T E N D E R S P E C I F I C A T I O N

for

TENDER NUMBER	**BHE/PW/PUR/DJRI-STG U-1 2 3 BLOCK I/1346**
Broad Scope of job	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **Unit # 1, 2 & 3 of 3X90.3 MW RUPPL DMD Dahej Project** At **RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), DAHEJ TALUKA : VAGRA, DIST- Bharuch, GUJARAT: BLOCK # I**
TENDER NUMBER	**BHE/PW/PUR/HZRI-STG U-1&2 BLOCK II/1347** **BHE/PW/PUR/HZRI-STG U-3&4 BLOCK III/1349**
Broad Scope of job	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **BLOCK # II (Unit # 1 & 2)** & **BLOCK III (Unit # 3 & 4)** of 4X93.1 MW RUPPL HMD Hazira Project At RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), HAZIRA District: Surat GUJARAT

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

TENDER SPECIFICATION ISSUE DETAILS

For

TENDER NUMBER	**BHE/PW/PUR/DHJRI-STG U-1 2 3 BLOCK I/1346**
Broad Scope of job	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **Unit # 1, 2 & 3 of 3X90.3 MW RUPPL DMD Dahej Project** At **RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), DAHEJ TALUKA : VAGRA, DIST- Bharuch, GUJARAT: BLOCK # I**
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EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION . Refer Notice Inviting Tender

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

AGM (Purchase)
Place: Nagpur
Date :

CONTENTS			
Volume No	Description	No. of pages	Hosted in website bhel.com as files titled
NIL	Tender Specification Issue Details	1	(Part of **Vol-IA-1346-1347-1349**)
NIL	Notice Inviting Tender	25	(Part of **Vol-IA-1346-1347-1349**)
I-A	Technical Conditions of Contract for RUPPL DMD Dahej	75	Vol-IA-**1346-1347-1349**)
I-A	Technical Conditions of Contract for RUPPL HMD Hazira	78	Vol-IA-**1346-1347-1349**)
I-B	Special Conditions of Contract	47	Vol-IBCD-**1346-1347-1349**)
I-C	General Conditions of Contract	29	(Part of **Vol-IBCD-1346-1347-1349**)
I-D	Forms & Procedures	71	(Part of **Vol-IBCD-1346-1347-1349**)
II	Price Bid Specification	3	Vol II

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Ref: BHE/PW/PUR/1346, 1347, 1349 Date: 30/10/2014

NOTICE INVITING TENDER (NIT)

NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES OR PURCHASE TENDERS FROM THIS OFFICE ALSO

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To

Dear Sir/Madam

Sub : NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i A	TENDER NUMBER	BHE/PW/PUR/DJRI-STG U-1 2 3 BLOCK I/1346	
ii A	Broad Scope of job	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **Unit # 1, 2 & 3 of 3X90.3 MW RUPPL DMD Dahej Project** At **RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), DAHEJ TALUKA : VAGRA, DIST- Bharuch, GUJARAT: BLOCK # I**	
i B	TENDER NUMBER	BHE/PW/PUR/HZRI-STG U-1&2 BLOCK II/1347 BHE/PW/PUR/HZRI-STG U-3&4 BLOCK III/1349	
ii B	Broad Scope of job	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **BLOCK # II (Unit # 1 & 2) & BLOCK # III (Unit # 3 & 4)** of **4X93.1 MW RUPPL HMD Hazira Project At RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), HAZIRA District: Surat GUJARAT**	
iii	DETAILS OF TENDER DOCUMENT		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*

c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PS Regional office at :*** ***Start : 30/10/2014 ,*** ***Closes: 15/11/2014 , Time : 16.00 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents will be available for downloading from website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date : 17/11/2014, Time 15.00 Hrs*** ***Place : BHEL PS Regional office at :Nagpur*** Tenders being submitted through representative shall be submitted at dispatch section of of PSWR HQ Office after making entry/registration at the reception. For any assistance on the matter kindly contact following officials: • Pratish Gee Varghese/Sr Engineer(Purchase • Shivkesh Meena / Engineer (Purchase)	*Applicable*
vi	**OPENING OF TENDER**	***1 hours after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	*Rs 2,00,000/- (Rupees Two Lakhs Only)*	*Applicable*
viii	**COST OF TENDER**	*Rs 2000/-.*	*Applicable*
ix	**LAST DATE FOR SEEKING CLARIFICATION**	*Five days before the due date of offer submission. Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**		***Not Applicable.***
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**		***Not Applicable***
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

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

Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.

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

4.0 Unless specifically stated otherwise, bidder shall deposit EMD through Demand Draft/Pay Order in favour of Bharat Heavy Electricals Ltd, payable at Nagpur. For other details and for 'One Time EMD' please refer General Conditions of Contract.

5.0 **Procedure for Submission of Tenders**: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of tender documents shall be retained by the bidder for their reference

6.0 The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below. **(All pages to be signed and stamped)**

Sl no	Description	Remarks
	Part-I A	
	ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. 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.	
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 : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc **(Issued Seperately for Dahej & Hazira Project)**	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

	PART-I B	
	ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender **OR** 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)	

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

	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT:	

	DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING:**	
i	o Envelopes I o Envelopes II o Envelopes III	

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) $P_1, P_2, P_3, P_4, P_5, \ldots P_N$ 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 = $\mathbf{P_T}$ (ie $P_T = P_1 + P_2 + P_3 + P_4 + .. P_N$)

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

c) Sum 'S_1 ' of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$,…. $S_{1\text{-}N}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}N}$). 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 '$\mathbf{P_T}$' for all Regions (i.e 'S_T '$= S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

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

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

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

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

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

Sl no	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	…	P_N	Total No of similar packages for all Regions = $\mathbf{P_T}$ 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	T_1	T_2	T_3	T_4	T_5	…	T_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$

	assessment for corresponding similar Package (as in row 1)								
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1}, S_{1-2}, S_{1-3}, S_{1-4}, … S_{1-T1}	S_{2-1}, S_{2-2}, S_{2-3}, S_{2-4}, … S_{2-T2}	S_{3-1}, S_{3-2}, S_{3-3}, S_{3-4}, … S_{3-T3}	S_{4-1}, S_{4-2}, S_{4-3}, S_{4-4}, … S_{4-T4}	S_{5-1}, S_{5-2}, S_{5-3}, S_{5-4}, … S_{5-T5}	.. … … … …	S_{N-1}, S_{N-2}, S_{N-3}, S_{N-4}, … S_{N-TN}	---------
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	…	S_N	Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$

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

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

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

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

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

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

III. 'Assessment of Capacity of Bidder':

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

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

Note:

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

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

IV. **Explanatory note**:

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

b) Identified Packages (Unit wise)

Table-1

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

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_{BHEL}**'** only, starting from the upper band.

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

i. up to Boiler Steam Blowing in case of Steam Generator and Auxiliaries

ii. upto Synchronisation in case of all other works excepting sl no (i) and (iii)

iii. Upto execution of at least 90% of anticipated contract value in case of Civil & Structures (unit wise), Enabling works and upto 90% of material unloading (in tonnage) as per the original contract in case of MM Package.

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

f) Performance evaluation in CL 9 above is applicable to Prime bidder and consortium partner (or Technical tie up partner) for their respective scope of work

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

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

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

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

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

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

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

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

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

19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .

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

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

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

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

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

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

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

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

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

23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0

23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'

23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified

23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.

23.9 Prime Bidder shall be responsible for the overall execution of the contract

23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats

23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.

23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.

23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of two similar works with the same consortium partner or partners under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.

23.14 The consortium partner shall submit SD equivalent to 2% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.

23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also

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

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

26.0 Order of Precedence

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

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

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

for BHARAT HEAVY ELECTRICALS LTD

AGM Pur

Enclosure

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

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **Unit # 1, 2 & 3 of 3X90.3 MW RUPPL DMD Dahej Project** At **RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), DAHEJ TALUKA : VAGRA, DIST- Bharuch, GUJARAT** **BLOCK # I**
TENDER NO	**BHE/PW/PUR/DJRI-STG U-1 2 3 BLOCK I/1346**

JOB	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, HEAT EXCHANGERS, SURFACE CONDENSER, HP/LP HEATER, DEARATORS, TANKS & VESSELS, PUMPS & AUXILARIES, HANGERS & SUPPORTS, INSULATION, AND FINAL PAINTING ETC FOR **BLOCK # II (Unit # 1 & 2) & BLOCK # III (Unit # 3 & 4)** of **4X93.1 MW RUPPL HMD Hazira Project At RELIANCE UTILITIES AND POWER PVT. LIMITED (RUPPL), HAZIRA District: Surat GUJARAT**
TENDER NO	**BHE/PW/PUR/HZRI-STG U-1&2-BLOCK II/1347** **BHE/PW/PUR/HZRI-STG U-3&4 BLOCK III/1349**

SL NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document. **Bidder must fill up this column as per applicability**
A	Submission of Integrity Pact duly signed (if applicable) (Note: To be submitted by Prime Bidder & Consortium/Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder)	**NOT APPLICABLE**	
B	**Technical** **B.1** Executed Erection Testing & Commissioning (E T & C) of One STG/GTG job of one unit of 20 MW or higher OR **B.2** Executed E T & C of Atleast One Boiler (With Rotating Machines upto synchronization) of 100 MW or higher, under direct order of BHEL. OR **B.3** Executed E T & C of Atleast One R&M job of Steam Turbines of capacity 100 MW or higher. OR **B.4** Executed E T & C of Atleast three number capital overhauling works of STGs against BHEL's direct orders. The rating of individual STG be atleast 250	**APPLICABLE**	

	MW or higher.		
C-1	**Financial** **TURNOVER** Bidders/prime bidders must have achieved an average annual financial turnover (Audited) of **Rs 90 Lakhs** or more over last three Financial Years (FY) i.e. 2011-12 2012-13 & 2013-14	**APPLICABLE**	
C-2	**NETWORTH** (only in case of Companies) Net worth of the Prime Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive	**APPLICABLE**	
C-3	**PROFIT** 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
E	Approval of Customer (if applicable) **Note:** Names of bidders (including consortium/Technical Tie up partners in case consortium bidding is permitted) who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval.	**APPLICABLE**	BY BHEL
F	Price Bid Opening **Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E		BY BHEL
F	Consortium criteria (if applicable)	NOT APPLICABLE	

Explanatory Notes for the PQR (unless otherwise specified in the PQR):

i. 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

ii. 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.

iii. 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)

iv. 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

v. ~~'Additional' Criteria in respect of 'Technical' criteria of PQR (as in 'B' above) for Civil, Electrical, CI, unless otherwise specified :~~

1. ~~Bidder should have executed similar work of any one of the following:~~
   - ~~a. One (1) work of value not less than Rs XXX~~

   ~~OR~~
   - ~~b. Two (2) works of not less than Rs YYY~~

   ~~OR~~
   - ~~c. Three (3) works of not less than Rs ZZZ~~

~~(Value XXX, YYY, ZZZ shall be as indicated by BHEL~~

2. ~~'Similar' work for criteria 5 above means~~
   - ~~a. Civil or Structures or Civil & Structures or Chimney respectively as applicable to the tendered scope in respect of 'CIVIL' Works~~
   - ~~b. Electrical works in respect of 'ELECTRICAL'~~
   - ~~c. CI works in respect of 'CI' Works~~
   - ~~d. Material Handling and/or Management works in respect of 'MM' works~~

vi. 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 unless otherwise specified

vii. '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

viii. Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:

1. Term 'Commissioning' indicated in PQR referrers to 'assistance to commissioning' / 'commissioning'
2. "BOILER LIGHT UP" in respect of Boiler & Aux and ESP
3. "SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG
4. "STEAM BLOWING COMPLETION" in respect of at least Main Steam Line of Power Cycle Piping
5. ~~"HYDRAULIC TEST" of the system in respect of Structures, Pressure parts/IBR Piping~~
6. ~~"CHARGING" in respect of power Transformers, Bus ducts, HT/LT switchgears~~
7. ~~"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.~~
8. ~~Achievement of physical Quantities as per respective PQRs in respect of Civil & Structures and Piling Works~~
9. ~~'Readiness for coal Filling" in respect of Bunker Structure Work.~~

ix. Boiler means HRSG or WHRB or any other types of Steam Generator

x. ~~Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass, LP Bypass lines~~

xi. 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.

xii. ~~In case the experience/PO/WO certificate enclosed by bidders do not have separate break up prices for the E&C portion of Electrical and CI Works, (i.e. the certificates enclosed are for composite order for supply and erection of Electrical & CI and other works if any), then value of Erection and Commissioning for the Electrical & CI portion shall be considered as 15% of the supply & erection of Electrical & CI, unless otherwise specifically indicated in the PQR~~.

xiii. 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.

xiv. 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

xv. 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.

