

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D. LP TURBINE

1. LP Turbine middle flange & cross over pipes insulation removal.
2. Removal of IPT-LPT cross over pipes.
3. Removal of LP cylinder parting plane fasteners.
4. Removal of top cylinder liners and diaphragms, gland boxes etc.
5. Measurement of steam flow path dimensions and casing reference/leveling etc (as per log sheets to be supplied by BHEL).
6. Removal of LP Rotor and place on stand.
7. Cutting of deflectors/ribs & blanking the space in LP casing to facilitate removal of Baumen stage as per requirement.
8. Modification of structure at the exhaust end of LPC to facilitate installation of diffuser as per requirement
9. Modification of structure by cutting/machining at the steam inlet end of LPC to facilitate installation of 1st stage of guide blades as per requirement.
10. Installation of water sprays system in position.
11. Receipt of new LP rotor, Guide blade carriers and shaft seals. Cleaning & Blue matching of all contact surfaces.
12. Checking of rotor coupling faces for convex/concavity.
13. Erection of suitable gland steam sealing lines and lube oil lines.
14. Colour Matching/machining of parting plane and correction as per requirement
15. Installation of guide blade carriers in position
16. Installation of new mono-block LP rotor in position
17. Measurement of steam flow path and correction as per requirement.
18. Installation of Cross over pipe suitable to exhaust opening of IP Turbine and inlet to LP Turbine.
19. Thermal Insulations.

Note: In-situ Machining of LP casing/liner for modification as per BHEL is included in the subcontractor's scope. Contractor has to arrange the agency for in-situ machining with consultation of BHEL. All drawings & document shall be provided by BHEL.

E. TURBINE STOP AND CONTROL VALVES

1. Dismantling of Emergency stop valves (ESVs), Interceptor valves (IVs) and control valves of HPT & IPT.

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2. Assistance for conducting condition assessment of various equipment/components including T&P and consumable as required for DPT,MPI UT etc. Subsequent rectification/replacement of components for TG Auxiliaries and valves etc.
3. Servicing of governing elements i.e. intermediate pilot valves, differentiator, CVSM, emergency governor etc.
4. Servicing Of HPCV /IPC1 TO 4 Valves & Actuators--Clearances of control valves is to be maintained as per BHEL standard. If required replacement of liner is in the scope of contractor. Material required for replacement of liners such as induction heating coil, liquid nitrogen etc. is to be arranged by the contractor. Blue matching valve to valve seat and bonnet sealing. Re-assembly.
5. Servicing / replacement of cams and cam shaft of HPT and IPT. Replacement of valve body seat if required.
6. Servicing of both ESVS and IVS WITH Servomotors (Opening of valve nuts by Induction Heating process).
7. Checking for looseness of valve body seat, replacement if required and re-assembly.
8. Replacement of the internals of all valves viz. Emergency stop valves (ESVs), Interceptor valves (IVs) and control valves of HPT & IPT
9. Replacement of Gland steam supply and leak off valves. Servicing of servomotors.
10. Assistance during commissioning, valve characteristics setting, steam rolling & synchronization, till machine reaches full load.

F. TURNING GEAR, MAIN OIL PUMP AND LUBE OIL & JOPs

1. MOP dismantling, NRV checking, bearing replacement, and checking of P&T, K1 to K4 valve, coupling replacement. Alignment with HP Rotor, MOP, top casing and bottom housing blue matching. Re-assembly.
2. Dismantling and replacement of Turning gear assembly. Modification of necessary piping, instrumentation, motors etc. as per requirement.
3. Dismantling with replacement of all AC/DC lube oil pumps (01 no each) and seal oil pumps (02 nos) alongwith motor, piping, valves etc..
4. Installation of AC & DC Jacking Oil Pumps along with erection of all necessary piping, instrumentation, motors etc.
5. Overhauling /servicing/replacement lube oil coolers/tube bundles as per requirement.
6. Cleaning of Oil tanks
7. Flushing of lube oil, seal oil, control oil system pipeline
8. Replacement of Main oil tank filters elements.

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G. GOVERNING SYSTEM

1. Disassembly of Governing valves, servomotors, Cam arrangements, pipelines etc.
2. Installation of modified EHG (Electro Hydraulic Governing) type governing system & Their components/Governing rack including all governing oil pipelines from starting points to connected equipment/components as per new governing system scheme. All pipelines fabrication, installation, Grouting, welding & NDT including consumable are covered in the subcontractor scope. Necessary drawings and materials shall be supplied by BHEL.
3. Assembly of Governing valves, servomotors, cams etc.
4. Inside cleaning of main oil tank, strainers cleaning after oil flushing up to synchronization & full load of set as per requirement and inspection of injector in MOT.

H. GENERATOR & EXCITATION

1. Decoupling of LP-Generator and Dismantling of Hydrogen seals at both ends.
2. Dismantling of the End Shields at both the ends & connected oil & gas piping.
3. Threading out of Generator Rotor after L.P./Gen decoupling.
4. Lifting of the old Generator Stator, weighing about 200 Metric Tonnes (approx.) and the rotor weighing about 50 Metric Tonnes from the TG floor and packing, loading, transporting to Customer/BHEL storage area as per requirement. Extend the necessary support as required for approach/accessibility, filling of ditches, leveling etc for transporting till unloading and placement of Generator Stator as per BHEL Engineer is the part of scope of work under this contract.
5. Matching of Pedestal No. -7 with sole plate.
6. Receipt of new Generator stator & rotor at site and placement of new stator on foundation including adjustment/alignment/matching of stator foundation.
7. Scope of contractor shall be keeping liaison and follow up with transporters and extend the necessary support as required for approach/accessibility, filling of ditches, leveling etc for marching till unloading and placement of Generator Stator to required foundation/elevation.
8. Dismantling, cleaning & Hydraulic Test of Hydrogen coolers, then assembly as per requirement.
9. Cleaning & Inspection of Generator Stator & rotor and Connection of all terminal bushing/links and soldering/brazing/insulation of bus bar joints as per requirement.
10. Connection of stator water & cooling water system by cutting/re-routing/welding/NDT are covered in this scope.
11. Hydraulic test of complete stator winding.
12. Replacement/Revising of brgs 6 & 7 and Matching of Bearing No. 6 & 7 , adjustment of all clearances .

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13. Replacement/Revising of Hydrogen seal liners, matching with generator rotor collars.
14. Air leak test of Generator rotor.
15. Purge test of Generator rotor cooling air canals.
16. Final cleaning of stator & rotor, Varnishing.
17. Generator rotor thread in.
18. Alignment, coupling & CRO of L.P./Generator rotor , checking & correction of Air gap , Magnetic center
19. Assembly of end shields, Hydrogen seal rings, seal systems etc & restoration of removed piping of seal oil stator water, L.O. etc.
20. Air tightness test of Generator and attending to leakages.
21. Overhauling /servicing/replacement/ repairs of water box and reassembly and hydraulic test of lube oil/seal oil stator water coolers/tube bundles as per requirement.
22. Cleaning of damper tank, Seal oil tank and adjustment of float valve etc.
23. Servicing of DPR and POR. Cleaning of seal oil filters.
24. All the works related to removal of old excitation system
25. All the works related to installation of excitation system

The Generator Stator shall be lifted/lowered and place on foundation by the contractor with the help of Strand jack arrangement. Extend the necessary support as required for approach/accessibility, filling of ditches, leveling etc for lifting and placement of Generator Stator on foundation is covered in the scope. Strand Jack will be in the scope of BHEL.

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I. AUXILIARIES AND PIPING SYSTEM

Removal/reapply of insulation of the following piping/equipment and Assistance for conducting condition assessment of various existing piping including T&P and consumable as required for DPT,MPI UT etc. Subsequent rectification/replacement of following equipment & pipeline as per requirement.

1. Steam admission pipe from ESV to HPC II
2. Steam admission pipe from IV to IPC
3. Steam supply to front seals of HPT & IPT (Rotor heating system)
4. Pipeline for heating flange and stud of HPT & IPT
5. Pipe line for sealing & suction. (excluding control valve and its piping)
6. Turbine oil pipe line (Excluding pipe connecting tank and coolers)
7. Generator lubricating oil pipe line.

J. TURBINE GLAND STEAM SEALING SYSTEM

The existing turbine seal steam system shall be replaced by modified seal steam system which shall include components like seal steam supply and leak off valve, individual line valves to turbine, pipe etc. to make the system reliable and compatible with the retrofitted turbine. While modifying the system the existing gland steam piping, gland steam condenser and exhaust blowers to be retained. Removal/reapply of insulation of the following piping and Assistance for conducting condition assessment of various existing piping including T&P and consumable as required for DPT,MPI UT etc. Subsequent rectification/replacement of following pipeline as per requirement.

1. Turbine Gland steam system
2. Overhauling of Turbine Gland steam system
3. Overhauling/Serviceing/HT of existing Gland steam condenser

K. TURBINE DRAINS AND VENTS

1. Turbine drain and vent valves shall be replaced with the remote operated valves

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2. Any accessories such as actuators, microprocessor based positioner, limit switches, lock relay etc., repair/replacement will be done as per the system and design requirement.
3. Provision of drain and vent piping and valves as per the requirement for the retrofitted Turbine is covered in this scope of work.

L. HP-LP BYPASS SYSTEM

The existing capacity with new advanced class of valves including spray control station, fittings, de-super heater, hydraulic power pack, solenoid valves quick acting devices, blanking devices for steam blowing, warm up arrangement, valve instrumentation and control hardware, electrical devices and actuator/motors etc are to be replaced as per requirement.

1. Replacement of existing 2 nos of HP bypass system consists of main bypass valve, spray control valve and block valves.
2. Replacement of existing 2 nos of LP bypass system consists of main bypass valve, spray control valve and block valves and 2 nos of LP bypass
3. Installation of LP dosing and ammonia dosing system. The location is to be finalized in consultation with the MAHAGENCO.
4. Installation of oil supply unit for the hydraulically operated valves.

M. CONDENSER

The existing Condenser is of double pass, cross flow type manufactured and supplied by BHEL, Hardwar.

1. Disconnecting the CW inlet & outlet pipe lines from the water boxes as per requirement.
2. Opening of water boxes from both sides.
3. Cleaning of the Condenser water boxes (front and rear side) of both the passes. Cleaning has to be carried out in the steam space as well as the hot well portion of the condenser.
4. Removal of old condenser tubes from position by pulling out /cutting. Through cleaning of tube plates after removal of old tubes and realigned if required.
5. Condenser tubing insertion and tube expansion (roller expansion) is to be done at site by the contractor, after taking due care to clean all the tube holes. (**Condenser Tube material is SS-304 tubes OD 30&0.71 thick tubes-15620Nos, Length-10 mtrs**).
6. Before insertion of tubes, the contractor shall clean the holes in the tube plates and tube support plates to remove paint, corrosion spots, oxide scales etc. Usage of suitable cleaning agent may also be required which has to be supplied by the contractor.

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7. 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.
8. Replacement of Gaskets of water box cover and manhole cover and box up.
9. RE joints conventional (1600 NB)
10. The hydrostatic testing of steam space and hydraulic testing of water space up to the terminal point after assembly of water boxes are also included in the scope.
11. Work of painting of condenser surfaces in various area and at various stages of work are specified elsewhere in these specifications.
12. Condenser flood test.

N. Condenser Vacuum pumps:

1. Replacement of existing ejector system with vacuum pumps. Installation of Condenser vacuum pumps -2 nos with complete piping, accessories for condenser air evacuation system with all instrumentation system shall be installed with required grouting etc.
2. Condenser vacuum pump along with motor and all accessories for condenser air evacuation system & instrumentation as complete skids-2 Nos
3. All piping viz. Air extraction piping, cooling water piping, DM water piping, instrument air piping and required valves for the new vacuum pump system (located @ '0' meter floor).

The work shall also include servicing of safety valves provided in the system and servicing/replacement of vacuum breaker valve.

O. LP Dosing system:

Replacement of Ammonia and hydrazine dosing system including dismantling and disposing of existing systems with grouting wherever required.

P. HP & LP HEATERS and connected pipelines

1. Replacement of Vertical HP heaters (03 nos) (HPH-5, 6 & 7) consisting of de superheating, condensing & Drain cooling zones. Including cutting /modification/welding/NDT are covers in this scope.
2. Replacement of Tube bundles of LP Heater-1 , LP Heater-2,3 & 4 . Including cutting /modification/welding/NDT are covers in this scope.

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3. Tubes replacement of Gland Steam Cooler-1 & 2. Including cutting /modification/welding/NDT are covers in this scope.
4. HP and LP drip piping along with isolating and control valves as per the system requirements up to the inlet of drip pumps and from drip pumps to the feed water lines to be carried out. Including cutting /modification/welding/NDT are covers in this scope.
5. Level monitoring system for the LP, HP heaters as per the system requirements to modified. Including cutting /modification/welding/NDT are covers in this scope.
6. Installation of Flow measurement nozzle in the HP heater extraction lines. Including cutting /modification/welding/NDT are covers in this scope.
7. Installation of bleed steam pipe in the Drain and vent piping and Connection of bleed steam pipe to the flash tank. Including cutting /modification/welding/NDT are covers in this scope.
8. Replacement of isolation valves, drain valves and vent valves for heaters as per requirement.
9. Replacement of the valves of LP & HP Heaters. Including cutting /modification/welding/NDT are covers in this scope.
10. Installation of shut off and check valves Drain points on all the extraction lines on upstream side . Including cutting /modification/welding/NDT are covers in this scope.
11. Installation of Drain points on the downstream side depending on layout where the lines are not self-draining towards the heater. Including cutting /modification/welding/NDT are covers in this scope.
12. Installation of Safety valves of all Heaters. Including cutting /modification/welding/NDT are covers in this scope.
13. Overhauling of system valves etc.

Q. DEAERATOR

1. Retrofitting of the bleed line to the deaerator by providing 1 no FCNRV
2. Installation of Bleed steam line with proper drain and venting facility as per system requirements
3. Installation of normal NRV at the Deaerator end
4. Installation of A bypass line with orifice across the main pressure control valve for bleeding small quantity of steam to keep CRH system warm up
5. Insulation of deaerator system and Feed Storage tank
6. Rectification of deaerator platforms, ladders and handrails. Including cutting /modification/welding/NDT are covers in this scope.

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7. Installation of Trays for deaerator header.
8. Installation of Drain and vents for deaerator.
9. Rectification/modification/replacement as required in Flash tank, drain cooler and siphon and inter connected piping. Including cutting /modification/welding/NDT are covers in this scope.
10. Any rectification/modification/replacement required and installation of new servicing flash tank, drain cooler and siphon and inter connected piping including valves is also to be included in the scope of the bidder.

