

# TENDER SPECIFICATION

SI No	Tender Specification Number	Unit Number & Project
1	BHE/PW/PUR/VNT5-STG/1205	500 MW STG Set of Unit 13

FOR

**COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING & COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF TURBINE AND GENERATOR SET AND ITS AUXILIARIES, HP/LP HEATER AND DEAERATOR, INSULATION AND FINAL PAINTING (INCLUDING SUPPLY) ETC FOR UNIT 13 OF**

**1X500 MW NTPC VINDHYACHAL PROJECT**

**AT**

**VINDHYANAGAR IN SINGRAULI DISTRICT IN MADHYA PRADESH STATE**

**VOLUME – I**

**CONSISTING OF:**

- Notice Inviting Tender,
- Volume-IA : Technical Conditions of Contract-,
- Volume-IB : Special Conditions of Contract,
- Volume-IC : General Conditions of Contract
- Volume-ID : Forms & Procedures



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

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1	BHE/PW/PUR/VNT5-STG/1205	500 MW STG Set of Unit 13

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**1X500 MW NTPC VINDHYACHAL PROJECT**

**AT**

**VINDHYANAGAR IN SINGRAULI DISTRICT IN MADHYA PRADESH STATE**

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR Refer Notice Inviting Tender

TENDER SUBMISSION .

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

M/s. ....

.....

PLEASE NOTE:

THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

ADDITIONAL GENERAL MANAGER (Purchase)

Place: Nagpur

Date :

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1205

# NOTICE INVITING TENDER

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	<b>TENDER NUMBER</b>	<b>BHE/PW/PUR/ VNT5-STG U-13 /1205</b>	
ii	<b>Broad Scope of job</b>	COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING AND COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF <b>TURBINE AND GENERATOR SET AND ITS AUXILIARIES</b> , HP/LP HEATER AND DEAERATOR, INSULATION, HANGERS & SUPPORTS AND FINAL PAINTING (INCLUDING SUPPLY) ETC. <b>FOR UNIT 13 OF NTPC VINDHYACHAL PROJECT AT VINDHYANAGAR IN SINGRAULI DISTRICT IN MADHYA PRADESH STATE.</b>	
iii	<b>DETAILS OF TENDER DOCUMENT</b>		
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>	<i>Applicable</i>
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i>	<i>Applicable</i>
c	Volume-IC	<i>General Conditions of Contract (GCC)</i>	<i>Applicable</i>
d	Volume-ID	<i>Forms and Procedures</i>	
e	Volume-II	<i>Price Schedule (Absolute value).</i>	<i>Applicable</i>
iv	<b>Issue of Tender Documents</b>	<b>1. <u>Sale from BHEL PS Regional office at :</u></b> <b>Start : 29/11/2013, Time :</b> <b>Closes: 21/12/2013 , Time :16:00 Hrs</b> <b>2. From BHEL website (<a href="http://www.bhel.com">www.bhel.com</a>)</b> Tender documents will be available for downloading from website till due date of submission	<i>Applicable/ Not applicable</i>
v	<b>DUE DATE &amp; TIME OF OFFER SUBMISSION</b>	<b>Date : 23/12/2013 , Time : 15:00 Hrs</b> <b>Place : <u>BHEL PS Regional office at :Nagpur</u></b>  Tenders being submitted through representative shall be submitted at dispatch section of of PSWR HQ Office after	<i>Applicable</i>

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		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)	
vi	<b>OPENING TENDER OF</b>	<b>1 hours after the latest due date and time of Offer submission</b> 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	<b>EMD AMOUNT</b>	Rs 2,00,000/- (Rupees Two Lakhs Only)	Applicable
viii	<b>COST OF TENDER</b>	Rs 2000/-.	Applicable
ix	<b>LAST DATE FOR SEEKING CLARIFICATION</b>	Atleast 5 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	<b>SCHEDULE OF Pre Bid Discussion (PBD)</b>	Date :	Applicable/Not applicable.
xi	<b>INTEGRITY PACT &amp; DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)</b>		Applicable/Not Applicable
xii	<b>Latest updates</b>	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage ( <a href="http://www.bhel.com">www.bhel.com</a> -->Tender Notifications →View Corrigendums) <b>and not in the newspapers</b> . Bidders to keep themselves updated with all such information	

- 2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed & 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)

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- 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
	<b>Part-I A</b>	
	<p><b>ENVELOPE – I superscribed as :</b> PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p><b>CONTAINING THE FOLLOWING:-</b></p>	
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><b>Note:</b></p> <p>a. In case of any deviation, the same should be submitted separately for technical &amp; 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="margin-left: 20px;">i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL</p> <p style="margin-left: 20px;">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.	

<b>PART-I B</b>		
	<p><b>ENVELOPE – II superscribed as:</b> PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK :</p>	

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	PROJECT: DUE DATE OF SUBMISSION:  <b>CONTAINING THE FOLLOWING:-</b>	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender <b>OR</b> Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender  2. Cost of Tender ( Demand Draft or copy of Cash Receipt as the case may be)	

	<b>PART-II</b>	
	<b>PRICE BID</b> consisting of the following shall be enclosed	
	<b>ENVELOPE-III</b> superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:  <b>CONTAINING THE FOLLOWING</b>	
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)	

	<b>OUTER COVER</b>	
	<b>ENVELOPE-IV</b> (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:  <b>CONTAINING THE FOLLOWING:</b>	
i	<ul style="list-style-type: none"> <li>○ Envelopes I</li> <li>○ Envelopes II</li> <li>○ Envelopes III</li> </ul>	

**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**

$$S_T = \frac{\sum_{i=1}^N P_i T_i}{T_T}$$

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

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

Sl no	Item Description	Details for all Regions							Total
		(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	...	P <sub>N</sub>	Total No of similar packages for all Regions = P <sub>T</sub> 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 ( as in row 1)	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	...	T <sub>N</sub>	Sum (Σ) of columns (iii) to (ix)  = T <sub>T</sub>
3	Monthly performance scores for the corresponding period (as in Row 2)	S <sub>1-1</sub> , S <sub>1-2</sub> , S <sub>1-3</sub> , S <sub>1-4</sub> , ... S <sub>1-T1</sub>	S <sub>2-1</sub> , S <sub>2-2</sub> , S <sub>2-3</sub> , S <sub>2-4</sub> , ... S <sub>2-T2</sub>	S <sub>3-1</sub> , S <sub>3-2</sub> , S <sub>3-3</sub> , S <sub>3-4</sub> , ... S <sub>3-T3</sub>	S <sub>4-1</sub> , S <sub>4-2</sub> , S <sub>4-3</sub> , S <sub>4-4</sub> , ... S <sub>4-T4</sub>	S <sub>5-1</sub> , S <sub>5-2</sub> , S <sub>5-3</sub> , S <sub>5-4</sub> , ... S <sub>5-T5</sub>	... ... ... ... ...	S <sub>N-1</sub> , S <sub>N-2</sub> , S <sub>N-3</sub> , S <sub>N-4</sub> , ... S <sub>N-TN</sub>	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>	S <sub>5</sub>	...	S <sub>N</sub>	Sum (Σ) of columns (iii) to (ix)  = S <sub>T</sub>

ii) Calculation of Overall 'Performance Rating' (R<sub>BHEL</sub>) 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<sub>BHEL</sub>' shall be calculated subject to availability of 'performance scores' for at least 6 'package months' in the order of precedence below:

- 'Period of Assessment.
- 12 months preceding the cut-off month
- 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 $\leq$ 65	0.4
3	> 65 and $\leq$ 70	0.35
4	> 70 and $\leq$ 75	0.25
5	> 75 and < 80	0.2
6	$\geq$ 80	NA

**III. 'Assessment of Capacity of Bidder':**

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

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

Note:

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

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if  $P \leq P_{Max}$   
(where P is calculated as per clause 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
iii). Civil Works including foundations	iii). Others (Elec & CI)	iii). LP Piping
iv). Structural Steel Fabrication & Erection		iv). ESP
v). Chimney		v). Steam Turbine Generator set & Aux

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	vi). Cooling Tower vii). Others (Civil)		vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). 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'.

- 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<sub>BHEL</sub>'** 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

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

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- 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 Purchase

**Enclosure**

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03. Annexure – 3 IMPORTANT INFORMATION
04. Other Tender documents as per this NIT.

**PRE QUALIFYING REQUIREMENTS**

JOB	COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE; ERECTION, TESTING AND COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF <b>TURBINE AND GENERATOR SET AND ITS AUXILIARIES</b> , HP/LP HEATER AND DEAERATOR, INSULATION, HANGERS & SUPPORTS AND FINAL PAINTING (INCLUDING SUPPLY) ETC. <b>FOR UNIT 13 OF NTPC VINDHYACHAL PROJECT AT VINDHYANAGAR IN SINGRAULI DISTRICT IN MADHYA PRADESH STATE.</b>
TENDER NO	<b>BHE/PW/PUR/ VNT5-STG U-13 /1205</b>

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. <b>Bidder must fill up this column as per applicability</b>
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium/Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	NOT APPLICABLE	
B	<b><u>Technical</u></b> Bidder must have, Executed Erection, Testing and Commissioning (Up to Synchronization of the Unit or beyond) of One set of Steam Turbine Generator (STG) of 190 MW or higher rating in last seven years as on the latest date of offer Submission.	APPLICABLE	
C-1	<b><u>Financial</u></b> <b><u>TURNOVER</u></b> Bidders must have achieved an average annual financial turnover (Audited) of <b>Rs 225 Lakhs</b> or more over last three Financial Years (FY) i.e. 2010-2011, 2011-12 & 2012-13	APPLICABLE	
C-2	<b><u>NETWORTH</u></b> (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	APPLICABLE	
C-3	<b><u>PROFIT</u></b> 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.	APPLICABLE	
D	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	APPLICABLE	By BHEL

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E	Approval of Customer (if applicable)  <b>Note:</b> 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.	<b>APPLICABLE</b>	BY BHEL
F	Price Bid Opening  <b>Note:</b> Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		BY BHEL
F	Technical Tie up criteria (if applicable)	<b>NOT APPLICABLE</b>	
<p><b><u>Explanatory Notes for the PQR (unless otherwise specified in the PQR):</u></b></p> <ol style="list-style-type: none"> <li>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</li> <li>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.</li> <li>3. 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)</li> <li>4. 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</li> <li>5. <del>'Additional' Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified:-</del> <ol style="list-style-type: none"> <li>i. <del>Bidder should have executed similar work of any one of the following:-</del> <ol style="list-style-type: none"> <li>a. <del>One (1) work of value not less than Rs XXX</del> <del>_____OR</del></li> <li>b. <del>Two (2) works of not less than Rs YYY</del> <del>_____OR</del></li> <li>c. <del>Three (3) works of not less than Rs ZZZ</del> <del>(Value XXX, YYY, ZZZ shall be as indicated by BHEL</del></li> </ol> </li> <li>ii. <del>'Similar' work for criteria 5 above means</del> <ol style="list-style-type: none"> <li>a. <del>Civil or Structures or Civil &amp; Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works</del></li> <li>b. <del>Electrical works in respect of 'ELECTRICAL'</del></li> <li>c. <del>CI works in respect of 'CI' Works</del></li> <li>d. <del>Material Handling and/or Management works in respect of 'MM' works</del></li> </ol> </li> </ol> </li> <li>6. 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</li> <li>7. '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</li> <li>8. Unless otherwise specified, for the purpose of 'Technical' criteria of PQR ( as in 'B' above), the word 'EXECUTED' means: <ol style="list-style-type: none"> <li>i. <del>"BOILER LIGHT UP" in respect of Boiler &amp; Aux and ESP</del></li> <li>ii. <del>"SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG</del></li> <li>iii. <del>"STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping</del></li> <li>iv. <del>"HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping</del></li> <li>v. <del>"CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears</del></li> <li>vi. <del>"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.</del></li> <li>vii. <del>Achievement of physical Quantities as per respective PQRs in respect of Civil &amp; Structures and Piling Works</del></li> <li>viii. <del>"Readiness for coal Filling" in respect of Bunker Structure Work.</del></li> </ol> </li> </ol>			

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	<p>9. Boiler means HRSG or WHRB or any other types of Steam Generator</p> <p>10. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines</p> <p>11. 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.</p> <p>12. In case the experience/PO/WO certificate enclosed by bidders do not have separate break up prices for the E&amp;C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply and erection of Electrical &amp; CI and other works if any), then value of Erection and Commissioning for the Electrical &amp; CI portion shall be considered as 15% of the supply &amp; erection of Electrical &amp; CI, unless otherwise specifically indicated in the PQR.</p> <p>13. 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.</p> <p>14. In case the tendered scope is not a Pulverised Fuel Boiler, experience of Oil/Gas Fired Boilers also can be considered unless otherwise specifically indicated in the PQR</p> <p>15. 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.</p>
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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.

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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 <b>PRE QUALIFICATION CRITERIA</b> (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/Not Applicable	YES/NO
8	Copy of PAN Card	Applicable/Not Applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable/Not Applicable	YES/NO
10	Integrity Pact	Applicable/Not Applicable	NO
11	Declaration by Authorised Signatory	Applicable/Not Applicable	YES/NO
12	No Deviation Certificate	Applicable/Not Applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable/Not Applicable	YES/NO
14	Declaration for relation in BHEL	Applicable/Not Applicable	YES/NO

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15	Non Disclosure Certificate	Applicable/ <del>Not Applicable</del>	YES/NO
16	Bank Account Details for E-Payment	Applicable/ <del>Not Applicable</del>	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/ <del>Not Applicable</del>	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Applicable/ <del>Not Applicable</del>	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable/ <del>Not Applicable</del>	YES/NO
20	Analysis of Unit rates	Applicable/ <del>Not Applicable</del>	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. **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](http://www.bhel.com) ---> Tender Notification -> List of Banned Firms )**
2. **All Statutory Requirements as applicable for this project shall be complied with.**
3. **Please take note of following Revised Tender Clauses:**
  - i. Notice Inviting Tender: SI No 9
  - ii. General conditions of Contract: Clause No 1.15.13 (New), Clause No 2.8.3, 2.8.4 and 2.8.5
4. **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.

