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

S. No.	E- TENDER SPECIFICATION NUMBER
01	BHE/PW/PUR/BWT6-STG/2318

FOR

Collection of materials from BHEL/Client's stores/Storage yard; Transportation to site; Erection, testing & commissioning, trial operation and handing over of **Steam turbine, Condenser, Generator set,** Integral piping, HP/LP heater, Pumps and Motors, Tanks & vessels and associated equipments, DG set, auxiliaries connected with the systems and other BOIs, Insulation, including supply and application of final painting for **1x660MW, Unit-6 Bhusawal Project.**

VOLUME I – TECHNICAL BID

THIS TENDER SPECIFICATION CONSISTS 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**
Volume-IE	**Technical Specifications**
Volume II	**Price Bid**

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

CONTENTS		
Volume No	Description	Hosted in website bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled
NIL	Tender Specification Issue Details	(Part of **Vol-IA-2318**)
NIL	Notice Inviting Tender	(Part of **Vol-IA-2318**)
I-A	Technical Conditions of Contract	Vol-I-A-2318
I-B	Special Conditions of Contract	Vol-I-BCD-2318
I-C	General Conditions of Contract	(Part of Vol-I-BCD-2318)
I-D	Forms & Procedures	(Part of Vol-I-BCD-2318)
I-E	Technical Specifications	Vol-IE-2318
II	Price Bid Specification as specified in E-Procurement Portal	Volume-II-2318

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

S. No.	E- TENDER SPECIFICATION NUMBER
01	BHE/PW/PUR/BWT6-STG/2318

FOR

Collection of materials from BHEL/Client's stores/Storage yard; Transportation to site; Erection, testing & commissioning, trial operation and handing over of Steam turbine, Condenser, Generator set, Integral piping, HP/LP heater, Pumps and Motors, Tanks & vessels and associated equipments, DG set, auxiliaries connected with the systems and other BOIs, Insulation, including supply and application of final painting for **1x660MW, Unit-6 Bhusawal Project.**

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:

2318

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Date: 22/10/2020

NOTICE INVITING TENDER (NIT)
NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES

To,

Dear Sir/Madam,

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system (National competitive bidding (NCB) ~~or International Competitive Bidding (ICB~~ are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1) 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

S No.	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	**BHE/PW/PUR/BWT6-STG/2318**	
ii	**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 Steam turbine,** Condenser, Generator set, Integral piping, HP/LP heater, Pumps and Motors, Tanks & vessels and associated equipments, DG set, auxiliaries connected with the systems and other BOIs, Insulation, including supply and application of final painting for **1x660MW, Unit-6 Bhusawal Project.**	
iii	**DETAILS OF TENDER DOCUMENT**		
A	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.*	*Applicable*
B	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
C	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
D	Volume-ID	*Forms and Procedures*	*Applicable*
E	Volume-IE	*Technical Specifications*	*Applicable*
F	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	**Tender documents will be available for downloading from BHEL website (www.bhel.com) or e-procurement portal (https://bhel.abcprocure.com) as per schedule below:** ***Start : 22/10/2020 , Time :17:00*** ***Closes: 06/11/2020 , Time : 15:00***	*Applicable*

S No.	ISSUE	DESCRIPTION	
		Brief information of the tenders shall also be available at central public procurement portal. (*https://eprocure.gov.in/epublish/app*)	
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date: 06/11/2020, Time: 15.00 Hrs*** ***Place: on E-Tender Portal*** **https://bhel.abcprocure.com**	*Applicable*
vi	**OPENING OF TENDER (Techno-Commercial Bid)**	***Date: 06/11/2020, Time: 16.00 Hrs*** *(within 2 hours of 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. For e-Tender, Bidder may witness the opening of tender through e-Procurement portal only.*	*Applicable*
vii	**EMD AMOUNT**	***Rs 15,90,000/- (Rupees Fifteen Lakhs Ninety Thousands Only)*** ***Important Note: Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC.***	*Applicable*
viii	**COST OF TENDER**	*Free*	
ix	**LAST DATE FOR SEEKING CLARIFICATION**	One day before due date of offer submission. Along with soft version also, addressing to undersigned & to others as per contact address given below: 1) Name: P R Chiwarkar Designation:AGM Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Phone: Landline: +91-712-2858-633 Mob: +91-9422805222 Email :prchiwarkar@bhel.in Fax:+91-712-2858600 2) Name: Shivkesh Meena Designation:Dy Manager Deptt: Purchase Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001 Phone: Land Line: +91-712-2858715 Mob: 9049590486 Email :svm@bhel.in Fax:+91-712-2858600	*Applicable*

S No.	ISSUE	DESCRIPTION	
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	**On 02/11/2020, 10:00 Hrs to 12.30 Hrs.** Considering the present outbreak of COVID-19 pandemic, the pre-bid meeting shall be arranged through video conference and the date & link is given in sl no 16 of Annexure-11 Important Information	*Applicable*
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	**Sh. Arun Chandra Verma, IPS (Retd.) and Sh Virendra Bahadur Singh, IPS (Retd.)**	*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 Corrigendum), Central Public Procurement portal (https://eprocure.gov.in/epublish/app) & on e-tender portal **https://bhel.abcprocure.com 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 digitally using Class III DSC & uploaded in E-Procurement Portal, 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 Not Used

4.0 Unless specifically stated otherwise, bidder shall deposit EMD as per clause 1.9 of General Conditions of Contract.

For Electronic Fund Transfer the details are as below-:

NAME OF THE BENEFICIARY	BHARAT HEAVY ELECTRICALS LTD
ADDRESS OF THE COMPANY	SHREE MOHINI COMPLEX 345, KINGSWAY,NAGPUR
NAME OF BANK	STATE BANK OF INDIA
NAME OF BANK BRANCH AND BRANCH CODE	SBI,KINGSWAYBRANCH,BRANCH CODE-00432
CITY	NAGPUR
ACCOUNT NUMBER	31380025872
ACCOUNT TYPE	CURRENT A/C
IFSC CODE OF THE BANK BRANCH	SBIN0000432
MICR CODE OF THE BANK BRANCH	440002002

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

5.0 **Procedure for Submission of Tenders**:

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

Documents Comprising the e-Tender

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

a. Technical Tender (UN priced Tender)

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

i. Earnest Money Deposit (EMD) furnished in accordance with NIT Clause 4.0. ~~Alternatively, documentary evidence for claiming exemption as per clause 29 of NIT~~.

ii. Technical Bid (without indicating any prices).

b. Price Bid:

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

DO NOT'S

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

Digital Signing of e-Tender

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

The Requirement:

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

BHEL has finalized the e-procurement service Provider-:
M/s E-Procurement Technologies Limited Helpdesk Contacts:

During normal business hours, helpline maintained by the service provider e-Procurement Technologies Limited is available for clarifying any doubts of supplier/s. The helpline numbers are provided in the e-procurement website.

- Mr. Swapnil Hamilton, Support Executive, Ph: +91 7940270549, e-mail ID: swapnil.h@eptl.in
- Mr. Hardik Oza, Support Executive, Ph: +91 7940270560, e-mail ID: hardik.oza@eptl.in
- Mr. Ankur Bhatt, Support Executive, Ph: +91 7940270590, e-mail ID: ankur.bhatt@eptl.in
- Mr. Prashant, Asst. Manager – Implementation & Support, Ph: +91 7940270545, e-mail ID: prashant@eptl.in

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

Please refer http://www.mca.gov.in/ →MCA SERVICES → DSC SERVICES for DSC certifying authorities.

~~**Procedure for Submission of Tenders (To be used in case of Paper bid only):** 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)' 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) (To be used in case of Paper bid only):**~~

~~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.	
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) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:	
	Earnest Money Deposit (EMD) in the form as indicated in this Tender	

	~~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 to be submitted should be uploaded in respective places in the E-Tender portal as per the list mentioned given in this NIT. BHEL shall not be responsible for any in-complete 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:

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

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

Total number of Packages in hand = Load (P)

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

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:
(**Note**: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table 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 , …. P_N etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \ldots P_N$)

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

c) Sum 'S_1 'of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$…. $S_{1\text{-}T1}$) for similar package P_1, for the 'period of assessment' 'T_1' (i.e. $S_1 = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}}$

$_5$+…$S_{1\text{-}T1}$). Similarly, S_2 for package P_2 for period T_2, S_3 for package P_3 for period T_3 etc. for the tendered scope for all Regions. Now calculate cumulative sum 'S_T' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. 'S_T'= S_1+ S_2+ S_3+ S_4+ S_5+…. S_N.)

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

Aggregate of Performance scores for all similar packages in all the Regions
= ----------
Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions

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

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

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

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

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
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' (**R_{BHEL}**) in case at least 6 evaluation scores for 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

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

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

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

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

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

III. 'Assessment of Capacity of Bidder':

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

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

Note:

i). In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number

ii). For R_{BHEL} = 60, P_{Max} = '1'

iii). For $R_{BHEL} \geq 80$, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$

(Where P is calculated as per clause 'I' above)

IV. **Explanatory note**:

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

ii). Identified Packages (Unit wise)

Table-1

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

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

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

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

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

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

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

iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than minimum no. of bidders required for conducting RA as per extant RA Guidelines, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:

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

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

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

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

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

c. Up to Synchronization in all Balance Packages

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

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

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

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

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

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

ix). Performance evaluation as specified above in this clause 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 and/or through e-procurement portal, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 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.**

"Integrity Pact (IP)"

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

Sl. No.	IEM	Email
1.	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2.	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

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

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

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:

Details of contact person(s):

Name: (1) P R Chiwarkar/ AGM (Purchase) 2) Shivkesh Meena / Dy Manager (Purchase)
Dept.: Purchase Department
Address: Floor No. 5 & 6, Shreemohini Complex, 345 Kingsway, Nagpur-440001
Phone: (LL/ Mobile) (1) 0712-2858633 0712-2858715
Email: prchiwarkar@bhel.in svm@bhel.in
Fax: 0712-2858699

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 authorized 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 **Reverse Auction,:** "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com on "**supplier registration page".**) for this tender. RA shall be conducted among all the techno-commercially qualified bidders.

Price Bids of all the techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.

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 for the said contract with a validity period of six months initially. In case bidder becomes L1, Consortium Agreement valid till contractual completion period shall be submitted to BHEL before signing the contract. Consortium Agreement shall be kept valid till scope of work awarded to consortium partner(s) as per contract is completed.

23.2 'Standalone' 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) including Prime Bidder shall be NOT more than 3 (three).

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 and BHEL shall take necessary action as per extant guidelines. 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 Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL.

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 one work with a consortium partner under direct order of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.

23.14 The consortium 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. In case there are two consortium partners, then each partner shall submit SD equivalent to 0.5% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. However, Prime Bidder has also option for submission of SD on behalf of consortium partner (s).

SD submitted by Consortium Partner(s) may be released in case corresponding scope of work of the respective Consortium partner(s) has been completed upto the extent of 80% based on certification by Construction Manager and concurrence by the prime bidder.

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

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

26.0 The consultant / firm (and any of its affiliates) shall not be eligible to participate in tender(s) for the related works or services for the same project, if they were engaged for the consultancy services.

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

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

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

28.1.1 **Commitment by BHEL:**

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

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

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

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

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

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

29.0 ~~Micro and Small Enterprises (MSE)~~

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

~~Type under MSE~~	~~SC/ST owned~~	~~Women owned~~	~~Others (excluding SC/ ST & Women~~
~~Micro~~			
~~Small~~			

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

~~*a)* MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration Certificate or~~

~~EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM-II Certificate along with attested copy of a CA certificate (format enclosed as Annexure – 3) where deemed validity of EM-II certificate of five years has expired applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer. Documents submitted by the bidder may be verified by BHEL for rendering the applicable benefits.~~

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

31.0 **PREFERENCE TO MAKE IN INDIA:**
For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/Non-Local Supplier and purchase preferences to Class I local supplier, is as defined I Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.

32.0 ~~Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.~~
~~All overwriting/cutting, etc., will be numbered by bid opening officials and announced during bid opening.~~

33.0 In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

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

In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

35.0 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/ circulars/ amendments/ govt. directives issued from time to time shall also be applicable.

For BHARAT HEAVY ELECTRICALS LTD

(Addl. General Manager - Purchase)

Enclosure:

01. Annexure-1: Pre Qualifying Requirements.
02. Annexure-2: Check List.
03. ~~Annexure-3: Certificate by Chartered Accountant~~ Not Applicable
04. Annexure-4: Reverse Auction Process Compliance Form
05. Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process
06. Annexure-6: RA Price Confirmation and Breakup
07. Annexure-7: Integrity Pact
08. Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR
09. Annexure-9: Declaration reg. Related Firms & their areas of Activities (x) Other Tender documents as per this NIT.
010. Annexure-10: In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020
011. Annexure 11: Important information.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

E-Tender Specification Number: BHE/PW/PUR/BWT6-STG/2318	
JOB	Collection of materials from BHEL/Client's stores/Storage yard; Transportation to site; Erection, testing & commissioning, trial operation and handing over of Steam turbine, Condenser, Generator set, Integral piping, HP/LP heater, Pumps and Motors, Tanks & vessels and associated equipments, DG set, auxiliaries connected with the systems and other BOIs, Insulation, including supply and application of final painting for 1x660MW, Unit-6 Bhusawal Project.

S No	PRE QUALIFICATION CRITERIA	~~Bidders claim in respect of fulfilling the PQR Criteria~~	
		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)	Applicable	
B	**TECHNICAL PQR** **B.1: Not Applicable** **B.2: Technical Criteria:** Bidder must have executed any of the following in the last seven (7) years as on latest date of offer submission. **B.2.1:** Bidder should have Executed Erection & Commissioning one STG or (Boiler (Necessarily consisting of rotating machines)) of ≥190 MW.	Applicable	
C-1	**Financial TURNOVER** Bidders must have achieved an average annual financial turnover (audited) of **Rs. 238.50 Lakhs** or more over last three Financial Years (FY) i.e. '2016-17, 2017-18 & 2018-19' OR '2017-18, 2018-19 & 2019-20'*	**Applicable**	

	*To consider last three financial years as '2016-17, 2017-18 & 2018-19', bidder must provide a declaration that they do not have financial (audited) statements for FY 2019-20.		
C-2	**NETWORTH** (only in case of Companies) Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive.	Applicable	
C-3	**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	
C-4	Bidder must not be under Insolvency Resolution Process or Liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render him ineligible for participation in this tender, and shall submit undertaking (Annexure-8) to this effect.	Applicable	
D	**Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)** The "Assessment of Capacity of Bidders" for this Tender shall be carried out by considering the identified similar package as "**STG**".	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
G	Consortium tie-ups	Not Applicable	

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

1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above along with all annexures
2. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e. total divided by three.
3. 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)

4. C-3:- PROFIT : Shall be PBT earned during any one of the three financial years as in C-1 above.
5. For PQR B.1: The evaluation currency for this tender shall be INR.
6. ~~For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria B1 above, bidder may utilize the experience of its Parent/ Subsidiary Company along with its own experience, subject to following:~~
   1. ~~The parent company shall have a controlling stake of ≥50% in the subsidiary company (as per Format-1).~~
   2. ~~The Parent Company/ Subsidiary Company of which experience is being utilized for bidding shall submit Security Deposit(SD) equivalent to 1% of the total contract value~~
   3. ~~The parent/ subsidiary company and bidder shall provide an undertaking that they are jointly or severally responsible for successful performance of the contract (as per Format-2).~~
   4. ~~In case Bidder is submitting bid as a Consortium Partner, option of utilizing experience of parent/subsidiary Company can be availed by Prime Bidder only.~~
   5. ~~Parent Company/ Subsidiary Company of which experience is being used for bidding, cannot participate as a 'Standalone Bidder' or as a 'Consortium bidder'.~~
7. Completion date for achievement of the technical criteria specified in the Technical' criteria of PQR (as in 'B' above) should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work.
8. 'EXECUTED' means the bidder 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.
9. Unless otherwise specified, for the purpose of 'Technical' criteria of PQR (as in 'B' above), the word 'EXECUTED' means:
   1. "BOILER LIGHT UP" in respect of Boiler/CFBC/ ESP
   2. "SYNCHRONISATION" in respect of STG/GTG and 'SPINNING' in case of HTG
   3. "STEAM BLOWING" in respect of of Power Cycle Piping
   4. "HYDRAULIC TEST/ ANY OTHER EQUIVALENT TEST LIKE "100% RT/UT OF WELDED JOINTS"" of the system in respect of Pressure parts / LP Piping/ CW Piping.
   5. "CHARGING" in respect of Power Transformers/ Bus Ducts, "HT/LT switchgears", "HT/LT Cabling".
   6. Achievement of physical Quantities as per respective PQRs in respect of Civil, Structures, Piling, CHP Civil, AHP Civil and RCC Silo Works.
   7. Readiness for Coal Filling" of at least one Bunker in respect of Mill Bunker Structure Work.
   8. "CHARGING OF ATLEAST ONE PASS" in respect of ESP(R&M)
   9. "GAS IN" in respect of FGD
   10. For C&I works: "SYNCHRONISATION" in case of power project / "WORK EXECUTION of the value as defined in PQR" in case of industry.
10. Boiler means HRSG or WHRB or any other types of Steam Generator
11. Critical/Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass.
12. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating in terms of MW shall be considered for evaluation.
13. 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.

~~Explanatory Notes for QR 'B1'~~

- ~~For QR 'B1' above, actual executed value shall be considered.~~
- ~~For QR 'B1' above, Value of work is to be updated with indices for "All India Avg. Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per following formula-~~

$$P = \left\{ R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0} \right\}$$

~~Where~~

~~P = Updated value of work~~

~~R = Value of executed work~~

~~X_N = All India Avg. Consumer Price index for industrial workers for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).~~

~~X_0 = All India Avg. Consumer Price index for industrial workers for last month of work execution.~~

~~Y_N = Monthly Whole Sale Price Index for All Commodities for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).~~

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

a. Relevant documents, meeting above requirements at C & D, shall be submitted by bidders

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

Credentials submitted by the bidder against "PRE QUALIFYING CRITERIAS" shall be verified for its authenticity. In case, any credential (s) is/are found unauthentic, offer of the bidder is liable to the rejection. BHEL reserves the right to initiate any further action as per extant guidelines for Suspension of Business Dealings.

Format-1

Not Applicable

Format-2

Not Applicable.

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/~~Not 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 Authorized 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 ~~Power of Attorney of Consortium Partner~~.	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 :

AUTHORISED SIGNATORY

(With Name, Designation and Company seal)

ANNEXURE-3

Certificate by Chartered Accountant on letter head

(applicable upto 31st March'2021 in line with MSME notification no. S.O. 2119 (E), dated 26th June'2020)

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

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

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

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

3. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs…… Lacs and turnover is Rs. …… Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

4. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs…… Lacs and turnover is Rs. …… Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

(Strike off whichever is not applicable)

The above investment of Rs …… Lacs is within permissible limit of Rs …… Lacs for …… Micro / Small/ Medium *(Strike off which is not applicable)* Category under MSMED Act 2006.

Or

The enterprise has been graduated upward from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise shall maintain its prevailing status till expiry of one year from the close of year of registration, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Or

The enterprise has been reverse graduated from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise will continue in its present category till the closure of the financial year and it will be given the benefit of the changed status only with effect from 1st April of the financial year following the year in which such change took place, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Date:

(Signature)

Name:
Membership Number:
Seal of the Chartered Accountant

ANNEXURE-4

Reverse Auction Process Compliance Form

(The bidders are required to print this on their company's letterhead and sign, stamp before RA)

To

- M/s. {*Service provider*
- *Postal address}*

Sub: Agreement to the Process related Terms and Conditions

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the RFQ document for {Items} against BHEL enquiry/ RFQ no.{ BHE/PW/PUR/BWT6-STG/2318} dt. {…….}
This letter is to confirm that:

1) The undersigned is authorized official/ representative of the company to participate in RA and to sign the related documents.
2) We have studied the Reverse Auction guidelines (as available on www.bhel.com), and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that, in case we become L1 bidder, we will FAX/ email the price confirmation & break up of our quoted price as per *Annexure - 6* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post/ courier both to M/s. BHEL and M/s. {*Service provider.}*

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal

Name:
Company / Organization:
Designation within Company / Organization:
Address of Company / Organization:

Sign this document and FAX/ email it to M/s *{Service provider}* at *{……..}* prior to start of the Event.

ANNEXURE – 5

Authorization of representative who will participate in the on line Reverse Auction Process:

1	NAME OF THE BIDDER	
2	NAME & DESIGNATION OF OFFICIAL	
3	POSTAL ADDRESS (COMPLETE)	
4	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE – 6

Reverse Auction price confirmation and breakup
(To be submitted by L1 bidder after completion of Reverse Auction)

To
- M/s. *Service provider*
- *Postal address*

CC: M/s BHEL
{Unit-
Address-}

Sub: **Final price quoted during Reverse Auction and price breakup**

Dear Sir,

We confirm that we have quoted.

Rs.{___in value & in words_____} for item(s) covered under tender enquiry No. { BHE/PW/PUR/BWT6-STG/2318**} dt.{...}**

Total price of the items covered under above cited enquiries is inclusive of {*Packing & forwarding, GST, E.D., C.S.T., freight and insurance charges up to {……} District,{……..} State and Type Test Charges etc., (exclusive of service tax)*, *other as per NIT*}

as our final landed prices as quoted during the Reverse Auction conducted today {*date*} which will be valid for a period of {___ **in nos. & in words** ___} days.

The price break-up is as given below.

========
Total - Rs. **in value & in words**
========

Yours sincerely,

For _____

Name:
Company:
Date:
Seal:

ANNEXURE – 7

INTEGRITY PACT

Between

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

and

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

Preamble

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

_____

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

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

Section 1- Commitments of the Principal

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Section 4 - Compensation for Damages

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

4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

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

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

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

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

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

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

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

Section 8 -Independent External Monitor(s)

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

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

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

8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between

the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

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

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

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

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

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

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

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

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

Section 9 - Pact Duration

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

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

Section 10 - Other Provisions

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

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

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

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

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

For & On behalf of the Principal

(Office Seal)

Place----------

Date----------

For & On behalf of the Bidder/ Contractor

(Office Seal)

Witness: _____

(Name & Address) _____

_____

Witness: _____

(Name & Address) _____

_____

ANNEXURE – 8

UNDERTAKING

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

To,

(Write Name & Address of Officer of BHEL inviting the Tender)

Dear Sir/Madam,

Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS

Ref: NIT/Tender Specification No: BHE/PW/PUR/BWT6-STG/2318

I/We, _____ declare that, I/We am/are not under insolvency resolution process or liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

Sign. of the AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Place:
Date:

Annexure-9

DECLARATION

Date:_____

To _____

BHEL, _____
_____
_____

_____

Email: _____

Sub: **Details of related firms and their area of activities**

Dear Sir/ Madam,

Please find below details of firms owned by our family members that are doing business/ registered for same item with BHEL,_____ (NA, if not applicable).

1	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	
2	Material Category/ Work Description	
	Name of Firm	
	Address of Firm	
	Nature of Business	
	Name of Family Member	
	Relationship	

Note: I certify that the above information is true and I agree for penal action from BHEL in case any of the above information furnished is found to be false.

Regards,

(_____)

From: M/s _____
Supplier Code: _____
Address: _____
_____

_____

_____

Annexure-10

(To be submitted in the bidder's letter head)

In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020

Tender no . ……..

Job: ……..

"I/ we have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India. I/We hereby certify that I/ we the bidder < name of the

bidder……
……..> is / are

a) Not from such a country and eligible to be considered for this tender.
OR
b) From such country, has been registered with the competent authority and eligible to be considered for this tender. (Evidence of valid registration by the competent authority shall be attached)

For and behalf of _____ (Name of the bidder)

(Signature, date & seal of authorized representative of the bidder)

Annexure-11: IMPORTANT INFORMATION

E -Tender for this work is invited by BHEL PSWR NAGPUR and offer shall be submitted through BHEL e-procurement portal only. All correspondences regarding this tender shall be through E-procurement portal.

Postal Address:
AGM /Purchase BHEL PSWR,
SRIMOHINI COMPLEX, Floor No. 5 & 6, 345 KINGSWAY, NAGPUR 440001, INDIA

Following are the concerned BHEL officials to whom bidders can contact in case of any difficulty:

AGM Purchase, Email: prchiwarkar@bhel.in. Ph: +91 – 712 – 2858 - 633
Dy Manager Purchase, Email: svm@bhel.in Ph: +91 – 712 – 2858 –715/9049590486
Dy Manager Purchase, Email: vivekjha@bhel.in Ph: +91-9429198214
Asst. Engineer Purchase, Email: baijnath@bhel.in , Ph: +91 – 712 –2858 - 652

1. **Refer Chapter XII of Volume IB Special Conditions of Contract regarding Suspension of Business Dealings: The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' has now been uploaded on www.bhel.com on "supplier registration page" at the following link:** http://www.bhel.com/vender_registration/pdf/Suspension_guidelines_abridged.pdf

2. **"Pradhan Mantri Kaushal Vikas Yojna:** The contractor shall, at all stages of work deploy skilled/semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/Industrial Training Institute/ National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in–Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs.100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding".

3. **All Statutory Requirements as applicable for this project shall be complied with.**

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

5. **Following clause shall form part of the HSE documents issued under Chapter IX of Volume IB 'Special Conditions of Contract'**

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

6. **Commencement Period for "Performance Guarantee for Workmanship" as per clause no 2.24 of Vol-IC GCC**: This period shall commence after the completion of work as certified by Engineer-in-Charge.

7. **The clause 2.7.9.1 below is added under the heading "Rights of BHEL" of General Conditions of Contract Volume-IC GCC.**

2.7.9.1 Provision of Penalty in case of slippage of Intermediate Milestones:

i) Two major Intermediate Milestones are mentioned as M1 & M2 in Chapter VI: Time Schedule of Vol IA Technical Conditions of Contract.
ii) In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.
iii) In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 2% of Executable Contract Value, will be withheld.
iv) In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 3% of Executable Contract Value, will be withheld.
v) Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.
vi) Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
vii) Final deduction towards LD (if applicable as per clause 2.7.9 above), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
viii) In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery.

* **Executable Contract Value** - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

8. **The following paragraph has been added in clause 2.7.1 under clause 2.7 "Rights of BHEL" of General Conditions of Contract (Volume-IC GCC)**

In case of inadequate manpower deployed by contractor, BHEL reserves the right to deploy additional manpower through any other agency for expediting activities in the interest of the project. Supplied manpower shall be put on job by the contractor and payments and other statutory compliances related to manpower shall be the contractor's responsibly. In case of contractor's failure to fulfil his

obligations in respect of such manpower, BHEL reserves the right to take necessary action as per contract conditions

9. **Delay in 1st submission of SDBG/ PBBG**: SDBG/ PBG is to be furnished by the vendor before start of work. No payment will be released till SDBG/PBG is submitted by the vendor.

However if requested by the vendor, cash recovery equivalent to SDBG/ PBG value to be made from the running bills submitted by the vendor. In such case, recovery of interest calculated @SBI PLR +2% on amount equivalent to SDBG/ PBG value to be made for the gap period (difference between date of start of work and date of submission of BG/ cash recovery).

10. **Compensation in case of Death/ Permanent Incapacitation of Person:** BHEL shall recover the amount of compensation paid to victim (s) by BHEL towards loss of life/ permanent disability due to an accident which is attributable to the negligence of contractor, agency or firm or any of its employee as detailed below:

a) Victim: Any person who suffers permanent disablement of dies in an accident as defined below.

b) Accident: Any death or permanent disability resulting solely and directly from any unintended and unforeseen injurious occurrence caused during the manufacturing/ operation and works incidental thereto at BHEL factories/ offices and precincts thereof, project execution, erection and commissioning, services, repairs and maintenance, trouble shooting, serving, overhaul, renovation and retrofitting, trial operation, performance guarantee testing undertaken by the company or during any works/ during working at BHEL Units/ Offices/ townships and premises/ Project sites.

c) Compensation in respect of each of the victims:
(ii) In the event of death or **permanent disability** resulting from **Loss of both limbs**: Rs 10,00,000/- (**Rs Ten Lakh**)
(iii) In the event of **other permanent disability**: Rs 7,00,000/- (**Rs Seven Lakh**)

d) Permanent Disablement: A disablement that is classified as a permanent total disablement under the proviso to Section 2(I) of the Employee's Compensation Act, 1923.