R. MOTOR OPERATED BOILER FEED PUMPS:

1. Retrofitting with modified energy efficient cartridge assembly within the same outer casing for all 03 (three) feed pumps.
2. Replacement of Recirculation valves with valves of higher differential pressures.
3. Replacement of coolers with plate type heat exchangers with provision of drain tray.
4. Replacement of mechanical seal water cooler with SS shell type coolers.
5. Replacement of existing connectors with flexible connectors to cooling water circuit
6. Overhauling of hydraulic coupling.
7. Replacement of metaflex couplings on both ends.
8. Final assembly, alignment, coupling, trial run etc. including cutting /modification/welding/NDT are covers in this scope.

S. HANGER & SUPPORTS:

1. Inspection of hangers & supports of TG & Auxiliaries piping system. Repair repair/refurbishment/Replacement of Hangers of TG & Auxiliaries piping system as per requirement.

T. EXPANSION BELLOWS

1. Inspection/condition assessment of all Expansion bellows in the LPT extraction lines, Vent lines from the condenser flash tank to the condenser and hot well. Check suitability to the new system and replacement of the same as per requirement. Including cutting /modification/welding/NDT are covers in this scope.

U. CONDENSATE EXTRACTION PUMP

1. Overhauling of CE pumps and their system, repair/replacement/refurbishment of damaged components as per requirement.
2. Replacement of recirculation valves and Installation of PG test flow nozzles. Including cutting /modification/welding/NDT are covers in this scope.
- 3.

V. COOLING WATER PUMPS

1. Overhauling of the CW pumps and replacement of the impeller and damaged parts.

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2. Replacement of back washing system for the debris filter.
3. Rubber expansion bellows to be replaced in CW inlet and outlet to the condenser
4. Replacement of air release valve provided in CW discharge line.

W. MISCELLANEOUS ITEM

The following components are to be installed along with necessary piping, valves & hangers & supports as per drawing/scheme.

1. Mounting arrangement for TSE
2. Flow nozzle for PG testing
3. Emergency oil pump with motor
4. Condensate spray system for LP exhaust hood spray including necessary piping, valves & hangers & supports-1no
5. Dirt catcher-1 No
6. Spray nozzle- 1 set
7. Oil centrifuge (manual cleaning type) associate with piping and valves.
8. Hanger and support for piping systems
9. Thermal Insulation for piping system
10. Overhauling of Turbine systems, and auxiliary system as per the instructions of BHEL Engineer.

X. INSULATION AND CLADDING FOR TG & AUXILIARIES

1. On completion of replacement/refurbishment/overhauling of Steam turbine and related auxiliaries equipment the bidder shall box up and couple/connect the equipment/systems and shall apply new insulation including cladding on the equipment/systems for the unit.

Y. PAINTING

1. The scope of work shall include supply and application of final painting. Painting of the complete turbine and other important areas associated with the present R & M works with suitable paints as per the industrial colour codes. The work involves removal of paints, scraping, cleaning, coating with suitable primers and applying two coats of suitable paints. Writing of the nameplates and tag details and their fixing with owners approval. All name boards and boards indicating equipment specifications. All boards giving directions related to the unit. Name plates and tag numbers of the valves to be provided.

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Z. LIST OF VALVES AND ACTUATORS TO BE REPLACED

S No	Type	Location	Qty
1	Globe-manual operated	MS line drains to unit flash tank	4
2	Gate motorized	Isolation before HP bypass valve	2
3	Electro hydraulic PRDS valve	HP bypass valve	2
4	Globe-manual operated	HRH line drains to condenser flash tank	4
5	Globe-manual operated	HP by pass valve pre warm up	4
6	Globe-manual operated	LP by pass valve pre warm up	4
7	Globe-manual operated	MS line drains between MSV & ESV to UFT	2
8	Globe-manual operated	HRH lines drain to CFT	4
9	Globe-manual operated	MS line drains to UFT isolation in common header	1
10	Globe motorized	MS line drains to UFT isolation in common header	1
11	Check	MS line drains to UFT NRV	1
12	Globe motorized	CRH line drains to CFT isolation in common header	1
13	Globe motorized	HRH line drains to CFT isolation in common header	1
14	Check	HRH line drains to CFT NRV	1
15	Check	LP bypass downstream line drains to CFT	1
16	Motorized gate	7 th Extraction pipeline	1
17	Motorized gate	6 th Extraction pipeline	1
18	Motorized gate	5 th Extraction pipeline	1
19	NRV with Hydraulic servomotor	4 th Extraction pipeline	1
20	NRV with Hydraulic servomotor	3 rd Extraction pipeline	1
21	NRV with Hydraulic servomotor along with sealed gland valve	2 nd Extraction pipeline	1
22	Motorized gate	4 th Extraction pipeline	1
23	Motorized gate with sealed gland	3 rd Extraction pipeline	1
24	Motorized	2 nd Extraction pipeline	1
25	Manual globe	Drain of 7 th Extraction	1
26	Manual globe	Drain of 6 th Extraction	1
27	Manual globe	Drain of 5 th Extraction	1
28	Manual globe	Drain of cond. Line from HPH-7 to bypass NRV	2
29	Manual globe	Drain of FW line from hph-6 to HPH-7	1
30	Manual globe	Drain of FW piping from GP protection valves	1

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31	Manual globe	Drain of FW line from HPH-6 to HPH-7	1
32	Manual globe	Drain of FW piping	3
33	-	-	-
34	Gate-Motorized	BFD discharge line- Isolation near each pump	3
35	Check	Spray water to HP bypass line-NRV	2
36	Gate-Motorized	Spray water to HP bypass line-Isolation	1
37	Control electro hydraulic	HP bypass spray-flow control valves	2
38	Control electro hydraulic	HP bypass spray-pressure control valves	1
39	Manual globe	Condensate supply to sealed gland valves	1
40	Globe	Condensate supply to sealed gland valves	26
41	Press reducing	Condensate supply to sealed gland valves	1
42	Regulating globe (with regulating type disc)	Main condensate supply to sealed gland valves	1
43	Manual globe	Main condensate supply to sealed gland valves	1
44	Manual globe	Main condensate supply to sealed gland valves	2
45	Manual globe	Condensate supply to sealed gland valves	17
46	Check	Main condensate to deaerator NRV	1
47	Gate-Motorized	Main condensate to deaerator isolating near deaerator	1
48	Gate manual operated	Condensate spray to LP bypass DESH from condensate pumps discharge header	1
49	Check	Condensate spray to LP bypass DESH near desuperheater	1
50	Electro hydraulic flow control valve	Condensate spray to LP bypass DESH near desuperheater	1
51	Gate manual operated	Main cond line drain to unit flash tank-isolation	1
52	Gate manual operated	Main cond line drain to unit flash tank-isolation to drain	1
53	Check	Main cond line drain to unit flash tank-NRV near flash tank	1
54	Manual globe	Drain from MS line from ESV to CV	4
55	Manual globe	Drain of steam line from IV to CV	2

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56	Motorized globe with integral bypass	Drain of MS line to condenser flash tank	1
57	Gate manual operated	Aux. steam to 139/16 at aux PRDS-drain before and after pressure reducing station	4
58	Gate manual operated	Extraction steam to deaerator-line drains	3
59	Gate manual operated	Aux steam to deaerator storage tank-line drain	2
60	Gate manual operated	Aux steam to FST heating-line drain	1
61	Gate manual operated	Aux steam/feed water storage tank steam to ejectors/gland seals/gland water coolers-drain	1
62	Gate manual operated	Feed storage tank drain to unit flash tank-isolation before control valve (DW-234)	1
63	Gate manual operated	Feed storage tank drain to unit flash tank-isolation after bypass control valve	1
64	Gate manual operated	Feed storage tank drain to unit flash tank-isolation after control valve (DW-234)	1
65	Gate manual operated	Feed storage tank drain to unit flash tank-isolation before control valve (DW-233)	1
66	Control pneumatic operated	Feed storage tank drain to unit flash tank-by pass control valve	1
67	Control pneumatic operated	Feed storage tank drain to unit flash tank-control valve	1
68	Gate manual operated	Feed storage tank drain to unit flash tank-line drain	1
69	Globe manual operated	Feed storage tank drain to unit flash tank-line vent	1
70	Control valve along with pneumatic actuator & sealed gland	Heater drain line from GC-2	1
71	Control valve along with pneumatic actuator & sealed gland	Drain line from LPH-2	1
72	Control valve along with pneumatic actuator & sealed gland	Drain line from LPH-3	1

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73	Control valve along with pneumatic actuator	Drain line from LPH-4	1
74	Manual gate with sealed gland	Drain line from LPH-2 to condenser	1
75	Manual gate with sealed gland	Drain line from LPH-3 to condenser (bypass of lph-2)	1
76	Gate-Motorized	Drain line from LP heater-4 to the condenser	1
77	Gate sealed gland	Drain line from LP heater-3 to the condenser	1
78	Gate sealed gland	Drain line from LP heater- 3 to LP Heater-2	1
79	Gate Manual	Drain line from LP heater- 4 to LP Heater-3	1
80	Gate Manual	Drip cascading from LP heater 3 & 4 to condenser	1
81	Globe (with sealed gland)	Vent from condensate pump to condenser	3
82	Control valve pneumatic	Make up to condenser-Control valve	2
83	Gate valve manual operated	Make up to condenser-Isolation valve	2
84	Gate valve manual operated	Make up to condenser-Isolation after control valve	2

APART FROM ABOVE LIST, OVERHAULING AND SERVICING, REPAIR/REPLACEMENT MAY BE REQUIRED TO BE CARRIED OUT OF ALL TYPES OF VALVES AS PER REQUIREMENT OF R&M. (UP TO 3" NB-150 NOS, ABOVE 3"NB TO 6"NB 75 NOS AND ABOVE 6" NB- 20 NOS).

2.2 Special Notes:

1. Fuel for operation of the BHEL Cranes to be provided by Bidder. Loading, unloading, shifting, assembly and disassembly arrangement are also included.
2. Drilling/Reaming and Doweling of various components of TG & Auxiliaries to be carried out during the Renovation & Modernisation. Contractor has to provide Drilling machine along with Tools at various stages of R & M.
3. Agency for Drilling/Reaming of coupling Bolts and machining of LP Turbine Casing, Liners and Diaphragms are to be arranged by contractor with consultation of BHEL. BHEL's decision in this respect of selecting agency will be final.
4. Re-grouting secondary grouting of any component/equipment are included in this scope. Contractor has to arrange grouting cement/mixture machine and all necessary T & Ps required for grouting.

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5. Bidders are strongly advised to visit the site to acquaint themselves with the working conditions and the project requirements for execution of the job.

6. Contractor shall carry out capital overhaul of the equipment (excluding replaced Turbine) at the time of carrying out the R & M works with the aim of renewing and replenishing the system.

7. scope of work also include dismantling of existing equipment which are rendered surplus or need replacement due to R & M work carried out under this package and depositing the dismantled equipment, material etc at the customer designated place.

8. During the course of R&M, 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.

2.3 Scrap Disposal:

All the scrap to be disposed shall be segregated into three categories A) Metallic scrap B) Non-Metallic and biological scrap and C) Hazardous waste. Separate spaces identified by the owner at site shall be used to collect these scraps. The bidder shall make arrangement to collect the scraps at identified locations and transport it to the owner's store as per instructions of the owner's site In-Charge for further disposal as per the rules. The re-usable scrap shall be separated from the Un-usable scrap before disposal and same may be handed over to the customer for use as spare.

2.4 Cleanliness:

The contractor shall be responsible for keeping the entire area allotted to it clean and free from rubbish, debris, metal scrap, Insulation scrap etc. All such rubbish and scrap shall be stacked or disposed in a place to be identified by the BHEL Engineer. In areas where equipment might drip Oil and cause damage to the floor surface, a suitable protective cover of a flame resistance, oil proof sheet shall be provided to protect the floor from such damage. Also, cleaning of insulation during RLA and dismantling is the scope of work.

2.5 PENALTY / LIQUIDATE DAMAGE:

Penalty / Liquidate Damage shall be applicable for delay in completion of works as per General Conditions of Contract (GCC).

Note:

FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT CHAPTERS IN THIS BOOK

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3.0 FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

Sl.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
3.1.1.0	ESTABLISHMENT			
3.1.1.1	FOR CONSTRUCTION PURPOSE:			
A	Open space for office	Yes		
B	Open space for storage	Yes		
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
D	Bidder's all office equipments, office / store / canteen consumables		Yes	
E	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
F	Fire fighting equipments like buckets, extinguishers etc		Yes	
G	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
A	Open space		Yes	
B	Living accommodation		Yes	
3.1.2.0	ELECTRICITY			
3.1.2.1	Electricity For construction purposes (to be specified whether chargeable or free)			
3.1.2.1.1	Single point source	Yes		Free for construction purpose. Chargeable for labour colony etc
3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	

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SI.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
3.1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:		Yes	
3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	
3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		Yes	
3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
3.1.2.2.4	Living facilities for office use including charges		Yes	
3.1.2.2.5	Demobilization of the facilities after completion of works		Yes	
3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
3.1.3.0	WATER SUPPLY			
3.1.3.1	For construction purposes:			
3.1.3.1.1	Making the water available at single point	YES		
3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.1.3.2	Water supply for bidder's office, stores, canteen etc			
3.1.3.2.1	Making the water available at single point		Yes	
3.1.3.2.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.1.4.0	LIGHTING			

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Sl.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
3.1.4.1	For construction work (supply of all the necessary materials) At office storage area At the preassembly area At the construction site /area		Yes	
3.1.4.2	For construction work (Execution of the lighting work / arrangements) At office storage area At the preassembly area At the construction site /area		Yes	
3.1.5.0	COMMUNICATION FACILITIES for site operations of the bidder	-		
3.1.5.1	Telephone, Fax, internet, intranet, email etc		Yes	
3.1.6.0	COMPRESSED AIR SUPPLY			
3.1.6.1	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc	Yes		
3.1.6.2	Installation of above system and operation & maintenance of the same	-		
3.1.6.3	Supply of the all the consumables for the above system during the contract period			

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SI.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART II			
	ERECTION FACILITIES			
3.2.1.0	Engineering works for construction			
3.2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
3.2.1.2	Drawings for construction methods		Yes	In consultation with BHEL
3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	”
3.2.1.4	Shipping lists etc for reference and planning the activities	Yes		”
3.2.1.5	Preparation of site erection schedules and other input requirements		Yes	”
3.2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	
3.2.1.7	Weekly erection schedules based on SI No 2.1.5		Yes	
3.2.1.8	Daily erection / work plan based on SI No 2.1.7		Yes	For daily monitoring meeting at site
3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
3.2.1.10	Preparation of preassembly bay		Yes	
3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the			Not applicable

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SI.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART II			
	contractor/bidder himself			
3.3.1	Installation Work shop facility at site (Lathe, Surface Grinder & Drilling Machine, etc).		Yes	

3.3 OPEN SPACE:

Open space for building of temporary office shed, contractor's stores shed(s) will be provided free of hire charges. Contractor has to make his own arrangements for labour colony.