**5. 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

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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 + Period extended for the reasons attributable to Contractor & Force Majeure Condition). Schedule Completion date shall be the actual start date plus contract period as defined in Chapter VI 'Vol IA TCC'

**6. OVER RUN COMPENSATION**

**Modification in Price Variation Compensation Clause no. 2.12 of Vol I C GCC:**

**Clause No. 2.12 of Vol IC GCC is Revised as below:-**

IF THE CONTRACT IS EXTENDED BEYOND THE CONTRACT PERIOD FOR ANY REASON OTHER THAN THOSE ATTRIBUTABLE TO THE CONTRACTOR OR FORCE MAJEURE CONDITIONS, THE CONTRACTOR WILL BE COMPENSATED BY PAYMENT OF OVERRUN CHARGES AT THE RATE OF **RS.100000/- (One Lakh Only)** PER MONTH. OVERRUN COMPENSATION WILL BE PAID FOR THE EXTENSION ATTRIBUTABLE TO BHEL ONLY. NO OVERRUN COMPENSATION WILL BE PAYABLE FOR THE EXTENSION ON ACCOUNT OF REASONS ATTRIBUTABLE TO CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS. OVERRUN COMPENSATION FOR ELIGIBLE PERIOD SHALL BE IN PROPORTION TO THE PROGRESS ACHIEVED AGAINST THE PLAN FOR RESPECTIVE PERIOD.

**7. 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:

- 7.1. 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.
- 7.2. The philosophy followed for reverse auction shall be English Reverse (No ties). English Reverse (No ties) is a type of auction where the starting price and bid decrement are announced before start of online reverse auction. The interested bidders can thereupon start bidding in an iterative process wherein the lowest bidder at any given moment can be displaced by an even lower bid of a competing bidder, within a given time frame. The bidding is with reference to the current lowest bid in the reverse auction. All bidders will see only the current lowest quoted price. The term „No ties“ is used since more than one bidder cannot give an identical price, at a given instant, during the reverse auction. In other words, there shall never be a tie in the bids.
- 7.3. Technically and commercially acceptable bidders only shall be eligible to participate.

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- 7.4. 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. Business rules for Reverse Auction and other information like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
- 7.5. After receipt of “online sealed bids” by the participating bidders, start price & bid decrement will be decided by BHEL, before the online Reverse Auction. Only those bidders who have submitted the “online sealed bid” within the scheduled time shall be eligible to participate further in RA process. **However, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA.** Once participating bidders have given ‘Online Sealed Bid’ and ‘start price’ & ‘bid decrement’ is decided by BHEL, Bidding for RA will start as per RA schedule specified in business rules. Bidders may then submit their bids (current L-1 price(s) lowered by multiple decrements). If the ‘start price’ decided by BHEL is same as the ‘Online Sealed Bid’ price of any bidder, then that bidder shall be reckoned as current L1 automatically at the start of Reverse Auction and no acceptance of that price is required i.e (RA shall deemed to have started at this stage for further bidding)
- 7.6. 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.
- 7.7. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

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# TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED



# TECHNICAL CONDITIONS OF CONTRACT (TCC) CONTENTS

SI No	DESCRIPTION	Chapter	No. OF PAGES
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1	Project Information	Chapter-I	1
2	Scope of Works	Chapter-II	1
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	7
4	T&Ps and MMDs to be deployed by Contractor	Chapter-IV	2
5	T&Ps to be deployed by BHEL free of hire charges on sharing basis	Chapter-V	1
6	Time Schedule	Chapter-VI	2
7	Terms of Payment	Chapter-VII	6
8	Taxes and other Duties	Chapter-VIII	2
9	Specific Inclusion	Chapter-IX	3
10	Specific Exclusion	Chapter-X	1
11	Annexures		
	Tentative list of packages, weight details, dimensions etc of equipment/ system	Annexure I A	20
	Summery Weight Details( for both Units)	Annexure I B	1
<b>Volume-IA</b>	<b>Part-II : Technical Specifications</b>		
1	General	Chapter-XI	5
2	Civil Works, Foundation, Grouting	Chapter-XII	2
3	Equipments Installation	Chapter-XIII	1
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9	Welding, Heat Treatment, Radiography	Chapter-XIX	4
10	Acid cleaning/alkali flushing/steam blowing/oil flushing	Chapter-XX	2
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12	Painting	Chapter-XXII	1
13	Lining and Insulation	Chapter-XXIII	3
14	Final painting	Chapter-XXIV	2

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**CHAPTER I PROJECT INFORMATION**

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<b>1.0</b>	<b>Project Information</b>
<b>1.1</b>	<p>VINDHYACHAL SUPER THERMAL POWER PROJECT IS PIT-HEAD COAL BASED PROJECT OWNED BY NATIONAL THERMAL POWER CORPORATION. 6X210 MW &amp; 6X500 MW UNITS ARE PRESENTLY OPERATIONAL. THE CAPACITY OF PLANT IS BEING AUGMENTED BY INSTALLATION OF ADDITIONAL 1X500 MW SET -13 STAGE -V.</p> <p>THE PROPOSED POWER STATION IS LOCATED IN SINGRAULI DISTRICT OF MADHYA PRADESH HAVING LATITUDE AND LONGITUDE OF 24° 6'N AND 82° 40'E RESPECTIVELY. THE SITE IS SITUATED ON NORTH –WESTERN BANK OF RIHAND RESERVOIR.</p> <p>NEAREST TOWN IS RENUKUT AT A DISTANCE OF 50 KM FROM THE PROJECT. THE NEAREST BROADGAUGE RAIL HEAD SHAKTINAGAR RAILWAY STATION, IS APPROXIMATELY 2.0 KM AWAY FROM PROJECT SITE. MIRJAPUR STATION IS APPROXIMATELY 200 KM AWAY FROM THE PROJECT. PROJECT IS ACCESSIBLE BY ALL SEASON ROAD FROM VARANASI - RABERTSGANG – RENUKUT OR SINGRAULI – W Aidhan Road. THE NEAREST AIR PORT IS VARANASI.</p> <p>OTHER IMPORTANT DATA</p> <p>HIGHEST AMBIENT TEMPERATURE : 44° C</p> <p>LOWEST AMBIENT TEMPERATURE : 10° C</p>

**The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.**

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter - II: Scope of Works

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### 2.0 SCOPE OF WORK

The work to be carried out under the scope of these specifications is broadly as under:

Collection of materials from BHEL/client's stores/storage yard; transportation to site; erection, testing & assistance for commissioning, trial operation and handing over of the following:-

1. Steam Turbine along with auxiliary systems :-
  - a. Turbine Gland Sealing system
  - b. Turbine Lube Oil and Control Oil system
  - c. Water Spray System
  - d. Steam Washing System
2. Generator set coupled to steam turbines and complete with auxiliary systems:-
  - a. Seal Oil System
  - b. Hydrogen Cooling System
  - c. Stator Cooling System
  - d. Carbon dioxide Purging System
3. Water cooled, horizontal surface condenser with integral accessories
4. Turbine Oil Purification System including Turbine Oil Storage, Dirty & Clean Oil Pumps, etc.
5. HP & LP Heater, PHE
  
6. Boiler Feed Pumps, ACW & DMCW Pumps
7. Condensate Extraction Pumps
8. Steel Storage Tanks/Vessels such as Main oil Tank, Dirty Oil tank etc
9. Bought Out Items.
10. Turbine integral and other miscellaneous piping
11. Insulation of TG equipments.
12. Painting (including supply) of all erected equipments and structures
13. Operating platform around the Deaerator ,GSC, MOT Room, CFT Room, Flash tanks , Lube oil / Control oil tanks , HP/LP By pass valves , ESVS / IVS, TDBFP Oil skids, Suction strainer, CRH NRV,Local platforms for various inaccessible valves and equipments etc.

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

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Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	<b>PART I</b> <b>ESTABLISHMENT</b>			
3.1.1	<b>FOR CONSTRUCTION PURPOSE:</b>			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	<b>FOR LIVING PURPOSES OF THE BIDDER</b>			

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

Sl.No	Description <b>PART I</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
a	Open space for labour colony (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	<b>ELECTRICITY</b>			
3.2.1	<b>Electricity For construction purposes</b> of Voltage 415/440 V	Yes		FREE
a	Single point source	Yes		At a distance of 700 Mtr from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	<b>Electricity for the office, stores, canteen etc of the bidder</b>			Free
a	Single point source	Yes		At a distance of 700 Mtr from site (Distance is only estimated, it may vary upto an extent depending on site condition)

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

Sl.No	Description <b>PART I</b>	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	<b>Electricity for living accommodation of the bidder's staff, engineers, supervisors etc</b>			<b>BHEL will not provide electricity for labour colony.</b> Contractor has to make his own arrangement.
a	Single point source		-	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	<b>WATER SUPPLY</b>			
3.3.1	<b>For construction purposes:</b>	<b>Yes</b>		FREE
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	

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

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	<b>PART I</b>			
3.3.2	<b><u>Water supply for bidder's office, stores, canteen etc</u></b>			Free
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	<b><u>Water supply for Living Purpose</u></b>			<b>BHEL will not make any arrangement for water.</b> Contractor has to make his own arrangement
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	<b>LIGHTING</b>			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	

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

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

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

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Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	<b>PART II</b> <b>3.9.0 ERECTION FACILITIES</b>			
3.9 .1	Engineering works for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		<b>YES</b>	"
d	Shipping lists etc for reference and planning the activities	Yes		"
e	Preparation of site erection schedules and other input requirements		Yes	"
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	"
g	Weekly erection schedules based on Sl No. e		Yes	"
h	Daily erection / work plan based on Sl No. g		Yes	"

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

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Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	<b>PART II</b> <b>3.9.0 ERECTION FACILITIES</b>			
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
L	Arranging the materials required for preassembly		YES	

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – IV: T&Ps and MMDs to be deployed by Contractor**

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**A: MAJOR TOOLS AND PLANTS & MMDs TO BE DEPLOYED BY THE CONTRACTOR PER UNIT**

S.N.	DESCRIPTION	CAPACITY	QUANTITY
1	CRANES (OF SUITABLE CAPACITY)		AS PER REQUIREMENT
2	TRAILER WITH HORSE	30 TON	AS PER REQUIREMENT
3	TRAILER TROLLEY	20 TON	AS PER REQUIREMENT
4	WELDING GENERATOR SETS (ELECTRIC AS WELL AS DIESEL )		AS PER REQUIREMENT
5	3-PHASE COMPLETE SET UP FOR DRAWAL OF POWER		-DO-
6	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER		-DO-
7	TIG WELDING SET		-DO-
8	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS		-DO-
9	ELECTRICAL BAKING OVEN – BIG		-DO-
10	ELECTRODE BAKING OVEN – PORTABLE		-DO-
11	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS		-DO-
12	VACUUM CLEANER (INDUSTRIAL)		-DO-
13	PIPE CUTTING AND BEVELLING MACHINE		-DO-
14	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	-DO-
15	AIR COMPRESSOR	120 CFM	01 NO
16	STEP DOWN TRANSFORMER	230V/24V	AS PER REQUIREMENT
17	CONDENSER TUBE EXPANDER SET		DO
18	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
19	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
20	<b>HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :</b>		
	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	06 NOS.
	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	06 NOS.
	<b>GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :</b>		
	A) - JACKS (HAVING BROAD BASE ONE INCH LIFT)	100 MT	06 NOS.
	B) - JACKS (WITH 4-6 INCH LIFT , FOR GEN. END SHIELDS)	63 MT	04 NOS.
	C) - LONG HIGH PRESSURE HOSES (FOR GENERATOR ALIGNMENT)		12 NOS.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – IV: T&Ps and MMDs to be deployed by Contractor

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.

21	TORQUE WRENCH	0 TO 200 N-M	01 NO.
22	TORQUE WRENCH	UPTO 2000 N-M	01 NO.
23	SLINGS FOR LP TURBINE ROTOR		01SET
24	SLINGS FOR HP TURBINE MODULE		01SET
25	SLINGS FOR GENERATOR ROTOR		01SET
26	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
27	LONG FEELER GAUGE SET		AS PER REQUIREMENT
28	SPANNERS / EYE BOLTS ( OF ALL SIZES )		AS PER REQUIREMENT
29	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT

### **B: MEASURING AND MONITORING DEVICES (MMD):**

To be finalized at site as per requirement.

#### **NOTE:**

1. This above list is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the schedules & as prescribed by BHEL engineer and required for completion of work.

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter – V: T&Ps to be deployed by BHEL free of hire charges on sharing basis**

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<b>SN</b>	<b>DESCRIPTION &amp; CAPACITY OF T&amp;P</b>	<b>QUANTITY</b>	<b>PURPOSE</b>
01	EOT CRANE IN TG HALL	-	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.
02	PORTAL GANTRY CRANE WITH ACCESSORIES (360 MT CAPACITY)	AS PER AVAILABILITY	FOR GENERATOR STATOR HANDLING & LIFTING ONLY

**NOTE:**

- ~~1. Operator for EOT crane will be provided by the contractor.~~
2. EOT crane will be used on sharing basis by other agencies working within the TG hall under the instruction of BHEL. ~~The contractor shall extend the services of his operator to such other agencies as well on mutually agreed mode of cost sharing.~~
3. Above T&Ps will be provided on sharing basis only. Contractor has to plan his activities well in advance and inform BHEL engineer in charge/ construction manager the date of actual use.
4. Contractor shall provide all necessary tools & tackles, crane, trailers etc for transportation of portal gantry crane components/parts from BHEL stores/ storage yard, assistance for assembly/erection at site, testing, commissioning, dismantling after completion of works and returning to BHEL stores/storage yard as per instruction of BHEL engineer.
5. Operation and maintenance service including manpower, supervision, consumables etc. for operation and maintenance of crane after commissioning (load test) for 24 months as required for one (1) No. 105/15 T capacity double girder EOT Crane with all accessories will be provided by BHEL.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VI: Time Schedule

### 6.1 MOBILIZATION, TIME SCHEDULE & CONTRACT PERIOD

#### 6.1.1 INITIAL MOBILIZATION

Contractor shall reach site, make his site establishment and be ready to commence the erection work within two weeks from the date of issue of Fax Letter of Intent or as per the directions of Construction Manager/ Project Manager of BHEL.

#### 6.1.2 MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for erection, testing etc shall be started as per the directions of construction manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1.1) as per the requirement to commence the work of erection, testing etc. of TG and auxiliaries and progressively augment the resources to match schedule of the project.

#### 6.1.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

**Erection/placement on its designated foundation/location, of the first major permanent equipment/component/column covered in the scope of these specifications shall be recognized as "start of contract period".** Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period.

Based on the availability of civil foundations from customer and materials from manufacturing units, contractor may have to advance the start of erection after getting clearance from construction manager, or the start of erection may get delayed due to site condition.

The contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

S.No	ACTIVITY	UNIT-1
1	CONDENSOR ERECTION START	1 <sup>st</sup> MONTH
2	TURBINE BOX UP	13 <sup>th</sup> MONTH
3	COMPLETION OF OIL FLUSHING	15 <sup>th</sup> MONTH
5	SYNCHRONISATION & FULL LOAD	17 <sup>th</sup> MONTH
6	COMPLETION OF TRIAL	20 <sup>th</sup> MONTH

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter – VI: Time Schedule

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### 6.1.4

#### **DURATION**

The total contract period for completion of entire work shall be 20 **(Twenty) months from the start of erection**

However the contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over and chipping of foundations, blue-matching and grouting of packer plates etc.