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.

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: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER		
5	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE		
			APPLICABILITY(BY BHEL)	ENCLOSED BY BIDDER
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format		Applicable	YES / NO
7	Audited profit and Loss Account for the last three years		Applicable/~~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~~	YES/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
15	Non Disclosure Certificate	Applicable/~~Not Applicable~~	YES/NO
16	Bank Account Details for E-Payment	Applicable/~~Not Applicable~~	YES/NO
17	Capacity Evaluation of Bidder for current Tender	Applicable/~~Not Applicable~~	YES/NO
18	Tie Ups/Consortium Agreement are submitted as per format	Applicable/~~Not Applicable~~	YES/NO
19	Power of Attorney for Submission of Tender/Signing Contract Agreement . Also the Power of Attorney of the signatories executing the Consortium Agreement	Applicable/~~Not Applicable~~	YES/NO
20	Analysis of Unit rates	Applicable/~~Not Applicable~~	YES/NO

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

DATE :

AUTHORIZED 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 ---> 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: Sl 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. **This is a combined tender for E & C of 3 Units of 90.3 MW STG Sets at DMD Dahej Project and 4 Units of 93.1 MW HMD Hazira Project.**

   i Entire Works has been split into 3 Blocks as below:
   - i.1 **Block I**: All the 3 units at RUPPL DMD Dahej project
   - i.2 **Block II**: Unit # 1 & 2 of RUPPL HMD Hazira project
   - i.3 **Block III**: Unit # 3 & 4 of RUPPL HMD Hazira project

   ii All the 3 Blocks shall be awarded separately and shall be dealt as separate contracts.

   iii All the three Blocks shall be awarded to separate agencies.

   iv Lumpsum rate for **One Unit of STG Set of DMD Dahej Project (One Unit of Block I)** is invited in the price bid.

   v L-1 Bidder shall be considered for award of BLOCK # I. Lumpsum Award value shall be (3 X L-1 accepted rate of One Unit of STG set)

vi For award of BLOCK # II, next bidder in the order of their rate competitiveness (i.e L-2, then L-3 and hence forth) shall be given an option to match their rate, with the Awarded/Finalized rate of BLOCK # 1. Lumpsum Award value shall be (2 X L-1 accepted rate of One Unit of STG set). In case none of the bidders agree to match the Awarded RATE of BLOCK # 1, then BHEL may consider awarding the BLOCK # II to L-1 bidder itself or opt any other suitable method to finalize BLOCK # II

vii For award of BLOCK # III, other bidder in the order of their price competitiveness (after eliminating Block I and Block II bidder) shall be given an option to match their rate, with the 0.95 times the Awarded/Finalised rate of BLOCK # 1. Lumpsum Award value shall be (2 X 0.95 times the L-1 accepted rate of One Unit of STG set). In case none of the bidders agree to match the offered rate, then BHEL may consider awarding the BLOCK # III to Block I bidder first (upon their acceptance) and then to Block II bidder (upon their acceptance) or opt any other suitable method to finalize BLOCK # III.

6. PRICE VARIATION CLAUSE

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

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

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

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

Clause No. 2.17.5 of is modified as below:-

Base date shall be the calendar month of the (schedule completion date of the contract + Period extended for the reasons due to Force Majeure Condition). Schedule Completion date shall be the actual start date plus contract period as defined in Chapter VI 'Vol IA TCC'

7. 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.1,00,000/- (Rupees 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.

8. Broad Terms & Conditions of Reverse Auction

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

8.1. Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

8.2. BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids. In case BHEL decides to go for Reverse Auction, only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit „online sealed bid‟ in the Reverse Auction. Non-submission of „online sealed bid‟ by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

8.3. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

8.4. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit ‘online sealed bid’ in the Reverse Auction. Non-submission of ‘online sealed bid’ by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

8.5. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

8.6. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

8.7. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

8.8. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

8.9. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for noncompliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

8.10. Reverse auction will be conducted on scheduled date & time.

8.11. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

8.12. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

8.13. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL‟s standard practice.

8.14. Bidders shall be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the “Business Rules of Reverse Auction‟, which will be communicated before the Reverse Auction.

8.15. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action as per extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

8.16. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

8.17. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

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TECHNICAL CONDITIONS OF CONTRACT (TCC) FOR RUPPL DAHEJ PROJECT BLOCK I

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

List of drawing & documents as a part of tender:

Sl./Annexure No.	Drawing/Document Name	Drawing No	Rev
1.	Input for STG Hall Equipment Layout	0-381-01-01529	09
2.	Construction Design and Management Health and Safety (CDM H&S) Plan	PEMC 04266	00
3.	Consolidated Paint sch for RIL - HMD DMD	PEMC 04398	01

1.0	Project Information (RUPPL, DMD,Dahej)			
	1	Purchaser	:	M/s Reliance Utilities and Power Pvt. Limited
	2	Project Title	:	3X90.3 MW STG Packages for CCPP Project
	3	Location	:	Dist-Bharuch, State–Gujarat(India)
	4	Address Detail	:	3x90.3 MW STG Package Reliance Utilities and Power Pvt Ltd Taluka – Vagra , Dist.- Bharuch Pin Code-392130 , Gujarat State, India"
	5	Nearest Railway Station	:	Bharuch, Gujarat
	6	Road Approach	:	NH8 & SH6 (Dahej Road)
	7	Nearest Air Port	:	Vadodara
	8	Nearest Port	:	Gujarat Chemical Terminal Port Company Limited
	9	Data of Seismic Design	:	As per IS 1893
	10	Average Annual Rainfall	:	1002 mm
	11	Ambient Air Temperature (Average)	:	a) Maximum : 47.0^0 C b) Minimum : 5.6^0 C:
	12	Soil Bearing Capacity	:	20 T / m^2
	13	Average Relative Humidity	:	50 – 85 %
	14	Climatic Condition	:	Tropical Climate

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. Auxiliaries of Turbine, Generator, BFPs and other systems

2. Chemical cleaning and associated testing plus related activities of different system and Normalization.

3. Flushing, steam blowing , related testing, pre-commissioning, commissioning activities of lub oil system, governing oil, gas systems, water lines and other systems of Turbine, Generator, Condenser, BFP and other auxiliaries. This includes preparation for flushing, hydro-test, chemical cleaning, steam blowing, other cleaning activities , actual execution of the activities, normalization etc.

4. Grouting, painting of all equipment's along with supply of required materials including supply of primer & paints and other resources as required to carry out the job.

5. Completion of punch points, Assistance in PG Test, and handing over of Unit.

Equipment details are as under below:

1.0 Steam Turbine (single casing) with all auxiliaries including:

1.1 Integral Valve chest with Emergency Stop Valve and Control Valve assemblies
1.2 Steam Strainers built into Emergency Stop Valves
1.3 Coupling Bolts & Coupling Guards between Turbine and Generator
1.4 Manual Barring Device
1.5 Turning Device - Hydro Motor.
1.6 Turbine and Generator Sole Plates
1.7 Mating Flanges for Turbine Inlets, Exhaust and Extractions Steam Flanges
1.8 Gland Sealing System (Automatic)
1.9 Gland steam piping from terminal point including Control Valves
1.10 Exhaust-hood spray system (Automatic)
1.11 Turbine Insulation(Mineral Wool Spray with CAT-9 cement outer layer)
1.12 Turbine Covers/Enclosures/acoustic hood
1.13 Relief Diaphragms on Exhaust-hood
1.14 Vacuum Breaker Valve(DC Solenoid Operated)

2.0 OIL SYSTEM (Console Type)

2.1 Main Oil Tank (Carbon Steel) including draining facilities & Heater Provision
2.2 1x100% Main Oil Pump with AC Motor

2.3 1x100% Auxiliary Oil Pump with AC Motor
2.4 1x100% Emergency Oil Pump with DC Motor
2.5 1x100% Jacking Oil Pump with AC Motor
2.6 1x100% Jacking Oil Pump with DC Motor
2.7 Duplex Filter for Lube Oil (metallic-5 micron absolute, beta no. 200)
2.8 Trans-flow Valves for Duplex Oil Filters
2.9 Oil Mist Fan with AC Motor (2 x 100%)
2.10 Pressure Throttles for Bearings
2.11 Lube oil Temperature control valve
2.12 Complete Lube Oil Piping(Carbon Steel material up to filter and return oil from bearings)
2.13 Complete Lube Oil Piping (Stainless Steel Material from outlet of L.O. Filters to bearings)
2.14 Complete Control Oil Piping (Stainless Steel Material)
2.15 Overhead Lube Oil Tank with Complete Piping (Stainless Steel Material) level gauges, level switches etc.
2.16 Complete jacking Oil Piping MOC - SS
2.17 Oil Accumulators (as required)
2.18 Oil Purifying System - with facilities for both clarification and purification. Portable lube oil purifier
2.19 High pressure control oil system with 2 x 100% redundancy

3.0 TG Integral Piping

3.1 Turbine Drain Water Piping within TG Block including Motor Actuated Drain Valves
3.2 Gland Sealing System from a Point within TG Block
3.3 Gland Steam Leak-off line to Gland Steam Condenser
3.4 GSC Exhausters Exhaust Piping
3.5 Exhaust Hood Spray Piping from terminal point to Turbine,
3.6 Balance Piston Leak-Off Steam Piping
3.7 Complete Lube Oil Piping
3.8 Complete Jacking Oil Piping
3.9 Complete Control Oil Piping
3.10 Supports for all the above piping where ever necessary
3.11 Insulation for all the above piping where ever necessary (Pyrogel material)

4.0 HEAT EXCHANGERS

A. SURFACE CONDENSER: (Will be received in assembled condition at site with all tube inserted & expanded.)

B. STEAM JET AIR EJECTOR:

1. 2 x 100% running ejector with inter and after condensers and 1x100% starting (Hogging) ejector with silencer.
2. Nozzle and diffusers for ejectors.
3. Inter and after condensers with carbon steel shell, tubesheet, waterbox & stainless steel (SA249 TP304) tubes
4. Steam and Air pipes
5. Accessories (water expansion relief valve, vent and drain valves).

C. GLAND STEAM CONDENSER :

1. GSC with 2 x 100% ejector
2. Carbon steel shell, waterbox and stainless steel (SA249 TP304) tubes
3. Accessories (tube side relief valves, vent and drain valves).

D. FEEDWATER HEATERS (Horizontal mounted) (3 Nos LP Heaters+2 Nos HP Heaters+ Drain Cooler):

E. **DEAERATOR (1 No- for each STG set)**

1. Spray-cum-tray Deaerator with feed storage tank
3. Accessories (safety relief valves, vent and drain valves, isolation valves).

F. ST OIL COOLER:

1. Horizontal 2 x 100% capacity ST Oil Cooler.
2. Coolers with carbon steel shell, waterbox etc. and Welded stainless steel tubes.
3. Manually operated 3-way change over valve.
5. Accessories (vent and drain valves).