3.4 ELECTRICITY:

3.4.1 The contractor shall be provided with free supply of Electricity for the purpose of execution of work at single point only at work site. However the contractor shall be required to pay for electricity duty and taxes, if levied by the Govt., at the prevailing rates. For further distribution contractor shall make his own arrangements. Electricity for all other services if required will be provided on **chargeable basis** as per MSPGCL norms.

- a) Consumption charges as per MSPGCL norms
- b) Any dispute regarding consumption, BHEL engineer's decision is final.

While efforts were be made to ensure continuous electric power supply, interruptions cannot be ruled out and no claim from the contractor shall be entertained on this account such as idle labor, extension of time etc.

3.4.2 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards contractor's office shed also all such expenditure shall be borne by the contractor.

3.4.3 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tendered / contractor.

3.4.4 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

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3.5 WATER:

The contractor shall be provided with free supply of water for the purpose of execution of work at single point only at work site. Duty and taxes for water, if levied by the Govt., shall be payable by the contractor to the owner at actual. For further distribution contractor shall make his own arrangements. Contractor has to make his own arrangements for his water requirement at his labor colony.

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CHAPTER – IV:T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

4.0 T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

A: The following minimum major Tools & Plants shall be deployed by the contractor:

S.N.	DESCRIPTION	CAPACITY	QUANTITY
1	TYRE MOUNTED HYDRAULIC CRANES/HYDRA	14 MT	2 NOs
2	TRAILER WITH HORSE	30 TON	1 NO
3	TRAILER TROLLEY	20 TON	1 NO
4	3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWING CONSTRUCTION POWER, FITTED WITH ENERGY METER	As required	AS REQUIRED AND AS PER INSTRUCTION OF BHEL ENGINEER
5	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	As required	
6	WELDING GENERATOR SETS (ELECTRIC AS WELL AS DIESEL)		AS PER REQUIREMENT
7	3- PHASE COMPLETE SET UP FOR DRAWAL OF POWER		-DO-
8	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER		-DO-
9	TIG WELDING SET		-DO-
10	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS		-DO-
11	ELECTRICAL BAKING OVEN - BIG		-DO-
12	ELECTRODE BAKING OVEN - PORTABLE		-DO-
13	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS		-DO-
14	VACUUM CLEANER (INDUSTRIAL)		-DO-
15	PIPE CUTTING AND BEVELLING MACHINE		-DO-
16	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	-DO-
17	CHAIN PULLEY BLOCK		-DO-
18	NIBLING MACHINE		-DO-
19	PROFILE MAKING MACHINE		-DO-
20	SELF DRILLING & TAPPING MACHINE		-DO-
21	AIR COMPRESSOR	120 CFM	01 NO
22	STEP DOWN TRANSFORMER	230V/24V	AS PER REQUIREMENT
23	CONDENSER TUBE EXPANDER SET		DO
24	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
25	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
26	HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :		
	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	04 NOS.
	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	04 NOS.
27	GANG OPERATED JACKS CONSISTING OF		

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THE FOLLOWING :			
	A) - JACKS (HAVING BROAD BASE ONE INCH LIFT)	100 MT	04 NOS.
	B) - JACKS (WITH 4-6 INCH LIFT , FOR GEN. END SHIELDS)	63 MT	04 NOS.
	C) - LONG HIGH PRESSURE HOSES (FOR GENERATOR ALIGNMENT)		08 NOS.
	C) - LONG HIGH PRESSURE HOSES (FOR GENERATOR ALIGNMENT)		08 NOS.
ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.			
28	TORQUE WRENCH	UPTO 2000 N-M	01 NO.
29	SLINGS FOR LP TURBINE ROTOR		02SET
30	SLINGS FOR HP TURBINE MODULE		02SET
31	SLINGS FOR GENERATOR ROTOR		02SET
32	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
33	LONG FEELER GAUGE SET		AS PER REQUIREMENT
34	SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
35	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT
36	Chemical cleaning/Flushing pumps		AS PER REQUIREMENT
37	Micro meter		AS PER REQUIREMENT
38	ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS.		

B:MEASURING AND MONITORING DEVICES (MMD):

01. Taper gauge, slip gauge set, depth gauge and depth micrometer.
02. Feeler gauge sets, feeler strips of 0.03 to 0.10 mm size.
03. One set of 2 meter long feeler gauge strips (0.05 to 1.0 mm).
04. Dial indicators with magnetic bases (at least 2 dials of diameter 40 mm travel – 5 mm).
05. Micrometers (inside and outside up to 300 mm, 450mm, 600mm & 1000mm).
06. Telescopic gauge (2 sets). Bevel protractor and combination sets.
07. Try square.
08. Set of parallel blocks/ V blocks.
09. Vernier calipers, (150 and 500 mm), measuring steel tapes and 5 meters steel rulers.
10. Precision spirit level (with micro head).
11. 2 sets of D.E. and Ring spanners (6-36mm).
12. 2 sets of ox spanners (6 to 20mm and 22-50mm).
13. Allen keys of various sizes (from 2mm. onwards).
14. D.P.Test Kit (with consumables).

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15. Crowbars tin cutters, pliers (cutting plier, nose plier grip plier circlip-outside and inside).
16. Screw drivers and sledge hammers – 10 lbs – 1 lbs.
17. Adjustable wrenches, pipe wrenches and heck saws.
18. Single ended spanners (36 Mm and above).
19. Flat, half round, triangular bearing scrappers-8", to 12".
20. Files flat round, half round and square, rough and smooth (sizes 6", 9" and 12").
21. Bench Grinders, straight grinders GQ4 and GQ6, Angle grinders.
22. Reamers upto 30 mm. Taper reamers.
23. Drilling machine with magnetic stand upto –30 mm with drill bits.
24. Flexible grinders with grinding stones and cutters of different Shapes and sizes, Angles Grinders and Sander machine.
25. Number punch, letter punch, centre punch and hole punches etc.
26. Steel wire brushes, wire brush wheels, nylon wire brushes and Painting bushes.
27. Reamers and honing tools with proper jigs and fixtures for carrying out coupling hole Reaming /honing.
28. Lifting devices eye bolts, D-shackles, slings of various sizes Guide rods etc.
29. Chain pulley blocks upto 5 tons, 2 tons pull/lift.
30. Copper/Brass rods dia. ½" to 1 ½"X450 mm.
31. Tap and die sets 6 to 36 mm.
32. Surface plate 450 X 450 mm.
33. Torch light/hand lamps with cables, 230/24 V transformer.
34. Torque wrench and torque multiplier.
35. Wooden mallet, Nylon Mallet.
36. Hand glover-asbestos, Manila rope, asbestos cloth leather and Rubber gloves.
37. Set of needle files.
38. Air blower – electric.
39. Electric drills – ¼", ½", and 5/8".
40. Ball pen hammer of various sizes.
41. Gas cutting and heating set with torches regulators, hoses and cylinder minimum two sets).
42. Arc welding generator/rectifiers with regulator, cables, Electrode holders and shields, TIG welding holders.
43. Pneumatic – grinders.
44. Hose pipes for compressed air.
45. Bench vices.
46. Hydraulic jacks 5, 10, 25, 50 & 150 tons capacity and screw jacks- 5 to 10 tons.
47. Hydraulic pump for testing coolers and 500 V megger.

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48. Electric switchboards and flood light arrangements with fuse boxes and isolating switches, Plugs and sockets.
49. In addition to above T and P contractor will be required to fabricate fixtures such as pullers etc. for removal of any other equipments related to the scope of work.
50. Pedestal fans/air coolers.
51. Wooden sleepers.
52. Wooden Planks.
53. Magnifying glass.
54. Plastic helmets, Fiber helmet.
55. Gas cutting/welding goggles, grinding goggles.
56. Bearing pullers.
57. Tarpaulin.
58. Insulation testers and Meggers 500 V and 1000 V at least 1 No. each.
59. Any other T and P as per requirement and as per our General and special conditions of Contracts.
60. Digital Multimeter
61. Analogue multimeter of Motwane make
62. Scaffolding materials

The above list is tentative. The contractor has to provide required type and capacity of T&P, cranes/lifting tools for satisfactory completion of work.

NOTE:

1. As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction site due to inherent power shortage in state; it shall be the responsibility of the contractor to have minimum numbers of diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by the bidders at their cost. No separate payment shall be made for this contingency.
2. Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work
3. All the T&Ps required for this scope of work, except the T&Ps provided by BHEL are to be arranged by the contractor within the quoted rates.
4. Also refer relevant clauses in SCC

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5. Lubricants like engine oil, Cadmium compound, hydraulic oil, gear oil, grease etc for BHEL's T&P including cranes will be provided by BHEL free of charge. Similarly filters for cranes will be provided free of charge by BHEL. All other consumables like cotton waste, cleaning agents etc shall be in the contractor's scope.
6. BHEL engineer will inspect all the tools and plants issued to contractor periodically. In case contractor fails to make good, the damages caused, BHEL will do the same at contractor's cost. The tools and tackles will be issued only to persons nominated by the contractor.

4.1 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES:

4.1.1 The contractor shall provide all (in addition to those in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipment for the scope of work covered under these specifications. Contractor has to provide suitable cranes for material handling at BHEL/client's stores/storage yard. BHEL's crane will not be available for this purpose other than specified. Please refer relevant Appendix for the list of T&P being provided by BHEL free of charges on sharing basis.

Derricks arrangements (Structural material for fabrication of Derik will be provided by BHEL on returnable basis) required for satisfactory and safe execution of work to be arranged by contractor at his cost. The quoted rate includes entire completion of work including arrangements for labor colony forms their workers stay & their transportation.

Due to confined space, there may be most of the areas being non-approachable by crane. Agency has to use improvised methods for dismantling and assembly / erection of various equipment components etc. to complete the EE R & M of TG & Auxiliaries work. These methods may include tying of ropes through existing structures /equipment such as chimney, conveyor structure and other available structures etc. At some locations, such structures are not available and crane also cannot approach .In such cases, derrick arrangement to be made for dismantling and erection. Bidders are strongly advised to visit the site along with BHEL officials to assess the possibility of using alternate arrangements apart from crane. No separate payment shall be made for any such arrangements used during the execution of the contract. All safety precautions have to be taken for such alternate arrangements and no damage should be caused to the existing equipment, structure, customer property etc.

All the above activities included in the quoted rate. No separate amount will be paid for any work. The EE R&M work completion means completion of work in all respects and takeover by customer. Any miscellaneous works arises for satisfactorily completion of work to be carried out by bidder without any extra amount.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER – IV:T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

4.1.2 Contractor has to provide spanners of all sizes, Bolt stretching devices etc. as required for satisfactorily carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

4.1.3 Contractor has to arrange slings of all sizes for completing the works covered under these specifications including special slings for Generator Stator Lifting/Handling.

4.1.4 All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. The indicative list of major T&P to be arranged by the contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P as necessary for timely and satisfactory completion of the work in scope.

4.1.5 BHEL shall not provide any Chemical Cleaning /Flushing pump / equipment as required for chemical cleaning/flushing of piping and related equipment / system. Contractor shall arrange / provide the required Chemical cleaning arrangements as per requirement and instructions of BHEL engineer without any delay/lapse.

4.1.6 Timely deployment of adequate quantity of T & P is the responsibility of the contractor. The contractor shall be prepared to augment the T & P at short notice to match the planned programme and to achieve the milestones.

4.1.7 Complete set of hydraulic jacks of 50 tonnes and 100 tonnes capacity shall be arranged by the contractor for use during erection and commissioning of Turbine & Auxiliaries. Also, hydraulic jacks of 100 tonnes and 63 tonnes capacity along with long high pressure hoses of suitable length for Generator erection and alignment shall be arranged by the contractor. These jacks shall of internationally reputed make, highly reliable and maintained in excellent working condition. They shall be tested for safe working before deploying in actual work. These jacks shall not be permitted for use anywhere other than Steam Turbine / Generator area.

4.1.8 All jack bolts that are required during R&M for carrying out all check wherever required will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

4.1.9 Contractor shall maintain and operate his tools and plants in such a way that major breakdowns are avoided. In the event of major breakdown, contractor shall make alternative arrangements expeditiously so that the progress of work is not hampered.

4.1.10 In the event of contractor failing to arrange the required tools, plants, machinery, equipment, material or non-availability of the same owing to breakdown, BHEL will make the alternative arrangement at the risk and cost of the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER – IV:T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

4.1.11 The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. Contractor shall obtain prior approval of BHEL for all the T&P before deploying in actual work. The movement of cranes, and other equipment should be such that no damage / breakage occurs to foundations, other equipment, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility. The necessary test certificates for Equipments to be submitted.

4.1.12 The contractor at his cost shall carry out periodical testing of his construction equipment and calibration of Measuring & Monitoring Devices (MMD). Test / Calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL. All calibration shall be traceable to national or international standards.

4.1.13 BHEL T&P will be issued in basic assembled condition; contractor shall transport these T&P to & fro between BHEL stores and site. Additional loose components/ sub-assemblies / attachments as and when necessary, will be issued by BHEL, to & fro movement between BHEL stores and site of such items shall also be done by the contractor. Assembly of such additional loose components/sub-assemblies/ attachments is in contractor's scope. Any boom reduction/ extension of BHEL cranes for contractor's use and restoration to previous state or as directed by BHEL shall be the contractor's responsibility. Contractor shall provide all enabling services with tools and tackles for assembly/dismantling and boom extension/reduction as above.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER – V:T&PS TO BE DEPLOYED BY BHEL ON SHARING BASIS

5.0 T&Ps AND MMEs TO BE DEPLOYED BY BHEL ON SHARING BASIS

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL 80T/20 MT CAPACITY (without operator)	01 No	CUSTOMER EOT CRANE FOR HANDLING AND ERECTION WITHIN TG HALL.
02	STRAND JACK FOR STATOR LOWERING/LIFTING	01 NO	Will be provided during dismantling and erection of new stator

NOTE:

1. Usually one EOT crane will be provided for TG erection work in TG hall.
2. Operator (03 nos) for EOT crane will be provided by contractor. Also, day to day maintenance, general cleanliness and holding/supporting the supply cables etc. will be provided by the contractor.
3. EOT crane will be used on sharing basis by other agencies working within the TG hall under the instruction of BHEL. Contractor has to plan his activities well in advance and inform BHEL engineer in charge/ Construction Manager the date of actual use.
4. Contractor shall have provide the sleepers/filling materials and manpower assistance for leveling of ground, filling of ditches/uneven approaches etc. as required for safe marching, smooth operation & movement.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER – VI: TIME SCHEDULE

6.0 TIME SCHEDULE

6.1 TIME SCHEDULE

6.1.1 The entire work of RLA, dismantling, Energy Efficient Renovation & Modernization, Testing and Commissioning of TG and Auxiliaries including Supply and Application of Final Painting for Unit-6 of 210 MW at MSPGCL-Koradi Thermal Power Station-Koradi, Maharashtra as detailed in the Tender Specification shall be completed within **32 (thirty two)** weeks from the date of commencement of work at site. Contractor shall reach site, make his site establishment and be ready to commence the work as per the directions of Construction Manager of BHEL.