11. Acceptance of Bank Guarantee (BG)

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

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

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below:

State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank

HDFC Bank Ltd.
The Hongkond and Shanghai Banking Corporation Ltd
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that "**It is enforceable at Nagpur, Maharashtra**".

c. Any private sector banks, with a clause in the text of Bank Guarantee that "**It is enforceable by being presented at any branch of the bank**".

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

12. 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:

"**BHEL shall be resorting to Reverse Auction (RA)** (**Guidelines as available on www.bhel.com**) (http://www.bhel.com/vender_registration/pdf/Guidelines%20for%20Reverse%20Auction-2020.pdf) for this tender. RA shall be conducted among all the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

~~BHEL shall open the Sealed Envelope Price bid through conventional method (either in E-Procurement Portal or in Hard Copy method) of all the techno-commercially qualified bidders with applicable loading, if any and same shall be considered for their ranking.~~

Note-01:- *In case the tender is an e-tender and bids are submitted on e-procurement portal of BHEL → https://bhel.abcprocure.com, the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.*
Note-02: *No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com.*

13. Bidder to strictly follow all the necessary guidelines issued by Customer, District Magistrate, State Government and Central government to control Covid-19 outbreak.

14. **Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC**

15. "Towards compliance of Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 - Bidder shall submit duly filled & signed Annexure-9 along with their techno-commercial offer. In this connection, following may be noted:

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.

II. "Bidder" (including the term 'tenderer", 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms, or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this order means: -

a. An entity incorporated, established or registered in such a country; or
b. A subsidiary of an entity incorporated, established or registered in such a country; or
b. An entity substantially controlled through entities incorporated, established or registered in such a country; or
c. An entity whose beneficial owner is situated in such a country; or
d. An Indian (or other) agent of such an entity; or
e. A natural person who is a citizen of such a country; or
f. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above

IV. The beneficial owner for the purpose of (iii) above will be as under:

1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation-

a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent. of shares or capital or profits of the company;

b. "Control" shall include the right to appoint the majority of the directors or to control the management of policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;

2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical
person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who hold the position of senior managing official;
5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

However, in this regard, provision of Clause no 1.15.9 of GCC shall also be applicable

16. In continuation to Clause 1.x of NIT (Notice Inviting Tender) following are the broad terms and conditions of Pre-Bid meeting:

Schedule of Pre-Bid meeting through VC mode:

Monday, Nov 2, 2020 10:30 am | 2 hours | (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Meeting number: **170 699 5175**
Password: **02112020**

The organizations desirous of participating in the pre-bid meeting through VC mode are requested to indicate the same immediately to following officials:

1. Mr. Shivkesh Meena, Dy Manager (Purchase), Contact: 0712-2858-715/9049590486, email: svm@bhel.in,
2. Mr. P R Chiwarkar, AGM (Purchase), Contact: 0712-2858-633, email: prchiwarkar@bhel.in.

The technical details for joining the pre-bid meeting are given below. The organizations can also email their queries to the above email addresses so that the same could be taken up during the meeting scheduled for 2nd November, 2020.

Technical Details

1. Participants can get connected by using their Desktop / Laptop / Mobile Device etc., by clicking the below link and downloading the CISCO WEBEX app. Please ensure to use a good web-camera and microphone-cum-speaker. Your internet bandwidth should be 2 Mbps or above, in order to get a good quality audio-video.

   Please click the below link for joining the Pre-Bid Meeting -
   https://bhel.webex.com/bhel/j.php?MTID=m863c9c4c7eabd5aaff3df7929074238a

   Join by video system
   Dial 1706995175@bhel.webex.com
   You can also dial 210.4.202.4 and enter your meeting number.

   Join by phone
   +91-11-6480-0114 India Toll (Delhi)
   +91-80-6480-0114 India Toll (Bangalore)
   Access code: 170 699 5175

2. All the participants are requested to get connected atleast 20 minutes prior to the scheduled meeting time in order work through any potential technical or login issues prior to the meeting.

3. It is desired that participants will need both visual and audio connections for the meeting. **Please mute your phones** to minimize any additional background noise during the meeting.

4. When attendees are logging in to WebEx, they should include their Company name before their first name to help BHEL capture the participants.

5. It is requested that all the participants to keep their MICROPHONE Muted, when they are not supposed to be speaking or else it will disturbs the entire meeting.

6. Camera position should be in zoom out mode to cover maximum participants.

7. For any technical assistance, regarding the proposed VC meeting, kindly contact Mr. Shivkesh Meena / Dy Manager/ Purchase at 0712-2858-715/9049590486.

2318

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS LIMITED

TECHNICAL CONDITIONS OF CONTRACT (TCC)
INDEX

1. Project Information

The brief information of project is given below:

1.0	**Project Title**	
1.1	Project Name	1x660MW Bhusawal Thermal Power Station, Unit-6
1.2	Rating/Plant Capacity	1x660MW
1.3	Owner	Maharashtra State Power Generation Co. Ltd. (MAHAGENCO)
2.0	**Location and approaches**	
2.1	Plant Site Location	At-Deepnagar, Bhusawal, District-Jalgaon, Maharashtra State
2.2	Location Co-ordinate	75°51'10''East/21°02'30''North
2.3	Nearest Town/City	Bhusawal– 8Kms, Jalgaon- 30Kms, Dhule-115Kms
2.4	State Capitol	Mumbai
2.5	Nearest Railway Station	Bhusawal Junction– 8Kms
2.6	Nearest Airport	Aurangabad–170Kms, Mumbai–461Kms
2.7	Nearest Seaport	Mumbai–461Kms
2.8	Nearest Road Access	NH-6 (Mumbai-Nagpur Highway)
3.0	**Meteorological conditions**	
3.1	Site Elevation	210M above MSL
3.2	Ambient Temperature	
a	Mean of Daily Maximum Temperature	48.25°C (During May)
b	Mean of Daily Minimum Temperature	18°C (During January)
c	Wet Bulb Temperature	27°C (Maximum)
3.3	Annual Rainfall	112mm average annually
3.4	Wind Speed	0 to 39 Km/Hr
3.5	Wind Direction	East North East to West South West
3.6	Seismic Zone	Zone III as per IS:1893
4.0	**Plant Input Sources**	
4.1	Source of Coal	Machaakata Coal blocks in Orissa
4.2	Source of Water	Ozerkheda Reservoir 18Km from Site
4.3	Plant Land Area	108.94 Hectors near existing TPS
4.4	Ash Disposal Area	Ash Bund is at Velhala 12Kms from site

The Bidder shall visit site and get acquainted himself with the conditions prevailing at site before submission of the bid. The information given here in under are for general guidance and shall not be contractually binding on BHEL/ Owner. All relevant site data/information as may be necessary shall have to be obtained/ collected by the Bidder.

The scope of work shall comprise but not limited to the following:
(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

2.1 The scope of work for the package as follows:

Collection of materials from BHEL/Client's stores/Storage yard; Transportation to site; Inspection, preparation of foundation, erection, leveling, centering, alignment, grouting, welding, NDT, testing & commissioning, trial operation and handing over of the following:-

1. Main Turbine (HP, IP, LP) with all auxiliaries.
2. Generator and Auxiliaries.
3. Generator Stator - Unloading from trailer, placement on TG floor with the help of Portal Gantry crane.
4. Condenser with extraction steam piping and air extraction piping inside condenser, steam space up to condenser walls, Condenser water box handling arrangement.
5. Drive Turbine & Boiler Feed Pumps (BFP- 2 nos Turbo-driven & 2 nos Motor Driven).
6. Condensate Extraction Pumps (CEP).
7. Concrete Volute Pumps and internal Cooling Water Piping for CV Motor & CV Pump.
8. ACW, DMCW (TG&SG) pumps, Fire fighting pumps.
9. Other vertical and horizontal pumps such as boiler fill pumps, Cycle makeup pumps, DM water transfer pumps, Sump pumps, CT makeup Pumps, Ash water pumps, Raw water pumps, Potable water pumps-plants, potable water pumps-Colony, Service water pumps, APH/ESP wash water pumps, Intake water booster pumps, AHP pumps, FGD and SCR pumps, clarified water transfer pumps, boiler drain pumps, emergency hotwell make up pumps, Vaccum pumps, Condenser air evacuation pump etc
10. Gland Steam Condenser, Drain Cooler, LP Heaters, HP Heaters.

11. Condenser on load tube cleaning systems (COLTCS), Debris filter and self-cleaning strainers and its associated piping system.

12. Hoists, Single girder EOT cranes and chain pulley blocks.

13. Plate Type Heat Exchangers, Coolers, chemical dosing skids such as NaOH, Oxygen, Ammonia, Hydrazine etc.,

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

15. Turbine lube oil, governing oil, Generator seal oil system, gas system, Jacking oil system, control fluid system, Primary Water system, dirty/waste fluid system, chemical dosing system, Gland steam system-for main turbine and integral piping for drive turbines of BFPs/MD BFP, Turbine Governing System with Valves and their servomotors, LP Bypass System with Valves, servomotors and HPBP and LPBP oil piping including oil tanks and other systems equipment's as per scope alongwith valves, fittings, H&S & insulations.

16. TG Valves, root Valves, TIP valves, Valves pertaining to scope of Turbine integral piping/Generator integral piping/MD BFP/TD BFP integral piping/equipment erected by TG agency including ESV,IV, Overload Valve with servomotors.

17. Condenser Evacuation system for the condenser with integral piping and valves.

18. Various TG Piping systems as per relevant annexure including erection of valves, fittings.

19. MS, HRH Strainers, Coolers.

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

21. Setting and commissioning of governing system.

22. Flushing, cardboard blasting steam blowing/washing (except MS, HRH & CRH), acid prickling, hydro test related testing, pre-commissioning, commissioning activities of lube 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.

23. Grouting, painting of all equipment's along with supply of required materials, machineries and other resources as required to carry out the job.

24. Insulation of TG & Aux such as LP Heaters, HP Heaters, flash tanks, equipment erected by TG agency.

25. Operating platform (with grating, railing, toe guards and stairs) around the GSC, MOT Room, CFT Room, Flash tanks, Lube oil/ Control oil tanks, HP/LP Bypass valves, ESVS/IVS, TDBFP Oil skids, Suction strainer, CRH NRV, Local platforms for various inaccessible valves and equipments and Misc platform.

26. RE joints, butterfly valves, bellows.

27. The entire surplus, damaged, unused materials, drums, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the Contractor.

28. The Contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the Contractor. Decision of BHEL on this will be final and binding on the Contractor.

29. with integral piping, Galvanized pre fabricated exhaust support structure, exhaust piping and enclosure.

30. Erection and commissioning of all miscellaneous tanks of water/ oil/ steam /waste systems etc.

31. Erection and commissioning of HT and LT motors of the equipment and auxiliaries, greasing of these motors is in the scope of this contract.

32. Completion of punch points and assistance for handing over of unit to customer. Execution of all Mechanical jobs identified during OWNER Technical audits, check list of pre-commissioning and commissioning. Erection of additional supports required to restrain pipe movement avoiding interference with nearby structural / piping.

33. Unit trial operation of equipments, systems of Unit as a whole, resolving any deficiencies observed and handing over of Unit.

34. Assistance during PG testing of main equipment along with all auxiliaries, Supply of Manpower during PG Test for installing of Temp and Pressure gauge Sensors, Mounting of thermo-wells etc.

35. Obtain clearances and approvals from all applicable statutory / Government agencies e.g. IBR clearance for heaters (HP, LP heaters if required), Electrical Inspectorate for Generator and motors etc.

36. Installation of any necessary blind or additional valves to isolate lines to facilitate phased commissioning and start-up.

37. Dewatering inside Power house building / CW/CEP pit and TG building for equipment erection facilitating is in contractor scope, inclusive of providing de-watering pump.

Detail scope of work:

(A) STEAM TURBINE

1. High Pressure (HP), Intermediate Pressure (IP) and Low Pressure(LP) steam turbines complete with sole plates, foundation holding down bolts, bearing, bearing pedestals, rotors, couplings, steam gland seals, electric/hydraulic turning gear and hand barring gear.
2. Emergency stop (ESV) and control valves(CV), reheat stop, interceptor and control valves with their servomotors, steam strainers (including its housing & blanking arrangement) for main and reheat steam lines etc., LP bypass stop and control valves along with their servomotors
3. Electro–hydraulic governing system for the turbine including governing control rack, LP bypass control, rack, valve test devices and racks, turbine gland sealing system complete with converters, associated piping, valves and fittings, specialties, fire protection valves and devices, hangers and supports to make the system complete in all respects.
4. Lube Oil System consists of main oil tank, oil coolers, centrifuge, MOP, AOP, JOP, DC driven EOP, Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, connected oil piping, valves, H&S etc. The pumps with motors may be supplied in loose parts, contractor shall have to match /assemble and align at site as per instructions of BHEL Engineer including placement on foundation.
5. Control oil system: Governing system skids: Control oil pumps, control oil tank, filters, control oil purification system, Accumulators etc. HP governing consists of HPSU skids along with accessories and piping.

(B) GENERATOR

Hydrogen Cooled Main Generator Consisting of the following:

1. Stator
2. Rotor

3. End Shields & Bearing
4. Exciter with coolers, enclosures etc.
5. Seal Oil System
6. Primary Water System
7. H2 Cooling System
8. CO2 System
9. Seal Oil Tank
10. PW Tank & Alkaliser Unit
11. Generator package piping
12. Other Accessories

(C) CONDENSER: Mainly comprising of the following parts:

1. Bottom Plate
2. Hot Well
3. Turbine & generator End side plate
4. Dome Walls
5. Front & Rear Water Boxes with Tube Plates
6. Tube Support Plates
7. Springs/Bearings
8. Steam dump/Throw -off device
9. Air Extraction Pipe & Baffle
10. Stiffening/Support Pipes/Rods, Bars etc.
11. Misc Fittings & Loose items.
12. Condenser Tubes- (SS- 304, Approx. 35000 nos)

(D) AUXILIARIES

1. HP, LP & Unit Flash tanks, DM Water Tanks, Steam Drain tanks, FWSVD tanks, Oil Unloading Vessel and all other misc. tanks with equipment drains & vents, Platforms and stairs. The handling system for all auxiliaries as per site requirement will also have to be erected, within this contract.
2. Drain coolers along with fittings, piping, steam traps and gland steam condensers and air exhausters with motor and fittings, associated piping, hangers and supports etc. to make the system complete in all respects.
3. LP and HP heaters, fittings, group protection device, stand pipes along with fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects.
4. RE Joints , Butterfly valves with Actuators, Bellows, flanges, Blanks and tie rods and spool pieces, H&S etc. NDT requirements also to be met as per Drawing.
5. The erection of Self-cleaning strainers (SCS) along with its integral piping, panels, gauges etc. is also in the scope of the contract.

6. Turbine oil coolers, gland steam condenser, drain coolers, seal oil coolers, stand pipes and fittings including gauge glasses for level indication, safety valves etc. to make the equipment complete in all respects.
7. Oil strippers, strainers, oil injectors and duplex oil filters.
8. Coolers, Tank, Filters etc. of Control Fluid System.
9. Hydraulic coupling, working oil and lubricating oil coolers of Boiler feed pumps and governing systems and other accessories of TD-BFP.
10. Seal oil storage tank, seal oil unit, pre-chambers, gauge glasses along with stand pipes, gauge glasses for level indication etc. to make the system complete in all respects.
11. Hydrogen cooling system, nitrogen and carbon dioxide systems including H2 dryers, gas control units and gas stands, racks and distributors to make the system complete in all respects.
12. Exciter air cooler.
13. Turbine oil purification system consisting of clean oil storage tank, Main oil tank, dirty oil storage tank, central oil purifier, dirty & clean oil transfer pumps, drain oil return pumps, oil unloading vessel.
14. Temp controlled valve of Primary water system

(E) PUMPS & MOTORS:

1. TDBFP (2 Nos.)
2. MDBFP (02 Nos.)
3. Hydraulic coupling, HT Motor for MD BFP
4. Booster Pumps for BFPs
5. CEP (3 Nos.) along with motors
6. ACW and DMCW pumps (TG and SG)
7. Fire fighting pumps
8. Air evacuation pumps for each condenser, including priming pumps for maintaining condenser vacuum, along with motors and its accessories, internal piping to make the equipments complete in all respects.
9. A.C. and DC motor driven lubricating oil pumps including DC motors starters along with resistance box.
10. Seal oil pumps with drives and fittings to make the system complete in all respects.
11. HT Motors for BFP, ECW-TG/SG Pumps, ACW & other HT and LT Motors. The greasing, mounting of CTs including of the grease guns, testing kits.
12. The erection and commissioning of the actuators of this contract scope. The commissioning of actuators of valves erected in the TG and auxiliaries is also under this contract scope.
13. Lube Oil Piping, Working Oil & Cooling Systems & other Accessories for 03 nos BFPs –01 No motor driven and 02 No. turbine driven.

Boiler Feed Pumps (2 Motor Driven & 2 Turbo Driven)

a) 02 Drive Turbine for TD BFP Consists of :
- Turbine Assembly
- Governing Valve Assembly
- Oil Pumps
- Lube Oil Console
- Gear Box
- Connecting Couplings
- Connecting piping to condenser
- Oil Coolers etc.

b) 02 Nos MDBFP consists of:
- Motor for MD BFP
- Booster Pumps for BFP
- Lube Oil Piping,
- Cooling Systems & other Accessories for

(F) BOUGHT OUT ITEMS:

a. Turbine Integral Piping Consists of
- Lube Oil Piping
- Control Oil Piping
- Seal Oil Piping
- Gland Seal Piping
- Equipment Drains & Vents
- Cross around/over Piping
- Gas System Piping
- H2 Cooler piping (Haridwar supply scope) from including temp. control valve
- Turbine drainage piping.
- Condensate spray piping

The erection/commissioning of integral piping has to be completed in all respects by the contractor. It may also be required to erect Valves/control valves/Bellows/ steam-traps, fittings, Hanger & Supports etc. of PEM/Trichy scope for completion of the system, with no extra cost to BHEL.

b.
- Oil Centrifuge, Portable lube oil purification unit & Associated System
- CF Purification Unit with pumps, Vapour exhauster etc.
- 3 Way Control Valves
- Drain Valves
- Springs, Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP, ACW, DMCW, Drip pumps etc)
- Dampers
- Vacuum Breaker valve
- H2 & CO2 Cylinders, N2 Cylinders

- Bearing Vapour Exhauster
- Coupling Covers
- RE Joints & Stretching Bolt Assembly
- Flash Tanks and flash box
- Butterfly Valves – for TIP and as given in BOM
- ME Bellows – for TIP and as given in BOM
- LP dosing system equipment
- Other vertical and horizontal pumps: boiler fill pumps, Cycle makeup pumps, DM water transfer pumps, Sump pumps, CT makeup Pumps, Ash water pumps, Raw water pumps, Potable water pumps-plants, potable water pumps-Colony, Service water pumps, APH/ESP wash water pumps, Intake water booster pumps, AHP pumps, FGD and SCR pumps, clarified water transfer pumps, boiler drain pumps, emergency hotwell make up pumps, Vaccum pumps, Condenser air evacuation pump etc
- Control valves for TG integral piping scope
- Rotameter for TG integral piping scope

(G) PEM supplied Packages to erected & commissioned under this scope of work.

- Plate heat Exchangers (PHEs)
- Condenser on load tube cleaning system
- Simplex strainers, self cleaning strainer
- Sump pumps
- Electric hoists/single girder EOT Cranes and Chain Pulley Blocks Mono-rails of the above hoists/cranes. Pre commissioning test of hoists before erection with suitable temporary arrangement
- Lube Oil Pumps.
- Valves and other fittings of PEM scope which are required to complete integral piping.
- LP Chemical Dosing & oxygen dosing system Chemical dosing system such as NaOH, Oxygen, Ammonia, Hydrazine etc. with the integral piping of the skid.
- Erection of Butterfly valves of Drive Turbine exhaust
- Insulation for all rotating and static equipments, heaters, strainers, piping and other auxiliaries erected under this scope, except for insulation for equipments supplied by Haridwar for Turbine, ESV & IV Valves and integral piping etc.

(H) Concrete Volute Pumps (02 nos)

- Concrete volute pump - Pump Pull-out unit
- Motors for concrete volute pumps
- Cooling water piping for Pumps and motors

(I) DG Set (02 nos of 1750KVA and 01 set of 500KVA)

- Preparation of foundation (like chipping), erection, and placement in position, levelling, grouting, alignment and completion etc of DG set, Fuel day tank, exhaust support structure.
- Internal fuel oil piping and complete exhaust piping completion along silencers, pipe supports, with bellows, flanges and accessories, including insulation and aluminium cladding upto entire length of the pipe and painting
- Assistance in trial run and commissioning of DG sets.

2.2 The quantities indicated above are approximate and are liable for variation and alteration at the discretion of BHEL
The item details and its weights under this scope of work indicated in the Chapter-IX "ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN SCOPE OF WORK (BOQ)" are approximate and these are subject to change as per site conditions.
The information furnished is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components/ items / systems according to the site requirements/ customer requirements to complete various systems in all respects. Any other systems / components which are integral to equipment supplied by the manufacturing units shall also be erected and commissioned by the contractor within the quoted/accepted Lump sum rate. No additional payment shall be made towards any variation in weights and quantities for such systems.

2.3 Supervisors / Engineers, consumables etc., required for the scope of work shall be provided by the contractor. All the expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies.

2.4 It shall be specially noted that, the contractor may have to work round the clock (24x7) to achieve the completion schedules / plans / targets during the entire course of erection, testing and commissioning works, which may involve payment of considerable overtime. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including labours, engineers / supervisors, T&Ps etc.

2.5 The terminal points can be inferred from the relevant drawings and any further clarifications can be obtained / decided by BHEL and that is final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals. Carrying out work as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL

Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.

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

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

2.8 The storage yard is located inside the Main Plant Boundary at a distance of approximately 1-2 KM from the location of Turbine area. All materials have to be transported from storage yard to construction area by the contractor at his own cost.

2.9 During the course of erection, testing and commissioning, certain rework / modification / rectification / repairs / fabrication etc will be necessary on account of feedback/revision from various relevant sources, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repairs etc promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours etc shall be maintained by the contractor and got signed by BHEL engineer every day. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.

2.10 The scope of work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management and green belt management. The contractor should ensure successful and timely completion of the work. The contractor 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.

The manpower deployment identified by contractor shall match with above scope of works.

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

Sl.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**			
a	Single point source (of Voltage 415 V**,** A.C.,3 Phase , 50 Hz)	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only tentative, 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	

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	**Electricity for the office, stores, canteen etc of the bidder**			
a	Single point source	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	**Electricity for living accommodation of the bidder's staff, engineers, supervisors etc**			
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:**			
a	Making the water available at single point	**Yes**		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
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.**			

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Making the water available at single point	Yes		FREE (however any taxes, duties, levy etc. as charged by customer, shall be paid by contractor.) At a distance of 1000 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	**Water supply for Living Purpose**			
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	Telephone, fax, internet, wi-fi, e-mail services etc		Yes	
3.6.0	**COMPRESSED AIR wherever required for the work**		**Yes**	

Sl.No	Description PART I	Scope / to be taken care by		*Remarks*
		BHEL	**Bidder**	
a	Supply of Compressor and all other equipments required for compressor & compressed air system including pipes, valves, storage systems etc		Yes	
b	Installation of above system and operation & maintenance of the same		Yes	
c	Supply of the all the consumables for the above system during the contract period		Yes	
3.7.0	**Demobilization of all the above facilities**		**YES**	
3.8.1	**TRANSPORTATION**			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	
3.8.2	**Other**			
a	Adequate water less urinal for both male & female and toilet facilities		Yes	

Sl. No	Description PART II	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9	**ERECTION FACILITIES**			
3.9.1	**Engineering works for construction:**			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		Yes	In consultation with BHEL

Sl. No	Description PART II	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9	**ERECTION FACILITIES**			
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 SL No. e		Yes	In consultation with BHEL
h	Daily erection / work plan based on SL No. g		Yes	In consultation with BHEL
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Arranging the materials required for preassembly		Yes	

3.10 ELECTRICITY:

3.10.1 The construction power (415V) will be provided at a single point for construction purpose only at free of any charges and the further distribution is to be arranged by the bidder at his cost. Construction power shall be provided from the nearest Substation / tapping point at a distance of approx.1000 M from site. The distance is only estimated, it may vary upto an extent depending on site condition.

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

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

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

3.10.5 Necessary "Capacitor Banks" to improve the Power factor to a minimum of 0.8 shall be provided by the contractor at his cost. Penalty if any levied by customer on this account will be recovered from contractor's bills.

3.10.6 Although the Electricity is free for construction, the same shall be used sparingly. Taxes, duties, levy etc. as charged by MSPGCL, shall be paid by contractor, if any. Details of Electricity units consumed shall be submitted to BHEL office every month for records.

3.10.7 The MSPGCL tariff and tax may vary from time to time. The required Energy meter for measuring the consumption shall be provided and installed by the contractor. Any dispute regarding consumption, the BHEL engineer's decision shall be final & binding to the contractor. The contractor shall make his own arrangement for further distribution with necessary isolator/LCB etc.

3.10.8 The required energy meter for measuring power consumption shall be arranged by the contractor and taken care by the contractor.

3.10.9 Contractor has to make his own arrangements for his electricity requirement for his labour colony at his cost.

3.10.10 As there are bound to be interruptions in regular power supply, power cut/load shedding in any construction sites, contractor should make his own arrangement for alternative source of power supply through deployment of adequate number of DG sets at their cost during the power breakdown /failure to get urgent and important work to go on without interruptions. No separate payment shall be made for this contingency

3.11 CONSTRUCTION WATER

3.11.1 The construction water will be provided at a single point for construction purpose only, at free of any charges. The further distribution is to be arranged

by the bidder at his cost. Construction water shall be provided at a distance of 1000 M from site. Distance is only estimated, it may vary upto an extent depending on site condition.

3.11.2 The required water meter for measuring the consumption shall be provided and installed by the contractor. All materials required for further distribution of water like pipes, pumps and accessories, tanks etc shall be arranged by the contractor at their cost. BHEL is not responsible for any loss or damage to the contractor's equipment due to any reason. Any dispute regarding water consumption and distribution, the BHEL engineer decision will be final and binding.

3.11.3 Although the construction water is free, the same shall be used sparingly. Taxes, duties, levy etc. as charged by MSPGCL, shall be paid by contractor, if any. Any duty, deposit involved in getting the Water shall be borne by the bidder

3.11.4 In case of non-availability of water, the contractor shall make his own arrangements of water suitable for construction purpose to have uninterrupted work. No separate payment shall be made, for any contingency water arrangement made by contractor, due to delay / failure for providing water supply. Contractor has to make his own arrangements for his water requirement for his labour colony at his cost.

3.12 POTABLE/DRINKING WATER

3.12.1 The potable/drinking water will be provided at a single point at free of any charges. The further distribution is to be arranged by the bidder at his cost. potable/drinking water shall be provided at a distance of 1000 M from site. Distance is only estimated, it may vary upto an extent depending on site condition.

3.12.2 All materials required for further distribution of water like pipes, pumps and accessories, tanks etc shall be arranged by the contractor at their cost. BHEL is not responsible for any loss or damage to the contractor's equipment due to any reason. Any dispute regarding water consumption and distribution, the BHEL engineer decision will be final and binding.

3.12.3 Although the potable/drinking water is free, the same shall be used sparingly. Taxes, duties, levy etc. as charged by MSPGCL, shall be paid by contractor, if any. Any duty, deposit involved in getting the Water shall be borne by the bidder

3.12.4 In case of non-availability of water, the contractor shall make his own arrangements of water suitable for drinking purpose to have uninterrupted work. No separate payment shall be made, for any contingency water arrangement made by contractor, due to delay / failure for providing water

supply. Contractor has to make his own arrangements for his water requirement for his labour colony at his cost.

3.13 ONLINE SITE CONSTRUCTION MANAGEMENT SYSTEM (SCMS):

3.13.1 The bidder will have to supply and install 02 Nos. of PCs, 01 printer and accessories along with one operator per PC with power backup, for the online material management system, reporting of daily progress, billing and other similar activities pertaining to contractor's scope of work. PCs & printers are to be installed at places as per instruction of BHEL Engineer.

Computers shall have minimum configuration multimedia PC work station Core i3/i5,1 GHZ or above, 320 GB HDD, 4 GB RAM, 100 MBPS LAN card of DELL/HP/ASUS or equivalent make with window 10 O/S with required accessories like mouse, keyboard, UPS and required software like MS Office 2010 Professional, AutoCAD 2011, ADOBE PDF CREATOR (version 8.0) with one laser jet printer compatible for A4 and A3 size printing (ink/ cartridge for which to be supplied as and when required, (the consumption may be assumed as 1 cartridge per month).