G. Motor along with accessories:

1. BFP, CEP & other pump motors.

5.0 GENERATOR and Auxiliaries (In assembled Condition with rotor inserted)

1. CLOSED circuit Air cooled Generator consisting of
    - Stator
    - Rotor
    - Bearings, base frame, built-in RTDs, Space Heaters
    - Provision for mounting Vibration Probes
    - Side mounted Air to water coolers (TEWAC) with cooler elements
2. Overhang Brushless exciter with PMG.
3. STG AIR COOLER:
    1. Pit mounted STG Air Cooler

2. High fin Stainless steel tubes with Al fins, Carbon steel frames.
3. Accessories (CW inlet/outlet valves, vent and drain valves).

6.0 BOILER FEED WATER PUMPS- 3 X50 % (for each STG set)

SL No.	DESCRIPTION	UNIT QTY. TOTAL QTY.
1	Barrel Design, High Pressure, Centrifugal Boiler Feed Pump FK6D30 (3x50%)	**3**
2	Boiler Feed Booster Pump FA1.B56 (3x50%)	**3**
3	Geared Variable Speed Hydraulic Coupling With accessories	**3**
5	Connecting Coupling between BFP & H.C	**3**
6	Connecting Coupling between H.C & Motor	**3**
7	Connecting Coupling between Motor & BP	**3**
8	Acoustic Enclosure for BFP	**3**
9	Recirculation Control Valve	**3**
10	Suction Strainer at BP Suction (Simplex Basket type)	**3**
11	Element for Suction strainer of BP	**1**
12	Special Tools and Tackles for Maintenance Set	**1**

6.0 STG MECHANICAL BOP SCOPE – DAHEJ

1.1 Pumps

1) 6 Nos. Condensate Extraction Pump (1 W+ lS)per Unit x3 unit.
2) 9 Nos.s. Condensate Forwarding Pump (2W+ IS) per Unitx3 unit.

1.2 LP dosing tanks.

1) Hydrazine (1 No) +Morphine (1 No.) per Unit. Total 3 Nos .. Hydrazine and 3 Nos. Morphine dosing skid.

1.3 De super heater (DS)

1) 1 No. Turbine bypass line (Common for Three Unit).-2Xl00%(COMMON FOR THREE TURBINE)
2) 3 Nos. Auxiliary steam for SJAE.
3) 3 Nos. Auxiliary steam D\A.

1.4 DM closed circuit cooling water system:-

a) 3 Nos. (Common) DMCW pumps
b) 3 Nos. (Common) Plate Type Heat Exchanger.
c) 1 Nos. (Common) Dosing system with expansion tank
d) Butterfly valves

1.5 03 nos control valve for CFT inlet

1.6 2x100 ACW booster pump per unit

1.7 Three (03) nos. of portable sump pumps.

1.8 Air Compressor system complete with air dryer and storage vessel- which includes instrument & service air requirement for both Boiler and Turbine package.

The detail shown above is for indicative purpose. The item details under this scope of work has been indicated in detail in Appendix I (Weight Detail) & Appendix II (Summary of weight details).

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
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	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		Yes	
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V			FREE
a	Single point source	Yes		At a distance of approx. 500 M from site (Distance is only estimated, it may vary up to 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	**Electricity for the office, stores, canteen etc of the bidder**			FREE
a	Single point source	Yes		At a distance of approx. 500 M from site (Distance is only estimated, it may vary up to 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	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	
a	Single point source		Yes	
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	**WATER SUPPLY**			
3.3.1	**For construction purposes**			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	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			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	**Water supply for Living Purpose**		**Yes**	
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	**LIGHTING**			

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	
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	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	**Description** **PART II** **3.9.0 ERECTION FACILITIES**	**Scope / to be taken care by**		*Remarks*
		BHEL	**Bidder**	
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		
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		**YES**	In consultation with BHEL

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
d	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on S. No. e. Hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily erection / work plan based on S. No. g. Hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of 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	
M	Coordination for inspection (IMIR etc) and getting clearance from Client / PMC		Yes	
N	Preparation of formats for completion of activities		Yes	

A: MAJOR TOOLS AND PLANTS & MMDs TO BE DEPLOYED BY THE CONTRACTOR for all 3 units

S.N.	DESCRIPITION	CAPACITY	QUANTITY
1	TYRE MOUNTED HYDRAULIC CRANES	14 MT	2 NOs
2	TRAILER WITH HORSE	30 TON	1 NO
3	TRAILER TROLLEY	20 TON	1 NO
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	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
18	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
19	**HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :**		
20	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	06 NOS.
21	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	06 NOS.
ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.			
22	TORQUE WRENCH	0 TO 200 N-M	02 NO.
23	TORQUE WRENCH	UPTO 2000 N-M	02 NO.
24	SLINGS FOR TURBINE ROTOR		01SET
25	BOLT STRETCHING DEVICE (FOR TURBINE &		AS PER REQUIREMENT

	GENERATOR FOUNDATION BOLTS)		
26	LONG FEELER GAUGE SET		AS PER REQUIREMENT
27	SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
28	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT

B: MEASURING AND MONITORING DEVISES (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.

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
1	EOT CRANE IN TG HALL (55 T Capacity)	1 No. (For Three units)	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.
2	Strand Jack System / Suitable capacity crane for Stator Lifting	1 No.	As per requirement. On sharing basis.
3	Suitable capacity crane for Dearator Lifting	1 No.	As per requirement. On sharing basis.
4	75 MT crawler crane	1 No.	As per requirement. On sharing basis.

NOTE:

1. The operator for EOT crane shall be arranged by contractor.
2. There is 1 No. EOT crane in the TG hall of capacity of approx. 55 MT.
3. 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.
4. Operator and O&M for BHEL owned crane will be arranged by BHEL.
5. Contractor shall provide the fuel for BHEL provided cranes (hired/owned) for their use.

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.

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 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	UNIT-2	UNIT-3
1	CONDENSOR ERECTION START	Dec 14	Jan 15	Feb 15
2	TG ERECTION START	Dec 14	Jan 15	Feb 15
2	TURBINE BOX UP	Feb 15	Mar 15	Apr 15
3	COMPLETION OF OIL FLUSHING	Jun 15	Jul 15	Aug 15
4	BARRING GEAR	Jul 15	Aug 15	Sep 15
5	SYNCHRONISATION	Jul 15	Aug 15	Sep 15

6	COMPLETION OF TRIAL OPERATION	Aug 15	Sep 15	Oct 15

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.

6.1.4

DURATION

The total contract period for completion of entire work shall be 12 **(Twelve) 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.

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)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	Overall weightage for each area out of lumpsum value quoted for STG	**10%**	**18%**	**15%**	**13%**	**15%**	**13%**	**16%**
Sl. No.	**Activity/Work Description**	**%**						
I	**PRO RATA PAYMENTS (85%)**							
1	**CONDENSER (weightage 10%)**							
1.1	PREPARATION OF FOUNDATION	5%			--			--
1.2	PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF HOT WELL, NDT & GROUTING.	20%			--			--
1.3	ASSEMBLY AND POSITIONING OF, CONDENSER SHELL ASSEMBLY, STAND PIPE, FOUNDATION BOLT FIXING, GROUTING & WELDING AND NDT INCLUDING HINGE ASSY	30 %		--	--			--
1.4	HYDRO TEST OF STEAM AND WATER SIDE	10%		--	--			--
1.5	WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS	20%		--	--			--
	Subtotal for condenser	**85%**						
2	**TURBINE (18 %)**							--
2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES. AND BEARING PEDESTALS	--	9 %		--			--
2.2	PLACEMENT AND ALIGNMENT OF OUTER CASING BOTTOM PORTION AND CENTRE GUIDE KEYS	--	8 %		--			--
2.3	PLACEMENT OF ROTOR AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--
2.4	ASSEMBLY, ALIGNMENT & WELDING OF OUTER CASING UPPER HALF.	--	9%		--			--
2.5	BOXING UP OF INNER-INNER & INNER- OUTER AND ROLL CHECK	--	7%		--			--

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
2.6	ALIGNMENT OF ROTORS INCLUDING REAMING, HONING AND FIXING OF COUPLING BOLTS		9%					
2.7	ASSEMBLY OF GOVERNING SYSTEM/EQUIPMENT		5%					
2.8	INSTALLATION OF ESVS, MS STRAINERS (INTERNALS)	--	9%		--			--
2.9	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND PIPING	--	5%		--			--
2.10	FINAL BOX-UP OF TURBINE	--	5%		--			--
2.11	ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING DEVICES AND NORMALISATION ETC.	--	0%		--			--
2.12	FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION	--	10 %		--			--
	Subtotal for Steam Turbine		**85%**					
3	**TURBO GENERATOR (15%)**	--		--	--			--
3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--
3.2	LIFTING, LEVELLING AND ALIGNMENT OF GENERATOR ASSEMBLY USING STRAND JACK / CRANE INCLUDING ASSEMBLY & DISMANTLING OF STRAND JACK SYSTEM (if USED)			45%				--
3.3	ALIGNMENT OF GENERATOR ROTOR WITH TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	15%				--
3.4	ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING SWING CHECK AND COMPLETION OF BALANCE WORKS	--	--	10%				--
3.5	INSTALLATION OF ENCLOSURES OF GENERATOR/EXCITER WITH ALL AUXILIARIES	--	--	5%				--
3.6	GROUTING OF GENERATOR BASE	--	--	5%				--

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	FRAME							
	Subtotal for Generator			**85%**				
4	**PUMPS AND AUXILIARIES (13 %)**	--	--		--			--
4.1	ERECTION / TESTING and commissioning OF MAIN OIL PUMP, JOP, EOP, AOP, OIL ACCUMULATORS, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES ETC.	--	--		20%			--
4.2	ERECTION / TESTING and commissioning OF THREE MOTOR DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				36%			
4.3	ERECTION, TESTING, GROUTING ETC. OF CCW SYSTEM INCLUDING PUMPS, TANKS & AUXILARIES	--	--	--	15%			--
4.4	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	14%			--
	Subtotal for pumps and Auxiliaries				**85%**			
5	**HEATERS & DEARATORS (15%)**							
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--	--	27%		--
5.2	ERECTION, TESTING & COMMISSIONING OF SJAE, GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--	--	12 %		--
5.3	ERECTION, TESTING & COMMISSIONING OF FST & DEARATOR & ASSOCIATED APPROACH PLATFORM with LADDERS ETC.	--	--	--	--	46 %		
	Subtotal FOR HEATERS & DEARATORS	**--**	**--**	**--**	**--**	**85%**		**--**
6	**MISCELLANEOUS ITEMS (13%)**							
6.1	ERECTION, TESTING & COMMISSIONING OF ACW PUMPS RELATED ITEMS	--	--	--			5%	
6.2	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			5%	

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
6.3	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS	--	--	--			5%	
6.4	ERECTION, TESTING & COMMISSIONING OF TWIN OIL COOLERS OF LOC, DUPLEX LUBE OIL COOLERS & DUPLEX WORKING OIL COOLERS , HP GOVERNING OIL COOLERS	—	—	—	-	-	5 %	
6.5	ERECTION, TESTING & COMMISSIONING OF STG AIR COOLERS	—	—	—	-	-	5 %	
6.6	ERECTION, TESTING & COMMISSIONING OF CCW EXPANSION TANK, CARBON DIOXIDE BREATHERS, HYDROSTATIC SEAL ETC	—	—	—	-	-	5 %	
6.7	ERECTION, TESTING & COMMISSIONING OF HP FLASH TANK, ATM FLASH TANKS IN STG AREA AND COMMON AREA	—	—	—	-	-	5 %	
6.8	ERECTION, TESTING & COMMISSIONING OF BOILER STARTUP PRDS AND DESUPERHEATERS.	—	—	—	-	-	5 %	
6.9	ERECTION, TESTING & COMMISSIONING OF AUXILARY PRDS AND DESUPERHEATERS.	—	—	—	-	-	5 %	
6.10	ERECTION, TESTING & COMMISSIONING OF DEAERATOR PEGGING STEAM PRDS AND DESUPERHEATERS.	—	—	—	-	-	5 %	
6.11	ERECTION, TESTING & COMMISSIONING OF STRAINERS	—	—	—	-	-	5 %	
6.12	ERECTION, TESTING & COMMISSIONING OF OVERHEAD OIL TANK	—	—	—	-	-	5 %	
6.13	ERECTION, TESTING & COMMISSIONING OF VENT SILENCERS	—	—	—	-	-	5 %	
6.14	COMMISSIONING SUPPORT FOR IA / PA COMPRESSOR (COMMON FOR ALL UNIT)	—	—	—	-	-	5 %	
6.15	COMMISSIONING SUPPORT FOR CONDENSATE FORWARDING TANK.	—	—	—	-	-	5 %	
6.16	ERECTION, TESTING AND COMMISSIONING OF BELLOWS, BUTTERFLY VALVE FOR SURFACE	—	—	—	-	-	3 %	

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	CONDENSOR							
6.17	ERECTION, TESTING & COMMISSIONING OF LP DOSING SKIDS (NaOH, HYDRAZINE, AMMONIA)	--	--	--	-	-	5 %	
6.18	ERECTION TESTING AND COMMISSIONING OF SWAS ROOM INTERCONNECTING LINES	--	--	--	-	-	2 %	
	Subtotal for MISCELLANEOUS ITEMS						**85%**	
7	**INTEGRAL PIPING (16%)**	--	--	--				--
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%
	Total for integral piping							**85%**
II	**STAGE/MILESTONE PAYMENTS (15%)**							
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%

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
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%
	Total for Milestone/Stage payments (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**
	Total of I & II	**100%**	**100%**	**100%**	**100%**	**100%**	**100 %**	**100%**

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 bill and is not indicative of the actual quantum or value of work.