The contractor has to mobilize his resources and work forces in such a manner that the entire EE R & M work is to be completed in 32 weeks from start of work to achieve the following schedule:

SL.NO	DESCRIPTION OF MILESTONE	TENTATIVE SCHEDULE OF COMPLETION
01.	RLA STUDY	2 ND WEEK
02.	DISMANTLING OF TURBINE AND AUXILIARIES	4 TH WEEK
03.	BOX UP OF TURBINE AND AUXILIARIES	25 TH WEEK
04.	COMPLETION OF OIL FLUSHING	26 TH WEEK
05.	BARRING GEAR	27 TH WEEK
06.	ROLLING & SYNCHRONISATION	28 TH WEEK
07.	FULL LOAD AND TRIAL OPERATION	32 ND WEEK

6.1.2 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL and the program of milestone events.

6.1.3 The erection work shall be commenced on the mutually agreed date between the bidder and BHEL engineer and shall be deemed as completed in all respect only when the unit is in operation. The decision of BHEL in this regard shall be final and binding of the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

6.1.4 Contractor shall specifically note that there is likely to be some delay in supplies of materials / release of work fronts / other reasons. Contractor shall have to work round the clock on

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER – VI: TIME SCHEDULE

such critical activities as a part of catch up programme to meet the project requirement to the extent possible and shall also provide required resources as part of scope of work.

6.1.5 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 parallel works in all fronts as made available to contractor.

6.1.6 It is to be noted that after dismantling of equipment under this scope, civil agency will do the foundation or repair works afterwards at some locations and further Erection and Commissioning of EE R & M work could be taken up after completion of these civil works at those locations. Hence, bidder has to plan their manpower and T & Ps accordingly so that work would not hamper during the entire contract period. Also, work shall be done on parallel fronts.

6.2 COMMENCEMENT OF CONTRACT PERIOD

The total contract period for completion of entire work of TG & Auxiliaries shall be **8 (Eight) months** from the start of erection. The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL Engineer to start the work. In case of discrepancy the decision of BHEL Engineer will be final.

6.3 CONTRACT PERIOD

The contract period for completion of entire work shall be 8 (Eight) months from the "COMMENCEMENT OF CONTRACT PERIOD".

6.1 GRACE PERIOD

Grace period of 4 (Four) weeks beyond the contract period will be applicable for this contract. However, all milestone events as per actual requirement of project schedule shall have to be achieved by the contractor without taking recourse to the Grace Period.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER-VII: TERMS OF PAYMENT

7.0 TERMS OF PAYMENT

SHALL BE ISSUED LATER

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER VIII: TAXES AND OTHER DUTIES

8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 05 dated 13/08/2015)

8.1. For All types of works excepting works covered under sl no 8.2

8.1.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

8.1.2 Service Tax & Cess on Service Tax

Contractor's price/rates shall be exclusive of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 14 %) on the admitted bill value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

- 1. The name, address and the registration number of the contractor,**
- 2. The name and address of the party receiving taxable service,**
- 3. Description, classification and value of taxable service provided and,**
- 4. The service tax payable thereon.**

All the Four conditions shall be fulfilled in the invoice before release of service tax payment.

Wherever, more than one route/option are available for discharge of service tax liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT)/CST on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be inclusive of the same and in no case input or output VAT/CST will be reimbursed extra.

In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. Contractor will submit all the details of VAT/CST paid for the contract in the prescribed

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER VIII: TAXES AND OTHER DUTIES

format of the respective state VAT laws. Also, the contractor will issue the tax Invoices to BHEL as per the Tax laws of respective state on monthly basis. Contractor shall also be required to furnish to BHEL necessary proof of VAT remittance on monthly basis.

Deduction of tax at source shall be made as per the provisions of law and is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made.

Further, if BHEL, at the instance of customer or otherwise adopts the specific route for discharging output VAT liability itself, benefit of the reduction in liability of the contractor will be passed on to BHEL.

In case, BHEL is forced to pay any VAT liability on behalf of contractor, the same will be recovered from contractor's bill or otherwise as deemed fit

8.2 'Enabling Works'

~~The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit. (i.e. rates quoted by bidder shall be inclusive of Service Tax, VAT/WCT and all other taxes and duties)~~

~~However, Since the proposed work is in the nature of 'Works Contract service' as per Service tax law, Hence, For non-corporate contractors being Individual, HUF, Proprietary Firm, Partnership Firm or Association of Persons (AOP), BHEL shall recover the applicable Service Tax under reverse charge mechanism from the contractor and remit the same with the Government as per the provisions of Law. Necessary advice/confirmation of remittance shall be issued to the contractor. The contractor shall not be eligible for any refund/reimbursement of such service tax from BHEL. It shall be the responsibility of the contractor to submit proper invoice giving all the requisite details as per Service Tax Law for the determination of the service tax liability of BHEL under reverse charge mechanism. BHEL reserves the right to determine such liability based on the invoice submitted by the contractor or otherwise independently and remittance of the same with the Government.~~

8.3 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same **before opening of Price Bid**. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER VIII: TAXES AND OTHER DUTIES

contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8.4 BOCW Cess

If BOCW cess is applicable for the subject work then the quoted rates shall be exclusive of the BOCW Cess which shall be paid extra by BHEL against Documentary evidence. However, the applicability of the BOCW Cess shall be got confirmed from BHEL in writing, before remitting such Cess/tax.

8.5 GST: As and when GST becomes applicable to this contract, the net differential (negative or positive) financial liability of the bidder to the Authorities (as compared to such liability prior to applicability of GST), if any, shall be to the account of BHEL. For this purpose, all available options under the GST shall be explored, and the decision of BHEL in this regard shall be final and binding on the bidder.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER – IX: WEIGHT SCHEDULE

9.0 WEIGHT SCHEDULE

SUMMARY LIST OF PACKAGES FOR TG & AUXILIARIES

S No	Pkg No	Description	Net Wt. (KG)	Pkg Dimension
1	501	HP CYLINDER WITH REAR SEALING (UPPER HALF)	15068	3700X3260X2250
2	502	HP CYLINDER WITH REAR SEALING (LOWER HALF)	15000	3985X3640X2500
3	503	FASTENERS AND SEALING SEGMENTS OF HPC	2815	2900X2100X1140
4	504	NOZZLE SEGMENT AND SEALING HOUSING OF HPC	2745	3800X2500X1270
5	505	BLADED HP ROTOR WITH EMERGENCY GOVERNOR	9076	4960X1800X1910
6	506	HP BLADED LINER NO.1	2546	2300X2076X981
7	507	HP BLADED LINER NO.2	3645	1800X1650X1140
8	508	HP BLADED LINER NO.3	7232	2300X2076X981
9	515	BLADED IP ROTOR WITH HALF COUPLING	16173	6650X2700X2600
10	516	IP CYLINDER (FRONT PART) U/H	9900	4120X2412X2470
11	517	IP CYLINDER (FRONT PART) L/H	9900	4120X2412X2471
12	518	IP CYLINDER (EXHAUST PART) U/H	8080	5160X2585X1860
13	519	IP CYLINDER (EXHAUST PART) L/H	7730	5360X1880X1610
14	520	IP DIAPHRAGM & LINER NO.1	3039	1900X1900X800
15	521	IP DIAPHRAGM & LINER NO.2	3963	2200X2100X990
16	522	IP DIAPHRAGM & LINER NO.3	4881	2700X2700X890
17	523	NOZZLE SEGMENT & SEALING HOUSING OF IPC	1540	3200X1800X800
18	524	FASTENERS AND SEALING SEGMENTS OF IPC	1600	2300X1300X1410
19	525	FLANGE HEATING DEVICE	55.55	1000X500X300
20	531	BLADED LP ROTOR WITH HALF COUPLING	34442	7710X3390X3560
21	532	ASSEMBLY PARTS OF DIAPHRAGMS LINER NO- 1,LPC (FRONT + REAR BOTH) WITH GUIDE BLADES	2500	2000X500X500
22	533	DIAPHRAGMS LINER NO-1, LPC (TS) WITH GUIDE BLADES	4500	3000X3000X600
23	534	DIAPHRAGMS LINER NO-1, LPC (GS) WITH GUIDE BLADES	4500	3000X3000X600
24	535	SHIELD RING LINER NO-1, LPC (GS)	750	2000X2000X400
25	536	SHIELD RING LINER NO-1, LPC (TS)	750	2000X2000X400
26	537	ANGLE RING FOR ASSEMBLY OF DIAPHRAGMS LINER NO-1, LPC	40	1700X1700X100
27	538	ANGLE RING FOR ASSEMBLY OF	40	1700X1700X100

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER -IX: Weight details

		DIAPHRAGMS LINER NO-1, LPC		
28	539	LINER NO-2 , 2R OF LPC	6500	3900X3900X600
29	540	LINER NO-2, 2L OF LPC	5500	3900X3900X601
30	541	FRONT AND REAR SEALING HOUSING HOUSING LPC	1500	2000x2000x1000
31	542	LP MODIFICATIONS	5550	3050X2240X1210
32	543	LP STRENGHTENING	3600	2350X1340X910
33	544	LP STRENGHTENING	530	5450X500X510
34	545	JOURNAL BEARINGS NOS.1, 3, 4 & 5	2695	2300X2130X980
35	546	JOURNAL BEARINGS NOS.2 & 6	2515	2500X1200X1000
36	547	BARRING GEAR	4591	3000X2300X1860
37	548	FALSE SHAFTS	2598	6400X1300X830
38	549	DEVICE FOR HOISTING LPC COVER AND DEVICE FOR HOISTING DIAPHRAGM	3500	4100X1650X1140
39	901	Nozzle Segment of HP casing	135	900X400X300
40	905	Nozzle Segment of IP casing	301	1500X750X400
41	906/	IP Diaphragm 14th stage	784	1500X800X600
42	906/2	IP Diaphragm 15th stage	641	1600X800X500
43	907/1	IP Diaphragm 16th stage	584	1650X800X450
44	907/2	IP Diaphragm 17th stage	548	1600X800X400
45	907/3	IP Diaphragm 18th stage	568	1600X800X500
46	908/1	IP Diaphragm 19th stage	635	1600X1000X450
47	908/2	IP Diaphragm 20th stage	669	1750X900X500
48	908/3	IP Diaphragm 21th stage	304	1800X950X500
49	909/1	IP Diaphragm 22th stage	946	1600X800X500
50	909/2	IP Diaphragm 23th stage	1680	2600X1550X850
51	916/1	Guide Blade Carrier LP 1R	726	2500X2500X200
52	916/2	Guide Blade Carrier LP 1L	726	2500X2500X200
53	916/3	Assembly of G.B.Carrier LP2R & LP3R (L/H)	2590	3600X1800X700
54	916/4	Assembly of G.B.CarrierLP2R & LP3R (U/H)	2590	3600X1800X700
55	916/5	Assembly of G.B.Carrier LP2L & LP3L (L/H)	2590	3600X1800X700
56	916/6	Assembly of G.B.Carrier LP2L & LP3L (U/H)	2590	3600X1800X700
57	600/1	BLANKING ARR. FOR HYD. TESTING OF HP STEAM PIPES	870	2500x2000x1500
58	600/2	BLANKING ARR. FOR STEAM BLOWING OF HP STEAM PIPES	2007	1500X1000X1000
59	600/3	BLANKING ARR. FOR HYD. TESTING OF IP STEAM PIPES	1404	2500x2000x1000
60	600/4	BLANKING ARR. FOR STEAM BLOWING OF IP STEAM PIPES	5100	4000x3500x1500
61	607	CENTRIFUGAL OIL PUMP ALONG WITH GEAR COUPLING	870	1700X1150X950
62	609/1	INTERNALS OF EMERGENCY	250	1200X1000X500

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER -IX: Weight details

		STOP VALVE		
63	609/2	INTERNALS OF EMERGENCY STOP VALVE	250	1200X1000X500
64	609/3	INTERNALS OF H.P. CONTROL VALVE NO. 1- DIA. 125	70	1600X1200X800
65	609/4	INTERNALS OF H.P. CONTROL VALVE NO. 2- DIA. 150	510	2100X1800X1500
66	609/5	INTERNALS OF H.P. CONTROL VALVE NO. 3 & 4-DIA. 150	140	1500X1000X600
67	609/6	STEAM STRAINER FOR TOP H.P. CONTROL VALVE	20	600X600X500
68	609/7	STEAM STRAINER FOR EMERGENCY STOP VALVES	56	1200X1000X800
69	610/1	INTERNALS OF INTERCEPTOR VALVE & IT'S CHEST	785	2500X2500X1800
70	610/2	INTERNALS OF INTERCEPTOR VALVE & IT'S CHEST	785	2500X2500X1800
71	610/3	INTERNALS OF SIDE I.P. CONTROL VALVE- LEFT & IT'S CHEST	560	3500X3000X1800
72	610/4	INTERNALS OF SIDE I.P. CONTROL VALVE- RIGHT & IT'S CHEST	560	3500X3000X1800
73	610/5	INTERNALS OF TOP I.P. CONTROL VALVE- LEFT	530	1600X1530X800
74	610/6	STEAM STRAINER FOR INTERCEPTOR VALVE	84	1100X1000X800
75	611/1	WORKING CAMS FOR HP & IP CONTROL VALVES	190	1500X1000X500
76	612/1	POSITION MEASURING ARRANGEMENT	30	1000X650X300
77	612/2	EHG RACK ASSEMBLY AND TRANSPORT DEVICE	883	2450X1300X2250
		Total in KG	247150.55	
		Total in MT	247.15	

Summary List of packages for Generator

SR.NO	PKG.NO	DESCRIPTION	NET WEIGHT(IN KG)
01	201	FOUNDATION BOLTS	1100
02	204	GENERATOR STATOR	200000
03	205	GENERATOR ROTOR	42965
04	206	END SHIELD(TE)	6676
05	207	END SHIELD(EE)	6676
06	209	H.V BUSHING	480
07	209/1	LOOSE ITMES OF WOUND STATOR	462