3.13.2 These computers/ printers & accessories shall remain contractor's property/ ownership for all legal/technical purposes. However, contractor will be allowed to take out the same after completion of the site works as per instruction of BHEL Engineer.

3.14 CONSUMABLES:

3.14.1 The contractor shall provide all consumables required for carrying out the work covered under these specifications excepting those which are specifically indicated as BHEL scope. TG special consumables like hylomar / golden hermetite / stag-b / molykote/ anabond compounds / rubber fixing compounds etc. will have to be arranged by the contractor.

3.14.2 All the required 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, suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

3.14.3 The contractor shall provide within finally accepted price / rates, all consumables like soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc required for temporary works such as supports, scaffoldings, bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work, except those which are specifically supplied by manufacturing unit, are also to be arranged by him.

3.14.4 All the shims, gaskets and packing, which go finally as part of equipment, shall be supplied by BHEL free of cost. 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.

Note: List of approved vendors attached in: Chapter-XXII Approved welding electrode supplier

3.15 MATERIAL SUPPLY:

BHEL will supply the materials / equipments indicated in the weight schedule Chapter-IX from their respective manufacturing units which are to be executed / incorporated in the permanent system. In addition, the material such as lube oil, grease required for commissioning the erected equipments and chemicals required for chemical cleaning of equipments will be supplied free of cost by BHEL.

3.16 LIGHTING FACILITY:

Adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, pre assembly yard and contractor's material storage area etc. at his cost.

3.17 GASES:

3.17.1 All the required gases like Argon, Oxygen, Acetylene etc including Nitrogen gas for purging of Generator stator water system required for work shall be arranged by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non availability of gases cannot be considered as reason for not attaining the required progress. BHEL

reserves the right to reject the use of any gas in case required purity is not maintained.

3.17.2 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

3.17.3 The contractor shall ensure safe keeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

3.17.4 BHEL reserves the right to reject the use of any gas in case required purity is not maintained.

3.18 ELECTRODES SUPPLY AND STORAGE

3.18.1 The bidder shall use the BHEL / Customer approved quality welding electrodes only.

3.18.2 It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding suppliers, type of electrodes etc. On receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.

3.18.3 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.

3.18.1 Shortage of any of the electrodes or the equivalent suggested by BHEL shall not be quoted as reason for deficiency in progress or for additional rate.

3.18.2 Storage of electrodes shall be done in an air conditioned / controlled humidity room as per requirement, at his own cost by the contractor.

3.18.3 All low hydrogen electrodes shall be baked / dried in the electrode drying oven (range 375 deg. C - 425 deg. C) to the temperature and period specified by the BHEL Engineer before they are used in erection work and each welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by contractor at his cost.

3.18.4 In case of improper arrangement of procurement of above electrodes BHEL reserves the right to procure the same from any source and recover the cost from the contractor's first subsequent bills at market value plus departmental charges

of BHEL communicated from time to time. Postponement of such recovery is not permitted.

3.18.5 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, date expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

3.19 OTHER FACILITIES

3.19.1 Adequate water less urinals (male & female both) shall be arranged by the contractor within quoted rates, at site of construction at different level and different areas of works with proper disposal arrangement.

3.19.2 Vendors have to comply requirements of HSE & Statutory requirement in line with BHEL HSE plan, MSPGCL Safety requirement, Maharashtra/Central statutory requirement.

3.19.3 Vendors have to arrange labour rest sheds, drinking water facility, toilets, canteen facility as per local labour act/BOCW act. Maintaining hygiene and disposal of debris, scraps, canteen items and area cleaning is included in vendor's scope.

3.19.4 Agency has to arrange trained scaffolding experts with accreditation from statutory agencies with proper experience and they will issue fitness certificates for safe use. Such kind of qualified scaffolding experts will vary as per job requirement. At the same time, training has to be given by these experts at regular intervals for their own workers for increasing no. of experts.

3.19.5 Agencies HSE officers should have sufficient experience as per rule 209 of Bocw act central rule 1998. Agencies HSE officers will be part of BHEL HSE Team and they will be responsible for giving training on HSE issues in addition to normal field works and other normal site requirements.

3.19.6 Preparation of method statement, HIRA, Job Safety analysis, permit to work, Lifting plans, and all supporting documents as required for starting & continuation of work/job is in vendor's scope.

3.19.7 First aid facilities shall be maintained by contractor at no. of working places as required as per instruction of BHEL Engineer. The basic medical facility will also be maintained by BHEL at site and the cost of the same will be proportionately recovered from BHEL subagencies/vendors working at site on monthly basis.

3.19.8 Vendor has to arrange land within his quoted rate for making labour colony. Vendors labour colony has to be maintained with proper hygiene, drinking water, bathroom water, lighting arrangement, sewerage system. These facilities are to be regularly maintained including drains, surrounding, upkeepment of labour

colony. BHEL/Cutomer & local statutory authorities will visit labour colony from time to time and all healthy conditions are to be maintained by vendor.

3.19.9 Scaffolding pipes, clamps, safety nets, floor grills for working platforms are to be made of good quality with proper certifications as per IS Codes.

3.20 DEWATERING:

Contractor shall ensure at all times that the work area & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. All equipments/materials required for dewatering such as pumps, pipes and accessories shall be arranged by the contractor. No separate claim in this regard shall be admitted by BHEL.

3.21 SITE ORGANISATION

3.21.1 The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL:

i. Overall planning, monitoring & control.
ii. Quality control and quality assurance.
iii. Materials management.
iv. Safety, fire & security.
v. Industrial relations and fulfilment of labour laws and other statutory obligations.

3.21.2 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent Construction Manager having sufficient authority to take decisions at site.

3.21.3 The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

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4.1 The following minimum major Tools & Plants (T&P) shall be arranged by the Contractor for execution of work as per Technical Conditions of Contract of this tender within the quoted rate.

4.1.1 List of major Tools & Plants (T&P)			
S.N.	DESCRIPITION	MINIMUM CAPACITY	MINIMUM QUANTITY
1	MOBILE CRANE	40MT	AS PER REQUIREMENT
2	TYRE MOUNTED MOBILE CRANES	16/18 MT	2 NOs
3	TRAILER WITH PULLING UNIT	30 TON	2 NOs
4	LOW BED TRAILER/HYDRAULIC TRAILER WITH PULLING UNIT**	AS PER REQUIREMENT	AS PER REQUIREMENT
	**The scope of shifting of material is in the scope of Contractor. Contractor has to arrange for the trailer of appropriate capacity, as per the requirement of shifting of the material from stores/Yard/ place of unloading, with no extra cost to BHEL. The trailers are to be arranged as per BHEL requirement, in addition to the trailers with pulling unit at site.		
5	WELDING GENERATOR SETS	-	AS PER REQUIREMENT
6	3-PHASE COMPLETE SET UP FOR DRAWAL OF POWER	-	-DO-
7	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER	-	-DO-
8	TIG WELDING SET	-	-DO-
9	STRESS RELIEVING EQUIPMENT WITH TEMPERATURE RECORDERS	-	-DO-
10	ELECTRICAL BAKING OVEN – BIG	-	-DO-
11	ELECTRODE BAKING OVEN – PORTABLE	-	-DO-
12	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	-	-DO-
13	VACUUM CLEANER (INDUSTRIAL)	-	-DO-
14	PIPE CUTTING AND BEVELLING MACHINE	-	-DO-
15	PIPE BENDING M/C	ELECTRIC/ ELECTRO - HYDRAULIC - UPTO 4" SIZE	-DO-
16	AIR COMPRESSOR	120 CFM	01 NO
17	STEP DOWN TRANSFORMER	230V/24V	AS PER REQUIREMENT
18	CONDENSER TUBE EXPANDER SET	-	DO
19	ELECTRICALLY OPERATED WINCHES	3T/5T	DO
20	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)	-	DO
21	**HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE, CONDENSER AND GENERATOR :**		
	A) - JACKS (WITH HAND OPERATED PUMPS)	100 MT	06 NOS.
	B) - JACKS (WITH HAND OPERATED PUMPS)	50 MT	06 NOS.

	GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :		
	A) - JACKS (HAVING BROAD BASE ONE INCH LIFT)	100 MT	06 NOS.
	B) - JACKS (WITH 4-6 INCH LIFT , FOR GEN. END SHIELDS)	63 MT	04 NOS.
	C) - LONG HIGH PRESSURE HOSES (FOR GENERATOR ALIGNMENT)		12 NOS.
ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.			
21	TORQUE WRENCH	0 TO 200 N-M	02 NO.
22	TORQUE WRENCH	UPTO 2000 N-M	02 NO.
23	SLINGS FOR LP TURBINE ROTOR		01 SET
24	SLINGS FOR HP TURBINE MODULE		01 SET
25	SLINGS FOR GENERATOR ROTOR		01 SET
26	BOLT STRETCHING DEVICE (FOR TURBINE & GENERATOR FOUNDATION BOLTS)		AS PER REQUIREMENT
27	LONG FEELER GAUGE SET		AS PER REQUIREMENT
28	SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT
29	HYDRAULIC TEST PUMPS, HAND PUMP AND FILL PUMPS	For testing LP lines	AS PER REQUIREMENT
30	Tube/ Pipe chamfering machine		AS PER REQUIREMENT
31	Profile making M/C		AS PER REQUIREMENT
32	Nibbling M/C		AS PER REQUIREMENT
33	Shearing M/C		AS PER REQUIREMENT
34	Portable grinding M/C		AS PER REQUIREMENT
35	Portable drilling M/C		AS PER REQUIREMENT
36	Chain Pulley blocks		AS PER REQUIREMENT
37	Scaffolding pipes		AS PER REQUIREMENT
38	Ultra sonic testing set		AS PER REQUIREMENT
39	Surface plate	Grade 1,2,3	AS PER REQUIREMENT
40	DFT measurement (Elcometer)		AS PER REQUIREMENT
41	Tools for Reaming and Honing		AS PER REQUIREMENT
42	Gas Cutting Sets		AS PER REQUIREMENT

4.1.2 List of suggestive safety Equipments/PPEs to be included in List of minimum T&P:		
SN	**DESCRIPTION**	**Capacity & Qty (Minimum)**
1.	Safety Net (Conforming IS 11057:1984) Safety Net (Net Size: 10m x 5m, Mesh Size: 25 mm, Mesh Rope: 2mm double cord, Border/Tie Cord: 12mm diameter polypropylene rope (tested as per IS: 5175).Two metres length shall be provided at all four corners.	As required
2.	Fall Arrester 'Rope grab fall arrester' & anchorage line. Anchorage Line: 14mm- 16 mm diameter, three strand twisted Polyamide rope. Rope Grab fall arrester: Openable & Guided type Fall Arrestor (on flexible line) conforming EN 353-2 & works on 14-16 mm diameter polyamide rope. Material: Nickel Chrome plated Steel Connector: Karbiner conforming to EN 362 (Minimum Strength 22 KN), material: Steel	As required As required As required
3.	**Horizontal life line** Stainless Steel Wire rope of 8mm diameter. Minimum six nos. of steel U-bolt clips are required for clamping each wire rope to a rigid support (03 nos. of U-bolt clips at each end).	As required

4.2 **MEASURING AND MONITORING DEVICES (MMD):**

As per requirement to be finalized at site, shall meet the requirements as per field quality plan and other erection, testing related activities.

NOTE:

1. All above T&Ps are to be deployed by contractor as and when required as per instruction of BHEL engineer. If works gets delayed due to non-availability of above T&Ps, BHEL reserves the right to deploy the same and recover the charges thereof from the contractor as per prevailing market rate/hiring rate/BHEL internal hiring rates + Applicable overhead rates.

2. This above list of T&Ps 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.

3. **Hydras are not permitted for material handling. Contractor shall deploy and use pick & carry crane of TRX or equivalent type only for the above purpose.**

4. Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work.

5. Necessary electrical / water / air connection required for operation of any of the tools & tackles shall be to Contractor‘s account.

6. Contractor has to submit the Calibration certificates of all the precision Equipement to BHEL. BHEL may ask for recalibration of the MMEs /precision equipments for ensuring quality of work. Contractor must reascertain/ recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration/ deployment.

7. 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

8. Any T&Ps, Cranes, Slings, D-shackles and other lifting tackles, Trailers (Low bed and normal) required for shifting of material from store to site shall be arranged by contractor over and above T&Ps/ crane provided by BHEL.

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

10. T&P and the mobilization shown in the above mentioned list is suggestive requirement considering parallel working in Main plant structural area. Mobilization schedule as mutually agreed at site for major T&Ps, have to be adhered to. Numbers / time of requirement will be reviewed time to time at site and contractor will provide required T&P / equipments to ensure completion of entire work within schedule / target date of completion without any additional financial implication to BHEL. Vendor will give advance intimation & certification regarding capacity etc. prior to dispatch of heavy equipments. Also on completion of the respective activity, demobilization of T&P in total or in part can be done with the

due approval of engineer in charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.

11. 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.

12. In the event of need of change of type of any of major T&Ps, approval shall be taken from BHEL Engineer in-charge prior to mobilization. The decision of Number of T&P required due to replacing the enlisted T&P as per above table, shall be taken after analyzing the production capacity and suitability of both the T&Ps.

13. The contractor shall submit the valid test certificate/calibration certificates for all the T&Ps before put into actual use at site. The certificates shall be renewed time to time as instructed by BHEL Engineer.

14. Crane operators deployed by the contractor shall have valid license for operation of cranes.

15. The above list is only indicative and these T&Ps may not be required for entire contract period but contractor shall ensure the availability of the T&Ps as per work requirement and T&P Deployment schedule. T&P Deployment schedule shall be finalized at site in consultation with BHEL Engineer based on the work fronts/work requirement. BHEL decision shall be final and binding regarding the T&P deployment schedule. Contractor shall mobilize / maintain the T&P's as per the deployment schedule notified time to time by BHEL Engineer.

16. Apart from above mentioned T&P, any additional item required for proper execution of scope of work, contractor has to arrange such T&P within quoted rate as instructed by BHEL Engineer. Deployment schedule of such T&Ps shall be maintained as per the instruction of BHEL Engineer.

17. T&P's mentioned above shall be specifically deploy as per the respective works. However, as per work requirement and availability of T&Ps the inter use in Material Handling and Mechanical works may be permitted as per the instruction of the BHEL Engineer.

18. Any of the T&Ps deployed by the contractor, will be released from site during contract period / extended period only after completion of work for which the particular T&Ps was envisaged. The written permission shall be taken by contractor from BHEL Construction Manager for releasing the T&Ps.

19. In the eventuality of contractor not deploying cranes / abnormal down time of cranes in his scope during the period specified above, and BHEL arranges for the same [either BHEL's own cranes / hired cranes], prevailing BHEL Corporate Crane hire charges (may vary from time to time) shall be recovered from the contractor's running bills. Corresponding pages of Corporate Crane hire charges are enclosed in "**Chapter XXI- BHEL T&P Hire Charges**". (Please note that these charges are as valid up to May 31, 2021 and may get revised further).

20. The loading, unloading and transportation of contractors T&Ps shall be in the scope of contractor. All necessary items such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor at his own cost.

21. The contractor has to furnish a list of Tools and plants including cranes / tractors / trailers / trucks etc. which he proposes to be deployed for this work.

22. The contractor shall arrange crane operator, diesel, petrol and other consumables required for the tools and plants, equipments etc. Preventive and routine maintenance of T & P are also to be arranged by the contractor at his cost without any delay. Required number of experienced mechanics and helpers for routine maintenance of the above cranes shall be arranged by the contractor within his quoted rate.

5.1 LIST OF T&P TO BE PROVIDED BY BHEL FREE OF HIRE CHARGES ON SHARING BASIS:

SN	DESCRIPTION & CAPACITY OF T&P	QUANTITY IN NOS	PURPOSE
01	Crawler Cranes	As decided by BHEL	All cranes (except Contractor scope) required for mentioned work will be arranged by BHEL as per requirement.
02	EOT crane in TG Hall (170/30 MT) without Operator	2	For handling and erection within TG hall on sharing basis as available and subject to their accessibility and approachability.
03	Portal Gantry crane 360T without operator	1	For Generator Stator
05	Suitable crane for erection and dismantling of Portal Gantry Crane	As required	For erection and dismantling of Portal Gantry Crane
06	Hydro test pump (400 – 600 kg/cm2 for HP lines) with accessories	1	HT of HP lines

5.2 All the T&Ps mentioned in clause 5.1 above shall be given to contractor on sharable basis and the allotment is made by BHEL on need basis. Contractor shall plan activities well in advance and inform BHEL Engineer in charge/ Construction Manager the date of actual use. The decision of BHEL Engineer in-charge/CM on this will be final and binding.

5.3 Contractor shall transport from BHEL stores, install, operate, carry out maintenance, dismantle after use and return to BHEL stores all T&Ps mentioned in Sr no 5.1 for his use.

5.4 **For Crawler Crane**:

1. The cranes may be BHEL owned or may be obtained on hiring basis including operating and maintenance crew.
2. Operator and O&M for BHEL owned crane will be provided by BHEL.
3. Operator and O&M for hired crane will be provided by the hiring agency.

4. Contractor shall provide the fuel for BHEL provided cranes (Hired/owned) for his use. Lubricants for crane (hired/owned) shall be provided by the BHEL.
5. Contractor shall provide necessary manpower assistance for initial and final assembly & dismantling and for subsequent operations of boom extension and reduction during execution of work. Contractor shall also make necessary arrangements like laying of special sleeper beds and steel plates (**sleepers for BHEL owned/hired cranes shall be provided by the BHEL)** for movement of the crane.
6. Cranes provided by BHEL will be on sharing basis with other agencies / contractors of BHEL. The allocation of cranes shall be the discretion of BHEL engineer, which shall be binding on the contractor. Cranes will be deployed at appropriate time as decided by BHEL for suitable duration and intended purpose. Augmentation of BHEL T & P under special circumstances shall be discretion of BHEL
7. The cranes mentioned at Sl. No. 1 shall be provided as per requirement on sharing basis for loading of HP Turbine, IP rotor, LP rotor, LP Inner casings, IP Outer casings, HP heaters, motors, valves and other heavy components. The types of cranes shall be allotted after seeing the actual load requirement. The cranes shall be issued for the purpose of loading of heavier equipment from BHEL stores/ yard/ other site locations where 40MT crane (Contractors scope) is not suitable, at the discretion of the BHEL Engineer.

5.5 **Hydraulic pump:** Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.

5.6 EOT Crane:

1. EOT cranes shall be provided to the contractor on sharable basis as per instruction of BHEL Engineer. Experienced EOT crane-operators are to be arranged in shifts by the contractor within the quoted rates. Contractor has to plan the activities on item wise where the EOT crane is required to be used and submit to BHEL site for approval. In case the erection can be carried out by using other T&Ps, contractor shall make his own arrangement. The decision of BHEL Site in-charge on this will be final and binding.
2. The availability of EOT crane is likely to be hampered from time to time due to routine preventive maintenance or breakdown maintenance. Contractor has to make alternative arrangement or plan / modify / alter his activities to suit the above

conditions and the contractor will not be liable for any compensation or extension of time due to this non availability, for maintaining the erection schedule.

3. Providing required manpower assistance for moving the trailing cable of EOT Crane is included in the scope of this contract.
4. Experienced Crane operator for EOT crane shall be arranged by the bidder within the quoted rate / price. Crane operators deployed by the contractor shall be tested by BHEL before he is allowed to operate the cranes.
5. The contractor shall extend the services of his operator to other agencies on mutually agreed mode of cost sharing as per site requirement.

5.7 Portal Crane:

1. Portal Gantry Crane will be issued in parts / components and are to be assembled at site by the contractor as per the instruction of the BHEL Engineers / Installation manual. The scope includes receipt of the materials from BHEL store, transporting to site, servicing of components / drives / pulleys etc., checking, lubricating wire ropes / drives, assembly, preparation of foundation & erection, cabling, pre commissioning and commissioning of drives, load testing / overload protection, etc., It is also the responsibility of the contractor to provide a qualified / experienced/ licensed operator within the quoted rate. As soon as the erection of Generator Stator is over, the crane has to be dismantled by the contractor, in the sequence as instructed by BHEL, apply preservatives / touch-up paints wherever required and return the same to store in a good condition. Required consumables, manpower (skilled/unskilled), T&Ps including gas, welding M/c etc shall be provided by the contractor.
2. The following facilities will be provided by BHEL.
   a. A suitable mobile crane for erection & dismantling of the portal crane on free of hire charges
   b. Lubricants for drives & wire rope.
   c. Supervision for servicing/assembly/commissioning
   d. Required Loads for testing.

5.8 The contractor at his cost shall arrange for grouting of anchor points of T&Ps issued to him. Necessary grout materials are to be arranged by the contractor at his cost.

5.9 The day-to-day and routine maintenance including replacement of spares for the BHEL T&Ps will be carried out by the contractor at his own cost. However, BHEL shall supply spare parts free of charges for normal wear and tear only.

5.10 Any loss/damage of tools by the contractor shall have to be replaced or otherwise cost thereof shall be recovered from the contractor.

6. TIME SCHEDULE & MOBILIZATION

6.1 INITIAL MOBILIZATION

After receipt of fax/Email LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall reach site, make his site establishment and be ready to commence the erection work within 15 days from the date of issue of Letter of Intent or as per the directions of Construction Manager/ Project Manager of BHEL. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

6.2 MOBILIZATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.

The activities for erection, testing etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1) as per requirement to commence the work of erection, testing etc. of TG and auxiliaries and progressively augment the resources to match schedule of the project.

6.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on its designated foundation/location/temporary bed, 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. The date of Start of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer is final.

Based on the availability of civil foundations from BHEL 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	SCHEDULE
1	CONDENSOR ERECTION START	1ST MONTH
2	TG ERECTION START	2ND MONTH
3	TURBINE BOX UP	12TH MONTH

S.No	ACTIVITY	SCHEDULE
4	COMPLETION OF OIL FLUSHING	14TH MONTH
5	BARRING GEAR	14TH MONTH
6	SYNCHRONISATION WITH OIL	16TH MONTH
7	COAL FIRING ON ACHIEVING COMMG OF CHP & AHP	17TH MONTH
8	COMPLETION OF TRIAL OPERATION	18TH MONTH (By 31.05.2022 as per current L2 schedule)
9	COMPLETION OF PENDING POINTS/ALL OTHER OBLIGATIONS AND CLOSURE OF CONTRACT	20th MONTH

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

6.4 CONTRACT PERIOD

The contract period for completion of entire work under scope of this packages shall be **20 (Twenty) months** from the "START OF CONTRACT PERIOD" as specified earlier for completion of the entire work.

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

The contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over & chipping of foundations, start of preassembly, Material transportation for yard 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.

6.5 PROVISION OF PENALTY IN CASE OF SLIPPAGE OF INTERMEDIATE MILESTONES:

In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 hereunder, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.

Milestones	Activities	To be completed by
M1	TURBINE BOX UP	12TH MONTH
M2	BARRING GEAR	14TH MONTH

Note 1: Refer clause no 7.0 of ANNEXURE-11 IMPORTANT INFORMATION of the NIT regarding modalities against provision of penalty in case of slippage of Intermediate Milestones.

Note 2:

1. In order to meet above schedule in general, and any other intermediate targets set, to meet customer/project schedule, contractor shall arrange & augment all necessary resources from time to time as per the instructions of BHEL.
2. In case the activities in the schedule are to be advanced, the related activities in the scope of the contractor are to be advanced to meet the project requirement. No extra payment whatsoever shall be paid on this account.
3. The contractor shall submit area-wise L3 schedule within 7 days in consultation with BHEL. The detailed L3 schedule shall be approved by BHEL and same shall be implemented. Bidder shall submit L3 schedule in MS Projects to meet the agreed project schedule covering various mile stone activities and their split up details such as mobilization, procurement of materials, fabrication & erection activities. This schedule shall also clearly indicate the interface facilities / inputs applicable in each package.

7. Terms of payment

7.1 BHEL Engineer will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

7.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

7.3 Subject to any deduction, which BHEL may be authorized to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder.

7.3.1 PROGRESSIVE PAYMENT ON PRORATA BASIS

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscellaneous items (6)	Integral ppg (7)
	Overall weightage for each area out of lumpsum value quoted for stg	**22%**	**18%**	**12%**	**18%**	**6%**	**15%**	**9%**
I	**Pro rata payments (85%)**							
1	**Condenser (22%)**							
1.1	**Preparation of foundation**	**2.00**			--			--
1.2	**Placement, alignment, assembly and welding of bottom plate segments, hot well, ndt and spring elements placement on foundation /temporary bed**	**10.00**			--			--
1.2.1	Placement of bottom plates	0.50						
1.2.2	Alignment & welding of bottom plate	1.50						
1.2.3	Ndt of bottom plate	1.00						
1.2.4	Assembly of hot well	1.00						
1.2.5	Welding of hotwell with bottom plate and ndt	1.00						
1.2.6	Placement of spring elements	1.00						
1.2.7	Spring assembly stitch welding. Visual check of weld, dpt of fillet weld	1.00						
1.2.8	Bottom plate placement & alignment. Level & alignment of bottom plate w.r.t turbine axis	1.00						
1.2.9	Packer plate final grouting	2.00						
1.3	**Assembly and positioning of water chamber, side plates, bottom plates, welding and ndt**	**11.00**		--	--			--

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
1.3.1	Cleaning & pre- assembly of water chamber and welding of joining plate	3.00						
1.3.2	Erection, leveling and alignment of water chamber at both end	2.00						
1.3.1	Pre-assembly of side wall/plates and its ndt	1.00						
1.3.2	Lowering of side wall & its alignment	1.00						
1.3.3	Condenser shell welding	2.00						
1.3.4	Lowering of water box	2.00						
1.4	**Assembly, alignment and welding & ndt of tube support plates and internals like baffle plates, air evacuation pipes etc.**	**12.00**		--	--			--
1.4.1	Cleaning & erection of tube support plates	2.00						
1.4.2	Alignment of tube support plates	3.00						
1.4.3	Welding & ndt of tube support plates	3.00						
1.4.4	Assembly, alignment and welding & ndt of internals like baffle plates	2.00						
1.4.5	Assembly, alignment and welding of air evacuation pipes etc.	2.00						
1.6	**Assembly, welding & ndt of dome walls and dome stiffeners, extraction piping and steam throw device, lph-1 support etc.**	**10.00**		--	--			--
1.6.1	Pre-assy & welding of front dome wall	0.50						
1.6.2	Pre-assy & welding of rear dome wall	0.50						
1.6.3	Pre-assy & welding of ts dome wall	0.50						
1.6.4	Pre-assy & welding of gs dome wall	0.50						
1.6.5	Assembly & welding of lower dome wall stiffeners	0.50						
1.6.6	Ndt completion of lower dome wall in all respects	0.50						
1.6.7	Erection of all lower dome wall	1.00						
1.6.8	Alignment of lower dome wall	1.50						
1.6.9	Welding & ndt of lower dome wall	1.50						
1.6.10	Erection, welding & ndt of extraction piping within condenser and steam throw device, lph-1 support etc.	3.00						
1.7	**Insertion, expansion, cutting etc. Of condenser tubes**	**15.00**		--	--			--
1.7.1	Insertion of condenser tubes	9.00						
1.7.2	Expansion, cutting etc. Of condenser tubes	2.50						
1.7.3	Seal welding of condenser tubes	3.50						

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
1.8	**Water box erection & fitup including hinge assy**	**4.00**						
1.9	**Welding of water box & its ndt**	**2.00**						
1.10	**Hydro test of steam and water side**	**5.00**		--	--			--
1.10.1	Water fill test of steam side	2.00						
1.10.2	Hydro test of water side	2.00						
1.10.3	Condenser flood test after neck welding and supporting piping	1.00						
1.11	**Welding of condenser neck joint and ndt& completion of balance works**	**10.00**		--	--			--
1.11.1	Erection, alignment & fitup of upper dome wall	4.00						
1.11.2	Welding of condenser neck joint	4.00						
1.11.3	Condenser neck joint ndt & completion of balance works	2.00						
1.12	**Erection, commissioning, load testing of condenser water box handling system**	**2.00**		--	--			--
1.13	**Satisfactory submission of all necessary documentation**	**2.00**						
	Subtotal for condenser	**85.00**						
2	**Turbine (18 %)(1 HP + 1 IP + 1LP)**							--
2.1	**Preparation of foundation, placement, alignment and grouting of base plates of HP, IP, LP and bearing pedestals**	--	**6.00**		--			--
2.1.1	Preparation of foundation		2.50					
2.1.2	Placement, alignment and grouting of base plates of hp,ip & lpc and bearing pedestals		3.50					
2.2	**Placement and alignment of LP outer casing - Bottom portion and centre guide keys**	--	**6.00**		--			--
2.2.1	Placement of end walls & centre guide bolts		1.50					
2.2.2	Welding of guide bolts		0.50					
2.2.3	Placement of end wall, side wall & welding and ndt completion		2.50					
2.2.4	Erection & welding of casing frame section		1.50					