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

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.

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 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.

9.6
Assembly and installation of strainer elements of MS 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 (PE & SD 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 our as part of scope of work.

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
Supply & application of all required Primers and paints for all equipment's / items erected under this scope of work are 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.

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.

10.0 EXLUSIONS

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

A) Power Cycle Piping (IBR & Non IBR)

B) All cable connections, except those specified as scope of work.

C) 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.

D) Erection, testing and commissioning of electrical panels and starting resistors for DC JOP and DC EOP pumps

E) Electrical testing of motors, turbo-generator. However erection of these items will be under the scope of this tender specification.

F) Impulse piping and fittings from the tapping points of various equipments other than those specified as scope of work.

G) Civil works to the extent not specifically provided for in this tender.

H) 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.

I) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.

J) Some sub-delivery items and electrical components such as push-buttons, junction boxes etc.

K) E&C work of cable trays, cables and earthing etc.

L) All electrical and control & instrumentation items except those specified elsewhere in these specifications.

M) Pneumatic copper tubing and fittings thereof.

N) Thermal insulation of BFPs and their Drive Turbine, Main Turbine.

O) Erection of sound proof/acoustic enclosure for turbine.

P) Electrical testing of Generator. (However obtaining statutory clearance is in this scope of work.)

Q) PG Test Impulse piping from root valve, Cabling of field instruments for PG test. However all assistance of issue of materials, return after PG test, assistance during PG test is in the scope of TG vendor. System Isolation, flushing of root valves etc. during PG test is in the scope of TG vendor.

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

A: Turbine

SL.No.	ITEM DESCRIPTION	DIMENSIONS (mm) LxWxH (Approximate)	WEIGHT (In MT for Each Unit)	WEIGHT (In MT for 3 Units)
1	Outer Casing Upper Part	4865 X 5600 X 3500	34.162	102.486
2	Outer Casing Lower Part	4700 X 3060 X 1400	23.335	70.005
3	Inner Casing Assembly	1784 X 1740 X 1600	8.96	26.88
4	Guide Blade Carrier -I	490 X 1780 X 1735	3.5	10.5
5	Guide Blade Carrier - II	540 X 1780 X 1735	3.4	10.2
6	Guide Blade Carrier - III	620 X 1980 X 1935	4.5	13.5
7	Guide Blade Carrier - IV	520 X 2200 X 2185	6.9	20.7
8	Exhaust Hood Upper Part	2050 X 5800 X 2500	11.98	35.94
9	Exhaust Hood Lower Part	2230 X 6140 X 2700	20.731	62.193
10	Rear Bearing Housing Assembly	1405 X 1400 X 900	1.928	5.784
11	Front Bearing Housing Assembly	1690 X 2610 X 950	15.791	47.373
12	Rotor Assembly	8650 X Dia 2230	34	102
13	Interconnecting Pipe (dia 220 mm)		3.127	9.381
14	Hydraulic oil supply unit	4200 X 3000 X 1500	4	12
			0	0
15	High Pressure electrohydraulic actuators for stop valve	1300 X 900 X 800	0.85	2.55
			0	0
16	High Pressure electrohydraulic actuators for control valve	1300 X 900 X 800	0.85	2.55
			0	0
17	Jacking Oil Pump Assembly with AC & DC motor	2100 X 2100 X 1600	1.9	5.7
18	Oil Purification Unit	2000 X 1700 X 2250	2	6
19	Oil Accumulator sets	1500 X 500 X 2500	0.8	2.4

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

20	Turbine Enclosure	-	13	39
21	Overhead Lube Oil Tank	Dia 2750 X 2750	2.075	6.225
22	**Lube Oil Console Assembly-I** Empty lube oil Reservoir and Duplex filter with Piping	4800x3800x3350	9.2	27.6
23	**Lube Oil Console Assembly-II** Pump assembly with piping	3800x4300x3300	8	24
24	TSI Rack	483 X 350 X 266	0.1	0.3
25	Local gauge Racks	1600 X 450 X 1700	0.4	1.2
26	Transmitter Racks	1250 X 450 X 2000	0.3	0.9
27	Control Valves	-	0.3	0.9
28	Turbine Integral System Valves - supplied by BHEL Trichy (including QCNRV's)		8.989	26.967
Total			**225.078**	**675.234**

B: Surface Condenser

Sl.No	Equipment	Overall Dimensions (in mm)	Dry Weight (In MT for Each unit)	Dry Weight (In MT for 3 units)
a.	Main Assly	L 10300 x W 4600 x H 4350	65.85	197.55
b.	Hot Well Assly	L 4500 x W 3100 x H 2300	7.4	22.2
c.	Top Conn. Piece	L 5164 x W 1864 x H 1170	3.888	11.664
d.	Bellow	L 5164 x W 1864 x H 1000	2.5	7.5
e.	DOME ASSLY	L 7300 x W 3700 x H 2130	15.905	47.715
f.	TUBES	SS TUBE(WLDD)	21.746	65.238
		22X 0.711X 7500	0	0

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

g.	TUBES	SS TUBE(WLDD)	3.08	9.24
		22X 0.889X 7500	0	0
h.	Stand pipe Assly	L 1200 x W 1000 x H 4900	0.3	0.9
i.	Surge Pipe Assly	L 1850 x W 1000 x H 6775	1.257	3.771
Total			**121.926**	**365.778**
Note: Condenser shall be received at site in assembled conditions including tubes				
C: Heat Exchengers				
1	***Steam Jet Air Ejector***			
a.	Complete Assly.	L 5400 x W 3000 x H 2000	7.5	22.5
2	***Gland Steam Condenser***			
a.	Complete Assly.	L 3500 x W 1400 x H 1400	2	6
3	***Drain Cooler***			
a.	Complete Assly.	L 6250 x W 1400 x H 1400	5.8	17.4
4	***LP Heater #1***			
a.	Complete Assly.	L 13650 x W 2000 x H 1700	18.5	55.5
5	***LP Heater #2***			
a.	Complete Assly.	L 13650 x W 2000 x H 1700	20	60
6	***LP Heater #3***			
a.	Complete Assly.	L 12800 x W 2000 x H 1700	19	57
7	***Spray cum Tray Deaerator***			
a.	Header	L 8950 x W 3750 x H 3750	20.7	62.1
b.	Feed Storage Tank-1	L 9000 x W 3700 x H 4350	19.15	57.45

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

c.	Feed Storage Tank-2	L 9350 x W 3750 x H 4350	19.3	57.9
d.	Feed Storage Tank-3	L 9000 x W 3700 x H 4350	19.4	58.2
8	***HP Heater #5***			
a.	Complete Assly.	L 10450 x W 2350 x H 2000	31	93
9	***HP Heater #6***			
a.	Complete Assly.	L 10750 x W 2350 x H 2000	37	111
10	***HP Flash Tank***			
a.	Complete Assly.	Ø 3032 x H 6100	8.5	25.5
11	***Steam Turbine oil Cooler***			
a.	Per Cooler	L 5000 x W 2550 x H 1000	5.15	15.45
12	***STG Air Cooler***			
c.	Per Element	L 3800 x W 1000 x H 600	1.5	4.5
	Total		**234.5**	**703.5**

D: Generators				
1	Generator Stator	L 9415 X W3910 X H 4225	145	435
2	Generator Rotor		31.5	94.5
3	Bearings		7.5	22.5
4	Exciter		3	9
5	Accessories		8	24
	Total		**195**	**585**
	Max. Erection Weight of Generator Stator = 187.5 MT			

E: Pumps & Auxilaries

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

1	**Boiler Feed Pump Assembly**		114.546	343.638
1.a	BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	2250 x 1000 x1050	17.31	51.93
1.b	BP Skid (Pump Assly. + Base Plate + tubing)	1650 x 1200 x 950	7.533	22.599
	Hydraulic Coupling (DD) Assly.	1800 x 1700 x 1800	10.68	32.04
	Hyd. Coupling W. O. Cooler (DD)	3700 x 1500 x 500	4.425	13.275
	Hyd. Coupling L. O. Cooler (DD)	3100 x 1300 x 450	2.325	6.975
	Hyd. Coupling Loose Items		2.13	6.39
	Suction Strainer at BP Suction DD)	900 x 800 x 1400	2.4	7.2
	BFP Recirculation valve (DD)	1800 x 550 x 1400	1.05	3.15
	Local Gauge Boards with instruments (DD)	2200 x 300 x 1800	2.1	6.3
	Loose Items		7.347	22.041
	Grillage	10200 x 2500 x 900	15.09	45.27
2	Condensate Extraction Pump Assembly		40	120
3	Condensate Forwarding Pump Assembly		24	72
4	Condensate Forwarding Tank		10	30
5	Aux Cooling Water Pump (ACW) Assembly		14	42
6	Plate Heat Exchanger (PHE)		9.9937	29.9811
7	Ammonia Dosing Skid		2.35	7.05
8	Hydrazine Dosing Skid		1.95	5.85
9	Over Head Tank		2.066	6.198
10	Atmospheric Flah Tank		1.5	4.5
11	Lube Oil Console (Lube Oil Tank, MOP, AOP,EOP, Twin Lub oil cooler, Filters etc.)		16.465	49.395
12	Jacking Oil Skid		2.25	6.75
13	HP Control Oil Skid		3.9	11.7
14	Oil Centifuge (Trolly Type)		1.2	3.6

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

	Total		**316.6107**	**949.8321**

F: Turbine Integral Piping

1	Carbon Steel Flanges		0.8	2.4
2	Carbon Steel Piping		14.4	43.2
3	Carbon Steel Fittings		1.9	5.7
4	Alloy Steel Piping		1	3
5	SS Piping		2.7	8.1
6	Support		2.08	6.24
	Total		**22.88**	**68.64**

G: Other Misc. Equipments

1	Miscellaneous Item		61.775	185.325

H: Common Equipments

1	Closed Circuit CW System Pump		24.104	24.104
2	IA & PA System		61.06	61.06
3	DMCW Expansion tank		2	2
4	SWAS Panel (Total per SWAS Unit)		6.4	6.4
5	NaOH Dosing Skid		2.05	2.05
6	Air Compressor		8.25	8.25
7	Air Receiver (WET)		8	8
8	Air Receiver (DRY)		11	11
9	Air Dryer		3.02	3.02
10	LOCAL Gauge Board		1.6	1.6
	Total		**127.484**	**127.484**

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

NOTE:

1. The information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
2. Any other systems / components, quantities which are the integral to equipment supplied by the manufacturing unit also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.
3. The dimensions, weights, quantities for scope of works are tentative. The works for complete scope as per site, systems/schemes and drawing requirement shall be carried out within accepted lump sum price where lump sum price has been offered. Whereas for scope of works where unit rate has been offered, the works shall be carried out as per site, systems and drawing requirement based on actual requirement at site and payment for such actual quantum of work executed, shall be made as per accepted applicable unit rate.