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08	213	GENERATOR ACCESSORIES	1046
09	215	GAS BAFFLE RING	236
10	216	BEARING WITH BRUSH GEAR	6540
11	219	SEAT RINGS	37
12	219/1	SEAL BODY	454
13	219/2	SHAFT SEAL	504
14	219/3	ADAPTER RING,OIL CATCHER(AIR SIDE)ETC	260
15	220	DEVICE FOR ROTER INSERTIONINTO STATOR	702
16	221	ERECTION DEVICES AND TG GEN.ASSLY	900
17	222	WIRE ROPES	102
18	223	DRY AIR BLOWER	40
19	224	TERMINAL CONNECTORS	186
20	226	CONSUMABLES	5
21	250	SEAL OIL UNIT	7825
22	251	SEAL OIL STRONGE TANK	1025
23	252	GAS UNIT	572
24	253	HYDROGEN DISTRIBUTOR	150
25	254	CO2 DISTRIBUTOR	116
26	256	LIQUID DETECTOR ROCK	238
27	258	LOOSE VALVES	1150
28	259	LOOSE INSTRUMENTS	25
29	260	CO2 VAPORISER	145
30	261	PRE-CHAMBER	728
31	542	PRE-CHAMBER	728
32	543	PRE-CHAMBER	728
33	544	PRE-CHAMBER	728
34	545	PRE-CHAMBER	728
35	546	PRE-CHAMBER	728
36	547	PRE-CHAMBER	728
37	548	PRE-CHAMBER	728
38	549	PRE-CHAMBER	728
39	550	PRE-CHAMBER	728
40	551	PRE-CHAMBER	728
41	600/1	PRE-CHAMBER	728
42	600/2	PRE-CHAMBER	728
43	600/3	PRE-CHAMBER	728
44	600/4	PRE-CHAMBER	728
45	607	PRE-CHAMBER	728
46	609/1	PRE-CHAMBER	728
47	609/2	PRE-CHAMBER	728
48	609/3	PRE-CHAMBER	728
49	609/5	PRE-CHAMBER	728
50	609/6	PRE-CHAMBER	728
51	609/7	PRE-CHAMBER	728
52	610/1	PRE-CHAMBER	728

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53	610/2	PRE-CHAMBER	728
54	610/3	PRE-CHAMBER	728
55	610/4	PRE-CHAMBER	728
56	610/5	PRE-CHAMBER	728
57	610/6	PRE-CHAMBER	728
58	611/1	PRE-CHAMBER	728
59	612/1	PRE-CHAMBER	728
60	612/2	PRE-CHAMBER	728
61	613/3	PRE-CHAMBER	728
62	901	PRE-CHAMBER	728
63	905	PRE-CHAMBER	728
64	906/1	PRE-CHAMBER	728
65	906/2	PRE-CHAMBER	728
66	907/1	PRE-CHAMBER	728
67	907/2	PRE-CHAMBER	728
68	907/3	PRE-CHAMBER	728
69	908/1	PRE-CHAMBER	728
70	908/2	PRE-CHAMBER	728
71	908/3	PRE-CHAMBER	728
72	909/1	PRE-CHAMBER	728
73	909/2	PRE-CHAMBER	728
74	916/1	PRE-CHAMBER	728
75	916/2	PRE-CHAMBER	728
76	916/3	PRE-CHAMBER	728
77	916/4	PRE-CHAMBER	728
78	916/5	PRE-CHAMBER	728
79	916/6	PRE-CHAMBER	728
TOTAL WEIGHT (in KG)			317017
TOTAL WEIGHT (in MT)			317.01

Summary List of packages for Condenser

SR.NO	PKG.NO	DESCRIPTION	NET WEIGHT(IN KG)
01	78157	LOOSE ITMES (CONDENSER & LPH)	84
02	78213	STEAM THROW DEVICE-1	1930
03	78214	STEAM THROW DEVICE-2	1930
04	78301	TUBE BUNDAL GC-1	867.84
05	78302	TUBE BUNDAL GC-2	1573.71
06	78304	LOOSE ITMES(GS & MOC)	50
07	78315	TUBE BUNDLE LPH-1A	2020
08	78315/2	TUBE BUNDLE LPH-1B	2020
09	78321	TUBE BUNDLE LPH-2	4662
10	78328	TUBE BUNDLE LPH-3	4286
11	78335	TUBE BUNDLE LPH-4	4530
12	78401	TUBE SYSTEM -1 OF MOC	1061.5

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13	78402	TUBE SYSTEM -2 OF MOC	1061.5
14	78405	TUBE SYSTEM -3 OF MOC	1061.5
15	2020	TUBE SYSTEM -3 OF MOC	1061.5
16	221	TUBE SYSTEM -3 OF MOC	1061.5
17	222	TUBE SYSTEM -3 OF MOC	1061.5
18	223	TUBE SYSTEM -3 OF MOC	1061.5
19	224	TUBE SYSTEM -3 OF MOC	1061.5
20	226	TUBE SYSTEM -3 OF MOC	1061.5
21	250	TUBE SYSTEM -3 OF MOC	1061.5
22	251	TUBE SYSTEM -3 OF MOC	1061.5
23	252	TUBE SYSTEM -3 OF MOC	1061.5
24	253	TUBE SYSTEM -3 OF MOC	1061.5
25	254	TUBE SYSTEM -3 OF MOC	1061.5
26	256	TUBE SYSTEM -3 OF MOC	1061.5
27	258	TUBE SYSTEM -3 OF MOC	1061.5
28	259	TUBE SYSTEM -3 OF MOC	1061.5
29	260	TUBE SYSTEM -3 OF MOC	1061.5
30	261	TUBE SYSTEM -3 OF MOC	1061.5
31	542	TUBE SYSTEM -3 OF MOC	1061.5
32	543	TUBE SYSTEM -3 OF MOC	1061.5
33	544	TUBE SYSTEM -3 OF MOC	1061.5
34	545	TUBE SYSTEM -3 OF MOC	1061.5
35	546	TUBE SYSTEM -3 OF MOC	1061.5
36	547	TUBE SYSTEM -3 OF MOC	1061.5
37	548	TUBE SYSTEM -3 OF MOC	1061.5
38	549	TUBE SYSTEM -3 OF MOC	1061.5
39	550	TUBE SYSTEM -3 OF MOC	1061.5
40	551	TUBE SYSTEM -3 OF MOC	1061.5
41	600/1	TUBE SYSTEM -3 OF MOC	1061.5
42	600/2	TUBE SYSTEM -3 OF MOC	1061.5
43	600/3	TUBE SYSTEM -3 OF MOC	1061.5
44	600/4	TUBE SYSTEM -3 OF MOC	1061.5
45	607	TUBE SYSTEM -3 OF MOC	1061.5
46	609/1	TUBE SYSTEM -3 OF MOC	1061.5
47	609/2	TUBE SYSTEM -3 OF MOC	1061.5
48	609/3	TUBE SYSTEM -3 OF MOC	1061.5
49	609/5	TUBE SYSTEM -3 OF MOC	1061.5
50	609/6	TUBE SYSTEM -3 OF MOC	1061.5
51	609/7	TUBE SYSTEM -3 OF MOC	1061.5
52	610/1	TUBE SYSTEM -3 OF MOC	1061.5
53	610/2	TUBE SYSTEM -3 OF MOC	1061.5
54	610/3	TUBE SYSTEM -3 OF MOC	1061.5
55	610/4	TUBE SYSTEM -3 OF MOC	1061.5
56	610/5	TUBE SYSTEM -3 OF MOC	1061.5
57	610/6	TUBE SYSTEM -3 OF MOC	1061.5
58	611/1	TUBE SYSTEM -3 OF MOC	1061.5
59	612/1	TUBE SYSTEM -3 OF MOC	1061.5
60	612/2	TUBE SYSTEM -3 OF MOC	1061.5

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61	612/3	TUBE SYSTEM -3 OF MOC	1061.5
62	901	TUBE SYSTEM -3 OF MOC	1061.5
63	905	TUBE SYSTEM -3 OF MOC	1061.5
64	906/1	TUBE SYSTEM -3 OF MOC	1061.5
65	906/2	TUBE SYSTEM -3 OF MOC	1061.5
66	907/1	TUBE SYSTEM -3 OF MOC	1061.5
67	907/2	TUBE SYSTEM -3 OF MOC	1061.5
68	907/3	TUBE SYSTEM -3 OF MOC	1061.5
69	908/1	TUBE SYSTEM -3 OF MOC	1061.5
70	908/2	TUBE SYSTEM -3 OF MOC	1061.5
71	908/3	TUBE SYSTEM -3 OF MOC	1061.5
72	909/1	TUBE SYSTEM -3 OF MOC	1061.5
73	909/2	TUBE SYSTEM -3 OF MOC	1061.5
74	916/1	TUBE SYSTEM -3 OF MOC	1061.5
75	916/2	TUBE SYSTEM -3 OF MOC	1061.5
76	916/3	TUBE SYSTEM -3 OF MOC	1061.5
77	916/4	TUBE SYSTEM -3 OF MOC	1061.5
78	916/5	TUBE SYSTEM -3 OF MOC	1061.5
79	916/6	TUBE SYSTEM -3 OF MOC	1061.5
	TOTAL WEIGHT (in KG)		96135.55
	TOTAL WEIGHT (in MT)		96.14

Hyderabad Supplies (HP Heaters, Deareator etc.) weight details

S.NO	MATERIAL DESCRIPTION	QUANTI TY	WEIGHT(in KG)
1	HP Heater -5	1.000	21,630.144
2	HP Heater -6	1.000	29,161.568
3	HP Heater -7	1.000	27,854.948
4	GLOBE VLV CS(SA105)1/2"CL1500 SW ENDS	16.000	80.000
5	GLOBE VLV CS(SA105)1" CL1500 SW	40.000	336.000
6	STAND PIPE ASSLY-2 FOR HPH- 5 & 6	2.000	112.000
7	STAND PIPE ASSLY-1 FOR HPH- 5 & 6	2.000	116.000
8	GLOBE VLV CS(SA105)1/2"CL1500 SW ENDS	8.000	40.000
9	GLOBE VLV CS(SA105)1" CL1500 SW	20.000	168.000
10	STAND PIPE ASSLY-2 FOR HPH- 7	1.000	56.000
11	STAND PIPE ASSLY-1 FOR HPH-7	1.000	67.000
12	NAB M.S.W. GASKET SIZE 4"#600 GRPH	1.000	0.080
13	SRV 4" 300#/6" 150# SET PR 16 ATG	1.000	100.000
14	SRV 4" 300#/6" 150# SET PR 34 ATG	1.000	160.000
15	SRV 4" 600#/6" 150# SET PR 48 ATG	1.000	140.000
16	ORIFICE ASSLY. DIA 5.3 HOLE (VAR-12)	1.000	5.200
17	ORIFICE ASSLY. DIA 4.8 HOLE (VAR-11)	1.000	5.200
18	ORIFICE PLATE ASSLY. (VAR-02)	1.000	4.500
19	FOUNDATION ASSLY.	12.000	88.800
20	JACKING SCREW	12.000	36.000

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21	WER VALVE 3/4"X1"SW SET PR 265ATG	1.000	5.000
22	WER VALVE 3/4"X1"SW SET PR 265ATG	2.000	10.000
23	GLOBE VLV CS(SA105)1" CL1500 SW	18.000	151.200
24	GLOBE VLV CS(SA105)1/2"CL1500 SW ENDS	6.000	30.000
25	GLOBE VLV CS(SA105)2" CL1500 SOC WELD	24.000	566.400
26	NAB M.S.W. GASKET SIZE 6" #150 PTFE	3.000	0.450
27	NAB M.S.W. GASKET SIZE 4" #300 PTFE	2.000	0.160
28	RND CS 6,15*6000.00MM	19.800	19.800
29	PIPE(SMLS)- 33.4X 9.09 CS SA106 GR B	12.000	65.400
30	PIPE(SMLS)- 33.4X 6.35 CS SA106 GR B	18.000	76.248
31	PIPE(SMLS)- 21.3 X4.78 CS SA106 GR B	12.000	23.364
32	PIPE(SMLS) 60.3X 5.54 CS SA106 GR B	12.000	89.784
33	PIPE(SMLS)- 26.7X 7.82 CS SA106 GR B	1.000	3.630
34	GLOBE VALVE CS 1" CL 2500 SW ENDS	24.000	216.000
35	FLANGE SOW CS 6" CL 150 RF (SA105)	3.000	23.400
36	STUD 2 NUTS M20X120	24.000	11.736
37	MINERAL ROCKWOOL MATTRESS 75X1220X1640	240.000	1,872.000
38	SHEET(AL)22G-W=914 ROLL-IS 737 GR 19000	600.000	600.000
39	WIRE GI 0.9MM-IS 280-ANLD	31.000	31.000
40	MINERAL ROCKWOOL MATTRESS 75X1220X1640	345.000	2,691.000
41	SHEET(AL)22G-W=914 ROLL-IS 737 GR 19000	759.000	759.000
42	WIRE GI 0.9MM-IS 280-ANLD	45.000	45.000
43	GLOBE VALVE CS 1" CL 800 SW ENDS	4.000	13.600
44	PLT CS 8 CHQD,2*1250.00*5000.00MM	861.250	861.250
45	BAR GRATING WIDTH=755, LENGTH=2500	2.000	150.000
46	FLAT CS 100 X 10,2*3500.00MM	54.950	54.950
47	RND CS 20,10*400.00MM	9.840	9.840
48	CHNL CS 125,2*3200.00MM	83.840	83.840
49	ANGLE CS 75X75X8,10*400.00MM	35.600	35.600
50	TUBE CS 48.8 X 3.25 ERW/SAW NB40	6.800	24.827
51	BAR GRATING GAL. 25THK, W=300, L=600	24.000	212.160
52	EWLI CC1800 1"SW END CONNECTION	1.000	100.000
53	EWLI CC1800 1"SW END CONNECTION	1.000	100.000
54	CARTRIDGE ASSEMBLY-200KHI/S (SLEEVE BRG)	1.000	2,556.000
55	CARTRIDGE ASSEMBLY-200KHI/S (SLEEVE BRG)	1.000	2,556.000
56	CARTRIDGE ASSEMBLY-200KHI/S (SLEEVE BRG)	1.000	2,556.000
57	SUPPORT RAIL ASSEMBLY 200KHI/S BFP	1.000	308.860
58	MOUNTING BRKT ASSY SPL TOOLS-200KHI/S	1.000	123.000
59	MOUNT WHEEL ASSY(TDBFP CART TOOLS)	2.000	10.000
60	EXTN SLV 1ST STG ASSY SPL TOOLS-200KHI/S	1.000	70.200
61	EXTN SLEEVE STG ASSY SPL TOOLS-200KHI/S	4.000	258.000
62	SUPPORT JACK ASSY-FK4E36 CART TOOLS	1.000	40.000
63	START SCREW M20	3.000	2.400
64	SCR HEX GR.A M30X70-P 4.8 IS1364	4.000	2.416
65	LIFTING PLATE (SPL.TOOLS) - 200KHI/S BFP	1.000	21.500
66	SUPPORT PAD (SPL.TOOLS) - 200KHI/S BFP	2.000	18.840
67	SUPPORT PLATE (SPL.TOOLS) - 200KHI/S BFP	1.000	11.800
68	EXTENDED NUT	4.000	1.240