The contractor shall complete all the works in the scope of this contract within the contract period. Pending points identified by the customer/BHEL during the execution of the contract are to be liquidated during the contract period itself.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

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

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATE RS(5)	MISCELL ANEOUS ITEMS (6)	INTEG RAL PPG (7)
	<b>Overall weightage for each area out of lumpsum value quoted for STG</b>	<b>24%</b>	<b>18%</b>	<b>15%</b>	<b>13%</b>	<b>5%</b>	<b>9%</b>	<b>16%</b>
<b>Sl. No.</b>	<b>Activity/Work Description</b>	<b>%</b>						
<b>I</b>	<b>PRO RATA PAYMENTS (85%)</b>							
<b>1</b>	<b>CONDENSER (weightage 24% )</b>							
1.1	PREPARATION OF FOUNDATION	2%			--			--
1.2	PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF BOTTOM PLATE SEGMENTS, HOT WELL, NDT AND SPRING ELEMENTS PLACEMENT & GROUTING.	10%			--			--
1.3	ASSEMBLY AND POSITIONING OF WATER CHAMBER, SIDE PLATES, BOTTOM PLATES, WELDING AND NDT INCLUDING HINGE ASSY	12%		--	--			--
1.4	ASSEMBLY, ALIGNMENT AND WELDING & NDT OF TUBE SUPPORT PLATES AND INTERNALS LIKE BAFFLE PLATES, AIR EVACUATION PIPES ETC.	13%		--	--			--
1.5	ASSEMBLY, WELDING & NDT OF DOME WALLS AND DOME STIFFENERS, EXTRACTION PIPING AND STEAM THROW DEVICE, LPH-1 SUPPORT ETC.	10%		--	--			--
1.6	INSERTION, EXPANSION, CUTTING ETC. OF CONDENSER TUBES	15%		--	--			--
1.9	HYDRO TEST OF STEAM AND WATER SIDE	10%		--	--			--
1.10	WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS	10%		--	--			--
1.11	ERECTION, COMMISSIONING, LOAD TESTING OF CONDENSER WATER BOX HANDLING SYSTEM	3%		--	--			--
	<b>Subtotal for condenser</b>	<b>85%</b>						
<b>2</b>	<b>TURBINE (18 %)</b>							--

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATE RS(5)	MISCELL ANEOUS ITEMS (6)	INTEG RAL PPG (7)
2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES OF LPC AND BEARING PEDESTALS	--	7%		--			--
2.2	PLACEMENT AND ALIGNMENT OF LP OUTER CASING BOTTOM PORTION AND CENTRE GUIDE KEYS	--	5%		--			--
2.3	PLACEMENT OF LP ROTOR AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--
2.4	ASSEMBLY, ALIGNMENT & WELDING OF LP OUTER CASING UPPER HALF	--	9%		--			--
2.5	PLACEMENT AND ALIGNMENT OF IP TURBINE OUTER CASING AND INNER CASING (LOWER HALVES)	--	2%		--			--
2.6	PLACEMENT AND ALIGNMENT OF IP ROTOR WITH LOWER CASING AND BOXING UP OF INNER & OUTER CASING ( UPPER HALVES ) & ROLL CHECK	--	5%		--			--
2.7	FINAL BOX UP OF IP TURBINE	--	0%		--			--
2.8	BOXING UP OF LP INNER-INNER & INNER- OUTER AND ROLL CHECK	--	5%		--			--
2.9	PLACEMENT OF HP TURBINE, LOWERING OF HP ROTOR ON BEARINGS AND CHECKING OF CLEARANCES, COUPLING, HP TURBINE SWING CHECKS ETC.	--	5%		--			--
2.10	ALIGNMENT OF ALL ROTORS INCLUDING REAMING, HONING AND FIXING OF COUPLING BOLTS		9%					
2.11	ASSEMBLY OF GOVERNING SYSTEM/EQUIPMENT		5%					
2.12	INSTALLATION OF ESVS, IVS, MS STRAINERS (INTERNALS), HRH STRAINERS (INTERNALS)	--	9%		--			--
2.13	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND PIPING	--	5%		--			--
2.14	FINAL BOX-UP OF LP TURBINE	--	5%		--			--
2.15	ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING	--	0%		--			--

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATE RS(5)	MISCELL ANEOUS ITEMS (6)	INTEG RAL PPG (7)
	DEVICES AND NORMALISATION ETC.							
2.16	FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION	--	5%		--			--
	<b>Subtotal for Steam Turbine</b>		<b>85%</b>					
<b>3</b>	<b>TURBO GENERATOR (15%)</b>	--		--	--			--
3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--
3.2	LIFTING, LEVELLING AND ALIGNMENT OF STATOR (including erection and dismantling of portal crane if used for stator lifting)			23%				--
3.3	FIXING OF END SHIELDS ON TO FOUNDATION BEAMS	--	--	6%				--
3.4	ROTOR INSERTION	--	--	6%				--
3.5	BOXING UP OF GENERATOR AND ASSEMBLY OF HYDROGEN SEALS	--	--	11%				--
3.6	ALIGNMENT OF GENERATOR ROTOR WITH LP TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	9%				--
3.7	ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING SWING CHECK AND COMPLETION OF BALANCE WORKS	--	--	10%				--
3.8	INSTALLATION OF ENCLOSURES OF GENERATOR/EXCITER WITH ALL AUXILIARIES	--	--	5%				--
3.9	GROUTING OF GEN BEARING PEDESTALS AND EXCITOR	--	--	5%				--
3.10	FINAL GAS TIGHTNESS TEST OF STATOR WITH COMPLETE SYSTEM	--	--	5%				--
	<b>Subtotal for Generator</b>			<b>85%</b>				
<b>4</b>	<b>PUMPS AND AUXILIARIES (13 %)</b>	--	--		--			--
4.1	ERECTION / TESTING and commissioning OF MAIN OIL PUMP, JOP, EOP, AOP, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES	--	--		18%			--
4.2	ERECTION / TESTING and commissioning OF ONE MOTOR				14%			

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATE RS(5)	MISCELL ANEOUS ITEMS (6)	INTEG RAL PPG (7)
	DRIVEN BFP, ALONG WITH ALL AUXILLIARIES							
4.3	ERECTION / TESTING and commissioning of TWO NOS TURBINE DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				30%			
4.5	ERECTION, TESTING, GROUTING ETC. OF DMCW (BOILER & TG) PUMPS	--	--	--	13%			--
4.6	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	10%			--
	<b>Subtotal for pumps and Auxiliaries</b>				<b>85%</b>			
5	<b>HEATERS AND DEAERATORS (05 %)</b>							
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--		27%		--
5.2	ERECTION, TESTING & COMMISSIONING OF GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--		12%		--
5.3	ERECTION, TESTING & COMMISSIONING OF DE-AERATOR , FEED STORAGE TANK AND ASSOCIATED APPROACH PLATFORM WITH LADDERS					46%		
	<b>Subtotal FOR HEATERS</b>	--	--	--		<b>85%</b>		--
6	<b>MISCELLANEOUS ITEMS (09 %)</b>							
6.1	DEBRIS FILTERS, RE JOINTS, ME BELLOWS, DIRTY, CLEAN OIL TANKS, ENCLOSURES, CO2 & H2 CYLINDER RACKS ETC						20%	
6.2	ACW PUMPS, RELATED ITEMS	--	--	--			10%	
6.3	ERECTION, TESTING & COMMISSIONING OF CONTROL FLUID TANK, C.F. COOLERS, C.F. PUMPS, PURIFICATION UNIT ETC.	--	--	--			9%	
6.4	ERECTION, TESTING & COMMISSIONING OF FLASH TANKS & FLASH VESSELS	--	--	--			8%	
6.5	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			10%	
6.6	ERECTION, TESTING & COMMISSIONING OF CONDENSER	--	--	--			12%	

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATE RS(5)	MISCELL ANEOUS ITEMS (6)	INTEG RAL PPG (7)
	ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS							
6.7	ERECTION, TESTING & COMMISSIONING OF SELF CLEANING STRAINER PACKAGE	--	--	--			8%	
6.8	ERECTION, TESTING & COMMISSIONING OF MISC.HOISTS & CHAIN PULLEY BLOCKS.						8%	
	<b>Subtotal for MISCELLANEOUS ITEMS</b>						<b>85%</b>	
<b>7</b>	<b>INTEGRAL PIPING (16%)</b>	--	--	--				--
7.1	Turbine Integral piping and Generator Integral piping consisting of Lube oil, Jacking oil, Oil vapour extraction, Seal Oil, Control oil, Seal steam, Condensate spray/Exhaust Hood spray, Turbine water drainage, Gas Piping, Primary Stator Water piping, etc including all accessories like thermowells, probes, orifices etc and hangers and supports (Erection and commissioning on prorata basis)	--	--	--				85%
	<b>Total for integral piping</b>							<b>85%</b>
<b>8</b>	<b>OTHER PIPING</b>							
8.1	<del>ON PRE-ASSEMBLY WHEREVER APPLICABLE ( IF NOT APPLICABLE, THIS PORTION TO BE PAID ALONG WITH PLACEMENT IN POSITION)</del>							
8.2	<del>PLACEMENT IN POSITION</del>							
8.3	<del>ALIGNMENT</del>							
8.4	<del>WELDING/BOLTING/FIXING</del>							
8.5	<del>COMPLETION OF NON DESTRUCTIVE EXAMINATION &amp; STRESS RELIEVING/ HEAT TREATMENT (if not applicable, then this portion to be clubbed with next activity)</del>							
8.6	<del>HANGERS &amp; SUPPORTS ETC WHEREVER NECESSARY AS PER DRG</del>							
8.7	<del>HYDRAULIC TEST/PNEUMATIC TEST WHERE EVER APPLICABLE</del>							
	<b>Total for Prorata (85%)</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>	<b>85%</b>

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# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VII: Terms of Payment

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATE RS(5)	MISCELL ANEOUS ITEMS (6)	INTEG RAL PPG (7)
<b>II</b>	<b>STAGE/MILESTONE PAYMENTS (15%)</b>							
1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%
2	ABO	0%	0%	0%	0%	0%	0%	0%
3	Steam Blowing	0%	0%	0%	0%	0%	0%	0%
4	Safety Valve Floating	0%	0%	0%	0%	0%	0%	0%
5	Oil Flushing (TG)	1%	1%	1%	1%	1%	1%	1%
6	Barring Gear (TG)	1%	1%	1%	1%	1%	1%	1%
7	Rolling and Synchronization	3%	3%	3%	3%	3%	3%	3%
8	Coal Firing	0%	0%	0%	0%	0%	0%	0%
9	Full Load	2%	2%	2%	2%	2%	2%	2%
10	Trial Operation of Unit	2%	2%	2%	2%	2%	2%	2%
11	Painting (including arrow marking, nomenclature, etc)	2%	2%	2%	2%	2%	2%	2%
12	Area cleaning, temporary structures cutting/removal and return of scrap	1%	1%	1%	1%	1%	1%	1%
13	Punch List points/pending points liquidation	1%	1%	1%	1%	1%	1%	1%
14	Submission of 'As Built Drawings'							
15	Material Reconciliation	1%	1%	1%	1%	1%	1%	1%
16	Completion of Contractual Obligations	1%	1%	1%	1%	1%	1%	1%
	<b>Total for Milestone/Stage payments (15%)</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>	<b>15%</b>
	<b>Total of I &amp; II</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Note:**

- Wherever application of INSULATION is applicable, same shall be covered under the respective item/equipment for 'Terms of Payment'.
- The terms of payment is only for enabling release of payments through RA bills and is not indicative of the actual quantum or value of work
- The terms of payment for Item No 2 of Voll II Price Bid i.e 'Platforms in TG hall' shall be 85 % against 'pre-assembly (if required), fit-up, welding etc' and balance 15 % against various stages/milestones.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VIII: Taxes and Other Duties

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### 8.0 TAXES, DUTIES, LEVIES (Consolidated Rev 03 dated 09/04/2013)

#### 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 12.36 %) 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 format of the respective state VAT laws. Also, the

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-VIII: Taxes and Other Duties

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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 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-IX: SPECIFIC INCLUSIONS

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### **SPECIFIC INCLUSIONS**

#### **9.1**

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

#### **9.2**

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

#### **9.3**

Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers & steam blowing & blanking devices in MS strainer, HRH strainer & and blanking ESV & IV system, for hydro test, steam blowing etc. is the part of scope of work.

#### **9.4**

It may be specifically noted that it should not be construed or claimed by the contractor that with the technical specification and "exclusions and/or inclusions" detailed in this tender specification, BHEL has covered the entire scope of work and/or the details thereof to be executed by the contractor.

#### **9.5**

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.

#### **9.6**

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.

#### **9.7**

Chipping of foundation, placement, erection, alignment, commissioning, grouting, mounting of equipment mount instruments, panels and other fittings of BHEL (PEM bought out items) supplied pumps & packages are in scope of the work. Erection and commissioning of these equipments/pumps & packages will be required to complete and meet the commissioning schedule/ milestone activities of other areas like boiler, etc. Contractor shall plan and complete erection & commissioning of these equipments on priority as per decision of BHEL engineer/customer requirement. Details of such systems are furnished in relevant appendix.

#### **9.8**

Most of the Misc. Pumps with drive motors, base frame, fittings etc will be supplied in loose parts/ dismantled condition as skid mount. These pumps along with drive and fittings shall be assembled at site. The Delivery of these will be taken from BHEL stores/storage yard and will be assembled/ installed at different locations as per drawing and instruction of BHEL Engineer at site. The work involved is preservation, assembly, installation, erection, alignment, foundation grouting including providing non-shrink free flow grout mix material, fixing of loose items, filling of lubricants, greasing, commissioning, no load/ load trial run of motors & pumps. All the works shall be carried out as part of scope of work.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-IX: SPECIFIC INCLUSIONS

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These Misc. pumps will be required for erection and commissioning of other systems, pipings, equipments which will be under scope of erection of other agencies. Contractor shall carry out the installation, erection and alignment works etc. as per priority decided by BHEL Engineer at site to enable the other agencies to proceed with their work. Contractor shall carry out the welding of terminal point/interface/matching & connected flanges joints, pipe joints etc. of other system & other agencies as scope of work. The decision of BHEL Engineer shall be final and binding on contractor.

### 9.9

~~Electric wire rope hoists shall be erected tested and commissioned for vacuum pump motor handling and CW butterfly valves handling. Chain pulley blocks with trolley (manual operated) shall be erected, tested and commissioned for control fluid system, central lube oil system etc.~~

### 9.10

#### **CONSUMABLES**

The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope.

TG special consumables like hylomar / golden hermetite / stag-b / molykote/ anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor.

### 9.11

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.