APPENDIX-II

Summary of Weight Details

		Dahej	
S No.	**Area**	**Weight In MT (Per Unit)**	**Weight In MT (For 3 Units)**
1	**Turbine**	225.078	675.234
2	**Surface Condenser**	121.926	365.778
3	**Heat Exchengers**	234.5	703.5
4	**Generators**	195	585
5	**Pumps & Auxilaries**	316.6107	949.8321
6	**Turbine Integral Piping**	22.88	68.64
7	**Insulation**	6	18
8	**Misc. Equipments**	61.775	185.325
9	Common Equipment		127.484
	Total	**1183.7697**	**3678.7931**

NOTE:

1. The information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
2. Any other systems / components, quantities which are the integral to equipment supplied by the manufacturing unit also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.
3. The dimensions, weights, quantities for scope of works are tentative. The works for complete scope as per site, systems/schemes and drawing requirement shall be carried out within accepted lump sum price where lump sum price has been offered. Whereas for scope of works where unit rate has been offered, the works shall be carried out as per site, systems and drawing requirement based on actual requirement at site and payment for such actual quantum of work executed, shall be made as per accepted applicable unit rate.

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

work will be got done by BHEL at the risk and cost 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 risk and cost.

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

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.

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 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.

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.

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.

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.

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.
(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.

15 CONDENSER INSTALLATION

15.1
The condenser will be dispatched in assembled condition from manufacturing units including tubing & expansion. For detail erection method, the documents titled "Construction Design and Management Health and Safety (CDM H&S) Plan" may be referred.

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.

16.1 GENERATOR INSTALLATION

16.1.1 GENERATOR STATOR

The Generator stator, may be transported from Manufacturing Unit to site by special wagon consisting of 8 bogies (four on either side) with facilities to swivel or by special trailer. The contractor shall have to unload the generator stator from the Wagon/Trailor at a suitable place outside Machine Hall. The Stator shall be moved from the place of unloading and placed within the reach of strand jack arrangements by the contractor in consultation with BHEL Engineer.

For detail erection method, the documents titled "Construction Design and Management Health and Safety (CDM H&S) Plan" may be refered.

16.1.2

The generator stator shall be lifted and shifted to its designated place with the help of strand jack as per the scheme envisaged by BHEL. For this purpose, a separate agency shall be engaged by BHEL. The engaged agency shall provide Strand jack system with operator and carry out lifting & shifting of stator. The Contractor shall extend necessary assistance of manpower resources during this operation.

The transportation of Strand Jack system from store to TG Hall , assembly, erection, assistance in testing and commissioning, dismantling, transporting back to store after its use will be the responsibility of the contractor.

The required loads for load testing of strand jacks will be provided by BHEL free of charges. To & Fro transportation, loading & unloading of load from BHEL / Customer store to site shall be carried out by contractor.

The assembly of the special wagon 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 turbine module, LP & 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.

16.3 DEARATOR ERECTION: The contractor shall make suitable arrangements well in advance for lifting and placement to final position, fit up, welding etc. of **DEAERATOR / FST SECTIONS** at required elevation / location with utmost care. The suitable capacity crane shall be provided by BHEL as per the list of T & P's to be provided by BHEL on sharing basis for this purpose.

Erection of permanent approach platform and ladders etc for De-aerator and FST is in the scope of work. The structural steel and other members will be supplied in random length/size & will have to be cut to required size and profile as incidental to work.

For detail erection method, the documents titled "Construction Design and Management Health and Safety (CDM H&S) Plan" may be refered.

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,

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.

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, 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), 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 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.

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.

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.

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 8-10^0 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

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.

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.

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 penetrameter/ 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.

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

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.

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 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.

21.4
Contractor shall provide the complete operating crew like operator, helpers for handling trailing cable for EOT. It may be specifically noted that the EOT 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.

21.5
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.

21.6
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.

21.7
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.

21.8
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.

21.9
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.

21.10
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.

21.11
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.

21.12
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.

21.13
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.

21.14
Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to prior approval of BHEL.

21.15
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.

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.

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. SG-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 dedicated from contractor's bills towards expenditure incurred including 30% 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.

23.9

The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for alunimium 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 motor	-	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.

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.

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.

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 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.

24.16 Supply of all required paints shall be in the scope of contractor.

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&
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TECHNICAL CONDITIONS OF CONTRACT (TCC) FOR RUPPL HMD HAZIRA PROJECT

BLOCK II & BLOCK III

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
CONTENTS

List of drawing & documents as a part of tender:

Sl./Annexure No.	Drawing/Document Name	Drawing No	Rev
4.	Input for STG Hall Equipment Layout	0-381-01-01529	09
5.	Construction Design and Management Health and Safety (CDM H&S) Plan	PEMC 04266	00
6.	Consolidated Paint sch for RIL - HMD DMD	PEMC 04398	01

1.0	Project Information (RUPPL, HMD, Hazira)			
	1	Purchaser	:	M/s Reliance Utilities and Power Pvt. Limited
	2	Project Title	:	4X93.1 MW STG Packages for CCPP Project
	3	Location	:	Village - Mora, Dist-Surat, State–Gujarat(India)
	4	Address Detail	:	4x93.1 MW STG Package Reliance Utilities and Power Pvt. Ltd Village – Mora, Dist.- Surat Pin Code- 394510, Gujarat State, India
	5	Nearest Railway Station	:	Surat, Gujarat
	6	Road Approach	:	SH 6
	7	Nearest Air Port	:	Surat
	8	Nearest Port	:	Adani Hazira Port Pvt. Ltd.
	9	Data of Seismic Design	:	As per IS 1893
	10	Average Annual Rainfall	:	1205 mm
	11	Ambient Air Temperature (Average)	:	a) Maximum : 36.50 C b) Minimum : 14.20 C:
	12	Soil Bearing Capacity	:	20 T / m2
	13	Average Relative Humidity	:	50 – 85 %
	14	Climatic Condition	:	Tropical Climate

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:-

6. Auxiliaries of Turbine, Generator, BFPs and other systems

7. Chemical cleaning and associated testing plus related activities of different system and Normalization.

8. Flushing, steam blowing , related testing, pre-commissioning, commissioning activities of lub oil system, governing oil, gas systems, water lines and other systems of Turbine, Generator, Condenser, BFP and other auxiliaries. This includes preparation for flushing, hydro-test, chemical cleaning, steam blowing, other cleaning activities , actual execution of the activities, normalization etc.

9. Grouting, painting of all equipment's along with supply of required materials including supply of primer & paints and other resources as required to carry out the job.

10. Completion of punch points, Assistance in PG Test, and handing over of Unit.

Equipment details are as under below:

1.0 Steam Turbine (single casing) with all auxiliaries including:

6.1 Integral Valve chest with Emergency Stop Valve and Control Valve assemblies
6.2 Steam Strainers built into Emergency Stop Valves
6.3 Coupling Bolts & Coupling Guards between Turbine and Generator
6.4 Manual Barring Device
6.5 Turning Device - Hydro Motor.
6.6 Turbine and Generator Sole Plates
6.7 Mating Flanges for Turbine Inlets, Exhaust and Extractions Steam Flanges
6.8 Gland Sealing System (Automatic)
6.9 Gland steam piping from terminal point including Control Valves
6.10 Exhaust-hood spray system (Automatic)
6.11 Turbine Insulation(Mineral Wool Spray with CAT-9 cement outer layer)
6.12 Turbine Covers/Enclosures/acoustic hood
6.13 Relief Diaphragms on Exhaust-hood
6.14 Vacuum Breaker Valve(DC Solenoid Operated)

7.0 OIL SYSTEM (Console Type)

2.20 Main Oil Tank (Carbon Steel) including draining facilities & Heater Provision

2.21 1x100% Main Oil Pump with AC Motor
2.22 1x100% Auxiliary Oil Pump with AC Motor
2.23 1x100% Emergency Oil Pump with DC Motor
2.24 1x100% Jacking Oil Pump with AC Motor
2.25 1x100% Jacking Oil Pump with DC Motor
2.26 Duplex Filter for Lube Oil (metallic-5 micron absolute, beta no. 200)
2.27 Trans-flow Valves for Duplex Oil Filters
2.28 Oil Mist Fan with AC Motor (2 x 100%)
2.29 Pressure Throttles for Bearings
2.30 Lube oil Temperature control valve
2.31 Complete Lube Oil Piping(Carbon Steel material up to filter and return oil from bearings)
2.32 Complete Lube Oil Piping (Stainless Steel Material from outlet of L.O. Filters to bearings)
2.33 Complete Control Oil Piping (Stainless Steel Material)
2.34 Overhead Lube Oil Tank with Complete Piping (Stainless Steel Material) level gauges, level switches etc.
2.35 Complete jacking Oil Piping MOC - SS
2.36 Oil Accumulators (as required)
2.37 Oil Purifying System - with facilities for both clarification and purification. Portable lube oil purifier
2.38 High pressure control oil system with 2 x 100% redundancy

8.0 TG Integral Piping

3.12 Turbine Drain Water Piping within TG Block including Motor Actuated Drain Valves
3.13 Gland Sealing System from a Point within TG Block
3.14 Gland Steam Leak-off line to Gland Steam Condenser
3.15 GSC Exhausters Exhaust Piping
3.16 Exhaust Hood Spray Piping from terminal point to Turbine,
3.17 Balance Piston Leak-Off Steam Piping
3.18 Complete Lube Oil Piping
3.19 Complete Jacking Oil Piping
3.20 Complete Control Oil Piping
3.21 Supports for all the above piping where ever necessary
3.22 Insulation for all the above piping where ever necessary (Pyrogel material)

9.0 HEAT EXCHANGERS

H. SURFACE CONDENSER: (Will be received in assembled condition at site with all tube inserted & expanded.)

I. STEAM JET AIR EJECTOR:

6. 2 x 100% running ejector with inter and after condensers and 1x100% starting (Hogging) ejector with silencer.
7. Nozzle and diffusers for ejectors.
8. Inter and after condensers with carbon steel shell, tubesheet, waterbox & stainless steel (SA249 TP304) tubes
9. Steam and Air pipes
10. Accessories (water expansion relief valve, vent and drain valves).

J. GLAND STEAM CONDENSER :

1. GSC with 2 x 100% ejector
2. Carbon steel shell, waterbox and stainless steel (SA249 TP304) tubes
3. Accessories (tube side relief valves, vent and drain valves).

K. FEEDWATER HEATERS (Horizontal mounted) (3 Nos LP Heaters+2 Nos HP Heaters+ Drain Cooler):

L. **DEAERATOR (1 No- for each STG set)**

1. Spray-cum-tray Deaerator with feed storage tank
3. Accessories (safety relief valves, vent and drain valves, isolation valves).

M. ST OIL COOLER:

1. Horizontal 2 x 100% capacity ST Oil Cooler.
2. Coolers with carbon steel shell, waterbox etc. and Welded stainless steel tubes.
3. Manually operated 3-way change over valve.
5. Accessories (vent and drain valves).

N. Motor along with accessories:

1. BFP, CEP & other pump motors etc.

10.0 GENERATOR and Auxiliaries (In assembled Condition with rotor inserted)

4. CLOSED circuit Air cooled Generator consisting of
    - Stator
    - Rotor
    - Bearings, base frame, built-in RTDs, Space Heaters
    - Provision for mounting Vibration Probes

- Side mounted Air to water coolers (TEWAC) with cooler elements

5. Overhang Brushless exciter with PMG.
6. STG AIR COOLER:
    1. Pit mounted STG Air Cooler
    2. High fin Stainless steel tubes with Al fins, Carbon steel frames.
    3. Accessories (CW inlet/outlet valves, vent and drain valves).