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69	HYDRAULIC STUD TENSIONER(M64X3)	1.000	80.000
70	PIPE(SMLS) 88.9X11.13 CS SA106 GR B	0.165	3.522
71	STUD B P M20X55-8.8	1.000	0.916
72	NUT HEX P M20-8	1.000	0.064
73	NUT HEX P M20-8	30.000	1.920
74	SCREW HEX M20X150-8.8	4.000	2.288
75	SCREW HEX M20X40-8.8	4.000	0.668
76	SCREW HEX M24X55-8.8	4.000	1.180
77	SCREW HEX M24X50-8.8	8.000	2.232
78	EYE BOLT CS M24 COL DIA 48 EYE ID 48 CP	2.000	2.400
79	SCREW HEX M20X45-8.8	6.000	1.002
80	NUT LOCK HEX P M30-4	4.000	0.464
81	SCREW HEX M20X70-8.8	16.000	3.504
82	STUD A P M24X130-8.8	4.000	0.224
83	RECIRCULATION CONTROL VALVE	1.000	250.000
84	RECIRCULATION CONTROL VALVE	2.000	500.000
85	LO COOLER(SIMPLEX),HC R17K,3067401014940	3.000	900.000
86	WO COOLER(SIMPLEX),HC R17K,3067401014930	3.000	1,800.000
87	MECH SEAL(CARTG) COOLER-200KHI/S	6.000	210.000
88	MECH SEAL(CARTG) COOLER-200KHI/S	6.000	210.000
89	CONN COUPLING-VAR 01(BFP/HC)	3.000	168.600
90	CONNECTING COUPLING MOTOR/HC-R17K	3.000	150.000
91	EOP ASSEMBLY-100 NCU(IMP DIA 310)	1.000	253.000
92	EOP(HOR)220 V DC 18KW MOTOR 1500RPM	1.000	450.000
93	STAND BY OIL PUMP (150COAV/2)	1.000	1,210.000
94	SOP VERTICAL 415V AC 25KW MOTOR 970RPM	1.000	500.000
	TOTAL WEIGHT (in KG)		104336.319
	TOTAL WEIGHT (in MT)		104.34

TG Piping

SR.NO.	PIPING DESCRIPTION	NET WEIGHT (in MT)
01	ALLOY STEEL	8
02	CARBON STEEL EXTRACTION STEAM TO HPH-7	64.5
03	H & S/ AUXILIARY STRUCTURE	5
	Total in MT	77.5

R.E. Joints - Conventional (1600 NB)

S No	Description	Size (Leng x Dia)	Weight (in MT)
1	Conventional RE Joint- in assembled condition	700 mm x 2400 mm	1.5

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LP Dosing system

S No	Description	Weight in MT
1	Ammonia Dosing System	1.3
2	Hydrazine Dosing system	1.2
	Total in MT	2.5

Valves

S No	Description	Weight in MT
1	Air Release valves	1
2	Flow Elements	1
3	Valves to be replaced in scope (Trichy supplied)	45
	Total (in MT)	47

TG Integral Piping

S No	Description	Weight in MT
1	LPT exhaust hood spray piping + EHC Integration piping + Installation for 3-way Temperature control valve & Duplex filter	1.16
2	Jacking Oil system	0.5
3	Generator Integral Piping	16
	Total (in MT)	17.66

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER -IX: Weight details

Summary of weight schedule:

S No	Description	Total weight in MT
1	Turbine & Generator	564.16
2	Condenser	96.14
3	Hyderabad Supplies(Heaters, Dearators etc.)	104.34
4	TG Piping	77.5
6	RE Joints	1.5
7	LP Dosing	2.5
8	Valves	47
8	TG Integral piping	17.66
	Total	910.8

NOTE FOR WEIGHT SCHEDULE:

1. The weights given are only approximate and for general guidance and they are subject to variation as per site requirement for dismantling & design consideration for erection.
2. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete the systems in all respects.
3. Any other systems / Components which are integral to TG & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted lump sum value.

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

10.1 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work within the quoted rate.

10.2 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.

10.3 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account contractor only. BHEL engineer, depending upon the availability of materials, fronts etc, will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.

10.4 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

10.5 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe/tubes, and handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

CHAPTER -X: GENERAL

10.6 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be affected for such excess draws at the rate prescribed by manufacturing units.

10.7 No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.

10.8 Contractors shall ensure that all their Staff/Employees are exposed to periodical training program conducted by qualified agencies/ personnel on ISO 9001 – 2000 Standards.

10.9 For other agencies, such as piping, cabling, instrumentation, insulation etc., to commence their work from/on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence/continue the work so as to keep the overall project schedule.

10.10 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

10.11 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

10.12 On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

10.13 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

10.14 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the sit premises. Without the Entry Gate Pass these materials will not be allowed to be taken outside.

10.15 Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.

10.16 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.

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10.17 SITE INSPECTION

The owner/employer or his authorized agents may inspect various stages of work during the period of the contract. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner/employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

10.18 UTILITY POINTS

Number of utility points (Service / plant air, service / plant water, service / washing steam, inert gas (N₂) etc., shall be indicated in the P & I diagram. The utility points shall be located at convenient point to handle. Contractor to locate the utility points as advised by site engineer.

10.19 Safety

Adherences to safety are upper most during execution of work. 100% safety norms to be strictly followed. Tenderer should appoint qualified safety officer to implement safety. He should interact with BHEL and customer for day to day activities. As the work is to be executed in the running plant, all work force to undergo for a safety classes and obtain the certificate from customer. No person will be allowed with out safety training.

Trained and certified safety supervisors to be appointed for every 50 work men. The safety officer, supervisors are not allowed to assigning any work other than safety. Heavy penalty will be levied if any un -safe practices are found during execution of work.

10.20 Quality:

Qualified and certified quality engineer to be posted at site for quality assurance. The quality person should maintain all records and reports to be generated as per BHEL quality standards. He should interact with customer and BHEL and all the stage wise protocols to be prepared after joint inspection and get is signed by BHEL and customer. All the record to be maintained and he is responsible for quality audit carried out by BHEL and customer.

10.21 Foundation for the equipments to be erected shall be provided by BHEL/ clients of BHEL. The dimension of the foundation and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments plants shall be carried out by the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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10.22 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form/shuttering work are within the scope this work.

10.23 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundation obtaining proper face for packer plates/shims, and may be required for the erection of the equipment/plants will have to be carried out by the contractor without extra cost.

10.24 The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of Turbine, Generator, Pumps and other equipment wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks

10.25 Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

10.26 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments

10.27 Foundation pockets are to be cleaned thoroughly before placing the columns/equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement., if required cleaning of the threads to be done with proper dies.

10.28 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to erection of the equipment. Packer plates should not only be blue matched with foundation but also inter-packer contact surfaces between the packers and foundation frame etc., shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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10.29 There is no provision for separate payments for foundation & grouting specified above and rate quoted shall include the cost of the same.

10.30 The certificates of the grout is to be submitted BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc to be arranged by the contractor including the fine aggregates.

10.31 All the materials required for grouting including special cements like Conbextra GPI,GP2, ACC- Shrinkkomb-N20, Sika Ankor, NSG/ NSG -1, CICO Excem GP, or its equivalent as approved by BHEL and other materials like Portland cement, sand etc., are to be arranged by the contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.

10.32 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates/sheets at site by the contractor to meet site requirement.

10.33 PROCEDURE FOR GROUTING:

Contractor has to carry out the grouting as per the work instructions for grouting available at site (As per FQP).

10.34 Cleaning, servicing, lubrication of actuators, pumps, governing system components, ESV & IV, control valves, LP bypass & HP Bypass valves, Cold Re-heat Non Return Valves with power cylinders and other valves etc. during installation and commissioning stages is in the scope of work. However, gaskets/packing/lubricants for replacement will be provided by BHEL free of cost.

10.35 All equipment shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. The journals of steam turbine rotors, generator rotor, HT motors and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CHAPTER – X: GENERAL

10.36 Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

10.37 All racks or assembled units like Governing Rack, LP Bypass Rack & HP Bypass system, Cold Re-heat Non Return Valve, Seal Oil Unit, Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

10.38 Filling of lubricants for steam turbine, turbo-generator and other rotating auxiliaries for purpose of oil flushing. Initial fill up and subsequent topping up during various stages of work.

10.39 PIPING INSTALLATION

10.39.1 The scope of work in piping system (Air, Gas, Water, Oil, Steam, Control fluid etc.) will include cutting modification to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc., fixing supports/hangers/shock absorbers/guides and restraints etc. and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per engineer's instructions and/or as per approved drawings. Weld joints and NDT requirement for all TG Integral piping, External/Regenerating System and other pipings as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld joints will be provided at site during execution of work.

10.39.2 Carrying out of all TG piping wherever required for modification/re-routing as per the specifications between equipment constituting terminal points, whether the terminal points of equipment fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDT & PWHT if applicable, for all the piping schemes covered in the scope of work.

10.39.3 Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipment, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of

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joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

10.39.4 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 works have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

10.39.5 All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / flash box / condenser / sump / atmosphere etc. from the stubs on the piping and equipment erected by contractor is completely covered in the scope of this tender with support.

10.39.6 The following items of work shall be incidental and forming part of piping fabrication and erection:

- (1) To locate cause of vibrations in equipment/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.
- (2) Fabrication and erection & welding of racks, steel supports, guides, restraints for all the piping. Steel for this purpose will be supplied by BHEL free of charge in random and running lengths.
- (3) Pre-assembly of spring suspension/hangers and shock absorber as per requirement.
- (4) Erection of steam traps, filters, flow nozzles/ flow indicators/ flow orifices other measuring elements in the piping. These may have been supplied either by BHEL or their customer. This may involve cutting of pipelines, fresh edge preparation and welding with stress relieving wherever applicable.
- (5) Fabrication / making of bends for pipes and tubes of diameter upto 65mm.
- (6) Matching of all fittings like tees, bends, flanges, reducers valves, socket fittings, etc with pipes for welding.
- (7) Servicing of valves, Power Cylinders and actuators etc.
- (8) Cleaning of all pipes by wire brushing / blowing by compressed air.
- (9) Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles/orifices/metering/ measuring elements fixed on piping.
- (10) Welding of blanks with stress relieving if required on a temporary basis.

10.39.7 Pipelines will be field routed as per schemes/ suggestive layout or as per the instructions of BHEL engineer. Pipes & tubes will be supplied in random lengths and running lengths. The contractor shall have to lay the piping after carrying out the

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necessary fabrication, edge preparation, routing etc to suit site requirement in best professional manner.

10.39.8 As far as possible pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

10.39.9 All the welders shall be tested and approved by BHEL Engineer before they are engaged on work though they may possess previous qualification certificate. BHEL reserves the right to reject any welder without assigning any reason.

10.39.10 Welding/threading of GI instrument air / Service air piping as specified in drawing / documents and instruction of BHEL engineer shall be carried out as part of scope of work.

10.39.11 No temporary supports should be welded on to the piping.

10.39.12 Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. The contractor shall provide this facility till the commissioning and handing over of the equipment to the customer. The contractor shall also carry out preservative and touch up painting on equipment covered under this specification stored at stores/storage yard.

10.39.13 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.

10.39.14 The contractor shall return to BHEL the excess materials left over after completion of work, materials issued for temporary pipelines for HT, chemical cleaning, flushing, blowing etc. and materials issued on returnable basis in neatly dressed condition. Necessary grinding, edge cutting (square facing), edge preparation (VEE),

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painting etc. to the condition similar to the one at the time of issue shall be in scope of work.

10.39.15 All suitable access/approach platform for valves/ isolating/throttling devices/equipments at suitable location/elevations shall be carried by contractor as per instruction of BHEL Engineer as part of scope of work.

10.40 This tender covers tentative scope of work. Also tentative scope of supplies are mentioned in relevant chapters of this tender for the EE R & M. The supplies are indicative and may vary as per actual requirement after RLA and Dismantling of machine. Price quoted by bidder shall remain firm considering such variations in scope of work & scope of supplies.

10.41 PG TEST TAPPING POINTS

Installation 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. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

10.42 SPECIFIC INCLUSIONS

10.42.1 All terminal connections for equipment & piping covered in this specification.

10.42.2 Impulse/pneumatic piping between customer's battery limit and equipments.

10.42.3 Auxiliary Cooling water/Cooling Water Piping between battery limits of customer and equipments covered under the tender specification like SWAS, BFP system (Booster Pump Coolers, Lube oil Coolers, Motor air Coolers, Working oil coolers, Stuffing Box, Seal water Coolers), Condensate Extraction Pumps, Generator Hydrogen Coolers, Exciter Air Coolers, Seal Oil Coolers, Turbine oil coolers, Plate Heat Exchanger, Condenser On Load Tube Cleaning system, Condenser Vacuum Pumps etc.

10.42.4 Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers & steam blowing & blanking devices in LP bypass, M.S. Strainer, HRH Strainer & and blanking of LP bypass, HP Stop & control valves System, for hydro test, steam blowing etc is the part of scope of work.

10.42.5 Renovation & Modernisation, commissioning and testing of HP/LP Bypass system valves and Cold Re-heat Non-return valve with respective oil system and accessories are included under the scope of tender specification. Erection HP Bypass valve and CRH NRV shall involve installation of valves on temporary supports to provide

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reference/connection of HP Bypass and CRH Critical piping which will be erected by other agency, dismantle the valves/ remove valve internals & fix steam blowing devices (as advised by BHEL Engineer at site) to make Steam blowing connection and install the valves permanently/re-fix the internals on permanent supports for final connection. Oil system shall require erection of tanks, Motors, Power Cylinder, oil piping, oil flushing of system etc. till final commissioning and handing of system. All above are under the scope of contractor. BHEL shall provide oil for flushing and initial fill, topping up free of charges. Contractor shall collect the oil barrels from BHEL stores/storage yard and return the empty container/left over oil barrels (flushed oil / fresh oil) to BHEL stores after completion of work.