### 9.12

#### **PRIMERS & PAINTS**

**The contractor will provide paint & primer for final painting. Primers and paints for other requirements are also in contractor's scope.**

### 9.13

#### **WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES**

All welding consumables including filler wires are in the contractor's scope.

### 9.14

All the required welding electrodes as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of electrodes etc. on receipt of the electrodes 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-IX: SPECIFIC INCLUSIONS

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### **9.15**

The contractor shall provide all consumables required for carrying out the work covered under this scope of work including TIG wires for welding of piping joints.

### **9.16**

All the required gases like argon, oxygen, and acetylene etc. including required high purity nitrogen gas (for purging of generator stator water system) shall be arranged by the contractor at his cost.

### **9.17**

SS SHIM for alignment of turbine & miscellaneous pumps, Grease shall be in the scope of contractor.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-X : SPECIFIC EXCLUSIONS

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### 10.0 EXCLUSIONS

The following are specific exclusions from the scope of work/ specification:-

- A) All cable connections, except those specified as scope of work.
- B) Measuring instruments, monitoring, relaying, protection and signaling equipments other than those supplied with the equipments by / on behalf of BHEL and which have been indicated as scope of work.
- C) Erection, testing and commissioning of electrical panels and starting resistors for DC JOP and DC EOP pumps
- D) Electrical testing of motors, turbo-generator. However erection of these items will be under the scope of this tender specification.
- E) Impulse piping and fittings from the tapping points of various equipments other than those specified as scope of work.
- F) Civil works to the extent not specifically provided for in this tender.
- G) Supply of materials for temporary piping (pipe, valve, structural steel etc.) required for hydraulic test, chemical cleaning, flushing or steam/air blowing of the pipelines.
- H) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.
- I) Some sub-delivery items and electrical components such as push-buttons, junction boxes etc.
- J) E&C work of cable trays, cables and earthing etc.
- K) All electrical and control & instrumentation items except those specified elsewhere in these specifications.
- L) Pneumatic copper tubing and fittings thereof.
- M)  
Electrical & C&I work for all Electrically operated hoists, COLTCS & SCS .

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

SL	PKG.NO	DESCRIPTION	PKG.SIZE(MM)	GR.WT IN KG.
<b>A.</b>		<b>STEAM TURBINE</b>		
1	75001	EMBEDMENT FOR ANCHOR POINTS	4400x 1600x 1000	4940
2	75003	COMPONENTS FOR BASE PLATE	4900x 1200x 600	6350
3	75004	COMPONENTS OF BASE PLATE	2800x 1700x 600	3700
4	75101	BASE PLATE FOR LP CASING	1850x 1400x 500	7200
5	75102/1	LP OUTER CASING PARTS	9000x 2187x 3460	15520
6	75103/1	LP OUTER CASING PARTS	9000x 2190x 3460	15520
7	75104	LP OUTER CASING PARTS	5670x 3290x 1140	4600
8	75105	LP OUTER CASING PARTS	5670x 3290x 1140	4600
9	75106	LP OUTER CASING PARTS	3400x 1200x 1200	1255
10	75107	LP LONGITUDINAL GIRDER (LEFT)	8200x 1680x 1950	23380
11	75108	LP LONGITUDINAL GIRDER (RIGHT)	8200x 1680x 1950	23380
12	75109	LP FRONT WALL (TS)	8760x 3850x 1150	18300
13	75110	LP FRONT WALL (GS)	8760x 3850x 1150	18300
14	75111	LP SHAFT SEALING (FRONT)	1800x 1700x 740	2300
15	75112	LP SHAFT SEALING (REAR)	1800x 1700x 740	2300
16	75113	LP SHAFT SEAL COMPENSATOR (TS)	1500x 1500x 650	350
17	75114	LP SHAFT SEAL COMPENSATOR (GS)	1500x 1500x 650	350
18	75115	AUXILIARIES OF LP TURBINE	2300x 1200x 900	2340
19	75201	HP/IP BRG.PED.ASSLY.	4080x 2005x 2126	13275
20	75202	HP/IP BRG.PED.PARTS	1000x 600x 600	400
21	75301	ASSEMBLY DEVICES	1000x 750x 750	300
22	75302	INSPECTION SHAFT FOR IPC	4050x 600x 900	1430
23	75304	COMPONENTS OF ASSEMBLY FIXTURE	3800x 2500x 1300	6860
24	75305	COMPONENTS OF ASSEMBLY FIXTURE	2300x 2100x 900	1800
25	75306	COMPONENTS OF ASSY FIXTURE FOR HPT	3300x 1800x 1300	3350
26	75307	COMP.OF ASSY.FIXT.FOR H.P.T.	5450x 4050x 400	3400
27	75308	AUXILIARIES OF LP TURBINE	3750x 1000x 1000	1680
28	75309	AUXILIARIES OF LP TURBINE	2000x 1000x 1550	890
29	75310	AUXILIARIES OF LP TURBINE	2000x 1000x 1550	890
30	75311	ASSEMBLY TOOLS	1700x 800x 400	1020
31	75312	AUXILIARIES OF IP TURBINE	1200x 500x 550	260
32	75313	AUXILIARIES OF IP TURBINE	1100x 500x 650	210
33	75314	AUXILIARIES OF IP TURBINE	1100x 500x 650	210
34	75315	BOLT HEATING EQUIPMENT AND BREACH NUT HEATING DEVICE	1700x 900x 700	150
35	75316	GROMMET SLINGS	1700x 1700x 300	625
36	75318	OIL FLUSHING AND PRESSURE TEST DEVICE	750x 550x 400	250
37	75319	STEAM BLOWING & HYDRAULIC TEST	2900x 2100x 1200	4650
38	75320	TOOLS FOR GOV.SYST.&VALVES	1750x 1200x 1000	1500
39	75321	VALVE SUPPORT FOR HPT OVERHALL	1500x 750x 750	905
40	75401	IP-LP BEARING PEDESTAL ASSLY	3700x 1860x 2100	14500
41	75501	LP/GEN. PEDESTAL ASSEMBLY	3200x 2280x 2070	9370
42	75502	BEARING PEDESTAL (PARTS)	1600x 800x 600	1150
43	75601/1	FRONT BEARING PEDESTAL	3140x 3140x 2050	12386
44	75601/2	HYDRAULIC TURNING GEAR	2100x 1000x 600	750
45	75601/3	MAIN OIL PUMP ASSEMBLY.	1400x 1200x 1000	550
46	75704/1	LP CASING ASSEMBLY	1900x 1200x 600	3000
47	75704/2	PARTS OF LP OUTER CASING ASSLY	500x 500x 400	120

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

48	75705	LP EXTRACTION A1	4400x 1620x 870	1820
SL	PKG.NO	DESCRIPTION	PKG.SIZE(MM)	GR.WT IN KG.
49	75706	LP EXTRACTION A1	4400x 1620x 850	1814
50	75707/1	LP EXTRACTION A1	3420x 1620x 870	1286
51	75707/2	LP EXTRACTION A1	950x 750x 750	330
52	75708	LP EXTRACTION A2	2920x 2120x 1370	1730
53	75709	LP EXTRACTION A2	3420x 1220x 1120	1350
54	75710	LP EXTRACTION A3	1920x 1120x 920	655
55	75711	LP EXTRACTION A3	3120x 920x 870	1050
56	75716	LP EXTRACTION PIPE SHEATHING	2900x 2050x 1180	2650
57	75717	INNER GUIDE PLATE OF DIFFUSER	2300x 2300x 500	1850
58	75718	DIFFUSER (TS)	5050x 1800x 2550	6800
59	75719	DIFFUSER (GS)	5050x 1800x 2550	6800
60	75720	LP INNER OUTER CASING (U/H)	8640x 3650x 2550	36100
61	75721	LP INNER CASING (L/H)	9100x 3890x 3180	55080
62	75722	LP INNER INNER CASING (U/H)	4600x 1900x 2350	13300
63	75723	LP CASING ASSEMBLY	5000x 1900x 1000	5910
64	75724	LP INNER CASING ASSLY/FASTENER	2000x 1000x 600	2050
65	75725	INNER GUIDE PLATE OF DIFFUSER	2300x 2300x 500	1700
66	75728	STEAM INLET PIPE (LPT)	3200x 1500x 1500	1700
67	75801	LP ROTOR	8800x 4000x 4162	95240
68	75901	IP ROTOR	4800x 2120x 1995	23132
69	75902	IP OUTER CASING (U/H)	4050x 3800x 2650	25850
70	75903	IP OUTER CASING (L/H)	3400x 5250x 2600	25870
71	75904	IP INNER CASING (U/H)	2900x 3200x 1850	15200
72	75905	IP INNER CASING (L/H)	2900x 3200x 1850	15200
73	75906	IP INLET ASSEMBLY	4500x 3725x 1300	13550
74	75907	IP SHAFT SEALING	1400x 1200x 900	950
75	75908	IP TURBINE (PARTS)	2000x 1900x 1000	3125
76	75909	I.P. TURBINE PARTS	1000x 1000x 750	475
77	76001/1	HP TURBINE	5675x 3400x 2900	88650
78	76001/2	EMERGENCY GOVERNOR	495x 395x 695	57
79	76002	HP INLET ASSLY. & HP EXHAUST	1200x 1200x 500	80
80	76003	HP EXHAUST ASSEMBLY	1650x 1400x 900	2000
81	76004	HPT RELATED PARTS	1300x 1300x 700	200
82	76104	ESV & CV CASING WITH VALVES	3360x 3360x 2590	23146
83	76105/1	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x 1200x 1200	4250
84	76105/2	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300x 1200x 1200	4250
85	76107	HP CONTROL VALVE	2800x 1200x 2100	3280

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**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		SERVOMOTOR		
86	76108	ESV & CV CASING WITH VALVES	3360x 3360x 2590	23146
87	76112	HP CONTROL VALVE SERVOMOTOR	2800x 1200x 2100	3288
88	76201	SUSPENSION OF VALVE (IV)	4250x 2640x 750	8078
89	76202	IV & CV CASING WITH VALVES	5040x 4690x 2770	33276
90	76203/1	IV SERVOMOTOR WITH LIMIT SW.	2700x 1450x 1400	3965
91	76203/2	IV SERVOMOTOR WITH LIMIT SW.	2700x 1450x 1400	3965
92	76204	IP CONTROL VALVE SERVOMOTOR	3240x 1240x 1950	3019
93	76205/1	FRAME FOR SUSPENSION (IV)	3400x 3150x 750	2026
94	76205/2	FRAME FOR SUSPENSION (IV)	3400x 3150x 750	2026
95	76205/3	LOOSE ITEMS FOR FRAME FOR SUSPENSION	300x 200x 200	20
96	76206	IV & CV CASING WITH VALVES	5040x 4690x 2770	33276
				3003
97	76210	IP CONTROL VALVE SERVOMOTOR	3240x 1240x 1950	
<b>SL</b>	<b>PKG.NO</b>	<b>DESCRIPTION</b>	<b>PKG.SIZE(MM)</b>	<b>GR.WT IN KG.</b>
98	76301/1	SUSPENSION OF VALVES ( LPB )	3600x 1700x 800	1836
99	76301/2	SUSPENSION OF VALVES ( LPB )	3600x 1700x 800	1836
100	76402	INJECTOR FOR SUC. PIPE NB 350	3300x 800x 800	588
101	76403	INJECTOR FOR SUC. PIPE NB 300	3300x 1750x 1200	999
102	76404	MAIN OIL TANK & NOZZLE ARRGT.ASSY	6180x 3260x 2650	9981
103	76405	MAIN OIL TANK & NOZZLE ARRGT.	4200x 1200x 900	402
104	76406	OIL STRAINERS	1500x 1000x 1200	228
105	76407	OIL STRAINERS	1500x 1000x 1200	228
106	76409	OIL STRAINERS	2050x 1200x 1410	470
107	76412	DIRTY/LEAKAGE OIL TANK	1000x 1000x 3000	515
108	76413	WASTE OIL TANK	1000x 1000x 3000	515
109	76414	VAR.ORIFICES THR.VALV.&FLUSH.PART S	1700x 700x 760	255

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

110	76415	VARIABLE ORIFICE 125	400x 300x 200	50
111	76601	PARTS OF A CROSS AROUND PIPE	3500x 1750x 1800	2150
112	76602	PARTS OF A CROSS AROUND PIPE	3500x 1750x 1800	2150
113	76603	COMPENSATOR ASSEMBLY	1900x 1950x 1750	3190
114	76604	COMPENSATOR ASSEMBLY	1900x 1950x 1750	3190
115	76605	COMPENSATOR ASSEMBLY	1900x 1950x 1750	3190
116	76606	COMPENSATOR ASSEMBLY	1900x 1950x 1750	3190
117	76607	COMPENSATOR ASSEMBLY	1900x 1950x 1750	3270
118	76608	COMPENSATOR ASSEMBLY	1900x 1950x 1750	3270
119	76609	REDUCER ASSEMBLY	1250x 1250x 500	242
120	76610	REDUCER ASSEMBLY	1250x 1250x 500	242
121	76611	CROSS AROUND PIPE (PARTS)	2000x 1150x 600	2030
122	76612	CROSS AROUND PIPE (PARTS)	2000x 1150x 600	2030
123	76613	MITRE BEND ASSEMBLY	3640x 1540x 2040	2240
124	76614	MITRE BEND ASSEMBLY	3640x 1540x 2040	2240
125	76701	CHANGE OVER VALVE	800x 500x 200	97
126	76702/1	CRH NRV WITH SERVOMOTOR	3200x 2300x 2600	10528
127	76702/2	STEAM BLOWING DEV.FOR NRV CRH	2500x 1600x 1200	5600
128	76703	GLAND STEAM PRESSURE INDICATOR	400x300x300	20
129	76801	RATING,COLLABORATION &COMPANY'S	850x 550x 200	55
130	76901	OIL STRIPPER	600x 600x 850	133
131	76902	OIL STRIPPER	600x 600x 850	133
132	76903	HOUSING FOR M.S STRAINER	1725x 1250x 730	2370
133	76904	HOUSING FOR M.S STRAINER	1725x 1250x 730	2370
134	76908	HOUSING FOR HRH STEAM STRAINER	2275x 1650x 1100	4480
135	76909	HOUSING FOR HRH STEAM STRAINER	2275x 1650x 1100	4480
136	76912/1	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000x 900x 800	948
137	76912/2	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER	1600x 1200x 1000	2535