11.0 BOILER FEED WATER PUMPS- 3 X50 % (for each STG set)

SL No.	DESCRIPTION	UNIT QTY. TOTAL QTY.
1	Barrel Design, High Pressure, Centrifugal Boiler Feed Pump FK6D30 (3x50%)	**3**
2	Boiler Feed Booster Pump FA1.B56 (3x50%)	**3**
3	Geared Variable Speed Hydraulic Coupling With accessories	**3**
5	Connecting Coupling between BFP & H.C	**3**
6	Connecting Coupling between H.C & Motor	**3**
7	Connecting Coupling between Motor & BP	**3**
8	Acoustic Enclosure for BFP	**3**
9	Recirculation Control Valve	**3**
10	Suction Strainer at BP Suction (Simplex Basket type)	**3**
11	Element for Suction strainer of BP	**1**
12	Special Tools and Tackles for Maintenance Set	**1**

6.0 STG MECHANICAL BOP SCOPE - Hazira

1.1 Pumps

1) 8 No Condensate Extraction Pump (1 W+ 1S) per Unit x4 unit.

2) 12 Nos. Condensate Forwarding Pump (2W+ 1S) per Unit x4 unit.

1.2 LP dosing tanks.

1) Hydrazine (1 No) +Morphine (1 No.) per Unit. Total 4 No. Hydrazine and 4 No. Morphine dosing skid.

1.3 De super heater (DS)

1) 1 No. Turbine bypass line (Common for Four Unit).- 2XI00% (common for four Turbines)

2) 4 No. Auxiliary steam for SJAE.

3) 4 No. Auxiliary steam D\A.

1.4 DM closed circuit cooling water system:-

a) 3 Nos. (Common) DMCW pumps
b) 4 Nos. (Common) Plate Type Heat Exchanger.
c) 1 Nos. (Common) Dosing system with expansion tank
d) Butterfly valves

1.5 04 nos control valve for CFT inlet

1.6 2 x 100 ACW Booster pump / Unit and total nos. 8 nos.

1.7 Four (04) no. of portable sump pumps.

1.8 Air Compressor system complete with air dryer and storage vessel- which includes instrument & service air requirement for both Boiler and Turbine package.

The detail shown above is for indicative purpose. The item details under this scope of work has been indicated in detail in Appendix I (Weight Detail) & Appendix II (Summary of weight details).

S. No.	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
3.1	**ESTABLISHMENT**			
3.1.1	**FOR CONSTRUCTION PURPOSE**:			
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	**FOR LIVING PURPOSES OF THE BIDDER**			
a	Open space for labour colony (as per availability)		Yes	
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	**ELECTRICITY**			
3.2.1	**Electricity For construction purposes** of Voltage 415/440 V			FREE
a	Single point source	Yes		At a distance of approx. 500 M from site (Distance is only estimated, it may vary up to 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	**Electricity for the office, stores, canteen etc of the bidder**			FREE
a	Single point source	Yes		At a distance of approx. 500 M from site (Distance is only estimated, it may vary up to 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	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**		Yes	
a	Single point source		Yes	
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	**WATER SUPPLY**			
3.3.1	**For construction purposes**			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	
3.3.2	**Water supply for bidder's office, stores, canteen etc**			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	**Water supply for Living Purpose**		**Yes**	
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	**LIGHTING**			
a	For construction work (supply of all the necessary materials) 4. At office/storage area 5. At the preassembly area 6. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 4 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	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		Yes	
3.7.0	**Demobilization of all the above facilities**		Yes	
3.8.0	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

Sl. No	**Description** **PART II** **3.9.0 ERECTION FACILITIES**	**Scope / to be taken care by**		*Remarks*
		BHEL	**Bidder**	
3.9.1	**Engineering works for construction:**			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
b	Drawings for construction methods	Yes		
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		**YES**	In consultation with BHEL
d	Shipping lists etc for reference and planning the activities	Yes		In consultation with BHEL
e	Preparation of site erection schedules and other input requirements		Yes	In consultation with BHEL
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly erection schedules based on S. No. e. Hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily erection / work plan based on S. No. g. Hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of 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	
M	Coordination for inspection (IMIR etc) and getting clearance from Client / PMC		Yes	
N	Preparation of formats for completion of activities		Yes	

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

S.N.	DESCRIPITION	CAPACITY	QUANTITY
1	TYRE MOUNTED HYDRAULIC CRANES	14 MT	2 NOs
2	TRAILER WITH HORSE	30 TON	1 NO
3	TRAILER TROLLEY	20 TON	1 NO
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	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
18	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)		DO
19	**HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :**		
20	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	06 NOS.
21	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	06 NOS.
ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.			
22	TORQUE WRENCH	0 TO 200 N-M	02 NO.
23	TORQUE WRENCH	UPTO 2000 N-M	02 NO.

24	SLINGS FOR TURBINE ROTOR		01SET
25	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
26	LONG FEELER GAUGE SET		AS PER REQUIREMENT
27	SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
28	HYDRAULIC TEST PUMPS AND FILL PUMPS		AS PER REQUIREMENT

B: MEASURING AND MONITORING DEVISES (MMD):

To be finalized at site as per requirement.

NOTE:

2. 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.

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
1	EOT CRANE IN TG HALL (55 T Capacity)	1 No. (For four units)	FOR HANDLING AND ERECTION WITHIN TG HALL ON SHARING BASIS AS AVAILABLE AND SUBJECT TO THEIR ACCESSIBILITY AND APPROACHABILITY.
2	Strand Jack System / Suitable capacity crane for Stator Lifting	1 No.	As per requirement. On sharing basis.
3	Suitable capacity crane for Dearator Lifting	1 No.	As per requirement. On sharing basis.
4	75 MT crawler crane	1 No.	As per requirement. On sharing basis.

NOTE:

1. The operator for EOT crane shall be arranged by contractor.
2. There is 1 No. EOT crane in the TG hall of capacity of approx. 55 MT.
3. 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.
4. Operator and O&M for BHEL owned crane will be arranged by BHEL.
5. Contractor shall provide the fuel for BHEL provided cranes (hired/owned) for their use.

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.

6.2 MOBILIZATION, TIME SCHEDULE & CONTRACT PERIOD

6.2.1
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.

6.2.2
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.

6.2.3
COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on its designated foundation/location, of the first major permanent equipment/component 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	UNIT-2	UNIT-3	UNIT-4
1	CONDENSOR ERECTION START	Dec 14	Jan 15	Feb 15	Mar 15
2	TG ERECTION START	Dec 14	Jan 15	Feb 15	Mar 15
2	TURBINE BOX UP	Feb 15	Mar 15	Apr 15	May 15
3	COMPLETION OF OIL FLUSHING	Jun 15	Jul 15	Aug 15	Sep 15
4	BARRING GEAR	Jul 15	Aug 15	Sep 15	Oct 15
5	SYNCHRONISATION	Jul 15	Aug 15	Sep 15	Oct 15

6	COMPLETION OF TRIAL OPERATION	Aug 15	Sep 15	Oct 15	Nov 15

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.

6.2.4

DURATION

The total contract period for completion of entire work shall be 11 **(Eleven) months &** 11 **(Eleven) months from the start of erection for Block I (Unit 1 & 2) & Block II (Unit 3 & 4) separately**.

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.

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)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	Overall weightage for each area out of lumpsum value quoted for STG	**10%**	**18%**	**15%**	**13%**	**15%**	**13%**	**16%**
Sl. No.	**Activity/Work Description**	**%**						
I	**PRO RATA PAYMENTS (85%)**							
1	**CONDENSER (weightage 10%)**							
1.1	PREPARATION OF FOUNDATION	5%			--			--
1.2	PLACEMENT, ALIGNMENT, ASSEMBLY AND WELDING OF HOT WELL, NDT & GROUTING.	20%			--			--
1.3	ASSEMBLY AND POSITIONING OF, CONDENSER SHELL ASSEMBLY, STAND PIPE, FOUNDATION BOLT FIXING, GROUTING & WELDING AND NDT INCLUDING HINGE ASSY	30 %		--	--			--
1.4	HYDRO TEST OF STEAM AND WATER SIDE	10%		--	--			--
1.5	WELDING OF CONDENSER NECK JOINT AND NDT& COMPLETION OF BALANCE WORKS	20%		--	--			--
	Subtotal for condenser	**85%**						
2	**TURBINE (18 %)**							--
2.1	PREPARATION OF FOUNDATION, PLACEMENT, ALIGNMENT AND GROUTING OF BASE PLATES. AND BEARING PEDESTALS	--	9 %		--			--
2.2	PLACEMENT AND ALIGNMENT OF OUTER CASING BOTTOM PORTION AND CENTRE GUIDE KEYS	--	8 %		--			--
2.3	PLACEMENT OF ROTOR AND ALIGNMENT WITH INNER CASING AND CHECKING OF BLADE CLEARANCE	--	9%		--			--
2.4	ASSEMBLY, ALIGNMENT & WELDING OF OUTER CASING	--	9%		--			--

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	UPPER HALF.							
2.5	BOXING UP OF INNER-INNER & INNER- OUTER AND ROLL CHECK	--	7%		--			--
2.6	ALIGNMENT OF ROTORS INCLUDING REAMING, HONING AND FIXING OF COUPLING BOLTS		9%					
2.7	ASSEMBLY OF GOVERNING SYSTEM/EQUIPMENT		5%					
2.8	INSTALLATION OF ESVS, MS STRAINERS (INTERNALS)	--	9%		--			--
2.9	ERECTION, ALIGNMENT AND WELDING OF CROSS AROUND PIPING	--	5%		--			--
2.10	FINAL BOX-UP OF TURBINE	--	5%		--			--
2.11	ASSEMBLY AND PREPARATION OF HYDRO-TEST, STEAM BLOWING DEVICES AND NORMALISATION ETC.	--	0%		--			--
2.12	FINAL BOXING UP OF PEDESTALS AFTER OIL FLUSHING COMPLETION	--	10 %		--			--
	Subtotal for Steam Turbine		**85%**					
3	**TURBO GENERATOR (15%)**	--		--	--			--
3.1	PREPARATION OF FOUNDATION, LEVELLING, MATCHING AND GROUTING OF FOUNDATION PLATES	--		5%				--
3.2	LIFTING, LEVELLING AND ALIGNMENT OF GENERATOR ASSEMBLY USING STRAND JACK / CRANE INCLUDING ASSEMBLY & DISMANTLING OF STRAND JACK SYSTEM (if USED)			45%				--
3.3	ALIGNMENT OF GENERATOR ROTOR WITH TURBINE ROTOR, RUN-OUT CHECKS AND REAMING, HONING OF COUPLING HOLES AND FIXING OF COUPLING BOLTS	--	--	15%				--
3.4	ERECTION OF EXCITATION EQUIPMENTS & ALIGNMENT OF GEN.-EXCITER ROTORS INCLUDING	--	--	10%				--