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscellaneous items (6)	Integral ppg (7)
2.3	**Placement of LP rotor And alignment with inner casing and checking of blade clearance-**	--	**5.00**		--			--
2.3.1	Placement & allignment of inner outer casing Bottom half		1.50					
2.3.2	Placement of LP rotor		1.50					
2.3.3	Alignment with inner casing including blade Clearance, checking & allignment		2.00					
2.4	**Assembly, alignment & welding of LP outer casing upper half**	**--**	**5.00**		--			--
2.4.1	Placement of LP outer casing, allignment Including fit up		2.00					
2.4.2	Welding of LP outer casing including DPT/NDT		1.50					
2.4.3	Assy of ATM relief valve & leak test		1.50					
2.5	**Boxing up of LP inner-inner & inner- outer And roll check**	--	**3.00**		--			--
2.5.1	Boxing of LPT inner- inner, inner-outer casing Top half		1.50					
2.5.2	Roll check of LPT		1.50					
2.6	**Final box-up of LP turbine LPC**	**--**	**6.00**					
2.6.1	Erection & welding of extraction pipes with belows inside the condenser.		3.00					
2.6.2	Final box up of LP turbine		3.00					
2.7a	**Placement and alignment of IP turbine outer casing and inner casing (lower halves)**	--	**3.00**		--			--
2.7b	**Placement and alignment of IP rotor with lower casing and boxing up of inner & outer casing (upper halves) & roll check, bump check etc.**	**--**	**5.00**		--			--
2.8	**Final box up of IP turbine**	--	**1.00**		--			--
2.9	**Placement of HP turbine, lowering of HP rotor on bearings and checking of clearances, coupling, HP turbine swing checks etc.**	**--**	**6.00**		--			--
2.9.1	Placement of HP turbine on bearing pedestal		2.50					
2.9.2	Allignment of HP turbine, roll check, bump check etc.		3.50					
2.10	**Alignment of all rotors including reaming, honing and fixing of coupling bolts**		**9.00**					
2.10.1	Allignment of HP-IP, IP-LP turbines		5.00					

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
2.10.2	Reaming & honing of HP-IP, IP-LP couplings		2.00					
2.10.3	Combined swing check of HP-IP, IP-LP and correction to the required value.		2.00					
2.11	**Assembly of governing system/equipment**		**7.00**					
2.11.1	Placement & alignment of governing equipments (servo motors)		4.00					
2.11.2	Commissioning of governing system		3.00					
2.12	**Installation of ESVS, IVS, MS strainers (internals), HRH strainers (internals)**	**--**	**11.00**		--			--
2.12.1	Installation & allignment of ESV including breach nut and tightening to required value		2.00					
2.12.2	Installation & allignment of IV, CV		2.50					
2.12.3	Installation & allignment of LPBP		2.50					
2.12.4	Installation & allignment of MS strainers including internals		2.00					
2.12.5	Installation & allignment of HRH strainers including internals		2.00					
2.13	**Erection, alignment and welding of cross around/over and extraction piping**	**--**	**6.00**		--			--
2.13.1	Erection & welding of extraction piping with bellows inside the condenser.		3.00					
2.13.2	Erection of cross around/over pipe, welding and ndt		3.00					
2.15	**Final boxing up of pedestals after oil flushing completion**	**--**	**6.00**		--			--
2.15.1	Final boxing up of pedestals after oil flushing completion		3.00					
2.15.2	Checking of radial & axial keys dimension, machining to correct size and placement		3.00					
	Subtotal for steam turbine		**85.00**					
3	**Generator (12%)**	--		--	--			--
3.1	**Preparation of foundation, levelling, matching and grouting of foundation plates**	--		**5.00**				--
3.1.1	Blue matching of anchor plates &			1.00				

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
	soffit ep							
3.1.2	Blue matching of foundation plates & stator body load bearing member			1.00				
3.1.3	Positioning of foundation plates & bolts, welding of anchor plates			1.00				
3.1.4	Erection of sole plate, its grouting & erection of temporary pedestals			1.00				
3.1.5	Final grouting of foundation plates and gravel filling into foundation bolt sleeve			1.00				
3.2	**Lifting, levelling and alignment of stator** (including erection and dismantling of portal crane for stator lifting)			**20.00**				--
3.2.1	Assy of terminal box			3.00				
3.2.2	Assy of h2 cooler housing			4.00				
3.2.3	Placement of stator			10.00				
3.2.4	Alignment of stator			3.00				
3.3	**Fixing of end shields on to foundation beams**	--	--	**6.00**				--
3.4	**Rotor insertion**	--	--	**6.00**				--
3.5	**Boxing up of generator and assembly of hydrogen seals**	--	--	**11.00**				--
3.6	**Alignment of generator rotor with lp2 turbine rotor, run-out checks and reaming, honing of coupling holes and fixing of coupling bolts**	--	--	**9.00**				--
3.6.1	Alignment of gen rotor w.r.t lp2 rotor			4.00				
3.6.2	Reaming & honning of gen/lp coupling			3.00				
3.6.3	Final cro			2.00				
3.7	**Erection of excitation equipments & alignment of gen.-exciter rotors including swing check and completion of balance works**	--	--	**10.00**				--
3.7.1	Erection & alignment of exciter bed plate			3.00				
3.7.2	Alignment of gen/exciter rotor			3.00				
3.7.3	Cro & swing check of exciter rotor			2.00				
3.7.4	Completion of balance works			2.00				
3.8	**Installation of enclosures of generator/exciter with all auxiliaries**	--	--	**5.00**				--
3.9	**Grouting of gen bearing pedestals and excitor**	--	--	**5.00**				--
3.10	**Final gas tightness test of stator with complete system**	--	--	**8.00**				--

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
3.10.1	Assy of bushing & leak test			3.00				
3.10.2	Completion of leak test / hydro test of stator winding system			2.00				
3.10.3	Final gas tightneess test of stator with complete system.			3.00				
	Subtotal for generator			**85.00**				
4	**Pumps and auxiliaries (18 %)**	--	--		--			--
4.1	**Erection / testing and commissining of Main oil pump, JOP, EOP, AOP, Centralised lube oil purification system, along with all auxilliaries.**				**15.00**			
4.1.1	Erection and commissining of Main oil pump along with all auxillaries	--	--		2.00			--
4.1.2	Erection and alignment of Main oil tank				2.00			
4.1.3	Erection of Coolers & oil filters				2.00			
4.1.4	Erection and commissining of JOP along with all auxilliaries.				1.00			
4.1.5	Erection and commissining of EOP along with all auxilliaries.				1.00			
4.1.6	Erection and commissining of AOP along with all auxilliaries.				2.00			
4.1.7	Erection and commissining of centralised lube oil purification system along with all auxilliaries				5.00			
4.2	**Erection / testing and commissioning of 2 nos Motor driven BFP, along with all auxilliaries (2 nos)**				**12.00**			
4.2.1	Preparation of foundations for booster pump, main motor, hydraulic unit & BFP,				1.00			
4.2.2	Placement of BFP hyfraulic unit and booster pump and grouting				2.50			
4.2.3	Alignment of BFP with hydraulic coupling and booster pump				2.00			
4.2.4	Placement of coolers of BFP and hydraulic unit and completion of piping				2.00			
4.2.5	Completion of oil flushing				1.50			
4.2.6	Trial run of motor & hydraulic unit				1.50			
4.2.7	Commissioning of BFP with hydraulic unit and booster pump				1.50			
4.3	**Erection and commissioning of Turbine driven BFP, along with all auxilliaries (2 nos.)**				**12.00**			

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscellaneous items (6)	Integral ppg (7)
4.3.1	Preperation of foundation				1.00			
4.3.2	Placement of turbine, gear box, booster pumps with all aux.				2.00			
4.3.3	Grouting of above equips				1.00			
4.3.4	Assembly of exaust hood with drive turbine				1.00			
4.3.5	Completion of integral piping				3.00			
4.3.6	Completion of final alignment				2.00			
4.3.7	Completion of trial run				2.00			
4.4	**Erection, testing, grouting etc. of Condensate extraction pumps (3 nos.)**	--	--	--	**3.00**			--
4.4.1	Preparation of foundation				0.50			
4.4.2	Checking & erection of canister				0.50			
4.4.3	Placement of pump				0.50			
4.4.4	Assembly of cep bearing including connection of cooling water piping				1.00			
4.4.5	Commissioning of pump				0.50			
4.5	**Erection, mechanical completion (placement, alignment and grouting / welding / fixing etc.) Concrete volute pump (2 nos)**				**8.00**			
4.6	**Erection, testing, commissioning etc. of ACW, DMCW (TG&SG) pumps**	--	--	--	**5.00**			--
4.6.1	Placement of motor & pumps				1.50			
4.6.2	Alignment of motor with pumps				2.00			
4.6.3	Grouting of motor & pumps				1.00			
4.6.4	Commissioning of motor along with pumps				0.50			
4.7	**Erection, testing and commissioning of boiler fill pumps, Cycle makeup pumps, DM water transfer pumps, Sump pumps, CT makeup Pumps, Ash water pumps, Raw water pumps, Potable water pumps-plants, potable water pumps-Colony, Service water pumps, APH/ESP wash water pumps, Intake water booster pumps, AHP pumps, FGD and SCR pumps, clarified water transfer pumps, boiler drain pumps, emergency hotwell make up pumps, Vacuum pumps, Condenser air evacuation pump etc**				**25.00**			
4.7.1	Placement of motor & pumps				7.50			

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
4.7.2	Alignment of motor with pumps				10.00			
4.7.3	Grouting of motor & pumps				5.00			
4.7.4	Commissioning of motor along with pumps				2.50			
4.8	**Erection, testing, commissioning etc. of Fire fighting pumps (11 Nos)**				**5.00**			
4.8.1	Placement of motor & pumps				1.50			
4.8.2	Alignment of motor with pumps				2.00			
4.8.3	Grouting of motor & pumps				1.00			
4.8.4	Commissioning of motor along with pumps				0.50			
	Subtotal for pumps and auxiliaries				**85.00**			
5	**Heaters (6%)**							
5.1	**Erection, testing & commissioning of HP heaters, LP heaters and external desuperheater**	--	--	--		**70.00**		--
5.1.1	Placement of heater					25.00		
5.1.2	Alignment & grouting of heater					20.00		
5.1.3	Erection & welding of stand pipe & instruments					10.00		
5.1.4	Commissioning of heater					15.00		
5.2	**Erection, testing & commissioning of gland steam condenser, drain coolers etc**	--	--	--		**15.00**		--
5.2.1	Placement & grouting of gland steam condenser					10.00		
5.2.2	Placement & grouting of drain cooler					5.00		
	Subtotal for heaters	--	--	--		**85.00**		**--**
6	**Miscellaneous items (15%)**							
6.1	**Erection, testing & commissioning of Debris filters, RE joints, dirty, Clean oil tanks, Enclosures, CO2 & H2 cylinder racks etc**						**25.00**	
6.1.1	Debris filters						2.00	
6.1.2	RE joints						5.00	
6.1.3	BF valves						8.00	
6.1.4	Dirty & clean oil tanks, oil unloading vessel, central lube oil purification system						5.00	
6.1.5	CO2/H2 cylinders racks						1.00	
6.1.6	DMCW overhead tank with loose items (1 no)						1.50	
6.1.7	Portable water tank with loose items (1 no)						1.50	

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscell aneous items (6)	Integral ppg (7)
6.1.8	Seal oil unit						1.00	
6.2	**Erection, testing & commissioning of Control fluid tank, C.F. Coolers, C.F. Pumps, Purification unit etc.**	--	--	--			**6.00**	
6.3	**Erection, testing and commissioning of Flash tanks & flash vessels**	--	--	--			**8.00**	
6.4	Erection, testing & commissioning of Chemical & Oxygen dosing skids.						**3.00**	
6.5	**Erection, testing and commissioning of Plate heat exchanger package**	--	--	--			**4.00**	
6.6	**Erection, testing and commissioning of condenser on load tube cleaning package**	--	--	--			**6.00**	
6.7	**Erection, testing and commissioining of self cleaning strainer package**	--	--	--			**4.00**	
6.8	**Erection, testing and commissioining of Handling equipments Misc hoists, Chain pulley blocks, Single girder EOT cranes and other BOIs**						**10.00**	
6.9	**Erection of approach platforms (For Materials which are free issued from BHEL site; apart from those received from MUs)**						**5.00**	
6.10	**DG set (02 sets of 1750KVA)**						**10.00**	
6.10.1	Preparation of foundation,						1.00	
6.10.2	Erection, placement in position, leveling, grouting, and completion etc of dg set, fuel day tank.						2.50	
6.10.3	Erection, placement in position, leveling, grouting, and completion etc exhaust support structure.						2.00	
6.10.4	Erection, alignment and welding of internal fuel oil piping.						1.50	
6.10.5	Erection, alignment and welding of complete exhaust piping.						1.00	
6.10.6	Completion of balance works						1.00	
6.10.7	Testing, trial run and commissioning.						1.00	
6.11	**DG set (01 set of 500KVA)**						**4.00**	
6.11.1	Preparation of foundation,						0.40	

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscellaneous items (6)	Integral ppg (7)
6.11.2	Erection, placement in position, leveling, grouting, and completion etc of dg set, fuel day tank.						1.00	
6.11.3	Erection, placement in position, leveling, grouting, and completion etc exhaust support structure.						0.80	
6.11.4	Erection, alignment and welding of internal fuel oil piping.						0.60	
6.11.5	Erection, alignment and welding of complete exhaust piping.						0.40	
6.11.6	Completion of balance works						0.40	
6.11.7	Testing, trial run and commissioning.						0.40	
	Subtotal for miscellaneous items						**85.00**	
7	**Integral piping (9%)**	--	--	--				--
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)**	--	--	--				**85.00**
7.1.1	Pre-assembly							15.00
7.1.2	Placement in position							20.00
7.1.3	Alignment							15.00
7.1.4	Welding/bolting/fixing							20.00
7.1.5	Completion of non destructive examination and stress relieving/heat treatment , insulation wherever applicable							5.00
7.1.6	Hangers and supports etc. Wherever necessary as per drawing							5.00
7.1.7	Hydraulic test/pneumatic test wherever applicable							5.00
	Sub total for integral piping							**85.00**
II	**Stage/milestone payments (15%)**							
1	Boiler light up	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	ABO	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sl. No.	Activity/work description	CND (1)	Tur (2)	Gen (3)	Pumps & aux/ eq (4)	Heaters (5)	Miscellaneous items (6)	Integral ppg (7)
3	Steam blowing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Safety valve floating	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Oil flushing (TG)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6	Barring gear (TG)	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7	Rolling and synchronization	3.00	3.00	3.00	3.00	3.00	3.00	3.00
8	Coal firing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Full load	2.00	2.00	2.00	2.00	2.00	2.00	2.00
10	Trial operation of unit	2.00	2.00	2.00	2.00	2.00	2.00	2.00
11	Painting (including arrow marking, nomenclature, etc)	2.00	2.00	2.00	2.00	2.00	2.00	2.00
12	Area cleaning, temporary structures cutting/removal and return of scrap	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	Punch list points/pending points liquidation	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	Submission of 'as built drawings'	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Material reconciliation	1.00	1.00	1.00	1.00	1.00	1.00	1.00
16	Completion of contractual obligations	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Total for milestone/stage payments (15%)	**15.00**	**15.00**	**15.00**	**15.00**	**15.00**	**15.00**	**15.00**
	Total of I & II	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note:

1) The Terms of payment is only for enabling release of payments through RABs and is not indicative of the actual quantum or value of work
2) If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.
3) The payment for integral piping shall be on pro rata basis on a per MT rate. The per MT rate shall be the allocated (the % applicable as per 'terms of payment') value for integral piping divided by the tendered quantity of integral piping in MT.
4) **Quantity variation clause No 2.14 of Vol-IC General Conditions of Contract shall be applicable only for sl no 7 ' Integral Piping' of Chapter-VII-Terms of Payment'.**
5) Also refer GCC clause 2.23.1

8.0 TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

1. All taxes excluding GST, GST Cess **& BOCW** Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**
2. Any increase of the taxes excluding GST, GST Cess & BOCW **Cess**, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.
3. **GST :**

   The successful bidder shall furnish proof of GST registration .GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.
4. GST charged in the Tax Invoice/Debit note by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return
5. E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.

   If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.
6. Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details will as below:

   BHEL GSTN – As per **Annexure -1**

   NAME -- Bharat Heavy Electricals Limited

   ADDRESS – Site address

7. Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances :-
   Email id ---- to be intimated later on.
   In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.
8. In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.
9. Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.
10. Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.
11. Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

    The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.
12. **New taxes and duties**:-Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
    Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.

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

13. For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further, transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

14. **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**

15. **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**

16. **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**
    i. Buyer shall be as per clause (a) of section 206C- (1H)
    ii. Seller shall be as per clause (b) of section 206C- (1H)

iii. No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.

If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.

For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.

17. Refer Annexure – 2 for BOCW Act & Cess Act.

ANNEXURE-1

State wise GSTIN no.s of BHEL

Sl. No	Projects under state	GSTIN
1	Andhra Pradesh	37AAACB4146P7Z8
2	Bihar	10AAACB4146P1ZU
3	Chhattisgarh	22AAACB4146P1ZP
4	Gujarat	24AAACB4146P1ZL
5	Jharkhand	20AAACB4146P5ZP
6	Madhya Pradesh	23AAACB4146P1ZN
7	Maharashtra	27AAACB4146P1ZF
8	Orissa	21AAACB4146P1ZR
9	Telangana	36AAACB4146P1ZG

ANNEXURE-2

BOCW Act & Cess Act

Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

2. It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3. It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4. It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may , by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5. It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
6. It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7. It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8. It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics :

(i)Number of Building Workers employed during preceding one month.
(ii) Number of Building workers registered as Beneficiary during preceding one month.
(iii)Disbursement of Wages made to the Building Workers for preceding wage month.
(iv) Remittance of Contribution of Beneficiaries made during the preceding month

9. BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.
10. It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.
11. Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty (if any, imposed by Cess Authorities) from the payables on account of non-compliance.
12. The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.

BILL OF QUANTITY

Summary of Weight of BOQ under the scope:-

Description	Approx wt. (In MT)	Remarks
Steam Turbine & Aux	917.85	
Turbo Generator & Aux	555.82	
Condenser & Aux	527.25	
Major BOI	658.10	
TIP	119.10	
Heat Exchanger	539.75	
Pumps&Aux BFP - MD & TD	264.58	
Pumps&Aux - CEP		
Pumps&Aux Concrete Volute Pump		
BFP TD and Aux	181.34	
PEM supplied Pumps and Motors	283.30	
Motors for Pumps	186.50	
RE Joints, flash tanks, Misc Tank, BF valves	309.06	
PEM BOIs	233.80	
PESD pumps	22.20	
DG SET - ISG	78.00	
Misc Structure	100.00	
Total Weight in MT	**4976.65**	

Detailed (PGMA wise) weight of BOQ applicable for this package

Unit (For reference)	PGMA/ Item / Pkg no.	Description	Qty	Dimensions/Pkg size	Unit wt Kgs	Total Wt Kgs
Haridwar Supplies						
Condenser and Aux.						
HWR	78001/0	HOTWELL	-	10400X2700X1450	-	8205
HWR	78004/0	BOTTOM PLATE(FRONT PART ASSLY)	-	8720X3750X792	-	9096
HWR	78005/0	BOTTOM PLATE (REAR PART ASSLY)	-	8720X3750X948	-	9516
HWR	78006/0	BOTTOM PLATE(MID.PART ASSLY-I)	-	8720X3546X780	-	7447
HWR	78007/0	BOTTOM PLATE(MID.PART ASSLY-II	-	8720X3708X780	-	8423
HWR	78008/0	BOTTOM PLATE(MID.PART ASSY-III	-	8720X3546X780	-	7571
HWR	78010/0	LOOSE ITEMS (BOTTOM PLATE)	-	900X500X500	-	500
HWR	78012/0	EARTHQUAKE PROTECTION DEVICE	-	450X230X35	-	26
HWR	78014/0	LOOSE ITEM (COND.SUPPORT	-	3000X1200X1200	-	2375
HWR	78018/0	LOOSE ITEMS(CONDENSER SUPPORT)	-	3900X1100X600	-	1605
HWR	78019/0	LOOSE ITEMS(CONDENSER SUPPORT)	-	1400X1200X1000	-	2714
HWR	78020/0	FRONT WATER CHAMBER(GEN.SIDE)	-	6502X4450X3850	-	9735
HWR	78022/0	WATER BOX(LS)	-	6502X4450X3850	-	20957
HWR	78023/0	FRONT WATER CHAMBER(TUR.SIDE)	-	6600X4450X3850	-	9710
HWR	78025/0	WATER BOX(RS)	-	6570X4455X3000	-	20052
HWR	78026/0	REAR WATER CHAMBER(GEN.SIDE)	-	6660X4450X3850	-	9893
HWR	78028/0	WATER BOX (RS)	-	6660X4450X3850	-	21629
HWR	78029/0	REAR WATER CHAMBER(TUR.SIDE)	-	6660X4450X400	-	9893
HWR	78031/0	WATER BOX (LS)	-	6660X4450X3450	-	21007
HWR	78032/0	PLATES(SIDE WALL-TUR.SIDE)	-	6550X2480X160	-	17977
HWR	78038/0	PLATES(SIDE WALL-GEN.SIDE	-	6550X2480X160	-	17978
HWR	78047/0	SHELL INTERNAL STIFFENING RODS	-	3616X1050X600	-	6200
HWR	78048/0	SHELL INTERNAL STIFFENING RODS	-	3616X1050X600	-	6200
HWR	78049/0	SHELL INTERNAL STIFFENING RODS	-	3616X1050X600	-	6200
HWR	78050/0	SHELL INTERNAL STIFFENING RODS	-	3616X1050X600	-	6200
HWR	78051/0	SHELL INTERNAL STIFFENING RODS	-	3616X1050X600	-	6500
HWR	78052/0	SHELL INTERNAL STIFFENING RODS	-	3616X1050X600	-	6500
HWR	78053/0	SHELL INTERNAL STIFFENING RODS	-	3616X1000X800	-	7525
HWR	78054/0	SHELL INTERNAL STIFFENING RODS	-	3600X1050X600	-	5950
HWR	78055/0	SHELL INTERNAL STIFFENING RODS	-	3800X825X500	-	1970
HWR	78056/0	SHELL INTERNAL STIFFENING RODS	-	3800X825X500	-	1970
HWR	78057/0	SHELL INTERNAL STIFFENING RODS	-	3800X825X500	-	1970
HWR	78058/0	AIR EXTRACTION PIPE	-	9200X1000X900	-	2240

HWR	78059/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78060/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78061/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78062/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78063/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78064/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78065/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78066/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78067/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	6910
HWR	78068/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	5255
HWR	78069/0	TUBE SUPPORT PLATE	-	4650X4225X224	-	5255
HWR	78070/0	SHELL INTERNAL DETAILS	-	1600X900X1000	-	3018
HWR	78071/0	SHELL INTERNAL DETAILS	-	6000X900X1000	-	5489
HWR	78073/0	SHELL INTERNAL DETAILS	-	1300X1200X1050	-	3618
HWR	78074/0	SHELL INTERNAL DETAILS	-	3800X825X500	-	1582
HWR	78075/0	SHELL INTERNAL DETAILS	-	1000X1000X800	-	1308
HWR	78076/0	LOWER DOME WALL (TUR.SIDE)-LOWER PART	-	13000X3710X510	-	9194
HWR	78077/0	LOWER DOME WALL (TUR.SIDE)-LOWER PART	-	3710X2315X310	-	772
HWR	78078/0	LOWER DOME WALL (TUR.SIDE)-LOOSE ITEMS	-	5700X450X300	-	485
HWR	78079/0	LOWER DOME WALL(TUR.SIDE)-MIDDLE PART	-	13520X2750X510	-	5993
HWR	78080/0	LOWER DOME WALL(TUR.SIDE)-SIDEPART	-	3710X2400X310	-	777
HWR	78104/0	LOWER DOME WALL (GEN.SIDE)-LOWER PART	-	13000X3710X510	-	8616
HWR	78105/0	LOWER DOME WALL (GEN.SIDE)-LOWER PART	-	3710X2320X310	-	773
HWR	78106/0	LOWER DOME WALL (GEN.SIDE)-LOOSE ITEMS	-	5700X450X300	-	485
HWR	78107/0	LOWER DOME WALL (GEN.SIDE)-MIDDLE PART	-	13520X2750X570	-	6171
HWR	78108/0	LOWER DOME WALL (GEN.SIDE)-SIDE PART	-	3710X2400X310	-	777
HWR	78110/0	LOWER DOME WALL (FWB SIDE)-LOWER PART	-	9200X3900X800	-	6932
HWR	78111/0	LOWER DOME WALL (FWB SIDE)-UPPER PART	-	8300X3800X300	-	5282
HWR	78112/0	LOWER DOME WALL (FWB SIDE)-LOOSE ITEMS	-	2300X700X400	-	600
HWR	78116/0	LOWER DOME WALL (RWB SIDE)-LOWER PART	-	9200X1600X800	-	2572
HWR	78117/0	LOWER DOME WALL (RWB SIDE)-MIDDLE PART	-	8000X2900X700	-	4335
HWR	78118/0	LOWER DOME WALL (RWB SIDE)-LOOSE ITEMS	-	4000X2050X1900	-	2294
HWR	78119/0	LOWER DOME WALL (RWB SIDE)-UPPER PART	-	8810X3200X1530	-	6680

HWR	78121/0	PIPES(DOME INTERNAL STIFFENING)	-	5900X400X400	-	2320
HWR	78122/0	PIPES(DOME INTERNAL STIFFENING)	-	10616X2700X600	-	8163
HWR	78123/0	PIPES(DOME INTERNAL STIFFENING)	-	10616X2700X200	-	2815
HWR	78124/0	PIPES(DOME INTERNAL STIFFENING)	-	3350X1000X1150	-	2500
HWR	78125/0	PIPES(DOME INTERNAL STIFFENING)	-	3300X1450X1350	-	2100
HWR	78126/0	PIPES(DOME INTERNAL STIFFENING)	-	3000X1800X2200	-	11269
HWR	78127/0	PIPES(DOME INTERNAL STIFFENING)	-	2400X1500X1800	-	4613
HWR	78129/0	LP HEATER NO-1 SUPPORTARRANGEMENT	-	2700X1700X1070	-	2770
HWR	78130/0	LP HEATER NO-1 SUPPORTARRANGEMENT	-	9100X1200X800	-	4100
HWR	78132/0	UPPER DOME WALL (TUR.SIDE)	-	10420X300X300	-	513
HWR	78133/0	UPPER DOME WALL(GEN.SIDE)	-	10420X300X300	-	513
HWR	78136/0	UPPER DOME WALL (FWB SIDE)	-	7180X300X300	-	396
HWR	78139/0	UPPER DOME WALL (RWB SIDE)	-	7180X300X300	-	396
HWR	78142/0	FRONT & REAR W/BOX HINGEARRANGEMENT	-	2400X1300X1200	-	5256
HWR	78143/0	FRONT & REAR W/BOX HINGEARRANGEMENT	-	2400X1200X800	-	2376
HWR	78144/0	FRONT & REAR W/BOX HINGEARRANGEMENT	-	800X800X600	-	660
HWR	78149/0	FRONT & REAR W/BOX HINGEARRANGEMENT	-	2500X750X500	-	1204
HWR	78150/0	FRONT & REAR W/BOX HINGEARRANGEMENT	-	1495X1140X400	-	1037
HWR	78151/0	FRONT & REAR W/BOX HINGEARRANGEMENT	-	1495X1140X400	-	890
HWR	78157/0	CONDENSER (LOOSE ITEMS)	-	4300X900X900	-	1000
HWR	78158/0	COND. LOOSE ITEMS (RUBBER CORDFOR BOTH CONDENSER)	-	1600X500X500	-	103
HWR	78159/0	FASTENERS (CONDENSER)	-	1500X1300X1300	-	2330
HWR	78160/0	LOOSE ITEMS (TOOLS & TACKLES)	-	300X350X500	-	45
HWR	78162/0	CONDENSER LOOSE ITEMS	-	1100X700X600	-	2571
HWR	78166/0	CONDENSER STAND PIPES NO.1	-	3500X600X600	-	65
HWR	78167/0	LOOSE ITEMS CONDENSER STANDPIPES	-	3100X300X250	-	670
HWR	78169/0	CONDENSER STAND PIPES NO.2	-	3500X600X600	-	65
HWR	78175/0	CONDENSER INSTRUMENTATION	-	1550X600X600	-	90
HWR	78176/0	CONDENSER INSTRUMENTATION	-	1500X1300X700	-	730
HWR	78301/0	GLAND STEAM CONDENSER	-	1750X1700X1700	-	1950
HWR	78304/0	LOOSE ITEMS OF GSC	-	800X450X350	-	65
HWR	78305/0	LOOSE ITEMS OF GSC (FRAGILE)	-	700X600X500	-	45
HWR	78315/0	LP HEATER 1	-	14700X2200X2000	-	29000
HWR	78316/0	STAND PIPES OF LPH-1	-	2800X350X350	-	46
HWR	78317/0	LOOSE ITEMS OF LPH-1	-	500X400X400	-	135