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		HOUSING		
138	76913	GASKETS FOR MS & HRH STRAINER HOUSING	1000x 1000x 600	37
139	76914	COMPENSATOR	600x 600x 900	50
140	76915	ASSY. & DISASSY. DEVICES FOR MS & HRH STEAM STRAINER	2140x 1400x 500	564
141	76917	STEAM STRAINER (MS)	1200x 900x 500	350
142	76918	STEAM STRAINER (HRH)	1800x 1500x 800	750
143	76919	STEAM STRAINER (MS)	1200x 900x 500	350
144	76920	STEAM STRAINER (HRH)	1800x 1500x 800	750
145	77001	GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE	2800x 1360x 2750	1847
146	77002	SUPPLY RACK HP VALVE-2 (RIGHT)	2300x 1400x 2550	767
147	77003	SUPPLY RACK HP VALVE-1 (LEFT)	2300x 1400x 2550	767
148	77004	SUPPLY RACK FOR IP VALVES 1 & 2	2300x 1400x 2550	2080
149	77006	GOVERNING SYSTEM PROTECTION RACK AND TRANSPORT DEVICE	2450x 1300x 2250	1622
150	77201	TURBINE INSTRUMENTS RACKS (FRAMES)	2750x 1500x 800	2600
151	77202	TEMP. AND PRESURE CONNECTION	17500x 750x 750	600
152	77203	IMPULSE PIPES (CARBON STEEL)	6900x 650x 500	1225
153	77204	GAUGES AND SENSORS	2800x 1250x 1250	1035
154	77205	TRANSMITTERS & J.B. OF BEARINGS	500x 300x 200	118
155	77206	IMPULSE PIPE (ALLOY STEEL)	6900x 500x 500	986
			<b>SUB TOTAL A</b>	<b>948908</b>
<b>B.</b>		<b>GENERATOR</b>		
<b>SL</b>	<b>PKG.N O</b>	<b>DESCRIPTION</b>	<b>PKG.SIZE(MM)</b>	<b>GR.WT IN KG.</b>
1	501	STATOR	<b>8830x 4100x 4120</b>	<b>258000.00</b>
2	502	ROTOR WITH TOOLS AND TACKLES	<b>14000x 1850x1750</b>	<b>73159.00</b>
3	503	END SHIELD LOWER HALF (TE)	<b>6000x 2296x 2640</b>	<b>31473.00</b>
4	504	END SHIELD UPPER HALF (TE)	<b>6000x 2296x 2640</b>	<b>28747.00</b>
5	505	END SHIELD LOWER HALF (EE)	<b>4700x 1500x 2420</b>	<b>12847.00</b>
6	506	GENERATOR BEARING (2 NOS.).	<b>1250x 1150x 1250</b>	<b>3006.00</b>

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

7	508	BAFFLE RING,BAFFLE RING CARRIER & AIR GAP SEAL ASSY	1682x 1688x 1095	347.00
8	509	TERMINAL BUSHING (6 NOS.)	2200x 1830x 610	1427.00
9	510	TERMINAL BUSHING BOX WITH COVER	3600x 2500x 1940	11580.00
10	511	SHAFT SEALS (EE & TE) AND OIL CATCHER (INNER & OUTER )	2140x 1140x 840	1560.00
11	512	COMPRESSOR BAFFLE RING ASSLY.	1920x 1920x 1340	1745.00
12	515	GENERATOR END SHIELD BASE EE & TE (2 Nos EACH)	1940x 1550x 980	3464.00
13	516	PRIMARY WATER TANK	8100x 2000x 1200	2000.00
14	517	P.W.TANK PIPE LINES	6800x 2100x 500	818.00
15	518	FOUNDATION PLATES	2895x 760x 840	3030.00
16	519	ANCHOR BOLTS	2740x 655x 600	1485.00
17	520	CHANNELS,ANGLES,PIPE S & STUDS	4800x 1120x 520	1558.00
18	521	ROTOR & GENERAL ASSY.DEVICES	2460x 1170x 1240	2952.00
19	522	HYDRAULIC UNIT	1340x 840x 1380	798.00
20	524	WIRE ROPE FOR ROTOR (2 NO.)	1800x 1800x 400	289.00
21	530	GENERATOR ACCESSORIES	2140x 2140x 1240	1608.00
22	530/1	GENERATOR ACCESSORIES	1350x 850x 300	472.00
23	531	GENERATOR ACCESSORIES	2240x 940x 1220	1525.00
24	532/1	DRY AIR BLOWER	1100x 1000x 700	80.00
25	532/2	GENERATOR MAINTENANCE DEVICES	2550x 1180x 1140	1649.00
26	533	ERECTION DEVICES/FOUND TN ITEMS	1640x 1140x 1240	2781.00
27	534	BRUSHLESS EXCITER SET WITH COVERS	5750x 2350x 3400	32928.00
28	535	BRUSHLESS EXCITER FRONT COVER	4400x 3400x 3100	4478.00
29	536	BRUSHLESS EXCITER REAR COVER WITH PACKING	4400x 3400x 3100	4978.00
30	537	EXCITER BED PLATE ACCESSORIES	3900x 1250x 1150	1741.00

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

31	539	SEAL OIL STORAGE TANK	3700x 1400x 1260	1532.00
32	540	PW PUMP AND FILTER UNIT	3450x 2750x 2815	5294.00
33	541	MEASURING INSTRUMENT RACK	1550x 910x 1715	831.00
34	542	SEAL OIL MOTOR PUMP UNIT	3600x 2100x 1600	3272.00
35	543	SEAL OIL UNIT	3100x 3000x 3400	7890.00
36	544	SEAL OIL VALVE RACK	2700x 1140x 2440	1935.00
37	545	GAS UNIT	1980x 1640x 2420	1205.00
38	547	CO2 VAPOURISER	1520x 840x 840	250.00
39	549	EXCITER BED PLATE ACCESSORIES (NOT TEST BED)	5800x 1140x 1240	2925.00
40	550	EXCITER ACCESSORIES	2200x 1200x 1100	1111.00
SL	PKG.N O	DESCRIPTION	PKG.SIZE(MM)	GR.WT IN KG.
41	551	END SHIELD UPPER HALF (EE)	4700x 1500x 2420	9353.00
42	556	P.W.TANK PIPE LINES	3000x 600x 500	454.00
43	557	SPECIAL TOOLS & TACKLES	800x 700x 300	87.00
44	558	EMBEDMENTS	800x 800x 300	928.00
45	559	SEALING FOR TRANSPORT	3950x 2420x 150	869.00
46	561	SEAL RING	700x 700x 200	80.00
47	562	CONNECTION PIECE ASSEMBLY	1650x 1100x 450	862.00
48	563	GENERATOR ACCESSORIES	1700x 1200x 250	140.00
49	564	COOLER AIR VENT ASSEMBLY	5100x 200x 150	51.00
50	565	H2 DISTRIBUTOR	3480x 1540x 440	333.00
51	566	CO2 DISTRIBUTOR	4860x 1240x 440	353.00
52	567	N2 DISTRIBUTOR	1400x 1240x 440	143.00
53	568	TG SYSTEM INTEGRAL PIPING(HANGER AND SUPPORT)	6200x 1500x 1200	3410.00
54	569	TG SYSTEM INTEGRAL PIPING	3500x 1700x 1000	2576.00
55	570	TG SYSTEM INTEGRAL PIPING (STRAIGHT PIPES)	7000x 1000x 1300	4502.00
56	571	TG SYSTEM INTEGRAL PIPING (STRAIGHT PIPES)	6600x 1500x 2000	9380.00
57	572	TG SYSTEM INTEGRAL PIPING (FLANGES)	1000x 1000x 500	2176.00

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

58	573	TG SYSTEM INTEGRAL PIPING (HANGERS AND SUPPORTS)	2500x 1200x 1000	1555.00
59	574	TG SYSTEM INTEGRAL PIPING (VALVES)	2750x 1400x 1400	3799.00
60	575	TG SYSTEM INTEGRAL PIPING (INSTRUMENTS)	1000x 940x 900	177.00
61	576	TG SYSTEM INTEGRAL PIPING (FASTNERS AND SEALINGS)	1000x 1000x 500	630.00
62	577	EXCTR. BED PLATE ACCESSORIES (NON TEST BED ITEMS)	1000x 800x 800	775.00
63	578	RESINS	1200x 600x 600	100.00
64	581	ALKALYSER UNIT	1150x 780x 1900	267.00
65	582	PLATFORM FOR P W TANK	5000x 1000x 500	852.00
67	583	TG SYSTEM INTEGRAL PIPING (STRAIGHT PIPES)	7000x 800x 600	1338.00
68	584	RR WHEEL AIR GUIDE COVER	2800x 1500x 2000	1572.00
69	585	CONSUMABLES	800x 400x 200	55.00
			<b>SUB TOTAL B</b>	<b>567238.00</b>
<b>C.</b>		<b>CONDENSOR</b>		
1	78001	HOT WELL(FRONT HALF)	7300x3300x1800	7005
2	78002	HOTWELL (REAR HALF)	7560x3300x1850	7527
3	78004	FRONT / REAR BOTTOM PLATE	8760x3555x725	8177
4	78005	FRONT/REAR BOTTOM PLATE	8760x3560x725	8177
5	78006	MIDDLE BOTTOM PLATE-I	8760x3850x675	8364
6	78007	MIDDLE BOTTOM PLATE-I	8760x3850x625	8364
7	78008	MIDDLE BOTTOM PLATE-I	8760X3000X720	5052
8	78009	MIDDLE BOTTOM PLATE-II	8760X2340X720	5024
9	78010	BOTTOM PLATE LOOSE ITEMS	2485x780x180	492
10	78012	SPRING ELEMENT ( CONDENSER SUPPORT )	1970x1320x1320	6780
11	78013	SPRING ELEMNT (CONDENSER SUPPORT )	1970x1320x1320	6780
12	78014	SPRING ELEMNT (CONDENSER SUPPORT )	1970x1320x1320	6780
13	78018	LOOSE ITEMS ( CONDENSER SUPPORT )	1920x1000x660	4094
14	78019	LOOSE ITEMS ( CONDENSER SUPPORT )	1600x1100x600	4584

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

15	78020	FRONT WATER CHAMBER (GEN SIDE)	7050x4470x540	9900
16	78022	FRONT WATER BOX (GS)	7645x 4460x 2640	28300
17	78023	FRONT WATER CHAMBER (TUR SIDE)	7050x4470x540	9900
18	78025	FRONT WATER BOX (TS)	7645x4460x2640	28300
SL	PKG.N O	DESCRIPTION	PKG.SIZE(MM)	GR.WT IN KG.
19	78026	REAR WATER CHAMBER (GS)	7050x4470x540	9900
20	78028	REAR WATER BOX (GS)	6655x4460x2495	21560
21	78029	REAR WATER CHAMBER (TS)	7050x4470x540	9900
22	78031	REAR WATER BOX (TS)	6655x4460x2495	21560
23	78032	SIDE WALL (TUR.SIDE)	6925x2470x120	15804
24	78038	SIDE WALL TUR.SIDE(LOOSE ITEM)	7800x330x230	1100
25	78040	PLATES(SIDE WALL- GEN.SIDE)	6925x2470x120	15804
26	78046	LOOSE ITEMS(SIDE WALL-GEN.SIDE )	7800x330x230	1100
27	78048	RODS(SHELL INTERNALS)	3530x900x270	4376
28	78049	RODS(SHELL INTERNALS)	3530x900x270	4376
29	78050	RODS(SHELL INTERNALS)	3530x900x270	4376
30	78051	RODS(SHELL INTERNALS)	3530x900x270	4376
31	78052	RODS(SHELL INTERNALS)	3530x900x270	4376
32	78053	RODS(SHELL INTERNALS)	3530x900x270	4376
33	78054	RODS(SHELL INTERNALS)	3530x900x270	4376
34	78055	RODS(SHELL INTERNALS)	3530x900x270	4376
35	78056	RODS(SHELL INTERNALS)	3630x590x380	4705
36	78057	RODS(SHELL INTERNALS)	1000x680x390	1421
37	78058	AIR EXTRACTION PIPE	7100x900x560	2452
38	78059	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
39	78060	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
40	78061	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
41	78062	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
42	78063	SUPPORT TUBE PLATES(SHELL	6500x4225x224	8614

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		INTERNALS)		
43	78064	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
44	78065	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
45	78066	SUPPORT TUBE PLATES(SHELL INTERNALS)	6500x4225x224	8614
46	78069	LOOSE ITEMS(SHELL INTERNALS)	2190x970x775	6823
47	78070	LOOSE ITEMS(SHELL INTERNALS)	6200x900x570	5915
48	78071	LOOSE ITEMS(SHELL INTERNALS)	1920x1000x660	1820
49	78075	LOWER DOME WALL(TUR.SIDE)-	13350X4030X550	10775
50	78076	LOWER DOME WALL(TUR.SIDE)- LOWER PART	13150x4050x550	9894
51	78077	LOWER DOME WALL(TUR.END)-UPPER PART	10520x2140x1130	4000
52	78103	LOWER DOME WALL (GEN END)	4900x900x500	11171
53	78104	LOWER DOME WALL(GEN.SIDE)- LOWER PART	13150x4050x930	10450
54	78105	LOWER DOME WALL(GEN.SIDE)- UPPER PART	10520x2140x1080	3700
55	78109	LOWER DOME WALL(FWB SIDE)	9052x4266x1000	7710
56	78110	LOWER DOME WALL(FWB SIDE)- LOWER PART	9150x4600x870	8365
57	78111	LOWER DOME WALL(FWB SIDE)- UPPER PART	7850x2300x920	3450
58	78112	LOWER DOME WALL(FWB SIDE)- LOOSE ITEMS	1650x1100x1100	808
59	78116	LOWER DOME WALL(RWB SIDE)- LOWER PART	9140x4430x1530	9300
60	78117	LOWER DOME WALL(RWB SIDE)- UPPER PART	7850x2320x520	3677
61	78121	PIPES(DOME INTERNAL STIFFENING)	1840x1350x1535	3895
62	78122	PIPES(DOME INTERNAL STIFFENING )	2176x1500x1285	4940