10.42.6 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.

10.42.7 Complete control fluid system of both HP and LP Bypass System is included in this specification. Associated assistance for commissioning like lube oil flushing, filling and topping up of lube oil etc shall be part of the work.

10.42.8 Dismantling, Overhauling and Assembly and Installation of Strainer Elements of MS and HRH system is within the scope of work. Cleaning of these strainer elements during trial operation of machine is also covered under this scope.

10.42.9 Erection and welding of Impulse piping from various equipment & piping tapping point to root valve.

10.43 CONSUMABLES

10.43.1 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 cleaning agent, sealing compound(Hylomar / Golden Hermetite / Stag-B / Molykote-1000/ Anabond compounds / Rubber fixing compounds etc. will have to be arranged by the contractor.

10.43.2 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.

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Supply of all primer and paints required for final painting as per specification provided by BHEL shall be in the scope of contractor. Contractor shall obtain approval from BHEL prior to procurement.

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CHAPTER -XI: Handling of heavier Equipments

11.0 HANDLING OF HEAVIER EQUIPMENTS

Heavy and voluminous equipment/consignments like HP Turbine, IP Turbine, LP Rotor LP Carrier rings, diaphragms , Generator stator, Generator rotor, Exciter HP,LP Heaters, Deaerator Sections etc. along with other equipment shall be handled carefully. Contractor shall have to arrange his own Tools & Tackles, Trailer of suitable capacity including additional suitable capacity lifting Crane and any other arrangement required to handle right from collection of materials from BHEL/Customer store yards/stores, transportation to site of works and erection & their placement on respective elevation/foundation. BHEL Shall not provide any T&P other than those specified for the specific in BHEL scope and other relevant clauses of tender specification.

11.1 TURBINE (HP-IP-LP)

11.1.1 Removal of Turbine gladding sheets and insulations of Turbine casing, valves and pipe line as required. This covers complete cleaning of insulation, shifting of HP-IP casing and HP-IP-LP rotor from the TG floor and packing, loading, transporting to Customer/BHEL storage area as per requirement. Extend the necessary support as required for approach/accessibility, filling of ditches, levelling etc for transporting till unloading and placement of Generator Stator as per BHEL Engineer is the part of scope of work under this contract.

11.1.2 Fabrication of support stands and transporting device for stator & rotor and arranging trailer for transporting of stator & rotor from TG floor to unloading location are the part of scope of work under this contract. BHEL will provide all the materials required for fabrication of support stands and transporting device.

11.2 GENERATOR REPLACEMENT

11.2.1 Dismantling of all connected pipelines, bus ducting, terminal bushing, end shields, pedestal and thread out of Generator rotor. Lifting of the old Generator Stator, weighing about 200 Metric Tons (approx.) and the rotor weighing about 50 Metric Tons from the TG floor and packing, loading, transporting to Customer/BHEL storage area as per requirement. Extend the necessary support as required for approach/accessibility, filling of ditches, leveling etc for transporting till unloading and placement of Generator Stator as per BHEL Engineer is the part of scope of work under this contract.

11.2.2 Fabrication of support stands and transporting device for stator & rotor and arranging trailer for transporting of stator & rotor from TG floor to unloading location are the part of scope of work under this contract. BHEL will provide all the materials required for fabrication of support stands and transporting device.

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11.2.3 The new Generator Stator, weighing about 200 Metric Tonnes (approx.) and Generator rotor weighing about 50 Metric Tonnes will be delivered to site on a special trailer. Scope of contractor shall be keeping liaison and follow up with transporters and extend the necessary support as required for approach/accessibility, filling of ditches, levelling etc for marching till unloading and placement of Generator Stator to required foundation/elevation. Contractor shall plan all his activities / operation so as to avoid the delay in unloading and releasing the transporter's Carrier trailer. For any demurrage Charges by Transporters / Customer on account of delay in Handling, Unloading from Trailer after arrival at site shall be the responsibility of Contractor. The all above complete works of receipt from trailer, unloading, shifting/placement to required foundation /elevation of Generator Stator is the part of scope of work under this contract.

11.2.4 The Generator Stator shall be lifted and place on foundation by the contractor with the help of Strand jack arrangement. Extend the necessary support as required for approach/accessibility, filling of ditches, levelling etc for lifting and placement of Generator Stator on foundation is covered in the scope. Arranging Strand Jack Agency will be in the BHEL scope.

11.2.5 Before insertion of tubes in condenser, the contractor shall clean the holes in the tube plates and tube support plates to remove paint, corrosion spots, oxide scales etc. Usage of suitable cleaning agent may also be required which has to be supplied by the contractor.

11.2.6 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 indicator. 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.

11.2.7 The hydrostatic testing of steam space and hydraulic testing of water space up to the terminal point after assembly of water boxes and connecting all the pipes with the condenser are also included in the scope.

11.2.8 Work of painting of condenser surfaces in various areas and at various stages of work are specified elsewhere in these specifications.

11.2.9 Condenser vacuum pumps with complete piping, accessories for condenser air evacuation system with all instrumentation system shall be installed with required grouting etc.

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CHAPTER – XII: PRE-COMMISSIONING, COMMISSIONING AND POST
COMMISSIONING TESTS

12.0 PRE-COMMISSIONING, COMMISSIONING AND POST COMMISSIONING TESTS

12.1.1 Commissioning of the TG equipment with associated Aux. and other Equipments with auxiliaries shall involve the following tests and activities of the equipment erected:

- (a) Trial run of Boiler Feed Pumps, CEP, Booster Pump, DM make-up Transfer Pumps, DM CW Pumps with Booster pumps, etc. and other various rotating machineries / pumps as per tender specification.
- (b) Trial run of motors/ drives for various auxiliaries.
- (c) Hydraulic Test, Chemical Cleaning, Oil flushing of lube oil system, Control fluid (Governing oil system/Control oil system), Seal oil System, Air cleaning/blowing of pipelines, closed systems, Tanks and Vessels.
- (d) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.
- (e) Servicing of all valves, Hydraulic Power cylinders, HP-IP stop & control valves, HP & LP Bypass valves, CRHNRV, Butter Fly Valves (Hydraulic/Electrical/manually operated), and fittings.
- (f) Manual/mechanical cleaning of Oil tanks, Deaerator, FST, Suction Strainers / Filter elements of CEP, BFP, Booster Pump, DM make-up Transfer Pumps, DM CW Pumps with Booster pumps, Central lube oil system pumps etc and other various equipments & tanks /vessels erected by the contractor. This may have to be repeated several times during the commissioning process.
- (g) Chemical cleaning of piping systems, Deaerator as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like deaerator spray nozzles, gauges, instruments etc. as instructed by BHEL during this process.
- (h) Putting turbine on barring gear.
- (i) Rolling and synchronisation.
- (j) Full load operation.
- (k) Trial operation
- (l) PG Test

The above activities/tests/trial runs may have to be repeated till satisfactory results are obtained and also to meet the technical and statutory requirements.

12.1.2 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 equipments as part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this T.S.

12.1.3 The contractor shall provide necessary assistance to facilitate/enable electrical and instrumentation testing and commissioning of equipment under this scope of work, to BHEL and their Testing & Commissioning agency.

12.1.4 The contractor shall carry out any other test as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or parts of work performed by the contractor.

12.1.5 In case any malfunctioning and / or defect is found during tests / trial runs such as loose components, undue noise or vibrations, strain on connected equipment etc. The contractor shall immediately attend to these defects/ malfunctioning and take necessary corrective measures. If any readjustment and realignments are necessary, the same shall be done as per BHEL engineer's instructions, free of cost.

12.1.6 Cleaning of Lube oil tank, Over Head condensate surge tank, DM make –up Tank, Dirty oil Tank, Clean Oil tank, Oil unloading Vessels etc. by sand blasting or other methods as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

12.1.7 The contractor shall associate for initial and subsequent fillings of gas in generator gas system as and when required till unit is handed over to Customer.

12.1.8 The contractor shall carry out air tightness test on generator gas cooling system to the satisfaction of BHEL engineer.

12.1.9 Replacing/changing mechanical/other seals of equipment, pumps etc. during commissioning stage is within the scope of work.

12.1.10 During the stages of commissioning, and till Unit is handed over, if any part of TG and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim if any, for such repair/rectification/rework/ replacement etc. for reasons not attributable to the contractor, will be governed by clauses 2.15 of GCC. The parts to be replaced shall however, be provided by BHEL free of cost.

12.1.11 During this period, though BHEL's and customer's engineers will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken over by the customer.

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

12.1.13 The pre-commissioning activities will start prior to Lube oil, Governing/ Control oil flushing, Seal Oil 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. All these works need specialized gangs including electricians, Instrument Technicians, 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.

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

12.1.15 After the start of commercial operation of machine, commissioning activities will continue. It shall be the responsibility of contractor to provide following manpower along with supervisor as part of commissioning assistance for a period of three months.

1. Engineer(1per shift) 2 Nos
2. Supervisor(1per shift) 2 Nos.
3. Forman(1per shift) 2Nos
4. Pipe fitter 2Nos
5. Millwright fitter (TG & Aux.) 8 Nos.
6. Welder 2 Nos.
7. Rigger 2 Nos.
8. Electrician 2 Nos
9. Instrument technician 1 No.
10. Unskilled worker 10 Nos.

12.1.16 The above figures shows only minimum required over and above labour required for completing pending R&M and commissioning works and clearing of punch lists. Contractor has to provide number of personnel and other resources as per work demand.

12.1.17 It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers.

12.1.18 During commissioning, opening of valves, changing of gaskets, checking, realigning of rotating and other equipment, attending to leakages in piping, tanks etc. and adjustments of erected equipment may arise. Valves shall be serviced and lubricated to the satisfaction of BHEL engineer during the erection and commissioning as per BHEL engineer's instructions.

12.1.19 It is the responsibility of the contractor to provide for necessary resources till the completion of work under these specifications, even in case erection, testing and commissioning of the TG and other equipment are delayed due to reasons not attributable to the contractor.

12.2 HYDRAULIC TESTING, PRESERVATION AND OTHER TESTS

12.2.1 Contractor shall carry out the following tests required to complete the Renovation & Modernisation and commissioning of the TG Set and its Auxiliaries:

- (1) Hydraulic testing of individual equipment like condenser, coolers, heaters, other auxiliaries and equipment. Required capacity Hydraulic test pump/Fill pump and other necessary arrangement shall be provided by contractor to carry out hydraulic testing, Chemical cleaning of the equipment and piping as part of scope of work under this tender specification.
- (2) Ultrasonic test
- (3) Dye Penetrant test
- (4) Magnetic Particle Test.

All above facilities (men, materials, equipment, consumables etc) with operating engineer/experienced person and proper approach wherever required shall be provided by the contractor for satisfactory completion of the above tests.

12.2.2 Contractor shall lay all necessary temporary piping, weld, support, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

12.2.3 All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

12.2.4 Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work. Contractor will provide required valves, fasteners, blank flanges, blanks or steel for blank flanges. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL engineers' instruction.

12.2.5 Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

12.2.6 While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points, strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and some-times piping of other agencies may have to be combined. Contractor shall carry out all such incidental work to satisfactorily conduct the hydro test. Wherever work is involved in the terminal points, Contractor shall carryout the same as per instruction of BHEL engineer. The decision of BHEL engineer is final and the same is binding on the contractor.

The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor

12.3 CHEMICALS, GASES AND LUBRICANTS FOR PRE-COMMISSIONING AND COMMISSIONING

12.3.1 All lubricants/Lube oil and chemicals required for testing, chemical cleaning, acid cleaning, oil/chemical/gas flushing required for testing, pre-commissioning & commissioning upto trial operation of equipment/unit will be provided by BHEL. Flushed/fresh oil for flushing of lube oil/governing/control oil system and filling with day today topping, Carbon-dioxide & Hydrogen gas for purging and filling in Turbo-generator will also be supplied by BHEL. Contractor shall arrange for taking delivery and loading of all such consumables from BHEL/ Customer Stores/ yard, transportation to site of work and unloading thereon, filling in the system and return the used lube oil, balance quantity of consumables etc, to BHEL stores duly reconciled for quantity.

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12.4 ACID CLEANING / ALKALI FLUSHING / STEAM BLOWING / OIL FLUSHING ETC WHEREVER REQUIRED.

12.4.1 Contractor shall lay temporary pipelines with fittings and accessories and also erect/commission pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing etc. of piping and other equipment including providing the Chemical Cleaning/flushing Pumps/ equipment etc which are within the scope of work and also systems in which equipment and piping erected by contractor form a part of the scope of work.

It shall be specifically noted by the contractor that all pipes for above works shall be supplied in random length and in loose condition. Contractor has to assemble and erect them as per schemes / drawings provided by BHEL. Further, flanges, bend etc. for completing the scheme shall be machined/ fabricated by the contractor at his own cost. However, plates / steel etc. for the same will be provided by BHEL free of charges.

12.4.2 After the chemical cleaning has been successfully completed, dismantling of all temporary installations as instructed by BHEL is within the scope of work under this specification. The dismantled materials shall be dressed and returned to BHEL as stated elsewhere in this tender specification.

12.4.3 Preservation of the cleaned surfaces will be the responsibility of contractor under the guidance of BHEL engineer.

12.4.4 Hydraulic test of temporary piping is to be carried out as per the instructions of BHEL Engineer. Carrying out repairs, if any, is in the scope of work/specification.

12.4.5 For chemical cleaning of the piping system, contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected is in the scope of contractor or not. Decision of BHEL Engineer in this regard will be final and binding on the contractor.

12.4.6 During the initial stages of work, trenches for draining water may not be available after alkali flushing or mass flushing for discharging and emptying. Necessary low point drains and temporary piping for this will have to be provided by contractor from materials provided by BHEL.

12.4.7 Laying effluent discharge line from mixing tank (for acid cleaning or any other chemical cleaning process) as per the instructions of BHEL engineer and dismantling, servicing for preservation and handing over the same to BHEL stores after completion of the job is within the scope of work/specification.

12.4.8 Radiographic examination of weld joints on temporary pipes as required by the Engineer In-charge should be carried out.

12.4.9 Contractor shall also carry out the repairs or attend leaks etc., in the temporary piping and equipment for the above operations / activities while carrying out the above activities / operations.

12.4.10 For chemical cleaning of system which consist of equipment/piping erected by the contractor and also equipment/piping erected by other contractors of BHEL/ customer's contractor has to arrange for workers and supervisory staff as required supplementing/complimenting the labour and supervisory staff mobilised by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decisions on the strength of gangs and supervisory staff for deployment of labour and allocation of work for them at site, by BHEL engineer is final and binding on the contractor.