HWR	78318/0	LOOSE ITEMS OF LP HEATER 1	-	950X400X400	-	75
HWR	78319/0	LOOSE ITEMS OF LPH -1(NFRAGILE)	-	2100X500X400	-	170
HWR	78320/0	TROLLEY FOR LP HEATER 1	-	1350X1050X400	-	664
HWR	78424/0	HYDROGEN COOLER	-	4800X1200X1300	-	3300
HWR	78425/0	HYDROGEN COOLER	-	4800X1200X1300	-	3300
HWR	78428/0	LOOSE ITEMS(HYDROGEN COOLER)	-	1200X1200X650	-	750
					Subtoal	**527247.00**
Steam Turbine and Aux						
HWR	75001/1	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	-	3100X900X800	-	1060
HWR	75001/2	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	-	2700X700X800	-	1120
HWR	75001/3	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	-	1800X950X850	-	1470
HWR	75001/4	ARRANGE.OF EMBED(ANCHOR POINT)- ANCHOR BOX TYPE-A	-	1700X900X800	-	908
HWR	75001/5	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	-	1700X900X800	-	908
HWR	75001/6	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	-	1750X1300X800	-	1165
HWR	75001/7	ARRANGE.OF EMBED(ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	-	1300X1250X1100	-	1015
HWR	75001/8	ARRANGE.OF EMBED(ANCHOR POINT)- EMBED.FOR LPC GUIDE BOLT	-	1300X1250X1100	-	723
HWR	75001/9	ARRANGE.OF EMBED(ANCHOR POINT)- LOOSE ITEMS	-	1000X800X500	-	891
HWR	75001/10	ARRANGE.OF EMBED(ANCHOR POINT)- ANCHOR RODS/NUTS (L=3000)	-	3300X700X700	-	900
HWR	75001/11	ARRANGE.OF EMBED(ANCHOR POINT)ARRANGE.OF EMBED(ANCHOR POINT)	-	2900X1000X1000	-	2700
HWR	75003/1	BASE PLATE ASSEMBLY	-	1800X600X600	-	825
HWR	75003/2	BASE PLATE ASSEMBLY	-	800X800X600	-	300
HWR	75004/0	BASE PLATE ASSEMBLY	-	2200X1150X750	-	2777
HWR	75102/0	CASING UPPER PART	-	10800X3600X3500	-	23305
HWR	75103/0	CASING UPPER PART	-	10800X3600X3500	-	23009
HWR	75104/0	RUPTURE DIAPHRAGM ASSEMBLY	-	1600X1500X1600	-	1048
HWR	75107/0	CASING SIDE WALL (LEFT)	-	6700X5000X200	-	9900
HWR	75108/0	CASING SIDE WALL (RIGHT)	-	6700X5000X200	-	9900
HWR	75109/0	FRONT WALL (TS)	-	10800X5000X1400	-	23045
HWR	75110/0	FRONT WALL (GS)	-	10800X5000X1400	-	23045
HWR	75111/0	LP SHAFT SEAL CASING - TS	-	2000X1650X750	-	1130

HWR	75112/0	LP SHAFT SEAL CASING - GS	-	2000X1650X750	-	1130
HWR	75113/0	LP SHAFT SEAL COMPENSATOR (TS)	-	2800X2800X800	-	1852
HWR	75114/0	LP SHAFT SEAL COMPENSATOR (GS)	-	2800X2800X800	-	1852
HWR	75116/1	CASING FRAME SECTION	-	9000X1500X3600	-	9307
HWR	75116/2	CASING FRAME SECTION	-	2500X1000X2000	-	7450
HWR	75201/0	HP/ IP BEARING PEDESTAL	-	4500X1800X2100	-	11400
HWR	75202/0	HP/ IP BEARING PEDESTAL(PARTS)	-	1000X600X600	-	350
VARANASI	75301/0	MOUNT. FRAME FOR BEARING SHELL	-	1750X1350X600	-	365
VARANASI	75302/0	ALIGNMENT SHAFT FOR IP TURBINE	-	6100X600X650	-	1345
VARANASI	75303/0	SUPPORT FOR ESV AND IVCV &ARRANGEMENT OF ENDOSCOPE HOLE	-	3000X1350X800	-	473
VARANASI	75304/0	TURNING-OVER DEVICE FOR HP-CASING & SUPPORT	-	3850X2850X1850	-	7250
VARANASI	75305/0	ASSLY.FIXTURE FOR HP TURBINE 1	-	4550X2950X600	-	6850
VARANASI	75306/0	ASSLY.FIXTURE FOR HP TURBINE 2	-	3000X1900X1300	-	4622
VARANASI	75308/0	LP-SHAFT SUPPORT	-	3800X1200X1800	-	3200
VARANASI	75311/0	LIST OF TOOLS	-	3000X2500X1600	-	5743
VARANASI	75312/0	I.P. SHAFT SUPPORT	-	1850X1200X950	-	1326
VARANASI	75313/0	BREECH NUT HEATING &STRETCHING DEVICE	-	1700X900X700	-	240
VARANASI	75316/0	LIFTING SLINGS FOR HP/IP/LPTURBINE	-	3200X2900X1300	-	3231
VARANASI	75319/1	STEAM BLOWING AND HYDRAULICTEST DEVICE FOR HP VALVE	-	3000X2000X1500	-	2285
VARANASI	75319/2	STEAM BLOING DEVICE FOROVERLOAD VALVE	-	1200X700X500	-	120
VARANASI	75319/3	STEAM BLOWING AND HYDRAULICTEST DEVICE FOR IP VALVE	-	3500X3200X1200	-	4035
VARANASI	75320/0	TOOLS FOR GOVERNING SYSTEM	-	4200X3000X2000	-	660
VARANASI	75321/0	WIRE ROPES FOR HP, IP &OVERLOAD VALVE	-	3000X2000X1000	-	850
VARANASI	75322/1	ASSEMBLY DEVICE FOR HP VALVE	-	1500X1200X1200	-	1460
VARANASI	75322/2	ASSEMBLY DEVICE FOR OVERLOADVALVE	-	1300X700X1000	-	640
VARANASI	75322/3	ASSEMBLY DEVICE FOR IP VALVE	-	1200X1000X600	-	1710
HWR	75323/0	SUPPORT OF BREECH BLOCK &MOUNTING DEVICE FOR OVERLOAD	-	1800X1500X1250	-	752
VARANASI	75324/1	C-HOOK	-	360X140X170	-	1390
VARANASI	75324/2	C-HOOK	-	160X110X130	-	415
VARANASI	75324/3	C-HOOK	-	710X150X140	-	1525
VARANASI	75324/4	C-HOOK	-	470X200X150	-	2240
HWR	75401/0	IP/LP BEARING PEDESTAL	-	7500X2000X2400	-	22200
HWR	75402/0	IP/LP BEARING PEDESTAL(PARTS)	-	2500X1500X600	-	1485

HWR	75501/0	LP/GEN BEARING PEDESTAL	-	7500X2000X2400	-	21600
HWR	75502/0	LP/GEN BEARING PEDESTAL(PARTS)	-	1000X1000X650	-	860
HWR	75601/1	FRONT BEARING PEDESTAL	-	3400X1400X1600	-	5620
HWR	75601/2	HYDRAULIC TURNING MOTOR	-	1270X800X0	-	653
HWR	75601/3	FRONT BEARING PEDESTAL(PARTS)	-	1000X600X600	-	350
HWR	75601/4	FRONT PEDESTAL (PARTS)	-	2100X500X500	-	506
HWR	75705/0	LP EXTRACTION A1	-	3050X1430X1430	-	1380
HWR	75706/0	LP EXTRACTION A1	-	2490X1330X1120	-	770
HWR	75707/1	LP EXTRACTION A1	-	3050X1430X1430	-	1380
HWR	75707/2	LP EXTRACTION A1	-	2490X1330X1120	-	770
HWR	75708/0	LP EXTRACTION A2	-	2850X1400X1400	-	1610
HWR	75709/0	LP EXTRACTION A2	-	2900X1000X1600	-	1349
HWR	75710/0	LP EXTRACTION A2	-	5630X1150X1150	-	2030
HWR	75711/0	LP EXTRACTION A3	-	2860X1200X1200	-	1252
HWR	75712/0	LP EXRACTION A3	-	4620X1120X1120	-	1348
HWR	75713/0	LP EXTRACTION A3	-	1580X930X810	-	286
HWR	75716/1	EXTRACTION PIPE SHEATHING A2	-	3500X2600X1000	-	3453
HWR	75716/2	EXTRACTION PIPE SHEATHING A2	-	500X300X300	-	65
HWR	75716/3	EXTRACTION PIPE SHEATHING A3	-	2750X1200X1200	-	2110
HWR	75716/4	EXTRACTION PIPE SHEATHING A3	-	500X300X300	-	70
HWR	75717/0	COMPENSATORS FOR CASING GUIDE	-	3200X1800X650	-	1224
HWR	75720/0	LP INNER CASING (U/H)	-	6035X4778X3820	-	39012
HWR	75721/0	LP INNER CASING (L/H)	-	6812X6530X4360	-	89389
HWR	75722/1	ASSEMBLY OF GUIDE BLADECARRIERS 2L & 3L	-	5000X2900X1600	-	8900
HWR	75722/2	ASSEMBLY OF GUIDE BLADECARRIERS 2R & 3R	-	5000X2900X1600	-	8900
HWR	75722/3	ASSEMBLY OF GUIDE BLADECARRIERS 1L (U/H)- LPT	-	3450X1900X1300	-	8700
HWR	75722/4	ASSEMBLY OF GUIDE BLADECARRIERS 1R (U/H)- LPT	-	3450X1900X1300	-	8700
HWR	75723/1	LP CASING ASSEMBLY PARTS	-	6000X750X500	-	850
HWR	75723/2	LP CASING ASSEMBLY PARTS	-	1500X1000X800	-	870
HWR	75723/3	LP CASING ASSEMBLY PARTSLP CASING ASSEMBLY PARTS	-	500X500X400	-	25
HWR	75723/4	LP CASING ASSEMBLY PARTS	-	550X400X300	-	70
HWR	75724/1	LP INNER CASING ASSEMBLY(PARTS)	-	3300X1750X350	-	2750
HWR	75724/2	LP INNER CASING ASSEMBLY(PARTS)	-	350X350X500	-	157
VARANASI	75725/1	GRATING COVERING FOR (LP-12.5)	-	2000X1700X800	-	905
VARANASI	75725/2	GRATING COVERING FOR (LP-12.5)	-	3900X1700X1500	-	2764
HWR	75801/0	LP ROTOR	-	8174X4500X4456	-	110248
HWR	75901/0	IP ROTOR	-	XX	-	34000

HWR	75902/0	IP OUTER CASING (U/H)	-	6040X4320X2200	-	0
HWR	75903/0	IP OUTER CASING (L/H)	-	XX	-	36000
HWR	75904/0	IP INNER CASING (U/H)	-	XX	-	26000
HWR	75905/0	IP INNER CASING (L/H)	-	XX	-	30000
HWR	75906/0	SUPPORTING ARMS-IP OUTERCASING	-	XX	-	2850
HWR	75907/0	IP SHAFT SEALING	-	XX	-	570
HWR	75908/0	IP TURBINE (PARTS)	-	XX	-	1900
HWR	75909/0	IP TURBINE (PARTS)	-	XX	-	1900
HWR	76104/0	ESV & CV CASING WITH VALVES	-	5100X4770X2800	-	33855
HWR	76105/1	MOUNTING SUPPORT FOR MS VALVE	-	1700X800X1000	-	1100
HWR	76105/2	MOUNTING SUPPORT FOR MS VALVE	-	1700X800X1000	-	1100
HWR	76108/0	ESV & CV CASING WITH VALVESESV & CV CASING WITH VALVES	-	5100X4770X2800	-	33855
HWR	76112/0	OVERLOAD VALVE CASINGWITH VALVE	-	3000X2000X1400	-	3400
HWR	76201/0	SUSPENSION OF OVERLOAD VALVE	-	3900X700X1150	-	1200
HWR	76202/0	IV & CV CASING WITH VALVES	-	6210X5625X3600	-	46470
HWR	76205/1	MOUNTING SUPPORT FOR HRH VALVE	-	2750X1750X900	-	2600
HWR	76205/2	MOUNTING SUPPORT FOR HRH VALVE	-	2750X1750X900	-	2600
HWR	76206/0	IV & CV CASING WITH VALVES	-	6210X5625X3600	-	46470
HWR	76301/1	SUSPENSION OF LPBP VALVE	-	3600X1700X800	-	1836
HWR	76301/2	SUSPENSION OF LPBP VALVE	-	3600X800X600	-	1186
HWR	76412/0	LEAKAGE OIL TANK	-	1000X1000X3000	-	515
HWR	76413/0	WASTE OIL TANK	-	1000X1000X3000	-	515
HWR	76601/0	COMPONENTS OF COP ASSEMBLY	-	2500X2000X2400	-	3200
HWR	76602/0	COMPONENT OF COP ASSEMBLY	-	3700X3000X2000	-	3267
HWR	76603/0	COMPONENT OF COP ASSEMBLY	-	3100X3100X1100	-	5000
HWR	76604/0	COMPONENT OF COP ASSEMBLY	-	2500X2250X2300	-	2400
HWR	76605/0	COMPONENT OF COP ASSEMBLY	-	5000X3300X3000	-	11500
HWR	76606/0	COMPONENT OF COP ASSEMBLY	-	2850X2600X1400	-	2900
HWR	76607/0	COMPONENT OF COP ASSEMBLY	-	6200X2350X750	-	1900
HWR	76608/0	COMPONENT OF COP ASSEMBLY(PARTS)	-	2200X2200X1050	-	1300
HWR	76801/0	RATING, COLLABORATION ANDCOMPANY'S MONOGRAM	-	XX	-	75
HWR	76914/0	COMPENSATOR	-	600X600X900	-	50
HWR	76921/0	VALVE BLOCK ASSEMBLY	-	250X200X200	-	12
HWR	77202/0	TEMP. & PRESSURE CONNECTIONS	-	1700X750X750	-	350
HWR	77203/0	IMPULSE PIPES (CARBON STEEL)	-	7000X900X800	-	1817
HWR	77204/2	TEMP. INSTRUMENTS & SENSORS	-	800X800X500	-	281
HWR	77204/3	LEVEL INSTRUMENTS & SENSOR	-	650X400X400	-	30
HWR	77205/0	TRANSMITTERS & FITTINGS	-	700X600X450	-	90

HWR	77206/0	IMPULSE PIPES(ALLOY STEEL AND SS)	-	7000X500X500	-	635
HWR	77207/0	IMPULSE PIPESIMPULSE PIPES	-	7000X500X500	-	1300
					Subtoal	**917852.00**
Geneator and Aux.						
HWR	601/0	FOUNDATION PLATES	-	6400X1680X950	-	11915
HWR	602/0	FOUNDATION BOLTS	-	2540X655X600	-	960
HWR	603/0	FOUNDATION ITEMS	-	5800X1120X520	-	2170
HWR	605/0	GENERATOR STATOR	-	9860X4440X4260	-	312000
HWR	606/0	GENERATOR ROTOR	-	14140X1790X1760	-	85913
HWR	606/1	SKID PLATE	-	8050X855X335	-	818
HWR	607/0	END SHIELD LOWER HALF (TE)	-	3800X1500X2240	-	9883
HWR	608/0	END SHIELD UPPER HALF (TE)	-	3800X1500X2240	-	8883
HWR	609/0	END SHIELD LOWER HALF (EE)	-	3800X1500X2240	-	9933
HWR	610/0	END SHIELD UPPER HALF (EE)	-	3800X1500X2240	-	8933
HWR	611/0	GENERATOR BEARING (EE & TE)	-	1240X1050X1225	-	2191
HWR	612/0	BAFFLE RING CARRIER &AIR GAP SEAL ASSY.	-	2035X1885X1380	-	1714
HWR	613/0	TERMINAL BUSHINGS	-	1984X1856X680	-	1737
HWR	614/0	TERMINAL BUSHING BOX	-	3500X2600X1740	-	7337
HWR	615/0	SHAFT SEALS (EE & TE) &OIL CATCHER (INNER & OUTER)	-	2160X2160X730	-	1830
HWR	616/0	BAFFLE RING ASSY	-	1950X1950X1215	-	1420
HWR	617/0	GENERATOR ACCESSORIES	-	2200X2200X975	-	1228
HWR	618/0	FLEXIBLE TERMINAL CONNECTIONS	-	1420X1020X540	-	774
HWR	619/0	GENERATOR ACCESSORIES	-	1210X1010X400	-	670
HWR	620/0	GENERATOR ACCESSORIES	-	1200X1010X820	-	985
HWR	621/0	GENERATOR ACCESSORIES	-	1710X1220X420	-	350
HWR	622/0	PRIMARY WATER TANK	-	11000X2400X1565	-	5249
			-			
HWR	625/0	PLATFORM FOR PW TANK	-	5000X1200X765	-	1727
HWR	626/0	COOLER HOUSING FRAME	-	4290X4450X1428	-	21500
HWR	627/0	SEAL RINGS	-	830X830X315	-	165
HWR	628/0	CONNECTION PIECE ASSEMBLY	-	1880X1300X535	-	1088
HWR	630/0	GENERATOR - TERMINAL BOXES	-	1210X1010X800	-	340
HWR	631/0	DRY AIR BLOWER	-	1360X1190X1625	-	648
HWR	632/0	ERECTION PEDESTALS	-	6500X1500X1211	-	6543
HWR	633/0	ROTOR INSERTION DEVICES	-	2470X1180X1360	-	2320
HWR	634/0	WIRE ROPES FOR ROTOR	-	1800X1800X500	-	523
HWR	635/0	GENERATOR ERECTION DEVICES	-	3450X1630X795	-	1400
HWR	636/0	SPECIAL TOOLS AND TACKLES	-	800X700X428	-	218

HWR	645/0	SEAL OIL STORAGE TANK	-	5000X1800X2165	-	4217
HWR	646/0	PW COOLER & FILTER UNIT	-	5400X4400X3500	-	9818
HWR	648/1	SINGLE FLOW S.O.U.-PART I	-	3800X2500X2165	-	4264
HWR	648/2	SINGLE FLOW S.O.U. -PART II	-	2900X2500X3165	-	3040
HWR	649/0	LIQUID DETECTOR RACK	-	2132X840X2340	-	816
HWR	650/0	GAS UNIT	-	2550X1750X2725	-	1926
HWR	651/0	CO2 VAPOURISER	-	1800X880X900	-	579
HWR	652/0	H2 DISTRIBUTOR	-	3750X1800X840	-	919
HWR	653/0	CO2 DISTRIBUTOR	-	4900X1200X665	-	864
HWR	654/0	N2 DISTRIBUTOR	-	1400X1200X665	-	375
HWR	655/0	DRAIN OIL COLLECTOR	-	2000X600X715	-	336
HWR	656/0	RESINS	-	1200X600X715	-	242
			-			
HWR	658/0	TG SYSTEM INTEGRAL PIPING(INSTRUMENTS)	-	1000X940X1065	-	437
HWR	659/0	CONSUMABLES	-	1200X600X720	-	217
HWR	660/0	SLIP RING SHAFT ASSEMBLY	-	3400X1190X1255	-	3684
HWR	661/0	AIR FILTERS & SEALING WALL	-	2200X2220X1205	-	1168
HWR	662/0	ACCESSORIES OF SLIP RING SHAFT	-	3620X3500X900	-	2455
HWR	663/0	BED PLATE,BEARING & BRUSHGEAR	-	3260X2120X1795	-	7096
HWR	823/0	PW TANK PIPE LINES	-	0X0X0	-	0
					Subtoal	**555818.00**
BOIs						
HWR	BT001	LIFTING BEAM	1	No.	-	5000
HWR	BT006	BUTTERFLY VALVES	1	Set	-	117
HWR	BT009	NRV WITH ALUMINIUM FLAP	1	Set	-	24
HWR	BT011	OIL PURIFICATION UNIT	1	No	-	2000
HWR	BT014	SPRAY NOZZLES	13	No	-	5
HWR	BT015	DIRT CATCHERS	1	No	-	16.2
HWR	BT016	DAMPER	1	Set	-	22
HWR	BT017	VARIABLE LOAD SPRING CAGES	1	Set	-	3500
HWR	BT021	THERMAL INSULATION OF TIP	1	Set	-	7000
HWR	BT023	TURBINE OIL	1	ST	-	31855
HWR	BT024	DRY AIR PRESERVATION SYSTEM	1	No.	-	500
HWR	BT025	OIL PURIFICATION SYSTEM (CENTR	1	No	-	2000
HWR	BT026	GROUP CABLES	1	Set	-	4350
HWR	BT029	CALIBRATED FLOW NOZZLE ASSLY.	1	No.	-	2990
HWR	BT043	CONTROL FLUID (FRF) 13 Drums (Gross Wt. of each Drum is 255Kg approx.)	1	ST	-	3315
HWR	BT046	LP BYPASS STOP & CONTROL VALVE	1	Set	-	17000

HWR	BT054	STEAM TRAP	1	Set	-	20
HWR	BT065	GEAR PUMP (LUB. OIL RECIRCULAT	1	No	-	50
HWR	BT068	POWER CABLES FOR 24 V SOLENOID	1	Set	-	820
HWR	BT070	LEVEL INSTRUMENTS FOR OIL SYST	1	Set	-	80
HWR	BT071	LEVEL INDICATORS FOR OIL TANKS	1	Set	-	80
HWR	BT074	VACUUM BREAKER VALVE WITH PNEU	1	Set	-	150
HWR	BT081	HPT STEAM EVACUATION VALVE	1	No	-	650
HWR	BT091	FOR 660MW TG SET HP Turbine	1	Set	-	142210
HWR	BT096	OIL MODULE	1	No	-	72000
HWR	BT097	OIL THROTTLE VALVES	8	No	-	150
HWR	BT104	SEAL STEAM CONTROL VALVE WITH	1	Set	-	240
HWR	BT105	LEAK STEAM CONTROL VALVE WITH	1	Set	-	2000
HWR	BT106	TURBINE INSTRUMENT RACKS	10	No	-	3110
HWR	BT107	PNEUMATIC GLOBE VALVE	1	Set	-	14
HWR	BT110	HYDRAULIC POWER SUPPLY UNIT FO	1	Set	-	2000
HWR	BT111	ELECTRO-HYDRAULIC ACTUATORS FO	1	Set	-	3600
HWR	BT142	PRESSURE TRANSMITTERS FOR STEAM TURBINE	1	Set	-	566
HWR	BT147	PRESSURE GAUGES FOR TG SET	1	Set	-	70
HWR	BG001	EMPTY H2 CYLINDER	150	No	-	9000
HWR	BG002	EMPTY CO2 CYLINDER	75	No	-	4500
HWR	BG003	EMPTY N2 CYLINDER	12	No	-	720
HWR	BG004	PORTABLE GAS ANALYSER	1	No	-	20
HWR	BG007	VAPOUR EXHAUSTER	2	No	-	160
HWR	BG011	REFRIGERATION GAS DRYER	2	No	-	2000
HWR	BG082	HYDRAULIC UNIT ASSEMBLY	1	Set	-	**590**
HWR	BH010	CONDENSOR AIR EVACUATION PACKA	8	Nos.	-	16000
HWR	BH012	AIR EXHAUSTER WITH MOTOR	4	Nos.	-	320
HWR	BH022	MULTI BALL BEARING SUPPORT FOR	1	ST	-	5000
HWR	BH001	WELDED AUSTENITIC S.S. TUBES GR.304 (CONDENSOR)	35000	Nos.	-	300000
HWR	BG005	MOISTURE MEASURING EQUIPMENT	1	Set	-	175
HWR	BG008	MOTORISED TEMPERATURE CONTROL VALVE WITH ACTUATOR NB250 VAR-02	1	No	-	1955
HWR	BG009	H2 GAS ANALYSER CABINET	2	No	-	454
HWR	BG018	STARTING RESISTOR FOR DC S.O MOTOR	1	No	-	71
HWR	BG021	GROUNDING BRUSH MONITOR	1	Set	-	115
HWR	BG092	PW TEMPERATURE CONTROL VALVE	1	No	-	515
HWR	BT094	DC STARTERS & INSTRUMENTATION	1	Set	-	3000

HWR	BG106	SLIP RING COVER (COMPLETE WITH FABRICATION & LINING)	1	Set	-	**5000**
HWR	BG107	PRIMARY WATER PUMP MOTOR SET	2	No	-	1000
					Subtoal	**658099.20**
Turbine Integral Piping (TIP)						
HWR	BT027	TURBINE INTEGRAL PIPING	1	Set	-	55000
HWR	BT028	H & S FOR TURBINE INTEGRAL PIP	1	Set	-	35000
HWR	BG090	GENERATOR INTEGRAL PIPING	1	Set	-	19299
HWR	BG091	HYDROGEN COOLERS PIPING	1	Set	-	7171
HWR	624/0	PW TANK PIPE LINES	-	1200X600X715	-	277
HWR	657/0	TG SYSTEM INTEGRAL PIPING(VALVES)	-	2750X1400X1565	-	2354
					Subtoal	**119101.00**
Hyderabad						
Heat exchangers						
Hyd	W-1032323000	LP HEATER-2 ASSEMBLY	1	L 14800 x W 2000 x H 2400	31893	31893
Hyd	W-1032323100	LP HEATER-3 ASSEMBLY	1	L 13200 x W 1900 x H 2300	29688	29688
Hyd	W-1032323200	LP HEATER-4 ASSEMBLY	1	L 14000 x W 1900 x H 2300	29964	29964
Hyd	W-1032238700	H.P.HEATER-6 ASSLY	1	L 11800 x W 2800 x H 3300	98000	98000
Hyd	W-1032238800	HP HEATER-7 ASSLY	1	L 14100 x W 2800 x H 3300	148000	148000
Hyd	W-1032238900	H.P.HEATER-8 ASSEMBLY	1	L 11900 x W 2700 x H 3200	125000	125000
Hyd	W-1033020600	DRAIN COOLER ASSEMBLY	1	L 8900 x W 1200 x H 1700	13000	13000
Hyd	W-1032256800	EXTERNAL DE SUPER HEATER	1	L 9200 x W 2000 x H 2500	49500	49500
Hyd	-	TWIN OIL COOLER-1	1	L 5250 x W 1000 x H 2000	7350	7350
Hyd	-	TWIN OIL COOLER-2	1	L 5250 x W 1000 x H 2000	7350	7350
					Subtoal	**539745.12**
Pumps and Aux						
Hyd	W-1054402400	MD BFP-1	1	3500 x 3100 x 3000	21850	21,850.00
Hyd	W-1054402500	MD BFP-2	1	3500 x 3100 x 3000	21850	21,850.00
Hyd	W-1054804600	TD BFP-1	1	3500 x 3100 x 3000	21850	21,850.00
Hyd	W-1054804700	TD BFP-2	1	3500 x 3100 x 3000	21850	21,850.00
Hyd	W-1054333300	MD BOOSTER PUMP FA1B75-1	1	3000 x 3000 x 2500	5710	5,710.00
Hyd	W-1054333400	MD BOOSTER PUMP FA1B75-2	1	3000 x 3000 x 2500	5710	5,710.00
Hyd	W-	TD BOOSTER PUMP MLC 400X300 H-1	1	3000 x 3000 x	6350	6,350.00