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

63	78123	PIPES(DOME INTERNAL STIFFENING )	2766x1500x1120	6300
64	78124	PIPES(DOME INTERNAL STIFFENING )	5250x2270x220	1963
65	78125	PIPES(DOME INTERNAL STIFFENING )	1470x750x850	2930
66	78126	PIPES(DOME INTERNAL STIFFENING )	5250x2270x220	1963
67	78129	LOOSE ITEMS(LP HEATER SUPPORT S)	2250x1700x1070	2965
68	78130	LOOSE ITEMS(LP HEATER SUPPORTS )	7125x1125x580	3665
69	78132	UPPER DOME WALL (TUR.SIDE)	8700x1600x296	2628
70	78133	UPPER DOME WALL(GEN.SIDE)	8700x1600x296	2628
71	78136	UPPER DOME WALL (FWB SIDE)	7180x3000x300	5410
72	78137	LOOSE ITEMS(UPPER DOME WALL- FWB SIDE)	3600x550x200	731
73	78139	UPPER DOME WALL(RWB SIDE)	7180x3000x450	5754
74	78140	LOOSE ITEMS(UPPER DOME WALL- RWB SIDE)	3600x550x200	731
75	78142	FRONT & REAR W/BOX HING ARRANGEMENT	2450X1650X800	6852
76	78143	FRONT & REAR W/BOX HING ARRANGEMENT	500X500X500	135
77	78144	FRONT & REAR W/BOX HING ARRANGEMENT	2500X600X750	1650
78	78149	FRONT & REAR W/BOX HING ARRANGEMENT	800 X660 X580	564
79	78150	FRONT & REAR W/BOX HING ARRANGEMENT	1670X1040X480	914
80	78151	FRONT & REAR W/BOX HING ARRANGEMENT	1670X1040X480	914
81	78154	STEAM THROW DEVICE	1850x1040x860	2120
82	78155	STEAM THROW DEVICE	1850x1040x860	2120
83	78157	LOOSE ITEMS(CONDENSER)	4500x1000x1000	1955
84	78158	LOOSE ITEMS(CONDENSER)	800x600x500	103
85	78159	FASTENERS(CONDENSE R)	1200x1100x350	2737
86	78162	TOOLS & TACKLES(CONDENSER)	300x350x500	45
87	78166	STAND PIPE	3500x600x600	69

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

		NO.1(CONDENSER)		
88	78167	LOOSE ITEMS(STAND PIPE NO.1&2-CONDENSER)	3650x550x300	375
89	78169	STAND PIPE NO.2(CONDENSER)	3500x600x600	69
90	78175	INSTRUMENTATION-NON FRAGILE (CONDENSER)	1500x1300x700	733
91	78176	INSTRUMENTATION-FRAGILE (CONDENSER)	1500x600x600	252
92	78301	GLAND STEAM CONDENSER	1750x1200x1700	1610
93	78304	LOOSE ITEMS OF GSC	700x300x200	60
94	78305	LOOSE ITEMS OF GSC (FRAGILE)	600x500x350	35
95	78315	LP.HEATER NO.1	13000x2100x2000	21100
96	78316	STAND PIPE(LPH NO.1)	2600x350x350	55
97	78317	LOOSE ITEMS(LPH NO.1)	500x400x400	135
98	78318	LOOSE ITEMS-FRAGILE(INSTRUMENTATION,LPH NO.1)	700x400x400	85
99	78319	LOOSE ITEMS(INSTRUMENTATION, LPH NO.1)	2100x500x400	170
100	78320	TROLLEY FOR LP HEATER NO.1	1350x800x200	200
101	78401	TURBINE OIL COOLER	5850x1700x2300	13250
102	78402	TURBINE OIL COOLER	5850x1700x2300	13250
103	78406	LOOSE ITEMS(TOC)	800x800x500	130
104	78417	PRIMARY WATER COOLER	4300 X1350X1350	2220
105	78418	PRIMARY WATER COOLER	4300 X1350X1350	2220
106	78420	LOOSE ITEMS OF PWC	0 X 0 X 0	38
107	78424	HYDROGEN COOLER	4600x1450x800	2665
108	78425	HYDROGEN COOLER	4600x1450x800	2665
109	78426	HYDROGEN COOLER	4600x1450x800	2665
110	78427	HYDROGEN COOLER	4600x1450x800	2665
111	78428	LOOSE ITEMS (HYDROGEN COOLERS)	1300x1000x600	2140
112	78431	EXCITER AIR COOLER	3780x920x830	1980
113	78432	EXCITER AIR COOLER	3780x920x830	1980
114	78436	CONTROL FLUID COOLER	3300x850x1030	1506
115	78437	CONTROL FLUID COOLER	3300x850x1030	1506
116	78438	LOOSE ITEMS(CFC)	600x600x500	103
		<b>TOTAL</b>		<b>613227</b>

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

D.		ACG		
1	10001	STARTER CABINET FOR DC SEAL	1230x 1060x 2550	675
2	10002	GENERATOR INSTRUMENTATION CABINET	1230x 1060x 2550	675
3	10003	LOOSE ITEMS	600x 600x 400	65
4	10004	LOOSE ITEMS	1000x 800x 400	76
5	10005	STARTER CABINET FOR DC JACKING OIL PUMP	1230x 1060x 2550	675
6	10006	STARTER CABINET FOR DC EMERGENCY OIL PUMP ( EOP )	1230x 1060x 2550	675
			<b>SUB TOTAL D</b>	<b>2841.00</b>

**PUMPS, DEARATOR, COOLER, H.P. HEATERS AND DRIVE TURBINE FROM HYD.**

SL	ITEM DESCRIPTION	TOTAL QTY.	UNIT WT. IN KG	TOTAL WT. KG.
<b>A:</b>	<b>BOOSTER PUMPS</b>			
1	BOOSTER PUMPS (MD+TDA+TDB)	3	5370	16020
2	B.P. SKIDS	3	1000	3000
3	LOOSE ITEMS			115
			<b>SUB TOTAL A</b>	<b>19135</b>
<b>B:</b>	<b>BOILER FEED PUMPS</b>			
1	BOILER FEED PUMP(MD+TDA+TDB)	3	10933	32799
2	GRILLAGE ASSLY. (BP+MOTOR)	1	3710	3710
3	GRILLAGE ASSY. (BPF+HC)	1	3800	3800
4	BFP SKIDS	3	1000	3000
5	HYDRAULIC COUPLING	1	15000	15000
6	R.C. VALVES	3	900	2700
7	CONICAL TYPE SUCTION STRAINER	3	1200	3600
8	BASKET TYPE SUCTION STRAINER	3	2350	7050
9	PORTABLE OIL CENRIFUSE	1	1000	1000
10	LOCAL GUAGE BOARD	3	1000	3000
11	CONNECTING COUPLING (BFP AND HC)	1	80	80
12	CONNECTING COUPLING (MOTOR AND HC)	1	300	300
13	CONNECTING COUPLING (BP AND MOTOR)	1	31	31
14	LOCAL INSTRUMENT RACK	1	200	200
15	LOCAL GUAGE BOARD	3	1000	3000
16	LOCAL GUAGE BOARD	3	800	2400
17	HYDRAULIC COUPLING WORKING OIL	1	8820	8820
18	LOOSE ITEMS			9800
			<b>SUB</b>	<b>100290</b>

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

SL	ITEM DESCRIPTION	TOTAL QTY.	UNIT WT. IN KG	TOTAL WT. KG.
<b>C: CONDENSATE EXTRACTION PUMPS</b>				
1	CONDENSATE EXTRACTION PUMP(A, B, C)	3	6220	18660
2	CEP CANISTERS ASSLY	3	2910	8730
3	SUCTION STRAINER SIMPLEX	3	1500	4500
4	CONNECTING COUPLING FOR CEP	3	50	150
5	LOCAL INSTRUMENT RACK	1	250	250
6	LOCAL GUAGE BOARD	1	400	400
7	LOCAL GUAGE BOARD	1	1000	1000
8	LOOSE ITEMS			4350
			<b>SUB TOTAL C</b>	<b>38040</b>
<b>D: DRAIN COOLER</b>				
1	DRAIN COOLER ASSLY	1	5400	5400
2	LOOSE ITEMS			143
			<b>SUB TOTAL D</b>	<b>5543</b>
<b>E: DEAERATOR</b>				
1	DEAERATOR STORAGE TANK SECTION -I	1	30280	30280
2	DEAERATOR STORAGE TANK SECTION -II	1	25388	25388
3	DEAERATOR STORAGE TANK SECTION -III	1	31897	31897
4	HEADER ASSLY	1	28532	28532
5	LOOSE ITEMS			23130
			<b>SUB TOTAL E</b>	<b>139227</b>
<b>F: L.P. HEATERS</b>				
1	L.P. HEATER 2	1	26000	26000
2	L.P. HEATER 3	1	18000	18000
3	LOOSE ITEMS			1784
			<b>SUB TOTAL F</b>	<b>45784</b>
<b>G: H.P.HEATERS</b>				
1	H.P.HEATER 5A	1	44500	44500
2	H.P.HEATERS 6A	1	54000	54000
3	H.P.HEATERS 5B	1	44500	44500
4	H.P.HEATERS 6B	1	54000	54000
5	LOOSE ITEMS			5186
			<b>SUB TOTAL G</b>	<b>202186</b>
<b>H DRIVE TURBINE</b>				
1	TWIN OIL COOLER(BFP AND DT)	2	5700	11400
2	DC STARTER CUIBICAL	2	2000	4000
3	ASSEMBLED DRIVE TURBINE	2	14560	29120

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

4	GEAR BOX	2	1000	2000
5	LUBE OIL CONSOLE ASSEMBLY 1	2	9011	18022
6	LUBE OIL CONSOLE ASSEMBLY 2	2	65818	131636
7	EMERGENCY OIL PUMP	2	1700	3400
8	THERMAL INSULATION	2	800	1600
9	JACKING OIL PUMP	2	175	350
10	TURBINE OIL PURIFICATION UNIT	2	1500	3000
11	OIL ACCUMULATOR	2	30	60
12	CHARGING KIT	2	10	20
13	CENTRIFUGAL EXHAUST FAN	4	150	600
14	TRANSFER OIL PUMP	2	350	700
15	SERO PRIME-46 OIL	2	21000	42000
16	ACCOUSTICS ENCLOSURE	2	3000	6000
17	URBINE BLADED ROTOR	1		
18	LOOSE ITEMS			41126
			SUB TOTAL J	295034

SL	ITEM DESCRIPTION	TOTAL QTY	SIZE (MM)	UNIT WT KG	TOTAL WTKG
<b>(A)</b>	<b>RE JOINTS</b>	1 Set			
1.	Inlet -Pipe Assy. (RH)	1	2600Dx1050L	2305	2305
2.	Inlet -Pipe Assy(LH)	1	2600Dx1050L	2305	2305
3.	Inlet -Pipe Detail	2	1500Wx3000L	5477	10954
4.	Inlet -Pipe Assy.	2	3200Dx450H	5211	10422
5.	Inlet - Blank Flange Assy.	2	3650Dx125TH	7416	14832
6.	Inlet - Bellows	4	2600Dx500H	400	1600
7.	Outlet - Pipe Assy. (RH)	1	2600Dx350H	1428	1428
8.	Outlet - Pipe Assy. (LH)	1	2600Dx350H	1428	1428
9.	Outlet - Pipe Details	2	1500Wx3000L	5477	10954
10.	Outlet - Pipe Assy.	2	3200Dx450H	5211	10422
11.	Outlet -Blank Flange Assy.	2	3650Dx125TH	7416	14832
12.	Outlet - Bellows	4	2600Dx500H	400	1600
13.	Boxes for loose items	9	2000x1000x1000	1000	9000
				<b>SUB TOTAL A</b>	<b>92082</b>
<b>(B)</b>	<b>FLASH TANKS</b>	5 NOS			
1)	HP DRAIN FT	1	3500-OD; 5600L	7900	7900
2)	LP DRAIN FT	1	3000 OD; 5300 L	6600	6600
3)	STEAM DRAIN FT	1	2500 OD; 3700L	3700	3700
4)	UNIT FT	1	1700 OD; 1800L	1800	1800
5)	FEED WATER SAFETY VALVE FT	1	1700 OD; 1800L	1800	1800
6)	BOXES FOR LOOSE ITEMS	6	2000Lx1000Wx1000H	1000	6000

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

					<b>SUB TOTAL B</b>	<b>27800</b>
<b>(C) MISC TANKS</b>						
1)	CLEAN OIL TANK	1	6100L 3500W 4500H		9500	9500
2)	DIRTY OIL TANK	1	6100L 3500W 4500H		9500	9500
3)	OIL UNLOADING TANK	1	2300L 1200W 800H		550	550
4)	DMCW TANK	1	7200 L 3000W 2900H		6000	6000
5)	BOXES FOR LOOSE ITEMS	4	2000L 1000W 1000H		1000	4000
					<b>SUB TOTAL C</b>	<b>29550</b>
<b>(D) BUTTERFLY VALVES</b>						
1	2200 DIA	4	2530L 3000W 1110H		9353	37412
2	800 DIA	8	1030L 1250W 415H		1311	10488
3	700 DIA	3	930L 1160W 405H		1164	3492
4	600 DIA	6	815L 1000W 300H		765	4590
5	500 DIA	16	700L 865W 300H		600	9600
6	400 DIA	7	600L 750W 275H		336	2352
7	BOXES FOR LOOSE ITEMS	52	700L 700W 300H		300	15600
					<b>SUB TOTAL D</b>	<b>83534</b>
<b>(E) H.T MOTORS</b>						
SL	ITEM DESCRIPTION	TOTAL QTY	SIZE (MM)		UNIT WT KG	TOTAL WTKG
1	CEP	3	2050L 1600W 2550H		5400	16200
2	BFP	1	4300L 4500 W 2400H		23500	23500
3	BOXES FOR LOOSE ITEMS	6	2500L 1000W 1000H		1000	6000
					<b>SUB TOTAL E</b>	<b>45700</b>
<b>PEM SUPPLY</b>						
SL. NO.	ITEM DESCRIPTION		TOTAL WT. KG.		TOTAL WT. MT	
1	CONTROL VALVES					
2	FLOW ELEMENTS		6000		6	
3	<b>CHAIN PULLEY BLOCK / HOIST:</b>					
a)	ELECTRIC HOIST		3000		3	
b)	CHAIN PULLEY BLOCK		6000		6	
4	CHEMICAL DOZING SYSTEM		12000		12	
5	LUBE OIL TRANSFER PUMPS		500		0.5	
6	AIR TRAPS		500		0.5	
7	ALUMINIUM SHEET		62500		62.5	
8	ANCILLIARY MATERIALS FOR INSULATION		35000		35	
9	ME BELLOWS		34500		34.5	

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

10	STEAM TRAPS	100	0.1
11	THERMAL INSULATION	265000	265
12	<b>VALVES:</b>		
a)	AIR RELEASE VALVE	600	0.6
b)	BALL VALVES	700	0.7
c)	BUTTER FLY VALVES(STEAM SERVICE)	11000	11
d)	BUTTER FLY VALVES(WATER SERVICE)	4000	4
e)	DUAL PLATE CHECK VALVE	3600	3.6
f)	STEEL GATE/GLOBE/NRV(WATER SYSTEM VALVES)	800	0.8
13	AUX PRDS	1000	1
14	COLTCS	16000	16
15	DEBRIS FILTERS	10000	10
16	DESUPERHEATER FOR WET STEAM WASHING	1000	1
17	MISC. PUMPS: HORIZONTAL	60000	60
18	PORTABLE OIL PURIFICATION SYSTEM	500	0.5
19	STRAINERS - SIMPLE	3000	3
20	PLATE HEAT EXCHANGER	3000	3
<b>TOTAL</b>		<b>540300</b>	