12.4.11 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. No separate payment on this account shall be entertained.

12.4.12 After acid cleaning/pickling of lubricating system (including oil piping of lube oil system, Seal oil system, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems, HP/LP Bypass systems etc. as per instructions of BHEL Engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machineries, cooler etc. before and after oil flushing is the responsibility of the contractor.

12.4.13 Erection and commissioning of connecting piping – permanent and temporary for oil purification equipment and all operations for cleaning, oil flushing, dismantling of temporary piping during pre and post-commissioning of equipment up to full load.

12.5 ELECTRICAL AND INSTRUMENTATION

12.5.1 Contractor shall mount all flow indicators, centrifugal/speed switches of motors, accumulators, pressure regulators, etc which are received loose and which are to be

erected/mounted at site on air lines, water lines, oil lines, HP/LP Bypass system, steam lines, auxiliaries and firemen floor and other operating floors on boiler/power house and other equipments. These are to be mounted during R&M for finalising routing/position etc. They are to be dismantled after completion of erection work and handed over to BHEL for calibration. After calibration, these instruments shall be remounted by the contractor in their respective positions just before commissioning.

12.5.2 Certain instrumentation like, pressure gauges, power cylinders, flow meters, valve actuators, flow indicators, etc are received in assembled condition as integral part of equipment. Contractor shall dismantle such equipment at an appropriate stage under the instruction of BHEL and hand them over to BHEL for calibration and storage. Contractor shall re-erect them in position just before commissioning of the equipment.

12.5.3 Seal welding of Thermowells, plugs before Hydro test of equipment and piping systems is also within the scope of this work/specification. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld Thermowells after Hydro test/steam blowing of lines.

12.5.4 Providing necessary engineer/supervisors/technicians/electricians as required by BHEL engineer for drying out the LT/HT motors is within the scope of the work. Job includes testing the motor for finding out PI & IR values and making necessary cabling connection for heating for dry out from the nearest source of supply and maintaining and controlling the temperature till the IR and PI values are achieved as per standards. The contractor shall provide necessary power cables and other tools and consumables for the above works free of charges. Before undertaking dry out/trial run of HT motors, the end shields and covers shall be opened on both the ends of the motor for inspection, cleaning and greasing of bearings.

12.5.5 Welding of all Thermowells, draft, pressure and temperature instrumentation points, and all other instrumentation points on piping, and auxiliaries is within the scope of this work.

12.5.6 All the HT Motors shall be preserved with space heaters on, and provided with proper cover till the commissioning of the motors.

12.5.7 Mount instrumentation on turbine, generator and exciter and auxiliaries which are integral part and main equipment and render necessary services for their commissioning.

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13.0 WELDING

13.1.1 Removal of welding slag and burrs by hand files, with brushes and/or flexible grinders will be carried out simultaneously.

13.1.2 On all steam, oil, instrument, gas, air (Instrument air/services air) piping etc. both TIG welding and subsequent arc welding or total TIG welding process is to be adopted as instructed by BHEL engineer.

13.1.3 All weld joints on piping shall be ground / filed / dressed on completion of welding and before NDE as per instructions BHEL engineer.

13.1.4 The Contractor shall procure all electrodes and filler wires of approved quality / brand as per the standards and specifications of BHEL and instruction of BHEL Engineer.

13.1.5 Contractor should purchase the electrodes as per the recommendations of BHEL engineer, welding manual, welding schedule and other relevant documents. The electrodes shall be purchased only from BHEL approved manufacturers.

13.1.6 The purchase of electrodes shall be accompanied by proper test certificate and these certificates should be submitted regularly for the scrutiny of BHEL engineer.

13.1.7 All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like windows or ventilators. The temperature inside the room has to be kept in the range of 8-10° c above atmospheric temperature and humidity should be less than 50%. This is to be accomplished by using electric heaters or infrared lamps. The storage room must be provided with hygrometer and thermometer. Temperature and humidity are to be monitored regularly. 15-20 holders, welding cables, connecting cables to equipment and other welding accessories including temporary electrical connection from construction power point to individual equipment like winches, hoisting equipment, welding generators, transformers, heat treatment equipment and other construction equipment shall be arranged by contractor.

13.1.8 All racks and other items used for storage of electrodes shall be of steel and not of wood.

13.1.9 All electrodes soon after purchase shall be offered for inspection to the BHEL engineer. Contractor shall be strictly prohibited from using electrodes not inspected/approved by BHEL engineer.

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13.1.10 All welding consumables shall be issued to the welders only by authorized person who is controlled by contractor's welding engineer. The necessary baking requirements are to be ensured by Contractor's welding engineer.

13.1.11 All welders shall be tested and approved by BHEL engineer/customer before they are actually engaged on work though they may possess the requisite certificate. BHEL reserves the right to reject any welder without assigning any reasons. Statutory requirements like IBR approval for welders are to be complied with before starting of the work. If required, the welders may have to undergo Procedure Qualification test also. The decision of BHEL Engineer will be final in this regard.

13.1.12 All charges for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site shall have to be borne by the contractor. However for initial testing of welders the test plates will be provided by BHEL. However, If deployed welders fails in initial testing due to lack of experience OR frequent testing of new welders, due to non-availability/non-deployment of earlier qualified/tested welders, it shall be the responsibility of Contractor to provide necessary test plates at his cost for above testing.

13.1.13 BHEL engineer is entitled to stop any welder from his work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by him, which, in the opinion of BHEL engineers, will adversely affect the quality of welding though the welder has earlier passed the tests prescribed. The fact that the welders have passed the test does not relieve the contractor from his contractual obligations to check the performance of the welders. Contractor shall submit a monthly performance record of all welders.

13.1.14 All welded joints shall be subject to acceptance by BHEL engineer whose decision will be final and binding.

13.1.15 Pre-heating and stress relieving before and after welding are part of R&M work and shall be performed by the contractor in accordance with instructions of BHEL engineer. Contractor has to arrange for the recorders along with accessories and suitable technicians for heat treatment purpose. The temperature recorders and thermocouples shall be duly calibrated. During preheat and stress relieving operations the temperature shall be measured as per the instructions of BHEL engineers by thermocouples and recorded graphs for the heat treatment works carried out shall be the property of BHEL.

13.1.16 For the purpose of stress relieving, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations are as per the standards of BHEL. Thermocouples have to be attached using battery operated portable

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thermocouple attachment unit and not by manual arc welding. Contractor shall arrange sufficient number of thermocouple attachment units.

13.1.17 Wherever necessary, contractor should provide temperature indicator/temperature recorder as required by BHEL engineer for measuring preheat temperature for welding or for controlling temperature of metal for hot correction etc. Decision of BHEL engineer on method and checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

13.1.18 Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The contractor shall make all necessary arrangements including labour required for the same as per directions of BHEL.

13.1.19 Heat treatment requirements shall be as per the Welding Schedules of BHEL

13.1.20 For weld joints of heavy structural items like beams, I-sections, if heat treatment is required, the same shall be carried out as part of the work.

13.1.21 Checking effectiveness of stress relieving by hardness tests (either by Poldi Hardness Tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipment is within the scope of the work/specification.

13.1.22 TIG welding process is to be used for all root pass welds in pipes. Subsequent welding after root pass can be carried out by manual metal arc welding with basic coated electrodes. For the pipe of thickness less than 6mm, the entire welding has to be carried out by TIG welding. However, BHEL site engineer will have the option of changing the method adopted. For manual arc welding shall be done as per weaving technique and the width of weaving shall not exceed 1.5 times of the dia of the electrodes.

13.1.23 Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensions and with respect to the template. Dye penetrate check shall be carried out on edge prepared surfaces at random. The percentage shall depend on piping system as specified by BHEL engineer.

13.1.24 Joint fit up will be a stage for inspection.

13.1.25 All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

13.2 RADIOGRAPHY

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13.2.1 Radiographic inspection of welds shall be arranged by the contractor including all consumables like isotope camera, x-ray film, chemicals etc. Scaffolding and approaches for taking radiographs.

The contractor shall provide the necessary skilled technician and labourers for taking the radiographs. While taking radiographs, the contractor has to use proper penetrometer/ image quality indicators as instructed by the BHEL engineer. All the processed and accepted films will be the property of BHEL. In this regard, the contractor has to adhere to the safety rules/regulations laid by BARC authorities from time to time. It may please be noted that invariably the radiographic work will be carried after the normal working hours with prior intimation and permission.

13.2.2 Contractor shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL standard practice/code requirement. The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance/rejection of the joints will be final and binding on the contractor.

13.2.3 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radio graphed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if defect persists after first repair, as per radiograph, carrying out repairs and radiography shall be repeated till joint is made acceptable in case, the joint is not repairable, the same shall have to be cut and repaired at contractor's cost. Decision of BHEL engineer in all these matters is final and binding on the contractor.

13.2.4 100% radiography of weld joints of certain piping have to be carried out as per BHEL standards/drawings/specification.

13.2.5 It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. Necessary trained personnel shall be deployed for this purpose.

13.3 WELD FIT-UP AND WELD JOINT PROTECTIVE PAINT, COMPONENT PRESERVATIVE PAINTING ETC.

- 1) The water boxes shall be cleaned by sandblasting. Thereafter two coats of Epoxide priming paint followed by two/three coats of high build black coal tar epoxy (e.g., "Apcodur CP684" of Asian Paints or equivalent from any other BHEL/MSEB

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approved manufacturer). Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL/MSEB approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. Required paints & primers and other consumables for above works shall be arranged by Contractor.

- 2) All waterside surfaces of water chambers including tube plate shall be thoroughly surface prepared and painted. Required primer & paints and other consumables for condenser water box and tube plates shall be provided by Contractor.
- 3) After the successful completion of hydraulic testing, the interior surfaces of the water boxes, main tube plates shall be painted with suitable anticorrosive paints as per special procedures laid down by BHEL. Required necessary paints along with primers and other consumables shall be arranged by Contractor.
- 4) Prior to hydraulic testing of waterside of condenser, interior surfaces of water boxes shall be painted.
- 5) After completion of tubing and tube side hydro test, all waterside surfaces of water chambers including tube plate shall be painted.
- 6) Preservation of all components/equipment during various stages of R&M, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. Contractor has to arrange all primer and paints, and other consumables like wire brush, painting brush required for this work.

13.4 WELDING ELECTRODES, TIG WELDING FILLER WIRES AND GASES

13.4.1 Contractor, at his cost shall arrange all the required welding electrodes including the filler wires / TIG wires etc. as required and as approved by BHEL. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL regarding type of electrodes, batch number, date of expiry etc. Batch test certificates shall be made available for verification & record before the actual use of the welding consumables.

BHEL reserves the right to reject the use of any electrodes, if found non-acceptable because of bad quality, deterioration in quality due to improper storage, shelf life expiry, unapproved type / brand etc.

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13.4.2 Gases like Argon, Oxygen and Acetylene etc. that are required for erection related activities shall be arranged by the contractor at his cost.

13.4.3 Nitrogen gas it required for preservation during chemical cleaning process of piping system will be arranged by BHEL free of charges. Contractor shall arrange necessary connector, Nipple, Regulator, Header and piping for usage of such Gas from Cylinders.

14.0 LINING AND INSULATION

14.1 Application of thermal insulation/ spray insulation, finishing, cladding and outer casing etc on various components of TG, Generator, auxiliaries and piping including valves.

14.2 The work shall conform to dimension and tolerances specified in the various drawing and documents that will be provided during the execution. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost. Failing which the work will be got done by engaging other agencies or departmentally and recoveries will be deducted from contractor's bills towards expenditure incurred including 30% departmental charges.

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

14.4 All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the contractor.

14.5 The contractor shall provide the required quantity of wire, nails, and planks for formwork and other materials for shuttering and curing works.

14.6 Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.

14.7 Removable type of insulation has to be provided for valves fittings, expansion joints etc as per drawing or as directed by BHEL engineer.

14.8 The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for aluminium sheets have to be adhered to.

14.9 Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather.

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CHAPTER – XIV: LINING AND INSULATION

14.10 The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be in scope of bidder.

14.11 To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/strips or any other insert may have to be fixed as required.

14.12 The contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL engineer to facilitate inspection or during commissioning to fix gauges, fittings, instruments etc. These gaps will have to be finished as per drawings at later date by the contractor at his cost.

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

14.13 A log book shall be maintained by the contractor for the clearance of the area for application of insulation. Where the contractor does the work on his own accord without prior permission, the work should be re-done, at his own cost, where necessitated.

14.14 Wastage allowances for the material issued are envisaged as follows:

CWool mattresses -2%
DCladding sheets -2%

The wastage allowance will be applicable on the net issued quantity i.e. Total quantity issued reduced by the quantity returned to stores as unused/fresh item. Contractor shall reconcile the material issues periodically as prescribed by BHEL site. Payment for the done will be regulated as per relevant section.

14.15 The following works are also included in the scope of this contract:

- Cutting of cladding sheets as per the profile of the equipment and painting on inner surface two coats of bituminous paint. Paint shall be arranged by contractor.
- Cutting of the wool mattresses to the required shape and application of finishing cement of required thickness wherever required

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14.16 Insulation work of temporary piping for alkali boil out, steam blowing and chemical cleaning has to be carried out at site. The same have to be removed and returned to the BHEL stores after the completion of activity. Rates quoted for application of wool for boiler and auxiliaries will be applicable for this work also. No separate payment will be made for removal of temporary insulation and return of the same to BHEL stores/yard.

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CHAPTER -XV: FINAL PAINTING

15.0 FINAL PAINTING

15.1 All exposed metal parts of the equipment including piping, structures, railings etc (covered within the scope of this contract) 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 any other method approved by BHEL Engineer, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of paints specified by BHEL Engineer.

15.2 The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/customer engineer at site for the equipment/ components covered in these specifications.

15.3 Painting of welded areas/painting of areas exposed after removal of temporary supports/touch up painting on damaged areas of employer's equipment/employer's structure, where inter-connection, welding/modification etc. shall be carried out by the bidder.

a) Clean the surface to remove flux spatter and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.

b) Painting procedure to be followed as mentioned above for touch up painting on damaged area.

15.4 In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

15.5 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.

15.6 During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, contractor shall repair the same free of cost to BHEL.

15.7 Specified drying time shall be permitted from one to another coat.

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CHAPTER -XV: FINAL PAINTING

15.8 This work requires working at higher altitudes from ground level to as high as 90 m 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.

15.9 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.

15.10 Contractor shall take due care to cover/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.

15.11 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 or equipment decided by BHEL Engineer has to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. 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.

15.12 The contractor shall provide all the necessary paints, scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

15.13 Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.