	1055205800			2500		
Hyd	W-1055205900	TD BOOSTER PUMP MLC 400X300 H-2	1	3000 x 3000 x 2500	6350	6,350.00
Hyd	W-1056549200	CEP-1 ASSY	1	11000 x 3000 x 3000	6220	6,220.00
Hyd	W-1056549300	CEP-2 ASSY	1	11000 x 3000 x 3000	6220	6,220.00
Hyd	W-1056549400	CEP-3 ASSY	1	11000 x 3000 x 3000	6220	6,220.00
Hyd	W-1059100900	CV PUMP-1	1	5600x3000x3000	30000	30,000.00
Hyd	W-1059101000	CV PUMP-2	1	5600x3000x3000	30000	30,000.00
Hyd	CEP-1,2,3	CEP SUCTION STRAINER 20INCH	3	-	1,350.00	4,050.00
Hyd	CEP-1,2,3	CANISTER ASSY WITH SNBR&FLGS-EN6J40/500	3	-	2,910.00	8,730.00
Hyd	CEP-1,2,3	FOUNDATION RING ASSY	3	-	700.00	2,100.00
Hyd	CEP-1,2,3	CONNECTING COUPLING BETWEEN CEP&MOTOR	3	-	82.00	246.00
Hyd	CV PUMP-1,2	MOTOR SOLE PLATE- WANAKBORI	2	-	2,749.00	5,498.00
Hyd	CV PUMP-1,2	CVP CONNECTING COUPLING VAR. 02	2	-	1,100.00	2,200.00
Hyd	MD BP-1,2	AUXILIARY SKID FOR MECHANICAL SEALS	2	-	1,000.00	2,000.00
Hyd	MDBFP-1,2	HYD COUP FOR 30% DUTY MDG346 - VAR 08	2	-	12,500.00	25,000.00
Hyd	MDBFP-1,2	PORTABLE OIL CENTRIFUGE	1	-	500.00	500.00
Hyd	MDBFP-1,2	RC VALVE FOR MDG346 30% DUTY-VAR 15	2	-	900	1,800.00
Hyd	MDBFP-1,2	SUCTION STRAINER FOR BP 660MW	2	-	2,350.00	4,700.00
Hyd	MDBFP-1,2	SUCTION STRAINER FOR BFP 660MW(16 INCH)	2	-	1,200.00	2,400.00
Hyd	MDBFP-1,2	AUXILIARY SKID FOR MECHANICAL SEALS	2	-	1,000.00	2,000.00
Hyd	MDBFP-1,2	CONNECTING COUPLING HYD COUPLING / MOTOR	2	-	357	714.00
Hyd	MDBFP-1,2	CONNECTING COUPLING BOOSTER PUMP / MOTOR	2	-	31	62.00
Hyd	MDBFP-1,2	CON COUPLING BFP/HC MDG346 30% BHUSAWAL	2	-	200	400.00
Hyd	TDBFP-1,2	RC VALVE FOR MDG405 50% DUTY-VAR 16	2	-	900	1,800.00
Hyd	TDBFP-1,2	BP SUCTION STRAINER 660MW	2	-	1,500.00	3,000.00
Hyd	TDBFP-1,2	SUCTION STRAINER FOR BFP 660MW(18 INCH)	2	-	1,600.00	3,200.00
Hyd	TDBFP-1,2	AUXILIARY SKID FOR MECHANICAL SEALS	2	-	1,000.00	2,000.00
Hyd	TD BP-1,2	AUXILIARY SKID FOR MECHANICAL SEALS	2	-	1000	2,000.00
					Subtoal	**264580.00**
Drive Turbine and Aux						
Hyd	W-1019226200	ASSEMBLED DRIVE TURBINE-1	1	4350 x 4900 x 4250 with Gov	59000	59,000.00

				valves		
Hyd	W-1019226300	ASSEMBLED DRIVE TURBINE-2	1	4350 x 4900 x 4250 with Gov valves	59000	59,000.00
Hyd	-	LUBE OIL RESORVOIR	2	3000 x 3000 x 3000	5000	10,000.00
Hyd	-	ACOUSTIC ENCLOSURE FOR BHUSAWAL 660 MW	2	-	5,000.00	10,000.00
Hyd	-	THERML INSULATION,MIN.MATTRS+CAT9	2	-	600	1,200.00
Hyd	-	TOP FIXED TYPE 50LPM,3 KG/CM2 IE2 MOTOR	2	-	150	300.00
Hyd	-	SET OF OIL ACCUMULATORS 2X55 LTS CAPACIT	2	-	250	500.00
Hyd	-	SET OF OIL ACCUMULATORS 3X55 LTS CAPACIT	2	-	250	500.00
Hyd	-	JOP CAP 12LPM,100 KG/CM2 WITH IE2 MOTOR	2	-	500	1,000.00
Hyd	-	OIL CENTRIFUGE(FIXED)2400LPH IE2 MOTOR	2	-	1,100.00	2,200.00
Hyd	-	OIL VAPOUR FAN WITH IE2 Mtr 0.11M3/S	4	-	200	800.00
Hyd	-	GEAR BOX	2	-	1,000.00	2,000.00
Hyd	-	GLAND STEAM INLET CONTROL VALVE	2	-	50	100.00
Hyd	-	GLAND STEAM DUMP CONTROL VALVE	2	-	50	100.00
Hyd	-	LUBE OIL TEMPERATURE CONTROL VALVE	2	-	50	100.00
Hyd	-	11KW,220V DC MOTOR STARTER CUBICLE	2	-	600	1,200.00
Hyd	-	PIPING THERMAL INSULATION	2	-	2,500.00	5,000.00
Hyd	-	TURBINE EXHAUST PIPING (DOWNWARD)	2	-	2,601.72	5,203.44
Hyd	-	PIPING LUBE, JACKING, GOVERNING OIL & DRAINS	-	-	-	23,136.00
					Subtoal	**181339.44**
Bhopal Supplies						
Motors						
BPL	Motor	CWP Motor	2	5150*4700*4000	48000	96000
BPL	Motor	BFP Motor	2	4240*4675*2320	23000	46000
BPL	Motor	CEP Motor	3	3230*1800*3000	9100	27300
BPL	Motor	ACW Motor	2	1845*1330*840	2650	5300
BPL	Motor	DMCW TG Motor	3	1810*1330*840	2200	6600
BPL	Motor	Boiler Fill Motor	2	1845*1330*840	2650	5300
					Subtoal	**186500.00**
RE Joints						
		RE JOINTS (2500 NB) PB Type				
BPL	RE JOINTS (2500 NB) PB	Pipe Detail (Miter Bend) Inlet Side	2	2800 D X 3645 L	7300	14600

	Type					
BPL	RE JOINTS (2500 NB) PB Type	Pipe Detail (Miter Bend) Outlet Side	2	2800 D X 3645 L	7300	14600
BPL	RE JOINTS (2500 NB) PB Type	Pipe Assy. L & R (Inlet Side)	2	3800 D X 500 L	7300	14600
BPL	RE JOINTS (2500 NB) PB Type	Pipe Assy. L & R (Outlet Side)	2	3800 D X 500 L	7300	14600
BPL	RE JOINTS (2500 NB) PB Type	Blank Flg. Assy. L & R (Inlet Side)	2	3800 D X 150 L	11400	22800
BPL	RE JOINTS (2500 NB) PB Type	Blank Flg. Assy. L & R (Outlet Side)	2	3800 D X 150 L	11400	22800
BPL	RE JOINTS (2500 NB) PB Type	Pipe. Assy. Tie Rod End (Inlet Side)	2	3000 D X 800 L	2200	4400
BPL	RE JOINTS (2500 NB) PB Type	Pipe. Assy. Tie Rod End (Outlet Side)	2	3000 D X 800 L	2200	4400
BPL	RE JOINTS (2500 NB) PB Type	Bare Bellows	4	3000 D X 450 L	350	1400
BPL	RE JOINTS (2500 NB) PB Type	Tie Rod Assy.	12	280 D X 4400 L	510	6120
BPL	RE JOINTS (2500 NB) PB Type	Fasteners	01 SET	1500 L X 1500 W X 1500 H	4000	4000
BPL	RE JOINTS (2500 NB) PB Type	Bottom Spring Support	24	600 D X 1000 L	300	7200
BPL		RE Joint (conventional type) 700NB				0
BPL	RE Joint (conventional type) 700NB	Bare Bellow with Retaining Ring	5	1000 D x 300 L	200	1000
BPL	RE Joint (conventional type) 700NB	Flange 50 TK	10	1000 D x 60 L	90	900
BPL		RE Joint (conventional type) 2500NB				0
BPL	RE Joint (conventional type) 2500NB	Bare Bellow with Retaining Ring	2	3000 D x 400 L	350	700
BPL	RE Joint (conventional type) 2500NB	Flange 110 TK	4	3000 D x 130 L	1500	6000
BPL		RE Joint (conventional type) 450NB				0
BPL	RE Joint (conventional type) 450NB	Bare Bellow with Retaining Ring	5	700 D x 250 L	200	1000
BPL	RE Joint (conventional type) 450NB	Flange 45 TK	10	700 D x 70 L	50	500

					Subtoal	**141620.00**
Flash Tanks						
BPL	Flash Tanks	HP Flash Tank	1	4000 D X 5700 L	8500	8500
BPL	Flash Tanks	LP Flash Tank	1	3200 D X 4200 L	5250	5250
BPL	Flash Tanks	Steam drain Flash Tank	1	3000 D X 4400 L	4800	4800
BPL	Flash Tanks	Unit Flash Tank	1	1700 D X 3000 L	1700	1700
BPL	Flash Tanks	FWHSV Drain Flash Tank	1	2000 D X 3200 L	1900	1900
					Subtoal	**22150.00**
Misc Tanks						
BPL	Misc Tanks	Clean Oil Tank	1	4.5 x 3.5 x 3.5 mtr	8500	8500
BPL	Misc Tanks	Dirty Oil Tank	1	4.5 x 3.5 x 3.5 mtr	8500	8500
BPL	Misc Tanks	Oil Unloading Vessel	1	2.2 x 1.2 x 0.7 mtr	585	585
BPL	Misc Tanks	DMCW Tank	1	7.1 x 2.0 x 2.0 mtr	6000	6000
BPL	Misc Tanks	Potable Water Tank	1	5.0 x 3.0 x 4.0 mtr	11000	11000
					Subtoal	**34585.00**
Butterfly Valves						
BPL	Butterfly Valves	DIA. 2500-E	4	3800 X 3200 X 800	13565	54,260
BPL	Butterfly Valves	DIA. 2500-H	2	3800 X 3200 X 800	18000	36,000
BPL	Butterfly Valves	DIA. 1700-M	1	2800 X 2000 X 750	5940	5,940
BPL	Butterfly Valves	DIA. 1400-M	1	2000 X 1800 X 500	3580	3,580
BPL	Butterfly Valves	DIA. 1000-E	2	1800 X 1200 X 500	2145	4,290
BPL	Butterfly Valves	DIA. 1000-M	1	1800 X 1200 X 500	2070	2,070
BPL	Butterfly Valves	DIA. 800-E	2	1600 X 1100 X 400	1520	3,040
BPL	Butterfly Valves	DIA. 800-M	1	1600 X 1100 X 400	1520	1,520
					Subtoal	**110700.00**
PEM Supplies/BOIs						
Pumps & motors						
PEM	Pumps & Motots	ACW PUMPS (vertical)	2	2100MM X 2100MM	13,500	27,000
PEM	Pumps & Motots	DMCW-TG PUMPS (HORIZONTAL)	3	2800MM X 1300MM	4,400	13,200
PEM	Pumps & Motots	DMCW-SG PUMPS (HORIZONTAL)	2	2800MM X 1300MM	4,400	8,800
PEM	Pumps & Motots	CT M/U PUMPS (VERTICAL)	3	1300MM X 1300MM	4,500	13,500
PEM	Pumps & Motots	ASH WATER PUMPS (VERTICAL)	2	1300MM X 1300MM	4,200	8,400
PEM	Pumps & Motots	RAW WATER PUMPS (VERTICAL)	3	1500MM X 1500MM	5,000	15,000
PEM	Pumps & Motots	POTABLE WATER PUMPS -PLANT (VERTICAL)	2	765MM X 765MM	2,000	4,000
PEM	Pumps & Motots	POTABLE WATER PUMPS-COLONY (VERTICAL)	2	765MM X 765MM	2,000	4,000
PEM	Pumps &	SERVICE WATER PUMPS (VERTICAL)	2	1300MM X	6,000	12,000

	Motots			1300MM		
PEM	Pumps & Motots	APH/ESP WASH WATER PUMPS (VERTICAL)	2	1300MM X 1300MM	6,000	12,000
PEM	Pumps & Motots	INTAKE WATER BOOSTER PUMPS (VERTICAL)	3	1500MM X 1500MM	5,000	15,000
PEM	Pumps & Motots	AHP PUMP (VERTICAL)	2	1300MM X 1300MM	4,000	8,000
PEM	Pumps & Motots	FGD (VERTICAL)	2	1300MM X 1300MM	5,000	10,000
PEM	Pumps & Motots	SCR (VERTICAL)	2	1200MM X 1200MM	3,000	6,000
PEM	Pumps & Motots	COLTCS	2	2500MM x 5000MM	12,000	24,000
PEM	Pumps & Motots	SCS	2	2000MM X 1500MM	3,000	6,000
PEM	Pumps & Motots	DF	2	2500MM X 5000MM	11,500	23,000
PEM	Pumps & Motots	PHEs-TG	3	4300mm x 2800mm	9,000	27,000
PEM	Pumps & Motots	PHEs-SG	2	2500MM X 800MM	4,500	9,000
PEM	Pumps & Motots	BOILER FILL PUMPS (HORIZONTAL)	2	2500MM X 1000MM	2,500	5,000
PEM	Pumps & Motots	CYCLE MAKE UP PUMPS (HORIZONTAL)	2	2000MM X 800MM	1,000	2,000
PEM	Pumps & Motots	DM WATER TRANSFER PUMPS (HORIZONTAL)	2	1400MM X 500MM	700	1,400
PEM	Pumps & Motots	SUMP PUMPS	12	1000MM X 1000MM	2,000	24,000
PEM	Pumps & Motots	SIMPLEX STRAINER	5	1000MM X 1000MM	500	2,500
PEM	Pumps & Motots	CONICAL STRAINER	5	1000MM X 1000MM	500	2,500
					Subtoal	**283300.00**
BOIs						
PEM	Dosing skid	Hydrazine Dosing system	1	5.5m X 5m X 4m	5500	5,500
PEM	Dosing skid	Ammonia Dosing system	1	5.5m X 5m X 4m	5500	5,500
PEM	Dosing skid	NaOH Dosing System	1	3 m X2.5m X 2 m	1200	1,200
PEM	Dosing skid	Oxygen Dosing System	2	1.8m X 1.8m X 2m	450	900
PEM	Handling eqpt Crane, Hoist & Chain Pulley	Single Girder Cranes	8	15mX3mX2.5m (Each)	-	50,000
PEM	Handling eqpt Crane, Hoist & Chain Pulley	Electric Hoists	27	1.5mX2mX2m (Each)	-	30,000
PEM	Handling eqpt Crane, Hoist & Chain Pulley	Chain Pulley Blocks	66	1mX1mX1m (Each)	-	10,000
PEM	LOP	LOP Pump motor Set	2	1000 x 750	250	500
PEM	LOP	LOP Strainer (duplex)	2	1500 x 950	300	600
PEM	Valves & traps (main)	AIR TRAPS	60	-	-	900

PEM	Valves & traps (main)	AIR RELEASE VALVES	31	-	-	3,500
PEM	Valves & traps (main)	BALL VALVES	250	-	-	1,500
PEM	Valves & traps (main)	GUN METAL GATE/ GLOBE/ NRV/ HV	142	-	-	600
PEM	Valves & traps (main)	STEAM TRAPS	33	-	-	100
PEM	Valves & traps (main)	BUTTERFLY VALVES (STEAM SERVICE)	2	-	-	15,000
PEM	Valves & traps (main)	SPRING LOADED BYPASS VALVES	2	-	-	8,000
PEM	Misc. Items (Lumpsump)	Misc Pumps and Motors, Self cleaning strainers, ME bellows, Valves, Drip and Sump pumps, Insulation for which erection in TG scope etc	-	-	-	1,00,000
					Subtoal	**233800.00**
PESD						
FIRE WATER PUMP HOUSE EQUIPMENT						
PESD	Pumps	Electric Motor Driven, Horizontal, Centrifugal type Hydrant Pumpsets of Cap. 410 M3/Hr. x 105 MWC, complete with Electric Motor, Base plate and accessories - Main pump for Hydrant System	2	-	3700	7400
PESD	Pumps	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Pumpset of Cap. 410 M3 / Hr. x 105 MWC, complete with Diesel Engine and Accessories. - Standby	1	-	2800	2800
PESD	Pumps	Electric Motor Driven, Horizontal, Centrifugal type Spray Pumpset of Cap. 410 M3/Hr. x 105 MWC, complete with Electric Motor, Base plate and accessories - Main pump for Spray System	1	-	3700	3700
PESD	Pumps	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Pumpset of Cap. 410 M3/Hr. x 105 MWC, complete with Diesel Engine and Accessories. - Standby	1	-	2800	2800
PESD	Pumps	Electric Motor Driven, Horizontal, Centrifugal type Jockey Pumpsets of Cap. 40 M3/Hr. x 125 MWC, complete with Electric Motor, Base plate and accessories - Main & Standby	2	-	1000	2000

PESD	Pumps	Electric Motor Driven, Horizontal, Centrifugal type Hydrant Booster Pumpsets of Cap. 171 M3/Hr. x 45 MWC, complete with Electric Motor, Base plate and accessories - Main	1	-	700	700
PESD	Pumps	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Booster Pumpset of Cap. 171 M3/Hr. x 45 MWC, complete with Diesel Engine and Accessories. - Standby	1	-	600	600
PESD	Pumps	Electric Motor Driven, Horizontal, Centrifugal type Spray Booster Pumpsets of Cap. 410 M3/Hr. x 45 MWC, complete with Electric Motor, Base plate and accessories - Main	1	-	1200	1200
PESD	Pumps	Diesel Engine Driven, Horizontal Centrifugal type Hydrant Booster Pumpset of Cap. 410 M3/Hr. x 45 MWC, complete with Diesel Engine and Accessories. - Standby	1	-	1000	1000
					Subtoal	**22200.00**
ISG						
DG Set Main Plant						
ISG	DG SET	1750 KVA DG SET INSTALLATION ON FOUNDATION	2 SET	-	14000	28000
ISG	DG SET	ACOUSTIC ENCLOSURE INSTALLATION/ASSEMBLY	2 SET	-	5000	10000
ISG	DG SET	SILENCER, EXHAUST PIPING (MS Class 400 NB pipes, CLASS-B), SUPPORT , AND STACK (MS Class 400 NB pipe-CLASS B), BELLOW, FLANGES AND ACCESSORIES, PAINTING WHEREVER APPLICABLE	2 SET	-	5000	10000
ISG	DG SET	EXHAUST SUPPORT STRUCTURE WITH PLATFORMS (HEIGHT- 30 MTRS). GALVANISED, PRE FABRICATED , BOLTING TYPE EXHAUST SUPPORT STRUCTURE SHALL BE SUPPLIED. SAME TO BE ASSEMBLED AT SITE. MISCELLANEOUS PIPE CUTTING & WELDING TO BE DONE AT SITE.	1 SET	-	12000	12000
ISG	DG SET	INSULATION AND ALUMINIUM CLADDING OF SILENCER, EXHAUST PIPING AND STACK	2 SET	-	1000	2000
ISG	DG SET	FUEL TANK AND FUEL PIPING (MS Class 1 inch Pipes) WITH VALVES, SUPPORTS, ACCESSORIES AND PAINTING. FLUSHING OF TANKS AND FUEL LINES, FILLING OF 1000 LTRS OF HIGH SPEED DIESEL DURING COMMISSIONING.	2 SET	-	1500	3000

ISG	DG SET	DRAINING AND FILLING OF LUBE OIL AND COOLANT IN THE ENGINE AT THE TIME OF COMMISSIONING. (350 LITRES LUBE OIL AND 650 LITRES COOLANT).	2 SET	-	-	0
					Subtoal	**65000.00**
DG Set FGD						
ISG	DG SET FGD	500 KVA DG SET INSTALLATION ON FOUNDATION DG SET SHALL BE INSTALLED OUTDOORS. DG SET SHALL BE SUPPLIED IN ACOUSTIC ENCLOSURE WITH TARPAULIN PACKING.	1 SET	-	10000	10000
ISG	DG SET FGD	ERECTION OF SILENCER, EXHAUST PIPING (MS Class 200 NB pipes, CLASS-B), SUPPORT , AND STACK (MS Class 200 NB pipe- CLASS B), BELLOW, FLANGES AND ACCESSORIES, PAINTING WHEREVER APPLICABLE	1 SET	-	1000	1000
ISG	DG SET FGD	ERECTION OF EXHAUST SUPPORT STRUCTURE (HEIGHT- 10 MTRS) GALVANISED, PRE FABRICATED , BOLTING TYPE EXHAUST SUPPORT STRUCTURE SHALL BE SUPPLIED. SAME TO BE ASSEMBLED AT SITE. MISCELLANEOUS PIPE CUTTING & WELDING TO BE DONE AT SITE.	1 SET	-	1000	1000
ISG	DG SET FGD	INSULATION AND ALUMINIUM CLADDING OF EXHAUST PIPING AND STACK	1 SET	-	500	500
ISG	DG SET FGD	ERECTION OF FUEL TANK AND FUEL PIPING (MS Class 1 inch Pipes) WITH VALVES, SUPPORTS, ACCESSORIES AND PAINTING. FLUSHING OF TANKS AND FUEL LINES AT THE TIME OF COMMISSIONING. FILLING OF 1000 LTRS OF HIGH SPEED DIESEL DURING COMMISSIONING.	1 SET	-	500	500
ISG	DG SET FGD	DRAINING OF OLD OIL AND FILLING OF NEW LUBE OIL AND COOLANT IN THE ENGINE AT THE TIME OF COMMISSIONING (75 LITRES LUBE OIL AND 150 LITRES COOLANT).	1 SET	-	-	0
					Subtoal	**13000.00**
PSWR						
Misc Structure						
PSWR	Misc Structure	Misc Structure and approach Platforms (other than BHEL MU supply)	-	-	-	100000
					Subtoal	**100000.00**
		Final Total				**4976637**

1. The list is tentative and is given to enable the contractor to study the nature of work. The approximate weight and dimensions of the various sub-assemblies of turbine, generator & its auxiliaries and other Bought out Item is indicated above. The weights & Dimensions given are for general guidance and they are subject to variation as per design consideration.
2. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
3. Any other systems / Components supplied by BHEL manufacturing units which are integral to Steam turbine & Generator and its auxiliaries and other bought out items are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lump sum value.
4. Some of the packages may be sent in parts to suit the site condition/Transportation, the same is to be assembled at site without any extra cost, likewise the package may be assembled together and sent as a single assembly, contractor may have to dismantle and erect or, erect as single assemble as per instruction of BHEL engineers without any extra cost.

10.1 GENERAL

Site Visit by the Bidder

10.1 **The bidder shall, prior to submitting his tender for the work, visit and examine the site of works and its surroundings at his own expense, and obtain and ascertain for himself on his own responsibility all information that may be necessary for preparing his tender and entering into a contract, and take the same into account in the quoted contract price for the work.**

10.2 The bidder shall satisfy themselves about the following factors:

i) Site conditions including access to the site, existing and required roads and other means of transport/communication for use by him in connection with the work including diverting and re-routing of services.

ii) Requirement and availability of land and other facilities of his enabling works, establishment of his nursery, office, stores etc.

iii) Ground conditions including those bearing upon transportation, disposal, handling and storage of materials required for the work or obtained there-from.

iv) Source and extent of availability of suitable materials, including water etc., and labour (skilled and unskilled) required for work, and laws and regulations governing their use and employment.

v) Geological, meteorological, topographical and other general features of the site and its surroundings as are pertaining to and needed for the performance of the work.

vi) The limit and extent of surface and subsurface water to be encountered during the performance of the work, and the requirement of drainage and pumping.

vii) The type of equipment and facilities needed, for and in the performance of the work:

viii) The extent of lead and lift required for the work in complete form over the entire duration of the contract, and

ix) All other information pertaining to and needed for the work including information as to the risks, contingencies and other circumstances which may influence or affect the work or the cost thereof under this contract.

10.3 The work to be carried out at quoted / accepted rates by the Contractor under the scope of these specifications covers the complete work of handling, loading and transporting of materials from project stores sheds / storage yards to site of erection or preassembly yard and unloading at pre-assembly area/erection site, checking, cleaning chipping and levelling of foundations, providing packers and shims/pre-assembling of equipments at the preassembly yard, inspection, minor rectification, preservation, erection, levelling, and other adjustments, cutting, edge / surface preparation, welding, grinding, radiography, LPI/ MPI/ UT testing wherever

needed, heat treatment, carrying out air tightness test by soap solution / kerosene, hydraulic test, steam / air blowing, light up, chemical cleaning, passivation, steam blowing and safety valve floating including inter connection of all the termination points, erection and dismantling of all temporary piping, valves, pumps, tanks etc., required for the above operations, all pre-commissioning tests and trial runs Steam turbine, Condenser, Generator set, Integral piping, HP/LP heater, Tanks & vessels and associated equipments, DG set, Pumps & other auxiliaries connected with the system and other BOIs, Insulation, including supply and application of final painting of 1x660MW, Unit-6 Bhusawal TPS.

10.4 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe / tubes, and handrails etc. for any temporary supporting or approach platforms or scaffolding works or as bed for pre-assembly works. Contractor shall arrange himself all such materials. The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel (angles, channels, beams, plates etc) for such usage as normal scope of work without any cost implication on BHEL.
In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.

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

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

10.7 No member of the already erected structures, platform, ladders, pipes, grills, other component and auxiliaries should be cut without specific approval of BHEL engineer. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL / customer without any additional cost.

10.8 No temporary supports shall be welded on the pipings. Welding of temporary supports, cleats, etc. on the Power house columns shall be avoided. In case of absolute necessity contractor shall take prior approval from BHEL Engineer.

Further, any cutting or alternation of member of the structure of platform or other equipment shall not be done without specific prior approval of BHEL Engineer.

10.9 Contractors shall ensure that all their Staff / Employees are exposed to periodical training programme conducted by qualified agencies / personnel on ISO 9001 Standards latest version.

10.10 Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer for other agencies, like piping, electrical, Cabling, instrumentation, insulation etc., to commence their work from / on the equipments coming under this scope. Sometimes, more than one agencies may have to work in same location. Sometimes it may be required to re-schedule the activities to enable other agencies to commence / continue the work so as to keep the overall project schedule.

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

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

10.13 All necessary permits, certificates and licenses, permits & clearances to carry out this work from the respective IBR authorities/statutory/ local authorities/ Electrical Inspectorate are to be arranged by the Contractor at his cost in time to ensure smooth progress of work and render all assistance, service required in this regard. Contractor shall be responsible for all necessary liasioning work with Statutory Authority towards the certification of installation / works. All incidental expenses shall be borne by Contractor. BHEL/ BHEL‟s Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority.

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

10.15 Upon completion of daily work , the contractor shall remove from the vicinity of work all scrap packing materials, rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer.

10.16 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor’s bills.

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

10.18 The intent of specification is to provide services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient execution of this work shall not relieve the Contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

10.19 The work shall be executed under the usual conditions affecting major power plant construction/operation and in conjunction with numerous other operations and contracting agencies at site. The Contractor and his personnel shall cooperate with personnel of BHEL, BHEL'S Customer, Customer's consultants and other Contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

10.20 Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. All the work shall be carried out as per instructions of BHEL engineer. Wherever Construction sequences are furnished by BHEL, the contractor shall follow the same sequence. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

10.21 The work shall confirm to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be get done by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL as per GCC.

10.22 The Contractor shall perform any services, tests etc, which may not be specified but nevertheless, required for the completion of work within quoted rates.

10.23 The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.

10.24 BHEL reserves right to recover from the Contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to Contractor's lapse during any stage of work. Any loss to BHEL due to Contractor's lapse shall have to be made good by the Contractor as per GCC.