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	SWING CHECK AND COMPLETION OF BALANCE WORKS							
3.5	INSTALLATION OF ENCLOSURES OF GENERATOR/EXCITER WITH ALL AUXILIARIES	--	--	5%				--
3.6	GROUTING OF GENERATOR BASE FRAME	--	--	5%				--
	Subtotal for Generator			**85%**				
4	**PUMPS AND AUXILIARIES (13 %)**	--	--		--			--
4.1	ERECTION / TESTING and commissioning OF MAIN OIL PUMP, JOP, EOP, AOP, OIL ACCUMULATORS, CENTRALISED LUBE OIL PURIFICATION SYSTEM, ALONG WITH ALL AUXILLIARIES ETC.	--	--		20%			--
4.2	ERECTION / TESTING and commissioning OF THREE MOTOR DRIVEN BFP, ALONG WITH ALL AUXILLIARIES				36%			
4.3	ERECTION, TESTING, GROUTING ETC. OF CCW SYSTEM INCLUDING PUMPS, TANKS & AUXILARIES	--	--	--	15%			--
4.4	ERECTION, TESTING, GROUTING ETC. OF CONDENSATE EXTRACTION PUMPS	--	--	--	14%			--
	Subtotal for pumps and Auxiliaries				**85%**			
5	**HEATERS & DEARATORS (15%)**							
5.1	ERECTION, TESTING & COMMISSIONING OF HP & LP HEATERS	--	--	--	--	27%		--
5.2	ERECTION, TESTING & COMMISSIONING OF SJAE, GLAND STEAM CONDENSER, DRAIN COOLERS	--	--	--	--	12 %		--
5.3	ERECTION, TESTING & COMMISSIONING OF FST & DEARATOR & ASSOCIATED APPROACH PLATFORM with LADDERS ETC.	--	--	--	--	46 %		

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
	Subtotal FOR HEATERS & DEARATORS	--	--	--	--	85%		--
6	**MISCELLANEOUS ITEMS (13%)**							
6.1	ERECTION, TESTING & COMMISSIONING OF ACW PUMPS RELATED ITEMS	--	--	--			5%	
6.2	ERECTION, TESTING & COMMISSIONING OF PLATE HEAT EXCHANGER PACKAGE	--	--	--			5%	
6.3	ERECTION, TESTING & COMMISSIONING OF CONDENSER ON LOAD TUBE CLEANING PACKAGE/ CONDENSATE TRANSFER PUMPS	--	--	--			5%	
6.4	ERECTION, TESTING & COMMISSIONING OF TWIN OIL COOLERS OF LOC, DUPLEX LUBE OIL COOLERS & DUPLEX WORKING OIL COOLERS , HP GOVERNING OIL COOLERS	—	—	—	-	-	5 %	
6.5	ERECTION, TESTING & COMMISSIONING OF STG AIR COOLERS	—	—	—	-	-	5 %	
6.6	ERECTION, TESTING & COMMISSIONING OF CCW EXPANSION TANK, CARBON DIOXIDE BREATHERS, HYDROSTATIC SEAL ETC	—	—	—	-	-	5 %	
6.7	ERECTION, TESTING & COMMISSIONING OF HP FLASH TANK, ATM FLASH TANKS IN STG AREA AND COMMON AREA	—	—	—	-	-	5 %	
6.8	ERECTION, TESTING & COMMISSIONING OF BOILER STARTUP PRDS AND DESUPERHEATERS.	—	—	—	-	-	5 %	
6.9	ERECTION, TESTING & COMMISSIONING OF AUXILARY PRDS AND DESUPERHEATERS.	—	—	—	-	-	5 %	
6.10	ERECTION, TESTING & COMMISSIONING OF DEAERATOR PEGGING STEAM PRDS AND DESUPERHEATERS.	—	—	—	-	-	5 %	
6.11	ERECTION, TESTING & COMMISSIONING OF STRAINERS	—	—	—	-	-	5 %	

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
6.12	ERECTION, TESTING & COMMISSIONING OF OVERHEAD OIL TANK	—	—	—	-	-	5 %	
6.13	ERECTION, TESTING & COMMISSIONING OF VENT SILENCERS	—	—	—	-	-	5 %	
6.14	COMMISSIONING SUPPORT FOR IA / PA COMPRESSOR (COMMON FOR ALL UNIT)	—	—	—	-	-	5 %	
6.15	COMMISSIONING SUPPORT FOR CONDENSATE FORWARDING TANK.	—	—	—	-	-	5 %	
6.16	ERECTION, TESTING AND COMMISSIONING OF BELLOWS, BUTTERFLY VALVE FOR SURFACE CONDENSOR	—	—	—	-	-	3 %	
6.17	ERECTION, TESTING & COMMISSIONING OF LP DOSING SKIDS (NaOH, HYDRAZINE, AMMONIA)	—	—	—	-	-	5 %	
6.18	ERECTION TESTING AND COMMISSIONING OF SWAS ROOM INTERCONNECTING LINES	—	—	—	-	-	2 %	
	Subtotal for MISCELLANEOUS ITEMS						**85%**	
7	**INTEGRAL PIPING (16%)**	--	--	--				--
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%
	Total for integral piping							**85%**
II	**STAGE/MILESTONE PAYMENTS (15%)**							
1	Boiler Light Up	0%	0%	0%	0%	0%	0%	0%
2	ABO	0%	0%	0%	0%	0%	0%	0%

		CND (1)	TUR (2)	GEN (3)	PMP & AUX/ EQ (4)	HEATERS & Dearators(5)	MISC ELLA NEOU S ITEMS (6)	INTEG RAL PPG (7)
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%
	Total for Milestone/Stage payments (15%)	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**	**15%**
	Total of I & II	**100%**	**100%**	**100%**	**100%**	**100%**	**100 %**	**100%**

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 bill and is not indicative of the actual quantum or value of work.
- Wherever payment is linked with common system (All 4 units), the same is applicable for Block 1 (Unit 1 & 2) only. For Block II, the same shall be re- apportioned against other items. The decision by BHEL shall be final & binding over contractor.

TAXES, DUTIES, LEVIES

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.

8.2.2 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,

5. **The name, address and the registration number of the contractor,**
6. **The name and address of the party receiving taxable service,**
7. **Description, classification and value of taxable service provided and,**
8. **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.

8.2.3 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 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

~~**8.3 '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.

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 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.

9.6
Assembly and installation of strainer elements of MS 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 (PE & SD 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 our as part of scope of work.

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

Supply & application of all required Primers and paints for all equipment's / items erected under this scope of work are 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.

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.

10.0 EXLUSIONS

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

R) Power Cycle Piping (IBR & Non IBR)

S) All cable connections, except those specified as scope of work.

T) 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.

U) Erection, testing and commissioning of electrical panels and starting resistors for DC JOP and DC EOP pumps

V) Electrical testing of motors, turbo-generator. However erection of these items will be under the scope of this tender specification.

W) Impulse piping and fittings from the tapping points of various equipments other than those specified as scope of work.

X) Civil works to the extent not specifically provided for in this tender.

Y) 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.

Z) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.

AA) Some sub-delivery items and electrical components such as push-buttons, junction boxes etc.

BB) E&C work of cable trays, cables and earthing etc.

CC) All electrical and control & instrumentation items except those specified elsewhere in these specifications.

DD) Pneumatic copper tubing and fittings thereof.

EE) Thermal insulation of BFPs and their Drive Turbine, Main Turbine.

FF) Erection of sound proof/acoustic enclosure for turbine.

GG) Electrical testing of Generator. (However obtaining statutory clearance is in this scope of work.)

HH) PG Test Impulse piping from root valve, Cabling of field instruments for PG test. However all assistance of issue of materials, return after PG test, assistance during PG test is in the scope of TG vendor. System Isolation, flushing of root valves etc. during PG test is in the scope of TG vendor.

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

Hazira

A: Turbine **Hazira**

SL.No.	ITEM DESCRIPTION	QTY. For Each Unit	WEIGHT (In Kgs for Each Unit)	WEIGHT (In MT for Each Unit)	WEIGHT (In MT for 2 Units)	DIMENSIONS (mm) LxWxH (Approximate)
1	Outer Casing Upper Part	1	34162	34.162	68.324	4865 X 5600 X 3500
2	Outer Casing Lower Part	1	23335	23.335	46.67	4700 X 3060 X 1400
3	Inner Casing Assembly	1	8960	8.96	17.92	1784 X 1740 X 1600
4	Guide Blade Carrier -I	1	3500	3.5	7	490 X 1780 X 1735
5	Guide Blade Carrier - II	1	3400	3.4	6.8	540 X 1780 X 1735
6	Guide Blade Carrier - III	1	4500	4.5	9	620 X 1980 X 1935
7	Guide Blade Carrier - IV	1	6900	6.9	13.8	520 X 2200 X 2185
8	Exhaust Hood Upper Part	1	11980	11.98	23.96	2050 X 5800 X 2500
9	Exhaust Hood Lower Part	1	20731	20.731	41.462	2230 X 6140 X 2700
10	Rear Bearing Housing Assembly	1	1928	1.928	3.856	1405 X 1400 X 900
11	Front Bearing Housing Assembly	1	15791	15.791	31.582	1690 X 2610 X 950
12	Rotor Assembly	1	34000	34	68	8650 X Dia 2230
13	Interconnecting Pipe (dia 220 mm)		3127	3.127	6.254	
14	Hydraulic oil supply unit	1	4000	4	8	4200 X 3000 X 1500
				0	0	
15	High Pressure electrohydraulic actuators for stop valve	2	850	0.85	1.7	1300 X 900 X 800
				0	0	
16	High Pressure electrohydraulic actuators for control valve	4	850	0.85	1.7	1300 X 900 X 800
				0	0	
17	Jacking Oil Pump Assembly with AC & DC motor	1	1900	1.9	3.8	2100 X 2100 X 1600
18	Oil Purification Unit	1	2000	2	4	2000 X 1700 X 2250

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LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

19	Oil Accumulator sets	1	800	0.8	1.6	1500 X 500 X 2500
20	Turbine Enclosure	1	13000	13	26	-
21	Overhead Lube Oil Tank	1	2075	2.075	4.15	Dia 2750 X 2750
22	**Lube Oil Console Assembly-I** Empty lube oil Reservoir and Duplex filter with Piping	1	9200	9.2	18.4	4800x3800x3350
23	**Lube Oil Console Assembly-II** Pump assembly with piping	1	8000	8	16	3800x4300x3300
24	TSI Rack	1	100	0.1	0.2	483 X 350 X 266
25	Local gauge Racks	2	400	0.4	0.8	1600 X 450 X 1700
26	Transmitter Racks	8	300	0.3	0.6	1250 X 450 X 2000
27	Control Valves	5	300	0.3	0.6	-
28	Turbine Integral System Valves - supplied by BHEL Trichy (including QCNRV's)	121 no.'s	8609	8.609	17.218	
Total				**224.698**	**449.396**	

B: Surface Condenser

Sl.No	Equipment	Quantity	Dry Weight (in kgs for Each unit)	Dry Weight (In MT for Each unit)	Dry Weight (In MT for 2 units)	Overall Dimensions (in mm)
a.	Main Assly	1 no.	65850	65.85	131.7	L 10300 x W 4600 x H 4350
b.	Hot Well Assly	1 no.	7400	7.4	14.8	L 4500 x W 3100 x H 2300
c.	Top Conn. Piece	1 no.	3888	3.888	7.776	L 5164 x W 1864 x H 1170
d.	Bellow	1 no.	2500	2.5	5	L 5164 x W 1864 x H 1000

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

e.	DOME ASSLY	1 no.	15905	15.905	31.81	L 7300 x W 3700 x H 2130
f.	TUBES	7630	21746	21.746	43.492	SS TUBE(WLDD)
					0	22X 0.711X 7500
g.	TUBES	870	3080	3.08	6.16	SS TUBE(WLDD)
					0	22X 0.889X 7500
h.	Stand pipe Assly	2 no.	300	0.3	0.6	L 1200 x W 1000 x H 4900
i.	Surge Pipe Assly	1 no.	1257	1.257	2.514	L 1850 x W 1000 x H 6775
Total				**121.926**	**243.852**	
Note: Condenser shall be received at site in assembled conditions including tubes						
C: Heat Exchengers						
1	***Steam Jet Air Ejector***					
a.	Complete Assly.	1 nos.	7500	7.5	15	L 5400 x W 3000 x H 2000
2	***Gland Steam Condenser***					
a.	Complete Assly.	1 no.	2000	2	4	L 3500 x W 1400 x H 1400
3	***Drain Cooler***					
a.	Complete Assly.	1 no.	5800	5.8	11.6	L 6250 x W 1400 x H 1400
4	***LP Heater #1***					
a.	Complete Assly.	1 no.	18500	18.5	37	L 13650 x W 2000 x H 1700
5	***LP Heater #2***					
a.	Complete Assly.	1 no.	20000	20	40	L 13650 x W 2000 x H 1700
6	***LP Heater #3***					