S N	ITEM ID	DESCRIPTION	QTY	U	GROSS WT.(IN KGS.)
<b>BOUGHT OUT ITEMS FROM HARDWAR</b>					
1	BG001	EMPTY H2 CYLINDER	105	NO	
2	BG002	EMPTY CO2 CYLINDER	44	NO	8855
3	BG003	EMPTY N2 CYLINDER	12	NO	
4	BG005	MOISTURE MEASURING SYSTEM	1	ST	16
5	BG007	VAPOUR EXHAUSTER	2	NO	80
6	BG009	H2 GAS ANALYSER CABINET	2	NO	
7	BG011	REFRIGERATION GAS DRYER	2	NO	2000
8	BG018	STARTING RESISTOR FOR DC S.O MOTOR	1	NO	250
S N	ITEM ID	DESCRIPTION	QTY	U	REMARKS
9	BG019	SOUND ABSORBING LINING FOR EXCITER COVER & COUPLING COVER	1	ST	1500
10	BG021	GROUNDING BRUSH MONITOR	1	ST	
11	BG066	GENERATOR END WINDING VIBRATION MONITORING EQUIPMENT FOR TURBOGENERATOR	1	ST	39
12	BG079	PRIMARY WATER COOLER (PLATE TYPE)	2	No	
13	BG080	STROBOSCOPE	1	NO	
14	BH001	WELDED AUSTENITIC S.S. TUBES GR.304 (FOR CONDENSOR)	1	ST	300000
15	BH010	CONDENSOR AIR EVACUATION PACKAGE (VACUUM PUMP)	2	NO	8556

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

16	BH012	AIR EXHAUSTER WITH MOTOR (GSC AIR EXHAUSTER)	2	NO	300
17	BT001	LIFTING BEAM	1	NO	6200
18	BT002	JACKING OIL PUMPS	1	ST	2630
19	BT003	AOP & EOP	1	ST	FTL
20	BT004	DUPLEX FILTER (LUB.OIL)	1	NO	620
21	BT005	DUPLEX FILTER (JACKING OIL)	1	NO	163
22	BT006	BUTTERFLY VALVES	1	ST	80
23	BT007	THREE WAY TEMP. CONTROL VALVE	1	ST	615
24	BT008	DOUBLE THREE WAY VALVES	1	ST	230
25	BT009	NRV WITH ALUMINIUM FLAP	1	ST	35
26	BT010	PRESSURE LIMIT VALVE	1	NO	
27	BT012	OIL VAPOUR EXHAUSTER	2	NO	180
28	BT013	LEAD DIAPHRAGM	4	NO	108
29	BT014	SPRAY NOZZLES	1	ST	1.5
30	BT015	DIRT CATCHERS	1	NO	27
31	BT016	DAMPER	1	ST	125
32	BT017	VARIABLE LOAD SPRING CAGES	1	ST	1370
33	BT018	FLEXIBLE BENDS	1	ST	
34	BT020	THERMAL INSULATION OF TURBINE	1	NO	
35	BT021	THERMAL INSULATION OF TIP	1	ST	
36	BT022	TURBINE CLEADING	1	NO	
37	BT023	TURBINE OIL	1	M3	98070 litre
38	BT024	DRY AIR PRESERVATION SYSTEM	1	NO	FTL
39	BT027	TURBINE INTEGRAL PIPING	1	ST	62658
40	BT028	H & S FOR TURBINE INTEGRAL PIPING	1	ST	15321

**Details of Platform/Gratings/Monorails (PHB):**

Description	Weight (MT)
Front & Rear Water box handling system	40
Oil Canal	6
Platform at EL +0.060	20
Platform below TG at EL (+) 2.5 m (T.O.S)	36
Misc platform (B-C Bay)	20
C.F Room platform at EL +0.560 (T.O.S)	18
Oil equipment Room platform at EL+9.060 & 8.810 (T.O.S)	36
Power House Building (Monorail)	24
<b>TOTAL</b>	<b>200</b>

**LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC**

**NOTE :**

1. THE LIST IS TENTATIVE AND HAS BEEN GIVEN TO ENABLE THE CONTRACTOR TO STUDY THE NATURE OF WORK TO BE DONE IN THIS CONTRACT. THERE MAY BE VARIATION IN SIZE, WEIGHT ETC. AND NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED ON ACCOUNT OF THIS BY BHEL.
2. SOME OF THE PACKAGES MAY BE SENT IN PARTS TO SUIT THE SITE CONDITION / TRANSPORTATION, THE SAME IS TO BE ASSEMBLED AT SITE WITHOUT ANY EXTRA COST, LIKEWISE THE PACKAGE MAY BE ASSEMBLED TOGETHER AND SEND AS A SINGLE ASSY. CONTRACTOR MAY HAVE TO DISMANTLE AND ERECT OR, ERECT AS SINGLE ASSEMBLY AS PER THE INSTRUCTION OF BHEL ENGINEERS WITHOUT ANY EXTRA COST.
3. TG INTEGRAL PIPING SHOWN IN WEIGHT DETAIL UNDER GENERATOR PACKAGE COVERS ONLY INTEGRAL PIPING RELATED TO GENERATOR. INTEGRAL PIPING FOR TURBINE IS OUTSOURCED BY BHEL/HARIDWAR AND COVERED IN THE LIST OF BOUGHT OUT PACKAGES. LIST OF BOI PACKAGES IS ATTACHED AS ANNEXURE. THIS IS PART OF SCOPE.

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Annexure-II**  
**SUMMARY OF WEIGHT DETAILS**

<b>Sl.No.</b>	<b>EQUIPMENT / PACKAGE</b>	<b>GR.WT IN KG.</b>	<b>APPROX. WT. (in MT)</b>
1	STEAM TURBINE	948908	
2	GENERATOR	539033	
3	CONDENSOR	613227	
4	ACG	2841	
5	BOOSTER PUMPS	19135	
6	BOILER FEED PUMPS	100290	
7	COND ENSATE EXTRACTION PUMPS	38040	
8	DRAIN COOLER	5543	
9	DEAERATOR	139227	
10	LP HEATERS	45784	
11	HP HEATERS	202186	
12	DRIVE TURBINE	295034	
13	RE JOINTS	92082	
14	FLASH TANKS	27800	
15	MISC TANKS	29550	
16	BUTTERFLY VALVES	83534	
17	MOTORS	45700	
18	PEM - SUPPLY	540300	
19	BOUGHT OUT ITEMS FROM HARDWAR	333980	
20	TG INTEGRAL PIPING	106184	
	<b>TOTAL</b>	<b>4208378</b>	<b>4208</b>

**NOTE:**

- a. THE WEIGHT INDICATED ABOVE FOR **ONE UNIT ONLY.**
- b. THE WEIGHT INDICATED ABOVE IS APPROXIMATE AND THERE MAY BE A VARIATION IN WEIGHT OF EQUIPMENT / PACKAGE. NO CLAIM, WHATSOEVER, WILL BE ENTERTAINED BY BHEL ON ACCOUNT OF VARIATION IN WEIGHT QUANTITIES.
- c. **Platforms /Gratings/Monorail is not covered in above (Gross Weight) as payment for this will be done on tonnage basis as per actual execution.**

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

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### 11. GENERAL

#### 11.0.1

The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for fabrication, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipments etc, in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

#### 11.0.2

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

#### 11.0.3

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

#### 11.0.4

The Bidder shall at his cost perform any services, tests etc, although not specified but nevertheless required for the completion of work.

#### 11.0.5

Contractor shall erect all the equipments as per sequence prescribed by BHEL at site. The sequence of erection, methodology will be decided by the BHEL engineers depending upon the availability of material, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of erection adopted in erection of similar TG sets or for any reasons whatsoever.

#### 11.0.6

All the necessary certificates and licenses required to carryout this work are to be arranged by the Contractor expeditiously at his cost.

#### 11.0.7

The work to be carried out under the scope of these specifications covers the complete work of collection from stores/storage yard, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, leveling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial running of auxiliaries covered under these specifications, commissioning and all other activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. That will be provided during the course of installation. 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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

---

work will be got done by BHEL at the cost and risk of the contractor. Contractor may please note that the loading of materials at storage yard/Stores in contractor's Trailer / Carriers while collecting materials will be done by material handling agency deployed by BHEL.

### 11.0.8

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

### 11.0.9

The indicative schedule of weight of major equipments given in relevant appendices is meant for providing a general idea to the Contractor about the magnitude of the work involved.

### 11.0.10

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

### 11.0.11

All tools and tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables etc required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause.

### 11.0.12

The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.

### 11.0.13

All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipments without the specific permission of the engineer.

### 11.0.14

Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

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### 11.0.15

Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

### 11.0.16

Contractor shall mobilize sufficient quantity of sleepers for stacking of materials in his custody.

### 11.0.17

Performance testing of equipment and first fill and one year topping requirement of consumables/ chemicals will also form part of the work to be carried out by the contractor.

### 11.0.18

The Contractor's scope of work is further described in the following clauses:

## **11.1 COLLECTION AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES**

### 11.1.1

Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc. from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

### 11.1.2

The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

### 11.1.3

Transportation of lube oil, Chemicals, Gas cylinders etc from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

## **11.2 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 equipments covered under this tender

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

---

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.

### 11.2.1

All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

### 11.2.2

All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established upto National Physical Laboratory.

### 11.2.3

Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

## 11.3 GENERAL

### 11.3.1

During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc or for accommodating erection, rigging etc, the cutting of platforms and grills should be minimum and as approved by BHEL engineer. After completion of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.

### 11.3.2

Erection and welding of stainless steel fittings including supply of necessary stainless steel welding electrodes is within the scope of the work/specification.

### 11.3.3

No temporary supports should be welded on to the piping.

### 11.3.4

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. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer. Preservative and touch up painting on equipments covered under this specification stored at stores/storage yard shall also be carried out by the contractor.

### 11.3.5

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XI General

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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.

### 11.3.6

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

### 11.3.7

Wherever the equipments are erected by the contractor and connected piping is done by other agency, contractor shall weld / tighten the incoming pipes to either the equipment or the counter flange provided on the equipment.

### 11.3.8 Submission of Periodical Reports

Contractor shall submit periodical reports in respect of following aspects of operation:

Consumption of welding electrodes and gases

- 1) Consumption of construction power
- 2) Manpower reports
- 3) Daily and Monthly Progress reports
- 4) Field calibration reports

BHEL at site will inform formats for these reports.

**11.3.9** It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer/ BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permit for working beyond normal working hours

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XII CIVIL WORKS, FOUNDATION, GROUTING

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### 12 PREPARATION OF FOUNDATION

#### 12.1

Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 25mm for achieving proper levels will be within the scope of work/specification.

#### 12.2

All minor foundations and anchor points required for installing erection equipments like winches, anchors etc. are to be cast by the contractor.

#### 12.3

The complete work of secondary grouting of equipments is included in the scope of work/specification. Contractor shall arrange all manpower, T&P, form work and shuttering materials, all grouting materials such as ordinary portland cement, sand, stone chips etc & quick-setting-non-shrink-free-flow special grout mix of required specification (like conbextra-gp-2 or equivalent).

##### 12.3.1

The quick-setting-non-shrink-free-flow special grout mix shall be purchased only from the following BHEL approved vendors:

1. M/S FOSROC CHEMICALS (INDIA) PVT LTD;
2. M/S SIKA INDIA PVT LTD;
3. M/S PAGEL CONCRETE TECHNOLOGIES PVT LTD;
4. M/S PIDILITE INDUSTRIES LTD.

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essential be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

##### 12.3.2

Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

## TECHNICAL CONDITIONS OF CONTRACT (TCC)

### Chapter-XII CIVIL WORKS, FOUNDATION, GROUTING

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#### 12.4

BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

#### 12.5

The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments under scope 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.

#### 12.6

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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIII EQUIPMENT INSTALLATION

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### **13 EQUIPMENTS INSTALLATION – COMMON REQUIREMENTS**

#### 13.1

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 is in the scope of the contractor.

#### 13.2

All works such as cleaning, leveling, aligning, hot alignment, trial assembly, dismantling of certain equipments/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, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

#### 13.3

Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/pickings/lubricants for replacement will be provided by BHEL free of cost.

#### 13.4

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.

#### 13.5

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

#### 13.6

After initial trial of rotating equipments, control and power cabling for motors and other equipments/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

#### 13.7

All racks or assembled units like Governing Rack, 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIV PIPING INSTALLATION

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### 14 PIPING INSTALLATION

#### 14.1

The scope of work in piping system (air, Gas, Water, Oil, Steam, Governing oil/Control oil etc.) will include cutting 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, and other piping's 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.

#### 14.2

Carrying out of piping as per the specifications between equipments constituting terminal points, whether the terminal equipments 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 NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

#### 14.3

Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipments, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

#### 14.4

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 work has 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.

#### 14.5

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 equipments erected by contractor is completely covered in the scope of this tender specification.

#### 14.6

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

- (1) To locate cause of vibrations in equipments/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIV PIPING INSTALLATION

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- (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 pipe lines, fresh edge preparation and welding with stress relieving wherever applicable.
- (5) Fabrication / making of bends for pipes and tubes of diameter up to 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.

### 14.7

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

### 14.8

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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XV CONDENSER INSTALLATION

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### 15 CONDENSER INSTALLATION

#### 15.1

The condenser will be dispatched in loose parts mainly comprising of bottom plates, dome valves, front and rear water chamber, front and rear water boxes, side walls, hot well, spring elements, support plates, air extraction pipes, baffles, stiffening rods and pipes etc. Condenser tubing and tube expansion (roller expansion) is to be done at site by the contractor, after taking due care to clean all the tube holes. After final alignment and leveling of turbine exhaust and condenser, the same has to be welded to the exhaust position of LP exhaust as per the sequential welding procedure. Condenser tube material is stainless steel.

#### 15.2

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.

#### 15.3

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.

#### 15.4

The contractor shall carry out the condenser neck welding with LP cylinder exhaust hood only after final installation of LP casing. Neck welding shall be subjected to specified non-destructive testing.

#### 15.5

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.

#### 15.6

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

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter-XVI GENERATOR, DEAREATOR INSTALLATION &**  
**HANDLING HEAVIER EQUIPMENTS**

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**16.1 GENERATOR INSTALLATION**

**16.1.1 GENERATOR STATOR**

**Generator stator will be transported from HARIDWAR works to site on RAIL. Further unloading of stator from BHEL's special wagon at railway siding and transportation to TG Hall ((near 'A' row columns) will be done by BHEL. This will be received at site nearer to the lifting point of Portal Gantry Crane / Strand Jack (near 'A' row columns).**

Unloading of Gen. Stator from wagon/trailer, lifting of stator and shifting it to TG Deck foundation, assembling the terminal box & cooler housing is in the scope of this work.