10.25 All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables etc. except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by Contractor unless otherwise specified in the relevant clauses. The Contractor's quoted rates should be inclusive of all such contingencies.

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

10.27 The dismantling of equipments / components of EOT crane in abandoned Pump House shall be carried out by the Contractor as part of the work within the quoted rates.

10.28 The Contractor shall take delivery of the components, equipments, chemicals, and lubricants etc from the BHEL stores/ storage area after getting the approval of BHEL Engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.

10.29 Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work. No claim for extra payment for such work will be entertained.

10.30 The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant

only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

10.31 Hangers & suspensions, supports etc for piping and other systems etc will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required within the quoted cost.

10.32 Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.

10.33 Layout of field routed, fine fittings, oil system and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. As such, layout of small bore piping and oil system shall be done as per the site requirement. Necessary sketch for routing these lines shall be prepared and got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.

10.34 Erection and welding of necessary instrumentation tapping points, thermowell, plugs, metal temp pad and clamps, root valve, flow metering & measurement devices, control valves etc for regular measurements and performance testing to be provided for the systems completion are covered within the scope of this specification. The installation of all the above items shall be in the scope of contractor.

10.35 Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to BHEL. C & I erection agency will do storage / re-erection calibration etc.

10.36 Actuators/drives of valves, dampers, gates, powered vanes etc may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning,

including carrying out minor adjustments required as incidental to the work. Assistance for calibrating / testing the power cylinders / valves, gauges, instruments, etc. and setting to actuators coming under various groups shall be provided by contractor within the quoted rates.

10.37 All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. No separate payment is envisaged for the same.

10.38 In installation of various equipments it may become necessary to install these on temporary supports/ hanger due to various reasons including non-availability of suspension materials. Contractor shall install such temporary suspensions/hangers and later on shift the relevant equipments to their respective permanent hangers/ suspensions/ supports as incidental to work. Requisite materials for such temporary arrangements will be provided by BHEL on free -returnable basis which shall be returned to BHEL after the use.

10.39 The work shall be carried out strictly in accordance to the "Field Quality Plan" approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

10.40 Interconnection/ hookup, if any, with the existing system shall form part of work. Such interconnections, hookups may require shut down of running plant and the relevant work have to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

10.41 It may so happen that certain components like manhole doors, hanger etc may be supplied in loose items. They need to be assembled as per relevant drawings or as per advice of BHEL engineer prior to erection. This forms the part of the scope of work.

10.42 The Contractor shall have total responsibility for all equipment and materials in his custody at Contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

10.43 BHEL is operating web based computerized E-store system that includes, inter-alia, issue of materials, daily progress reporting, Contractor's running monthly billing and material reconciliation through a computerized data management system.

Contractor shall install necessary hardware to hook-up with the BHEL's system and use the same for his scope of work.

10.44 In the event the computerized E-store/SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the E-store/SOMS as and when the E-store/SOMS is reactivated/ normalized.

10.45 **All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for trial runs of the equipments and trial operation of the unit will be supplied by BHEL free of charges.**

10.46 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

10.47 It is not the intent to specify herein all details of all material. Any item related to this work not covered by this but necessary to complete the system will be deemed to have been included in the scope of the work.

10.48 Site testing wherever required shall be carried out for all items / materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.

10.49 The contractor shall carryout additional tests if any, which the Engineer feels necessary because of site conditions and also to meet system specification.

10.50 Contractor shall retain all T&P / Testing instrument / Material handling equipment's etc. at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from Engineer in charge. The contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.

10.51 The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances. However, completion time for

construction, agreed will be subject to the condition that contractor's work is not hampered by the agencies.

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

10.53 Contractor shall remove all scrap materials periodically generated from his working area and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.

10.54 The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer in- Charge.

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

10.56 It is the responsibility of the contractor to do the checking, testing etc. if necessary, repeatedly to satisfy BHEL Engineer with all the necessary tools and tackles, manpower etc. without any extra cost. The testing will be completed only when jointly certified so, by the BHEL Engineer.

10.57 The contractor's work shall not hinder other work, either underground or over ground, such as electrical, phone lines, water or sewage lines, etc. In areas of overlap, the contractor shall work in coordination with other related contractors.

10.58 Any damage by the landscape contractor's team to such utilities will be penalized and contractor shall be responsible for cost for such damages.

10.59 Contractor at his cost shall lay all necessary temporary piping including cutting and edge preparation, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary

piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermo well points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

The contractor shall return all 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.

10.60 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.

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

10.62 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.

10.63 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.

10.64 **SITE INSPECTION**

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

10.64.2 BHEL / Customer will have full authority to inspect the works at any time, either on the site or at the contractor's premises. The contractor shall arrange every facility and assistance to carry out such inspection. On no account will the contractor be allowed to proceed with work of any type unless such work has been inspected and entries are made in the site inspection register by customer / BHEL.

10.64.3 Wherever the performance of work by the contractor is not satisfactory in respect of workmanship, deployment of sufficient labour or equipment, delay in execution of work or any other matter, BHEL shall have the right to engage labour at normal ruling rates and get the work executed through other agency and debit the cost to the contractor and the contractor shall have no right to claim compensation thereof. In such a case, BHEL shall have the right to utilize the materials and tools brought by the contractors for the same work

10.65 **UTILITY POINTS**

10.65.1 Number of utility points (Service / plant air, service / plant water, service / washing steam etc., shall be indicated in the P & I diagram. Contractor to locate the utility points as advised by BHEL site engineer and shall route the piping to these points as per site conditions, and shall submit as built layout with 'BILL OF MATERIAL' to BHEL for approval.

10.65.2 The utility points shall be located at convenient point to handle and to be terminated with brass / bronze valve with suitable connection for hose pipe.

10.65.3 AS BUILT DRAWING:

After successful completion, testing and commissioning of installation work, Purchaser's drawings / documents shall be updated in line with the actual work carried out and as built drawings / documents shall be submitted by the contractor as agreed for the project. Contractor shall be supplied with one extra copies of the layout & isometrics drawings. Contractor to incorporate in one of the copy with red ink all the changes / deviations / alterations etc., Carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

10.66 **DOCUMENTATION**

10.66.1 Contractor shall be supplied with the layout & isometrics drawings. Contractor to incorporate with Red ink all the changes / deviations / alterations etc. carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

10.66.2 After successful completion, testing and commissioning of installation work, as built drawings / documents if any, in line with the actual work carried out as per site routing drawing shall be submitted by the contractor as agreed for the project.

10.66.3 Other documents as specified in Technical Conditions of Contract.

10.67 **PLATFORMS, CROSSOVERS & CANOPIES**

Platforms, ladders, crossovers and canopies shall also be provided at places where it has not been shown in drawings but if felt necessary by BHEL site engineer.

Contractor has to fabricate and install canopies for all outdoor pumps and motors, actuators, lub oil units, control valves and at places as instructed by BHEL Engineer etc. Raw materials required for fabrication of platforms, ladders, crossovers and canopies shall be provided by BHEL free of cost. The work is to be carried our as per the instruction of BHEL and shall be paid as per accepted tonnage rate for "Structures". No separate payment for fabrication is envisaged.

10.68 **Statutory approval for Lifts, hoists, Cranes:** Necessary approval for drawings, documents, load testing of hoists, Single girder EOT, Chain pulley blocks erected by bidders has to be arranged for getting statutory fitness certificates, load test certificates, drawings/documents from Statutory agency/Third party inspectors without any extra commercial implication on BHEL treating as normal scope of work. Weight/loads required for load test of hoists shall be provided by BHEL free of cost.

10.69 **Support for Handing Over of T&P, spares to BHEL/Customer, diversion to other BHEL Sites/Units**

Vendor shall assist in handing over of Special T&Ps for Erection/commissioning which were issued to them free of charge for returning to BHEL /Customer store.

10.70 **Dewatering**

Dewatering of Low Lying areas like CW pit and other low lying areas (as per scope applicability) till handing over to customer is in bidders scope for which vendor has to arrange and maintain adequate no. of Diesel & electrical pumps of suitable capacities, operators, necessary manpower with sufficient quantity of suction & discharges hoses, pipes, Clamps, cables, Electrical panels/starters, diesel, consumables without any extra commercial implication on BHEL treating as normal scope of work. Dewatering pumps will be required to run to ensure job progress is not hampered & if required pumps are to be run on round the clock basis on working days & holidays, Sundays.

10.71 **Housekeeping/Area Cleaning**

The contractor has to do area cleaning on every date on daily basis. Noncompliance of the above cleaning shall call for penal recovery of Rs.2000.00 on each instance and at the same time, cleaning of the area shall be done by BHEL at the risk and cost of the contractor. No excuses on this above account shall be entertained by BHEL on whatsoever account.

Contractor shall engage separate gang exclusively for proper housekeeping of the site. The contractor has to make necessary arrangements for collection and for bringing down the scrap from all locations and taking them away from the erection areas to various locations as indicated by BHEL Engineer. The house keeping must be a routine and continuous activity. in the various work fronts.

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

11.1 Refer forms F -14 to F-18 of volume I D (Forms & Procedure) of volume - I BCD. Plan and review will be done as per the formats.

11.2 The progress reports shall indicate the progress achieved against plan, indicating reasons for delays, if any. The report shall also give remedial actions which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original plan the slippages do not accumulate and affect the overall programme.

11.3 It is the responsibility of the contractor to provide all relevant information on a regular basis regarding progress of work, labour availability, equipment deployment, testing, etc.

11.4 Contractor is required to draw mutually agreed monthly work programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

11.5 Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.

11.6 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer. The periodicity of the reports will be decided by BHEL Engineer at site.

11.7 The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.

11.8 The contractor shall submit a report of any damage, shortage, discrepancy etc., every week detailing in this regard.

11.9 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

11.10 The monthly report as a booklet shall be submitted at the end of every month and shall contain the following details :-

a) Progress photographs in colour.
b) Erection progress in terms of percentage, tonnage, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.
c) Site Organization chart of engineers & supervisors as on the last day of the month with further mobilization plan.
d) Category - wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas cutters, electricians, crane operators and helpers. Data shall be split up under the work areas like Turbine, Condenser, Generator, Heaters, Pumps&motors, Integral piping etc.
e) Consumables report giving consumption of all types of gases and electrodes during the previous month.
f) Availability report of cranes.
g) Safety implementation report in the format.
h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.

12 FOUNDATIONS AND GROUTING

12.1 Building, foundations and other necessary civil works for supporting structures, equipments etc will be provided by BHEL / Customer. The checking of dimensional accuracy, axes, elevation, levels, orientation etc, with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the Contractor as per drawing. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.

12.2 Minor adjustment of foundation level, dressing and chipping of foundation surfaces, enlarging the pockets and blue-matching (wherever required) for of all equipments as per BHEL Engineers instructions, should be done by the Contractor as part of the work. Contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 30 mm for achieving proper levels will be within the scope of work/specification.

12.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection.
Foundation pockets are to be cleaned thoroughly before placing the supports / columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required cleaning of the threads to be done with proper dies.

12.4 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments / equipments based on the foundations including shear lug provisions / openings.

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

12.6 All temporary foundations and anchor points required for installing erection Equipments and winches, foundations for pumps, tanks etc are in the scope of Contractor. All building materials like cement, steel including re-enforcement bars, grits cements etc for such temporary foundations shall have to be arranged by the Contractor within the quoted rates. All such foundations shall be demolished and normal ground conditions restored after the usage.

12.7 Contractor shall carry out scrapping and blue matching of embedded plates, permanent spacers and all matching parts of turbine, generators, pumps and other equipments under the scope wherever required. Chipping and the leveling of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact between the two surfaces.

12.8 BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Machining of the packers, wherever necessary, shall be arranged by contractor within quoted rates. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL will have to be cut out from steel plates / steel sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by gas cutting / chiseling / grinding and de-burr the same. For preparation of shims/packer plates, necessary steel plates shall be provided by BHEL free of cost.

12.9 Complete grouting of equipments under the scope, including anchor/ foundation bolts, pockets, beneath base, base hollows etc, as may be applicable, is included in the scope of Contractor. Arranging all labour, building materials including cement, sand, chips, fine aggregates, ordinary portland as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra gp1/gp2, Shrinkkomp or its equivalent), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and 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 are within the scope of this specification/ work.

12.10 After the grouting has finally set and cured, alignment of equipments involved shall be checked again to verify for any disturbance or any other reason. If required, de-coupling of equipments has to be done for conducting the verification. In case any disturbance is noticed the cause, if any, shall be removed and re-alignment done as part of work.

12.11 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous expenditure for this activity. The certificates of the grout shall be submitted to BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards.

12.12 **PROCEDURE FOR GROUTING:** Contractor has to carry out the grouting as per the work instructions for grouting available at site or the grouting is to be carried out as per the supplier's recommendation / IS standard. Copy of those recommendations is to be submitted to BHEL for records.

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

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

13.1 Loading at BHEL / Customer stores and storage yard, transport to site, unloading at site / working area of equipment, placement on respective foundation / location, fabrication yard, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks/ slings/ tools and tackles / labour including operators, fuel, lubricants etc. for loading & unloading of materials will be in the scope of contractor.

13.2 The storage yard is located inside the Main Plant Boundary at a distance of approximately 1-2 KM from the location of Turbine area.

13.3 Transportation of materials including ODC items from BHEL Store/Yard to Erection site shall be in the contractors scope. However, in some cases, consignments including ODC may be unloaded near erection site as per space availability and site requirements.

13.4 Loading at storage yard and transporting to site, unloading at site / pre assembly area or at working area, is in the scope of work. Required cranes for loading & unloading of materials, trailer shall be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, sandbags which are required for temporary supporting/stacking of the components at site in his custody.

13.5 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection / location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage / loss of such equipment at site.

13.6 The contractor shall satisfy himself of the quality and quantity of the materials at the time of taking delivery from BHEL stores. No claims whatsoever will be entertained by BHEL because of quality or quantity after the materials are taken by the contractor from BHEL stores.

13.7 Contractor shall plan and transport equipments, components from storage yard to erection site in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. However, in specific cases **"as a special case to expedite the job"** the consignment received at BHEL stores can directly be

diverted to the work site, as decided by BHEL, following issuance procedure of BHEL. Such direct issues shall be as per the Challan/dispatch document/LR received with the consignment. In such cases, contractor shall do unloading of materials from trucks/lorry at their own cost.

13.8 Sometimes it may become necessary for the contractor to handle certain unrequited components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.

13.9 All materials issued by BHEL shall be stacked neatly, preserved, stored in the contractor's shed / work area above ground level by use of concrete or wooden sleepers. No materials shall remain on ground at any time. All concrete or wooden sleepers required for stacking the materials shall be arranged by contractor at his own cost within the quoted rates. In case it is necessary to shift and re-stack the materials kept at work area / site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.

13.10 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.

13.11 The contractor shall take care of material issued by BHEL and shall protect the same from damage and weathering. The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered. Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL store before and after erection as required at their cost.

13.12 The contractor shall take all such measures as may be reasonably necessary to ensure that its arrangements and those of its sub-contractors with respect to the transport of Goods, Materials and Labour to the site do not interfere with local traffic in the vicinity of the site and where such interference is unavoidable shall make such special arrangements as may be reasonably required to minimize the effect of such interference.

13.13 The contractor shall in no case be entitled for any compensation on account of any delay in supply or non-supply thereof for all or any such materials. However in case of non-availability of any specific materials which delays the completion of work, such cases shall be recorded separately in monthly planning format (F 14) and shall be considered for time extension of contract.

13.14 The contractor shall solely be responsible for the safety & security of material after it is handed over and issued to contractor by the BHEL. BHEL reserves the right to

recover from the contractor any loss arising out of damage/ theft or any other causes or during verification/stacking or at any time under the custody of the contractor.

13.15 Contractor shall also carryout in complete association with BHEL, the material management functions and execution like day-to-day update of materials, issued to contractor, accounting for surplus/scrap material returned etc. These functions shall also be carried out through computerized system utilizing suitable software. Contractor shall engage experienced software personnel to associate on dedicated basis for efficient discharge of the same in time.

13.16 Open space for storage purposes shall be provided by BHEL on free of cost/as available basis. Temporary barbed wire fencing, as required, of the open storage yard is to be done by the contractor and is included under the scope of his work. Contractor shall also remove grass, bushes, trees etc wherever required off the land provided to him and shall make proper continuous up keeping of the open yard /land by removing grass, bushes trees etc and same is included under the scope of his work & No extra payment shall be made to the contractor in this regard. The bidder shall make complete arrangement of necessary security personnel's to safeguard all such materials in his custody. The contractor shall take care of material issued by BHEL and shall protect the same from theft, damage and weathering. In case, loss of any materials for whatsoever reasons attributable to the contractor, then cost of such materials shall be recovered from the running bill payment with applicable overheads.

13.17 All surplus materials shall be returned to BHEL store. All wastage / scrap (including melting scrap, wastage, and unusable scrap) shall be returned to the stores on weighment basis in consultation with BHEL Engineer and a receipt obtained for material accounting purposes. Scrap materials shall be sorted section-wise and returned separately at a place directed by BHEL Engineer within the project area. Return of such materials will not be entitled for any handling and incidental charges.

The scope of the work will comprise of but not limited to the followings:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

14.1 The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision/clarification of BHEL engineer will have to be followed.

14.2 In case of any class of work for which there is no such specifications as laid down in the contract such as blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

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

14.4 Any fixtures, scaffolding materials, approach ladders, concrete block supports, steel structures required for temporary supporting, pre assembly, checking, welding, lifting & handling during pre-assembly, erection and commissioning shall be arranged by the contractor at his cost.

14.5 The temporary structures/ items welded to permanent members are to be cut and removed without any damage. Any damage so to permanent members/ pipes to be made good by the contractor at his cost.

14.6 In the case of structural members/ plates / ducts / pipes in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints at no extra cost. The contractor will have to carry out suitable minor alteration / adjustments at site, without any extra payment.

14.7 All welded joints shall be subjected to acceptance by BHEL Engineer.

14.8 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.

14.9 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope. No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.

14.10 All the tubes and pipes shall be cleaned and blown with compressed air as per instruction of BHEL Engineer before lifting. After cleaning is over, the end caps shall be put back in tube openings till such time they are welded to other tubes. Required compressors shall be arranged by the contractor at his cost.

14.11 In case of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat

correction or other method as instructed by BHEL Engineer is within scope of work.

14.12 Wherever elbows of 45 deg. or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used as per instruction of BHEL Engineer. No extra cost shall be paid.

14.13 Erection of flow switches, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL/Customer stores, transportation to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

14.14 Contractor shall also weld small length of piping with root valve to the pressure flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.

14.15 Welding of all thermowells, draft, pressure and temperature instrumentation points and all other instrumentation points on equipments and auxiliaries and welding of thermocouple pads for permanent system as well as for performance guarantee test is in the scope of work.

14.16 Pipe supports such as hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.

14.17 Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.

14.18 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.

14.19 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside for erection. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints and other components as per instruction of BHEL Engineer during erection within the quoted rate.

14.20 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. This contingency shall be included within the quoted value. During commissioning, opening of valves, changing of gaskets, attending to leakages, minor modification, and rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower with T & Ps in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning, the same has to be rectified by the contractor at his cost.

14.21 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up and preservative painting required to be done on any equipment or part during the course of erection will have to be done by the contractor. The Contractor shall arrange all paints, primer and consumables, T&P and facilities.

14.22 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed / attended as per BHEL engineer.

14.23 Field Quality Assurance Formats:-It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and customer as token of their acceptance. Payment to the contractor will be linked with the submission of these FQA log sheets. All test to be carried out as per FQP (Field Quality Plan) will be in bidders scope. FQP shall be provided by BHEL during execution time.

14.24 **STG and aux.:** Brief list of System / sub-system to be erected by the contractor & approximate weight of individual items mentioned in this Tender Specification are meant for giving general idea to the tenderer only about magnitude of the work involved. This should not be taken for billing or any other claims. All weights for such purposes will have to be taken from design documents only. This section also gives general idea about various components to be erected with expected accuracy level. However the contractor shall get the correct details from the engineer to avoid mistakes and rework.

14.25 Preparation of preassembly bed shall be in the scope of contractor including materials for preassembly works at site. The preassembled component should have minimum three supports to avoid sagging.

14.26 Some platform materials and approach ladders, suspension materials etc. will be supplied in running meters. The contractor has to cut and use these materials wherever they are supplied in running meters to the required size / shape, to be welded and erect them within the quoted rates.

14.27 All normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include;

a) Machine / flame / electric cutting, grinding, welding, radiography and stress relieving.
b) Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, cleaning, checking, levelling, blue matching, aligning and assembly.
c) Machining, surface grinding, drilling, doweling, shaping.
d) Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing etc.

14.28 All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre-commissioning.

14.29 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.

14.30 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.

14.31 Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, tanks, vessels, strainers 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.

14.32 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.

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

14.34 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.

14.35 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

14.36 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain a reliable and complete installation as per instructions of BHEL Engineer.

14.37 Edge preparation of Valves, tubes & pipes, Fittings like “T” pieces, weld neck flanges, reducers etc., shall be in the scope of contractor. No extra payment shall be made for this.

14.38 All valves will have to be checked, cleaned, lapped or overhauled in full or in part before erection, after chemical cleaning and during commissioning as may be necessary. After the chemical/acid cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. checking all the valves for any accumulation of foreign materials, welding the valves, pipes which were cut and cleaning, over hauling, re-fixing as per BHEL Engineer's instructions is within the scope of work/specification. The contractor, at his own cost, shall arrange experienced technicians for the above work, including required consumables.

14.39 Adjustments like removal of ovalities in pipes and opening or closing of bends to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL.

14.40 Pipes are sent in standard length and shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends.

14.41 It is the responsibility of the contractor to do the alignment, checking, etc., if necessary, repeatedly to satisfy BHEL Engineer / customer Engineers with all the necessary tools and tackles manpower, etc., without any extra cost. The alignment will be complete only when jointly certified so, by the BHEL Engineer & customer. Also the contractor should ensure that the alignment is not disturbed afterwards.

14.42 The Contractor shall install additional platforms of permanent nature for approaching different equipments as per the site requirement and also to meet O&M requirement, which may not be indicated in drawings, shall be fabricated, assembled and erected by the contractor. The steel materials required for these works shall be supplied by BHEL free of cost and the contractor will have to install them to suit the requirement.

14.43 For all the site routed piping as built drawings are to be submitted by the contractor immediately after erection. The Number of site welds joints shall be indicated for site routed piping.

14.44 All the drain lines should have sufficient slope towards drain. Provide expansion loops in all the vents and drains as per the drawings.

14.45 All equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

14.46 The contractor shall take all reasonable care to protect the materials and equipment during erection. Touch up painting required to be done on any

equipment or part during the course of erection will have to be done by the contractor.

14.47 Statutory Approval: It shall be the responsibility of the Contractor to obtain the all necessary approvals/permits from the inspection/regulatory authorities etc. on behalf of the Employer, as may be required for erection, testing and commissioning etc. As called for under the statutes, regulations and the safety codes, all such documentation submission and taking necessary approval shall be the responsibility of contractors. Necessary approval is required from statutory authorities for the entire Ammonia unloading, storage and handling system will be in the scope of agency.

14.48 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing/gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for regressing/ lubricating them with recommended lubricants and assembling back.

14.49 In some cases, structural material, pipes, ducts, suspension for pipes/ducts will be supplied in running lengths which shall be cut to size and adjusted as required. All joints connecting ducts, expansion pieces shall be seal welded on inside and as well outside. Also it may sometime become necessary to remove any of the erected members to facilitate erection of bigger / pre-assembled equipment. In such as the removal and re-erection of such members as per instruction of the BHEL Engineer, will have to be carried out by the contractor without any extra payment.

14.50 **Other structures, galleries and platforms:** All the hand rails and toe guards shall be provided as per drawings and site requirement. hand rails supplied in running lengths shall be suitably cut, edge prepared and welded. Also, hand rails/ guards may have to be provided from the safety point of view in certain places though not indicated in the erection drawings. The weld joints of hand rails shall be ground smooth to flush finish.

14.51 Electroforged floor grills will be supplied for this project. These may have to be cut to suit requirement. Cutting shall be done only by mechanical cutters **and not by gas cutting**. Cold galvanizing compound is to be applied on the cut surface/edge. Cold galvanizing paint supply is in Contractor scope.

14.52 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition. Checking of alignment and recoupling of the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction. All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

Contractor shall make all arrangements in this regard and complete the work as instructed. Vendor shall all necessary MMDs including the motorized insulation testers for the above test.

14.53 Some of the equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.

14.54 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking alignment and re-setting / re-alignment / hot alignment. Contractor shall have to arrange for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the control and power cabling after realignment. Quote tonnage rate shall be inclusive of the above.

14.55 **The scope covers changing of preservative oil in the gearboxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / customer's stores and transporting to site. No additional payment will be made for such works.**

14.56 Whenever required the contractor shall arrange for pre-qualification of process task Performers.

14.57 Non specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.

14.58 Instrument tapping for all systems and associated equipment's to be welded/fitted by the contractor with in the quoted price.

14.59 The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

14.60 Certain instruments like pressure gauges, pressure transmitters, temperature gauges, flow switches and indicators, etc., are received in assembled condition as integral part of equipment. Contractor shall be responsible for safe receipt, installation and custody of these instruments supplied mounted on skids / equipment. The calibration of skid / equipment mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will remove and reinstall the instruments after calibration, the contractor for this package will maintain the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package.

14.61 The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.

14.62 It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

14.63 Wherever piping erected by the contractor is connected to equipment / piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor who is erecting the piping under these specifications.

14.64 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes within the scope of the work.

14.65 All fittings like `T'-pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or over hauled in full or in part before erection and during commissioning.

14.66 The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It is the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.

14.67 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required. The adjustment of all hangers & supports erected in both cold & hot conditions for maintaining the proper slopes towards the drain pots and application of cold pull in the piping wherever required is also included in the scope of the contractor. Spring suspensions / constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrests / locks etc., have to be carried out as and when required.

14.68 Contractor shall install piping in such a way that no excessive or destructive expansion forces exists in either the cold condition or under conditions of maximum temperature and pressure. All bends, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.

14.69 The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Other means shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the pipe and building structure.

14.70 All the valves, including motorized valves, flap valves, dampers, actuators, etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.

14.71 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used the tools and the equipment

deployed shall be subject to the approval of Engineer. The competent technicians shall carry out the bolting work.

14.72 The contractor shall prepare as built piping drawing & submit to BHEL Engineer for approval & verification of material used.

14.73 All lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damages to equipment and personnel. Calibration/fitness testing certificates from recognized agency are to be submitted to BHEL site office for equipment/instrument/appliances to be used, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.

14.74 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded.

14.75 The work on piping systems (air, water, oil, steam, gas, governing oil, Control oil etc.,) will include cutting to required length, edge preparation, laying, edge preparation, fixing and welding of the elbows / fittings / valves etc., welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings / documents. 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.

14.76 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.

14.77 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.

14.78 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.

14.79 Electric wire rope hoists and single girder EOT cranes shall be erected, tested and commissioned for the scope as mentioned in the BOM. Entire cabling from local junction box to the hoist/single girder EOT crane is included in the scope. Chain pulley blocks with trolley (manual operated) shall be erected, tested and commissioned for the scope as mentioned in BOM. Third party load testing of all cranes and hoists mentioned in list shall be in agency scope. necessary arrangements and fees for carrying out work shall be responsibility of agency.

14.80 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.

14.81 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.

14.82 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.

14.83 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.

14.84 Pre Assembly joints to be marked in isometrics drawings in consultation with BHEL Engineers and submit to BHEL before starting work. Contractor to maintain Line History sheet (LHS) of all Pipe lines as per BHEL Format and submit before HT to BHEL/Customer for getting HT Clearance.

14.85 Erection of all drains / vents / relief / escape / safety valve, piping to various tanks/ sewage / drain canal / flash box / flash tank / condenser / sump / atmosphere etc. from the stubs on the piping to the equipments erected by the contractor is completely covered in the scope of this tender specification.

14.86 Contractor has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive within the quoted / accepted rate.

14.87 The scope of work includes marking of labelling & flow direction on the piping over insulation/other parts at the one place or number of places as instructed by BHEL Engineer. All consumable required for this work shall be in the scope of contractor.

14.88 Normally weld neck valves will have prepared edges for welding. But if it becomes necessary the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like tees, weld neck flanges, reducers, elbows, flanges, inserts etc., shall be suitably edge prepared and matched with pipes for welding. No extra cost shall be paid for this.