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

a.	Complete Assly.	1 no.	19000	19	38	L 12800 x W 2000 x H 1700
7	***Spray cum Tray Deaerator***					
a.	Header	1 no.	20700	20.7	41.4	L 8950 x W 3750 x H 3750
b.	Feed Storage Tank-1	1 no.	19150	19.15	38.3	L 9000 x W 3700 x H 4350
c.	Feed Storage Tank-2	1 no.	19300	19.3	38.6	L 9350 x W 3750 x H 4350
d.	Feed Storage Tank-3	1 no.	19400	19.4	38.8	L 9000 x W 3700 x H 4350
8	***HP Heater #5***					
a.	Complete Assly.	1 no.	31000	31	62	L 10450 x W 2350 x H 2000
9	***HP Heater #6***					
a.	Complete Assly.	1 no.	37000	37	74	L 10750 x W 2350 x H 2000
10	***HP Flash Tank***					
a.	Complete Assly.	1 no.	8500	8.5	17	Ø 3032 x H 6100
11	***Steam Turbine oil Cooler***					
a.	Per Cooler	1 no.	5150	5.15	10.3	L 5000 x W 2550 x H 1000
12	***STG Air Cooler***					
c.	Per Element	5 nos.	1500	1.5	3	L 3800 x W 1000 x H 600
	Total			**234.5**	**469**	

D: Generators						
1	Generator Stator	1 no.	145000	145	290	L 9415 X W3910 X H 4225
2	Generator Rotor	1 no.	31500	31.5	63	
3	Bearings	1 no.	7500	7.5	15	
4	Exciter	1 Set	3000	3	6	

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

5	Accessories	1 Set	8000	8	16	
	Total			**195**	**390**	
	Max. Erection Weight of Generator Stator = 187.5 MT					

E: Pumps & Auxilaries

1	**Boiler Feed Pump Assembly**	3 Nos.	114546	114.546	229.092	
1.a	BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	3 Nos.	17310	17.31	34.62	2250 x 1000 x1050
1.b	BP Skid (Pump Assly. + Base Plate + tubing)	3 Nos.	7533	7.533	15.066	1650 x 1200 x 950
	Hydraulic Coupling (DD) Assly.	3 Nos.	10680	10.68	21.36	1800 x 1700 x 1800
	Hyd. Coupling W. O. Cooler (DD)	3 Nos.	4425	4.425	8.85	3700 x 1500 x 500
	Hyd. Coupling L. O. Cooler (DD)	3 Nos.	2325	2.325	4.65	3100 x 1300 x 450
	Hyd. Coupling Loose Items	3 Nos.	2130	2.13	4.26	
	Suction Strainer at BP Suction DD)	3 Nos.	2400	2.4	4.8	900 x 800 x 1400
	BFP Recirculation valve (DD)	3 Nos.	1050	1.05	2.1	1800 x 550 x 1400
	Local Gauge Boards with instruments (DD)	6 Nos.	2100	2.1	4.2	2200 x 300 x 1800
	Loose Items	3 Nos.	7347	7.347	14.694	
	Grillage	3 Nos.	15090	15.09	30.18	10200 x 2500 x 900
2	Condensate Extraction Pump Assembly	2 Nos.	40000	40	80	
3	Condensate Forwarding Pump Assembly	3 Nos.	24000	24	48	
4	Condensate Forwarding Tank	1 No.	10000	10	20	
5	Aux Cooling Water Pump (ACW) Assembly	2 Nos.	14000	14	28	
6	Plate Heat Exchanger (PHE)	1 No.	9326.7	9.327	18.653	

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

7	Ammonia Dosing Skid	1 No.	2350	2.35	4.7	
8	Hydrazine Dosing Skid	1 No.	1950	1.95	3.9	
10	Over Head Tank	1 No.	2066	2.066	4.132	
11	Atmospheric Flah Tank	1 No.	1500	1.5	3	
12	Lube Oil Console (Lube Oil Tank, MOP, AOP,EOP, Twin Lub oil cooler, Filters etc.)	1 No.	16465	16.465	32.93	
13	Jacking Oil Skid	1 No.	2250	2.25	4.5	
14	HP Control Oil Skid	1 No.	3900	3.9	7.8	
15	Oil Centifuge (Trolly Type)	1 No.	1200	1.2	2.4	
	Total			**315.9437**	**631.8874**	

F: Turbine Integral Piping

1	Carbon Steel Flanges		800	0.8	1.6	
2	Carbon Steel Piping		14400	14.4	28.8	
3	Carbon Steel Fittings		1900	1.9	3.8	
4	Alloy Steel Piping		1000	1	2	
5	SS Piping		2700	2.7	5.4	
6	Support		2080	2.08	4.16	
	Total			**22.88**	**45.76**	

G: Other Misc. Equipments

1	Miscellaneous Item		61775	61.775	123.55	

H: Common Equipments

1	Closed Circuit CW System Pump	4	6026	24.104		
2	IA & PA System	1	61060	61.06		
3	DMCW Expansion tank	1	2000	2		
4	SWAS Panel (Total per SWAS Unit)	2	3200	6.4		
5	NaOH Dosing Skid	1	2050	2.05		

APPENDIX – 1

LIST OF PACKAGES, PACKAGE DIMENSION DETAILS, WEIGHTS ETC

6	Air Compressor	4	8250	8.25		
7	Air Receiver (WET)	1	8000	8		
8	Air Receiver (DRY)	2	11000	11		
9	Air Dryer	3	3020	3.02		
10	LOCAL Gauge Board	2	800	1.6		
	Total			**127.484**		

NOTE:

1. The information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
2. Any other systems / components, quantities which are the integral to equipment supplied by the manufacturing unit also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.
3. The dimensions, weights, quantities for scope of works are tentative. The works for complete scope as per site, systems/schemes and drawing requirement shall be carried out within accepted lump sum price where lump sum price has been offered. Whereas for scope of works where unit rate has been offered, the works shall be carried out as per site, systems and drawing requirement based on actual requirement at site and payment for such actual quantum of work executed, shall be made as per accepted applicable unit rate.

APPENDIX-II

Summary of Weight Details

		Hazira			
S No.	**Area**	**Weight In MT (Per Unit)**	**Weight In MT (For 2 Units)**	**Weight In MT (For Block 1 Unit 1 & 2)**	**Weight In MT (For Block 2 Unit 3 & 4)**
1	**Turbine**	224.698	449.396	449.396	449.396
2	**Surface Condenser**	121.926	243.852	243.852	243.852
3	**Heat Exchengers**	234.5	469	469	469
4	**Generators**	195	390	390	390
5	**Pumps & Auxilaries**	315.9437	631.8874	631.8874	631.8874
6	**Turbine Integral Piping**	22.88	45.76	45.76	45.76
7	**Insulation**	6	12	12	12
8	**Misc. Equipments**	61.775	123.55	103.55	83.55
9	Common Equipment			127.484	-
	Total	**1182.7227**	**2365.4454**	**2472.9294**	**2325.4454**

NOTE:

1. The information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
2. Any other systems / components, quantities which are the integral to equipment supplied by the manufacturing unit also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.

3. The dimensions, weights, quantities for scope of works are tentative. The works for complete scope as per site, systems/schemes and drawing requirement shall be carried out within accepted lump sum price where lump sum price has been offered. Whereas for scope of works where unit rate has been offered, the works shall be carried out as per site, systems and drawing requirement based on actual requirement at site and payment for such actual quantum of work executed, shall be made as per accepted applicable unit rate.

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 work will be got done by BHEL at the risk and cost 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 risk and cost.

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.

11.3 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 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.

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 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
5) Consumption of construction power
6) Manpower reports
7) Daily and Monthly Progress reports
8) 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.

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.

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.

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.

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:

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

(12) 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.
(13) Pre-assembly of spring suspension/hangers and shock absorber as per requirement.
(14) 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.
(15) Fabrication / making of bends for pipes and tubes of diameter up to 65mm.
(16) Matching of all fittings like tees, bends, flanges, reducers valves, socket fittings, etc with pipes for welding.
(17) Servicing of valves, Power Cylinders and actuators etc.
(18) Cleaning of all pipes by wire brushing / blowing by compressed air.
(19) 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.
(20) 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.

15 CONDENSER INSTALLATION

15.1
The condenser will be dispatched in assembled condition from manufacturing units including tubing & expansion. For detail erection method, the documents titled "Construction Design and Management Health and Safety (CDM H&S) Plan" may be refered.

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.

16.1 GENERATOR INSTALLATION

16.1.1 GENERATOR STATOR

The Generator stator, may be transported from Manufacturing Unit to site by special wagon consisting of 8 bogies (four on either side) with facilities to swivel or by special trailer. The contractor shall have to unload the generator stator from the Wagon/Trailor at a suitable place outside Machine Hall. The Stator shall be moved from the place of unloading and placed within the reach of strand jack arrangements by the contractor in consultation with BHEL Engineer.

For detail erection method, the documents titled "Construction Design and Management Health and Safety (CDM H&S) Plan" may be refered.

16.1.2

The generator stator shall be lifted and shifted to its designated place with the help of strand jack as per the scheme envisaged by BHEL. For this purpose, a separate agency shall be engaged by BHEL. The engaged agency shall provide Strand jack system with operator and carry out lifting & shifting of stator. The Contractor shall extend necessary assistance of manpower resources during this operation.

The transportation of Strand Jack system from store to TG Hall , assembly, erection, assistance in testing and commissioning, dismantling, transporting back to store after its use will be the responsibility of the contractor.

The required loads for load testing of strand jacks will be provided by BHEL free of charges. To & Fro transportation, loading & unloading of load from BHEL / Customer store to site shall be carried out by contractor.

The assembly of the special wagon 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 turbine module, LP & 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.

16.3 DEARATOR ERECTION: The contractor shall make suitable arrangements well in advance for lifting and placement to final position, fit up, welding etc. of **DEAERATOR / FST SECTIONS** at required elevation / location with utmost care. The suitable capacity crane shall

be provided by BHEL as per the list of T & P's to be provided by BHEL on sharing basis for this purpose.

Erection of permanent approach platform and ladders etc for De-aerator and FST is in the scope of work. The structural steel and other members will be supplied in random length/size & will have to be cut to required size and profile as incidental to work.

For detail erection method, the documents titled "Construction Design and Management Health and Safety (CDM H&S) Plan" may be refered.

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:

(5) 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.
(6) Ultrasonic test
(7) Dye Penetrate test
(8) 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, 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.

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:

(l) Trial run of Boiler Feed Pumps, CEP, Booster Pump, etc and other pumps/equipments like Misc pumps etc and other various rotating machineries / pumps as per tender specification.

(m) Trial run of motors/ drives for various auxiliaries.

(n) 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.

(o) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.

(p) Servicing of all valves, Hydraulic Power cylinders, HP Valves (ESV), CRHNRV and fittings.

(q) 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.

(r) 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.

(s) Putting turbine on barring gear.

(t) Rolling and synchronization.

(u) Full load operation.

(v) 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

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.

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.

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.

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 8-10^0 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

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.

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.

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 penetrameter/ 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.

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 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.

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 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.

21.4
Contractor shall provide the complete operating crew like operator, helpers for handling trailing cable for EOT. It may be specifically noted that the EOT 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.

21.5
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.

21.6
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.

21.7

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.

21.8
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.

21.9
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.

21.10
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.

21.11
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.

21.12
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.

21.13
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.

21.14
Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to prior approval of BHEL.
21.15

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.

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.

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. SG-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 dedicated from contractor's bills towards expenditure incurred including 30% 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.

23.9

The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for alunimium 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 motor	-	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.

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.

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 –

b) 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.

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 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.

24.16 Supply of all required paints shall be in the scope of contractor.