**16.1.2**

The generator stator shall be lifted and placed by the contractor with the help of portal gantry crane/strand jack (as per the availability), as per the scheme envisaged by BHEL on to the generator foundation. For this purpose, the portal crane/strand jack system will be provided by BHEL free of hire charges to the contractor. However the transportation from store/ storage yard / shed is in Contractor scope. Assistance as required in assembly, erection, testing and commissioning of this portal crane/strand jack system with respect to required T& P (As per Chapter-IV of Vol-I A TCC), ~~EOT Crane operator~~, Manpower as required, is in the scope of contractor before the stator lifting. Transportation, assistance for dismantling, cleaning, shifting/ packing back to store/ storage yard/ shed after its use will be the responsibility of the contractor.

The assembly of the special Wagon/Trailer for return after unloading of stator is in the scope of this work.

**16.2 HANDLING OF HEAVIER EQUIPMENTS**

Contractor shall provide all required suitable cranes and trailers for loading of materials during collection of from BHEL/ client's stores/ storage yard, transportation to site of work and at work site including unloading at site of works for all equipments and consignments including heavy and voluminous equipments/ components/ consignments like HP turbine module, IP turbine module, LP turbine inner-outer casing, LP turbine inner casing, LP rotor, generator rotor, brushless exciter, HP heaters etc.

BHEL shall not provide any T&P other than those specified for the specific work as per relevant Appendix and other relevant clauses of tender specification.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVII HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

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### **17 HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS**

#### 17.1

Contractor shall carry out the following tests required to complete the erection and commissioning of the TG Set:

- (1) Hydraulic testing of individual equipments like condenser, coolers, heaters, other auxiliaries and equipments. 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 equipments and piping as part of scope of work under this tender specification.
- (2) Ultrasonic test
- (3) Dye Penetrate test
- (4) Magnetic Particle Test.

All above facilities (men, materials, equipments, 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.

#### 17.2

Contractor shall lay all necessary temporary piping, welding, supports, 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.

#### 17.3

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.

#### 17.4

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. Required valves, fasteners, blank flanges, blanks or steel for blank flanges shall be provided by contractor. 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.

#### 17.5

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

#### 17.6

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,

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVII HYDROSTATIC TESTING, PRESERVATION & OTHER TESTS

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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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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### **18 PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING**

#### 18.1

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

- (a) Trial run of Boiler Feed Pumps, CEP, Vacuum Pumps, Booster Pump, etc and other pumps/equipments like Misc 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, Jacking oil/Lifting oil, HP oil supply system, Governing oil system/Control oil system, LP Bypass 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 Valves (ESV), HP Overload Bypass valves, IP Valves, LP Bypass valves, CRHNRV and fittings.
- (f) Manual/mechanical cleaning of Oil tanks, Suction Strainers / Filter elements of CEP, BFP, Booster Pump, Vacuum Pumps, Misc. Pumps, 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 as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like spray nozzles, gauges, instruments etc. as instructed by BHEL during this process.
- (h) Putting turbine on barring gear.
- (i) Rolling and synchronization.
- (j) Full load operation.
- (k) Trial operation

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.

#### 18.2

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this technical specification.

### 18.3

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

### 18.4

The contractor shall carry out any other test as desired by BHEL engineer on erected equipments 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.

### 18.5

In case any malfunctioning and / or defect is found during tests / trial runs such as loose components, undue noise or vibrations, strain on connected equipments 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.

### 18.6

Cleaning of oil tank by sand blasting or other methods as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

### 18.7

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.

### 18.8

The contractor shall carry out leak test of generator air cooling system to the satisfaction of BHEL engineer.

### 18.9

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

### 18.10

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 relevant clauses of 'General Conditions of Contract'. The parts to be replaced shall however, be provided by BHEL free of cost.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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### 18.11

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.

### 18.12

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.

### 18.13

The pre-commissioning activities will start prior to Lube oil, HP Oil supply System, Governing/ Control oil flushing etc. 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.

### 18.14

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.

### 18.15

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) Supervisor                        | 2 Nos.     |
| 2) Pipe fitter/Millwright fitter     | 2 Nos.     |
| 3) Welder                            | 2 Nos.     |
| 4) Rigger                            | 2 Nos.     |
| 5) Electrician/instrument technician | 1 No. each |
| 6) Unskilled worker                  | 6 Nos.     |

### 18.16

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XVIII PRE-COMMISSIONING TESTS, COMMISSIONING, POST COMMISSIONING

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18.17

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

18.18

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.

18.19

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 equipments are delayed due to reasons not attributable to the contractor.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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### 19.1 WELDING AND HEAT TREATMENT

#### 19.1.1

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

#### 19.1.2

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

#### 19.1.3

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

#### 19.1.4

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.

#### 19.1.5

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.

#### 19.1.6

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

#### 19.1.7

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<sup>0</sup> 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 equipments 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.

#### 19.1.8

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

#### 19.1.9

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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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.

### 19.1.10

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.

### 19.1.11

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.

### 19.1.12

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 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.

### 19.1.13

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.

### 19.1.14

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

### 19.1.15

Pre-heating and stress relieving before and after welding are part of erection 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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### 19.1.16

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

### 19.1.17

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 of checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

### 19.1.18

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.

### 19.1.19

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

### 19.1.20

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.

### 19.1.21

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 equipments is within the scope of the work/specification.

### 19.1.22

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.

### 19.1.23

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

### 19.1.24

Joint fit up will be a stage for inspection.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XIX WELDING, HEAT TREATMENT, RADIOGRAPHY

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### 19.1.25

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

## **19.2 RADIOGRAPHY**

### 19.2.1

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 labours 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.

### 19.2.2

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's 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.

### 19.2.3

Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed 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.

### 19.2.4

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

### 19.2.5

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.

**TECHNICAL CONDITIONS OF CONTRACT (TCC)**  
**Chapter-XX ACID CLEANING/ALKALI FLUSHING/STEAM**  
**BLOWING/OIL FLUSHING**

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**20 ACID CLEANING/ ALKALI FLUSHING/ STEAM BLOWING/ OIL FLUSHING ETC**

20.1

Contractor shall lay and erect temporary pipelines with fittings and accessories and also erect/commission the chemical cleaning/ circulating 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 of piping and shall provide all other arrangements as per requirement as part of 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.

20.2

After the chemical cleaning/ flushing have 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 spec.

20.3

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

20.4

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.

20.5

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.

20.6

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.

20.7

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XX ACID CLEANING/ALKALI FLUSHING/STEAM BLOWING/OIL FLUSHING

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preservation and handing over the same to BHEL stores after completion of the job is within the scope of work/specification.

### 20.8

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

### 20.9

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

### 20.10

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 mobilized by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decision 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.

### 20.11

**Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipments and valves and handing over to BHEL. No separate payment on this account shall be entertained.**

### 20.12

After acid cleaning/pickling of lubricating system (including oil piping of lube oil system, HP Oil supply system, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems, 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.

### 20.13

For full welding of structures, tanks and piping etc, only welding generators shall be used. The use of welding transformers will be subject to the approval of BHEL Engineer.

### 20.14

Erection and commissioning of connecting piping – permanent and temporary for oil purification equipments and all operations for cleaning, oil flushing, dismantling of temporary piping during pre and post-commissioning of equipment up to full load shall be the responsibility of contractor as part of scope of work.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXI TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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### 21 TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

#### 21.1

The contractor shall provide all (except those indicated in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipments 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. Please refer relevant appendix for the list of T&P being provided by BHEL free of charges on sharing basis.

#### 21.2

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. Indicative list of major T&P to be arranged by contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

#### 21.3

Contractor shall carry out installation, commissioning, testing and dismantling of the 360 ton portal gantry crane, if provided by BHEL. Contractor's scope shall also include to & fro transportation of the portal gantry crane between BHEL stores and site of work and shall provide T&P including crane etc required for assembly and dismantling of above portal gantry crane.

#### 21.4

Contractor shall provide all required suitable cranes and trailers for materials handling during collection from BHEL/ client's stores/ storage yard, transportation to site of work and at work site for all equipments and consignments including heavy and voluminous equipments/ components/ consignments like HP turbine module, LP turbine inner-outer casing, LP turbine inner casing, LP rotor, generator rotor, brushless exciter, HP heaters etc. BHEL/customer shall not provide any T&P other than mentioned in relevant appendix for the purpose identified. The contractor shall make suitable arrangements/arrange crane well in advance for lifting and placement to final position of deaerator/ FST sections at required elevation/ location with utmost care.

#### 21.5

Contractor shall provide the complete operating crew like operator (only for portal gantry), helpers for handling trailing cable for EOT & portal gantry cranes. It may be specifically noted that the EOT crane/ gantry crane shall be shared by many other agencies working within the TG hall.

The contractor shall have to extend the services of the EOT crane operation to all such other agencies as instructed by BHEL; ~~the operation cost (for crew) will be shared proportionately amongst the beneficiary agencies on mutually agreed terms and rate.~~

Portal gantry crane will be issued in parts/ components and are to be assembled at site by the contractor as per the instructions of BHEL engineers/ erection manual. The scope includes receipt of the materials from BHEL stores, transportation to site, servicing of the components/

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXI TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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drives / pulleys etc., checking and lubricating wire ropes , pre assembly and assembly of components, preparation of foundation, erection of crane on the foundation, grouting of crane base plates, cabling, pre-commissioning and commissioning of drives, load testing , checking of over-load protection , regular maintenance etc. a qualified / experienced operator is to be provided by the contractor. After erection of the generator stator, the contractor has to dismantle the crane in sequence as instructed by BHEL and apply preservatives / touch-up paints, wherever required and return the same to store in good condition. Necessary consumables, tools and plants including gas welding m/c etc. are to be provided by the contractor. There is no separate rate for the above and quoted rates shall be inclusive of this.

The required loads will be provided by BHEL free of charges for load testing of portal cranes.

### 21.6

Contractor has to provide spanners of all sizes for carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

### 21.7

Contractor has to arrange slings of all sizes for completing the works covered under these specifications except the special slings for generator stator lifting/handling, which will be provided by BHEL free of charges on returnable basis.

### 21.8

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.

### 21.9

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 program and to achieve the milestones.

### 21.11

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. Also, the contractor shall arrange hydraulic jacks of 100 tonnes and 63 tonnes capacity along with long high pressure hoses of suitable length for generator erection and alignment. These jacks shall be 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.

### 21.12

All jack bolts that are required during erection for carrying out roll-check etc will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

### 21.13

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXI TOOLS AND TACKLES, MEASURING AND MONITORING DEVICES

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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.

### 21.14

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.

### 21.15

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 occur to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility.

### 21.16

Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to prior approval of BHEL.

### 21.17

The contractor at his cost shall carry out periodical testing of his construction equipments 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXII PRESERVATIVE PAINTING

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### **22 WELD FIT-UP AND WELD JOINT PROTECTIVE PAINT, COMPONENT PRESERVATIVE PAINTING ETC.**

- 1) All protective paints for the protection of weld joint fit-ups, application of primers on finished weld joints are in the scope of contractor.
- 2) Two coats of steam washable paints shall be applied on steam side of LP turbine and condenser components, as advised by BHEL. The steam washable paints, primer and thinner will be provided by contractor as part of scope of work along with other like arrangements for surface preparation and paint application like sand/shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants as required for completion of work.
- 3) The water boxes shall be sandblasted to remove all traces of primer applied at the works. Thereafter apply two coats of primer paint followed by two/three coats of alloyed resin machinery enamel paints as approved by BHEL. Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL 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 shall be arranged by contractor.
- 4) All site weld joints falling in steam side shall be painted with two coats of steam washable paint.
- 5) All water side 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.
- 6) 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.
- 7) Prior to hydraulic testing of water side of condenser, interior surfaces of water boxes shall be painted.
- 8) After completion of tubing and tube side hydro test, all water side surfaces of water chambers including tube plate shall be painted.
- 9) Preservation of all components/equipments during various stages of erection, 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.**
- 10) Condenser internal components/parts/surfaces have to be surface protected with steam washable paint as per BHEL standards.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIII LINING AND INSULATION

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### **23 LINING AND INSULATION**

#### 23.1

Application of thermal insulation/ spray insulation, finishing, cladding and outer casing etc of the following:

1. TG integral piping and tanks & vessels
2. Feed water storage tank
3. Other equipments including BOI's, though not listed above but required for completion
4. ST-TG auxiliaries including, but not limited, to heat exchangers, pumps, tanks and vessels and other equipments
5. TG integral piping including condensate and extraction system piping

#### 23.2

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 BHEL departmental charges.

#### 23.3

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

#### 23.4

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.

#### 23.5

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

#### 23.6

Contractor shall observe all precaution for laying, curing etc of pourable insulation. The contractor at his own cost shall redo any defective works found.

#### 23.7

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.

#### 23.7

Cutting & dressing of insulation bricks to suit the site area of application is incidental to work.

#### 23.8

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

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIII LINING AND INSULATION

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23.9

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.

23.10

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

23.11

The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by BHEL free of cost.

23.12

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.

23.13

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.

23.14

A log book shall be maintained by the contractor for the clearance of the area for application of refractory and 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.

23.15

Wastage allowances for the material issued are envisaged as follows:

A	Pourable & castable insulation	-	2%
B	Insulation bricks and mortar	-	2%
C	Wool mattresses	-	2%
D	Cladding 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIII LINING AND INSULATION

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23.16

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.

23.17

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.

23.18

In certain instances, co-ordinated/ phased application of castable refractory/ insulation on pressure parts etc may be necessitated in consideration of sequence of activities of other erection agencies. Contractor shall do such phased work as may be directed by BHEL.

23.19

Prior to application of refractory bituminous painting on the pressure parts and other area is under contractor scope. The bituminous paint shall be arranged by contractor. No separate payment will be made for application of paint.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIV FINAL PAINTING

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### 24 FINAL PAINTING

#### 24.1

All exposed metal parts of the equipment including piping, structures, railings etc wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.

#### 24.2 Touch-up painting on damaged areas –

- a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. Minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer. Primer coat of touch-up primer has to be applied by brush immediately after the surface preparation.

Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

Painting scheme is enclosed for information at relevant annexure. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents. Similarly, documents as provided progressively during the execution of work for all other products/ equipments etc shall be applicable.

#### 24.3

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

- (a.) Clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
- (b.) Painting procedure to be followed as mentioned above for touch-up painting on damaged areas.

#### 24.4

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 equipments/ components covered in these specifications.

#### 24.5

All exposed metal parts of the equipment including piping, structures, hand railing, grating etc shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanised wire brushing, scrapping, sand blasting etc and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.

#### 24.6 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.

# TECHNICAL CONDITIONS OF CONTRACT (TCC)

## Chapter-XXIV FINAL PAINTING

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24.7

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.

24.8

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.

24.9

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

24.10

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.

24.11

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.

24.12

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.

24.13

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 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.

24.14

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

24.15

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