14.89 In case of any class of work for which there is no such specifications as laid down in the contract such us blue matching, welding of stainless steel parts etc., the work shall be carried out in accordance with instructions and requirements of the BHEL engineer at the quoted rates only.

14.90 The Contractor shall carry out the reaming and honing works with his own reamers, honing machine and honing accessories etc at his own cost.

14.91 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints, as per the instruction of BHEL Engineer.

14.92 All the weld joints on equipments and piping shall be ground or filed after completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,

14.93 Flow nozzles, orifice, spray nozzles etc., shall be mounted / erected after chemical cleaning / flushing / or steam blowing at site.

14.94 Erection of Flow nozzles, flow switches, steam traps, filters, flow meters, other metering elements, spray nozzles, steam traps, flow orifices, flow indicators, control valves, aux. control valves, NRVs, suction strainers, servomotors, Valve etc forming part of the system (under this scope of work) irrespective of the suppliers is also to be carried out by the agency without any extra cost after chemical and / or steam blowing / oil flushing at site. This will include collecting from BHEL / Customer stores,

transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.

14.95 Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismount such instruments and re-erect whenever required prior to commissioning. Sometime this may have to be handed over to store or instrumentation contractor.

14.96 Fixing, fitting, welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc., on different lines / equipments (which will be supplied by BHEL) is within the scope of work. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system for the erected equipments / pipe lines is the scope of this specification.

14.97 Contractor has to fabricate and erect temporary spool pieces wherever required due to non receipt of valves in time and after receipt of valves the spool pieces are to be replaced with regular valves at free of cost. For spool pieces materials will be supplied free of cost by BHEL.

14.98 All welded joints should be painted with anti-corrosive paint, once radiography and stress relieving works are over.

14.99 Welding, non-destructive testing and heat-treatment as prescribed in BHEL Welding / Heat treatment manual is to be carried out by the contractor. The contractor shall conduct nondestructive tests like radiography, ultrasonic test for weld defects etc., ultrasonic test for finding thickness, dye penetrant tests, magnetic particle test etc. on weld joints, castings, valve bodies and other equipments etc. as per BHEL Engineer‘s instructions within the quoted rate.

14.100 Contractor shall arrange all consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc.

14.101 Cutting and removal of dummies for all the shop welded stubs (irrespective of the equipments supplier for the above) for all the terminal points and preparation of edge where the piping is to be terminated is also in the scope of the contractor without any extra payment.

14.102 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.

14.103 All the shafts of equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.

14.104 The actuators / motors of valves may be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.

14.105 Contractor has to arrange required fire retardant covering material at their cost to protect the machined components, assembled parts and insulation materials drawn from BHEL before and after erection.

14.106 Prior to erection of any components, inspection to be done for any foreign materials and damages and they are to be removed / attended as per instructions of BHEL engineer.

14.107 Erection of items supplied by BHEL's Manufacturing units or Vendor as integral part of the systems covered under this scope of work, shall be done by the contractor within the quoted rate.

14.108 **CONDENSER INSTALLATION**

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

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

14.108.3 The tubes shall be expanded using an Automatic Electronic Torque Controlled Tube Expanding unit or Pneumatic Tube Expander. Tube expansion shall be checked with dial bore gauge. The total set up including tube expanders and tube cutting tools etc. for carrying out the complete condenser tube expansion works shall be provided by the contractor.

14.108.4 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.

14.108.5 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.

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

14.108.7 LP Heater is to be erected inside the condenser in rear side, for which contractor has to cut open the condenser dome plate already erected. After erection, condenser plates have to be strengthened / stiffened as per the instruction of BHEL Engineer.

14.109 **GENERATOR STATOR**

14.109.1 **Generator stator will be transported from HARIDWAR works to site on Trailer. This will be received at site nearer to the lifting point of Portal Gantry Crane (near 'A' row columns). Unloading of Generator Stator from trailer, lifting of stator and shifting it to TG Deck foundation, assembling the terminal box & cooler housing and placing in position using portal gantry crane is in the scope of this specification.**

14.109.2 The generator stator shall be lifted and placed by the contractor with the help of portal Gantry crane as per the scheme envisaged by BHEL on to the generator foundation. For this purpose, the portal crane will be provided by BHEL free of hire charges to the contractor. However the transportation of portal crane from store/storage yard/shed is in Contractor scope. Assistance as required in assembly, erection, testing & commissioning of this portal crane with respect to required T & P (as per Chapter-IV of

Vol-I A TCC) , Manpower as required, is in the scope of Contractor before the stator lifting. Transportation, assistance for dismantling, cleaning, and shifting/packing back to store / storage yard/shed after its use will be the responsibility of the contractor.

14.109.3 Civil works of Portal Gantry foundations (outside A-row and on TG Deck) including supply of foundation bolts are not in the scope of this contract.

14.109.4 Slings for generator stator lifting/handling, shall be provided by BHEL free of charges on returnable basis

14.109.5 The assembly of the Trailer for return after unloading of stator is in the scope of this work**.**

14.110 **HANDLING OF HEAVIER EQUIPMENTS**

14.110.1 Contractor will be provided as per requirement on sharing basis with suitable cranes for loading/lifting of heavy and voluminous equipment/ components/ consignments, for which 40MT contractor scope crane is not suitable, **HP turbine module, IP Outer casing, LP turbine inner casing, LP rotor, IP Rotor, generator rotor, brushless exciter, LP Heater, HP heaters, IV & CV casing with valves etc.** from BHEL/ client's stores/ storage yard/unloading area. Contractors have to arrange trailers including low bed trailers/hydraulic trailer for transportation/shifting of above equipment to the unloading point/erection site. **The contractor shall make necessary arrangement like lying of steel plates, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of BHEL cranes.**

14.110.2 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

14.110.3 Below is the list of major heavy consignments for 1x660MW Bhusawal project, Vendors may please visit site before submission of tender.

Sl No.	Description	Dimensions/Pkg size	Unit Wt Kgs
1	GENERATOR STATOR	9860X4440X4260	312000
2	HP HEATER-7 ASSLY	L 14100 x W 2800 x H 3300	148000
3	HP Turbine	Set	142210
4	H.P.HEATER-8 ASSEMBLY	L 11900 x W 2700 x H 3200	125000
5	LP ROTOR	8174X4500X4456	110248
6	H.P.HEATER-6 ASSLY	L 11800 x W 2800 x H 3300	98000
7	LP INNER CASING (L/H)	6812X6530X4360	89389
8	GENERATOR ROTOR	14140X1790X1760	85913
9	EXTERNAL DE SUPER HEATER	L 9200 x W 2000 x H 2500	49500
10	CWP Motor	5150*4700*4000	48000
11	IV & CV CASING WITH VALVES	6210X5625X3600	46470
12	IV & CV CASING WITH VALVES	6210X5625X3600	46470
13	LP INNER CASING (U/H)	6035X4778X3820	39012
14	IP OUTER CASING (L/H)	XX	36000
15	IP ROTOR	XX	34000
16	ESV & CV CASING WITH	5100X4770X2800	33855

	VALVES		
17	ESV & CV CASING WITH VALVESESV & CV CASING WITH VALVES	5100X4770X2800	33855
18	LP HEATER-2 ASSEMBLY	L 14800 x W 2000 x H 2400	31893
19	IP INNER CASING (L/H)	XX	30000
20	CV PUMP	5600x3000x3000	30000
21	LP HEATER-4 ASSEMBLY	L 14000 x W 1900 x H 2300	29964
22	LP HEATER-3 ASSEMBLY	L 13200 x W 1900 x H 2300	29688
23	BFP Motor	4240*4675*2320	23000

WELDING, HEAT TREATMENT & RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

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

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

15.1 All equipments, pipings shall be erected in conformity as per other standard / specification in practice in BHEL. The method of welding (viz) ARC, TIG or other methods as indicated in the detailed drawing or as instructed by BHEL Engineer shall be followed. BHEL Engineer will have the option to change the method to suit site conditions.

15.2 Welding of piping, high tensile structural steel shall be done by certified high pressure welders who possess valid certificate and who are approved by BHEL Engineer.

15.3 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder without assigning any reason if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification and performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

15.4 The welder Identification code as approved by the BHEL Engineer shall be stamped by the welder on each joint done by them. The contractor will be responsible for the periodic renewal, retesting of the welders as demanded by BHEL.

15.5 BHEL Engineer is entitled to stop any Welder from the work if his performance is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which in opinion of the BHEL Engineer will adversely affect the quality of the welding though the Welders has earlier passed the tests prescribed by BHEL Engineers. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

15.6 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor’s expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.

15.7 The contractor shall have to carry TIG welding of weld joints of tubes / pipes as per instruction of BHEL Engineer. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas.

15.8 All expenses for testing of contractor's welders including destructive and Non-destructive tests conducted by BHEL at site or at laboratory shall have to be borne

by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.

15.9 Only BHEL approved electrodes and filler wire shall be used. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate should have a co-relation with the lot number / batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same. Separate ovens shall be used for baking and holding. All racks and other items used for storage of welding electrodes shall be of steel and not of wood.

15.10 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.

15.11 All butt / fillet welds shall be subject to Non –Destructive testing as per the Drawing/Procedures/Welding Schedules/Documents at no additional cost.

15.12 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final.

15.13 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer. Prepared edges to be preserved / applied with wieldable primer.

15.14 The welded surface irrespective of place of welding shall be cleaned of slag and painted with anticorrosive primer paint / red oxide paint immediately once radiography, stress reliving and other NDE works are over as applicable. Necessary consumables and scaffolding etc. including paints shall be provided by contractor at his own cost. Daily welding reports in the format suggested by BHEL should be submitted by next morning without fail.

15.15 Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding, are parts of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. Contractor at his cost shall arrange all equipment and consumables essential for carrying out the above process.

15.16 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,

- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
- All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. Approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost.
  The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder prior to the starting of SR operations.

15.17 The contractor shall also be equipped for carrying out other NDT like LPI /MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by contractor within the quoted rate.

15.18 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.

15.19 Contractor at his cost shall arrange necessary safe guards required for radiography. Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

15.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

15.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph. Lead intensifying screens for front and back of the film shall be used as per the ASME specification and as per the instructions of BHEL Engineer

15.22 The weld joint is to be marked with permanent mark A, B, C to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down

streamside of the weld. For multiple exposures on pipes, an overlap of about 25-mm of film should be provided.

15.23 All arrangements for carrying out radiography work including dark room, air conditioner and other accessories & facilities shall be provided by contractor within the space allotted for office at his cost. There must be a number of radiographic personnel with sufficient experience and certified by BARC for field radiographic inspection. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and / or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

15.24 The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories. All radiography films shall be developed in the dark room at site.

15.25 100% radiography of weld joints of certain piping has to be carried out as per standards/drawings/Specifications. In case of radiography of less than 100%, the joints identified by BHEL at random shall be radiographed.

15.26 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radio graphed shall not be less than the requirement of BHEL welding schedule / welding Manual booklet applicable as per IBR/ Customer's requirements. The percentage radiography shown in the respective drawings shall be final and binding on the contractors. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL.

15.27 All the Radiographs shall be properly preserved in air-conditioned rooms and shall become the property of BHEL. They are to be reconciled with the work done, joints radio graphed and submitted to BHEL / customer.

15.28 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC /DRP certificate to be provided before taking up the work.

15.29 Radiography of joints shall be so planned after welding, that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he is to be replaced immediately.

15.30 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and new film re- submitted for evaluation.

15.31 The defects as pointed out by the Engineer shall be rectified immediately to the satisfaction of Engineer and Re-radio graphed. The decision of Engineer regarding acceptance or otherwise of the joint shall be final and binding on the contractor. However, if the defect persists after first repair, further repair work followed with

radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radio graphed at contractor's cost.

15.32 Radiography, heat treatment and other NDE processes may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including labour, operators/ supervisors/ engineer as required for timely and satisfactory execution of radiography work as per directions of BHEL.

15.33 The contractor shall assist BHEL Engineer in preparing complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site. The contractor shall strictly adhere to such schedules.

15.34 All welded joints shall be subjected to acceptance by BHEL Engineer whose decision will be final and binding.

15.35 The technical particulars, specifications and other general details of work shall be in accordance with BHEL welding, Heat treatment and NDE manuals or equivalent as decided by BHEL Engineer.

15.36 The field joints are to be radiographed and preheating and post weld heat treatment to be done as per BHEL procedure and manuals.

15.37 Penetrometor as per ASME/ISO shall be used for all exposures.

15.38 The contractor shall also be equipped for carrying out other NDT like liquid penetrant inspection, magnetic particle inspection, etc. as and when required in the interest of work within the quoted rates.

15.39 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. The contractor shall take all this into account and quote the price inclusive of all such work and radiography.

15.40 The welding process, weld joint details, joint configuration and material specification may change to suit the design requirements. The contractors quoted rates shall be inclusive of each contingency. All welds involved in the erection of temporary pipe lines for hydraulic test, chemical cleaning, steam blowing etc. to be carried out within the quoted rates.

15.41 Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer’s instructions. Where the electric resistance heating method is adopted Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment

units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth/pad, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

15.42 Contractor shall deploy NDE and Heat Treatment agency as per the "Guidelines for selection of NDE and Heat Treatment agencies at Site (to be deployed by BHEL's E&C associates). Refer Chapter-XXIV Guidelines NDE &Heat Treatment agencies.

15.43 **List of Penalties on Violations on Quality Provisions**

Sr no	Violation	Penalty in Rs
1	Mother oven not working	500 per day & ban on its use
2	Slackness in control over baking of welding electrodes(Doc.)	200 per incident
3	Holding oven not working/plugged in	500 per incident/day & ban its use
4	Portable oven not working/Plugged in	100 per incident & welder to be sent home
5	Use of cold electrodes(Except E6013)	100 per incident & welder to be sent home
6	Unauthorized welder on job	500 per incident & welder to be sent home
7	Delay in NDT Agency deployment w.r.t jointly agreed Ere. Prog	500 per incident & welder to be sent home
8	Failure to monitor Welder's Performance (RT, SR, Penalty Joint etc.)	5000 per week
9	Improper acts w.r.t maintain SR Charts	10000 per incident
10	Site Welding/QLY Engineer not deployed w.r.t mutually agreed Ere. Plan	500 per day
11	Delay in (RT, SR, UT) report submission & customer acceptance Log sheets esp. for Billed qty. from dt. of Billing (Vendor)	10,000 per week
12	Lack of safe approach Scaffolds/Platform for inspection & non-availability of calibrated MMDs –	1000 per incident.

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The scope of the work will comprise of but not limited to the following:
(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

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

Hydraulic testing

16.1 The pressure testing for piping system shall be carried out as per IBR / Customer / customers' consultant specification / BHEL. Customers' consultant specification forms the part of this tender specification.

16.2 All equipments shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.

16.3 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.

16.4 Soundness of the welds shall be tested hydraulically under the supervision of the BHEL Engineer and Customer, to the pressure indicated in the drawing. Prior to the test, the system shall be inspected by the BHEL Engineer to the extent necessary to ensure compliance with clearance for the test, which will be obtained by the contractor from the Engineer.

16.5 Hydraulic testing, as required shall be carried out by the contractor. The servicing, installation, electrical connection, erection, testing and dismantling of Hydraulic Test pump, temporary pipelines, fittings, etc. shall be carried out by the contractor as part of this work.

16.6 All the hydraulic tests shall be repeated till all the pipelines/equipmetnts to satisfy the requirements/obligation of BHEL to their customer. As far as the hydraulic pressure test is concerned, the same shall be conducted at various stages to the satisfaction of IBR inspectorate / BHEL / Customer Engineers. Any rectifications required shall have to be done / redone by the contractor at his cost. The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for successful and reliable operation. These would include hydraulic test of piping, detergent flushing/chemical cleaning, steam blowing, water washing etc. as instructed by BHEL.

16.7 Test records shall be made for pressure testing of various system. These records shall contain the following information:

a) Date of test
b) Identification of piping tested
c) Test fluid
d) Test pressure

16.8 Contractor has to arrange required filling pumps, with sufficient capacity for filling water in the tubes and pipes for conducting Hydraulic testing. Contractor has to arrange Hydraulic Test pump / Hand Pump at his cost for Hydraulic testing.

16.9 Hydraulic testing pumps (Above 400Kg/cm2) shall be provided by BHEL free of hire charges. The testing pumps will be issued to the contractor in working conditions. Installation, electrical connection, erection, testing and dismantling and returning to BHEL stores, etc, shall be carried out by the contractor as part of this work without any extra charges. In case any servicing of the test pump is to be done during the course of the test, the contractor shall provide the necessary labour for the same and spares will be arranged by BHEL.

16.10 Contractor shall arrange and lay all necessary electric cables and switches etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.

16.11 In certain places blanking has to be resorted prior to Hydraulic test and spool pieces have to be erected in place of control valves, orifices and other fittings and these spool pieces have to be subsequently replaced with the regular valves/ fittings by the contractor at no extra cost.

16.12 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping, pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL. All thermowell points are to be seal welded, with plug in position. All Temperature Element points are to be provided with blanks and welded. Necessary blanks will be provided by BHEL.

16.13 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 / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided without charging extra. 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 Engineer's instructions. Seal welding of thermo-wells and blanks of Temperature Element are to be removed by grinding only after steam blowing.

16.14 The contractor shall make all necessary arrangements including making of temporary closures / dummy on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost. Necessary blanks will be provided by BHEL.

16.15 The contractor shall see that the water shall not be allowed to accumulate in open trenches where work is in incomplete stage, precautionary works such as blank flanging the open ends of the pipe line and filling the pipe line with water etc. shall be taken as directed by the engineer. Such works shall be to the contractor's account and no separate payment will be made for the same

16.16 The contractor shall carryout the required test such as Hydraulic Test of various systems, Ultrasonic Test for weld defects and finding thickness, Dye penetrant test, Magnetic particles test for Weld defects and materials defects etc. All facilities (manpower, materials, equipment, consumables etc.) including proper approaches wherever required shall be provided by the contractor for satisfactory conduction of above tests. Special equipment such as magnetic particle tester, ultrasonic test kit and engineers required for these tests shall be arranged by the contractor along with Qualified technician within finally accepted rates.

16.17 Hanger adjustment / re-adjustment during erection, before and after Hydraulic Test, before and after steam blowing, during and after full load operation, are to be carried out by the contractor within Quoted Rate.

16.18 In general Hydraulic testing of piping shall be performed after all eventual pipe branches have been completed and valves installed. Should it be required to hasten erection work, pressure tests may be performed by sections. For this scope of work, the erected pipe lines shall be hydraulically tested as per site requirement in segments. For conducting hydraulic test, both ends of pipe lines shall be blanked by welding of plates. Only one or two set of plates and structural materials for blanking required for one segment will be provided by BHEL free of charge. After completion of hydraulic test in one segment, the same plates are to be cut and removed and utilized / welded on the other segment of the pipe lines, to carry out the hydraulic test for the respective segments. No separate plates for blanking for each segment will be provided. After completion of Hydraulic test, the required edge preparations shall be carried out on the end of pipe lines and to be welded with the respective pipe lines. In such cases joint connection shall be checked during a final and additional test, if required. The contractor shall note this aspect and quote accordingly.

16.19 During hydraulic test, the pipes being tested shall be isolated from the equipments to which they are connected.

16.20 Openings on piping for pressure / temperature impulse connections shall be fully closed during the test to prevent dust or foreign matter entering into the instrument piping inadvertently.

16.21 The contractor shall do all the repairs for site-welded joints arising out of the failure during testing.

16.22 The following specifications shall also be completed with during hydrostatic test.

a. Vent nozzles with valves shall be provided at the highest point of the runs, to eliminate air pockets. At the lowest point drain nozzles, with valves shall be provided to drain water from pipes. The nozzles and valves shall be of the same materials as the pipe.

b. The lowest part of the pipe shall always be filled first with water.

c. Pressure shall be slowly increased (without shocks) to the stipulated value and maintained as long as required to visually check all joints.

d. Following the control specified above the pressure shall be slowly decreased to the design pressure after which the pipe shall be subjected to the peening test, applying knocks every 150 mm approx. especially in the welded joint areas, with a 0.5 – 1.5 kg. Hammer (depending on the pipe wall thickness). The hammer used shall be a round headed one.

e. Following the peening test, the pressure shall be increased to the stipulated value and all welded joints shall be visually inspected.

f. Following these test, the pipe shall be drained or pumped out to the other section to be hydro test using the drain out pump to be provided by Contractor and wherever necessary shall be flushed with air for all pipes.

g. The pressure test is considered satisfactory if no cracks, unjustified pressure reductions, leakages, seepages etc., appear.

h. Should defects be found, these shall be repaired in the same manner as these during radiographic examination. Hydraulic test shall be repeated after defects have been repaired.

16.23 The Contactor shall carry out all the required tests and pre-commissioning and commissioning activities for TG equipments and aux. required for successful and reliable operation. These would include;

(1) Trial run of Boiler Feed Pumps, CEP, Vacuum Pumps, Booster Pump, CV pumps, etc and other pumps/equipments like Misc pumps etc and other various rotating machineries / pumps as per tender specification.
(2) Trial run of motors/ drives for various auxiliaries.
(3) 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.
(4) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.
(5) Servicing of all valves, Hydraulic Power cylinders, HP Valves (ESV), HP Overload Bypass valves, IP Valves, LP Bypass valves, CRHNRV and fittings.
(6) 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.
(7) 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.
(8) Putting turbine on barring gear.
(9) Rolling and synchronization.
(10) Full load operation.
(11) 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

16.24 Testing, & commissioning will involve, though not limited to these, various testing e.g., leak test, trial runs of equipments; checking/setting various clearances/ parameters, ensuring operation of various equipments free of undue restrictions, Synchronization, trial operation and loading etc are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

16.25 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications thoughsome of the tests / activities are not listed in these specifications.

16.26 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL to their client and also the relevant statutory authority at various stages of work.

16.27 The scope of pre-commissioning, commissioning and post commissioning activities cover installation of all necessary temporary piping, supports, valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, steam blowing or any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the offsite disposal of effluents of the tests under the scope of this contract as per instruction of BHEL Engineer.

16.28 Temporary pipes/materials and chemicals required for conducting hydraulic test, alkali boil out, acid cleaning/steam blowing etc., will be supplied by BHEL. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. Broadly the work on temporary systems will be as under:

- Erection etc. of all temporary piping including valves, tanks, effluent pumps, electrical control panel and cabling along with insulation and supports for steam blowing; chemical cleaning and effluent disposal are to be carried out as part of work. Contractor will be responsible for their operation and any servicing required during the pre-commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection / commissioning activities. All the pumps, motors and electrical control panels/ switch gear, valves and actuators will be furnished to the contractor after due servicing.
- Dismantling of the temporary equipment, piping and return the same to the BHEL stores is also included in the scope of work.

16.29 Commissioning of the TG and aux. will involve trial run of all the equipment erected. Flushing of all the lines by air, oil or steam as the case may be, trial run, servicing of valves and any other works incidental to commissioning are to be carried out. Contractor shall supply manpower round the clock.

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

16.31 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.

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

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

16.34 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

16.35 The scope include the commissioning activities during initial period and subsequently during unit operation during stabilization period/trial run/PG Test. For this purpose items erected by agency has to provide manpower, other resources, diesel, consumables, scaffoldings, T&Ps as required from time to time. These types activities will be repetitive in natures for no. of times and in cases dismantling, reinstallation of items/parts has also to be done till handing over of unit to customer. During case of dismantling /reinstallation logistic supports like Tyre mounted crane/ Crawler Crane /crane/truck/trailers as applicable including manpower are to be arranged by vendor. These types of activity is treated as vendor's normal scope of work without any extra commercial implication on BHEL.

16.36 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

16.37 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

16.38 During commissioning, opening / closing of valves, changing of old/damaged gaskets & packings, tightening of bolts, re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. Replacement materials will be given by BHEL. The finally accepted price /rates shall be inclusive of all such work.

16.39 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and re-alignment are necessary, the contractor at his cost shall do the same as per Engineer's instructions including

repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.

16.40 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

16.41 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.

16.42 Replacing, cleaning and servicing of all the filters / strainers, toppings of oils in the system shall be done by the contractor within the accepted price. All oils and greases to be filled in the main equipments as first fill and subsequent topping up's will be furnished by BHEL.

16.43 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the BHEL Engineer and incorporate the same at no additional cost. The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor.

16.44 The valves, dampers, actuators etc. will have to be checked cleaned and overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.

16.45 Transportation of oil drums from customer/ BHEL's stores, filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer / BHEL stores. Similarly transport of chemicals for various pre-commissioning activities / processes mentioned in the above clauses and returning of remaining and / or the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.

16.46 Contractor shall lay the temporary pipelines with fittings, accessories and erection / commission pumps, tanks, valves, fittings, hangers and supports and other installations as instructed by BHEL, Engineer for the purpose of chemical cleaning / alkali flushing / steam blowing / steam washing / steam flushing / water flushing / water washing / oil flushing etc. of piping and other equipments

are in the scope of work. Necessary, materials for this will be provided by BHEL. All the chemicals will be supplied by BHEL free of cost.

16.47 Laying of insulation of this temporary piping, tanks are to be carried out by the contractor within quoted rate, and required insulation materials will be provided by BHEL.

16.48 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**.**

16.49 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.

16.50 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

16.51 It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.

16.52 In case any erection defect is detected during various tests / operations trial runs as detailed above such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

16.53 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.

16.54 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer. The category of personnel to be as per site requirement and to meet the various pre-commissioning and commissioning programs made to achieve the schedule agreed with customer.

16.55 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 as required.

16.56 It shall be the responsibility of the contractor to provide various categories of workers skilled, semi-skilled & un-skilled in sufficient numbers as per the work requirement along with supervisors including necessary Tools & plants, consumable etc., during commissioning period. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are Supervisors, Pipe fitters / Millwright Fitters, Welders, Riggers, Electricians/Instrument technician, Unskilled workers etc.

16.57 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.

16.58 The above figures shows only minimum required over and above the 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.

16.59 It shall be specifically noted that the employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.

16.60 During commissioning any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.

16.61 The contractor has to provide required man power assistance during pre-commissioning and commissioning checks of motor operated valves, actuators, control valves etc. without any extra charges.

16.62 Contractor shall lay / install necessary blanking arrangement. This may involve fabrication & erection, welding & after satisfactory completion of test removal of same by cutting & grinding. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work.

No payment will be made for temporary installations made for testing of systems & similarly no payment will be made for electrical installations made for any temporary system.
All materials, equipment's necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the Contractor.
In accounting of temporary materials following wastage allowances are provided:

1. Structural items : 5%

- ✓ Contractor shall cut / open / dismantle work, if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

- ✓ Similarly, during the course of erection, if certain portion of equipments erected by the Contractor has to be undone for enabling other Contractors / agencies of BHEL / customer to carry out their work, Contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other Contractors / agencies of BHEL / customer as per BHEL engineer's / agencies of BHEL / customers instructions. Claims, if any, in this regard shall be governed as relevant clauses of 'General Conditions of Contract

16.63 Contractor shall provide assistance in conducting of performance guarantee test (PG test) of the equipments under the scope of work. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance within the quoted rates. In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided. However

installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.

16.64 The 'Initial Operation'/trial operation of the complete facility as an integral unit shall be conducted for continuous 28 days. During the period of trial operation of 28 days, all systems in the scope shall operate continuously at full load at designated fuel for a period not less than 72 hours .The Initial Operation shall be considered successful, provided that each item/ part of the facility can operate continuously at the specified operating characteristics, for the period of Initial Operation with all operating parameters within the specified limits and at or near the predicted performance of the equipment/ facility.

16.65 It shall be the responsibility of contractor to attend all punch points post commissioning and resolve the deficiency as may be necessary for handing over the unit to BHEL's Client.

17 PAINTING

Supply and application of final paining:

- The scope includes the supply and application of final paining for the systems/items/components covered in the entire scope of work including supply of primer, paints and associated consumables.
- In case any shop painted structure/component is required to be repainted due to the reasons attributable to the contractor such as Mis-handling, damage during erection process, other reasons incidental to the work etc, such touch-up painting/re-painting of the components/structures shall be in the scope of the contractor including the supply of paints and primers along with all required consumables .

BHEL/Customer Specification for Shop & Field Painting with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting will be given at site at the time of painting work.

Contractor shall carry out surface preparation and final painting works as per BHEL/Customer specification and instruction of BHEL engineer at site.

17.1 Scope of Contractor/BHEL regarding Supply of Paint & Paint application

S No	DESCRIPTION	BIDDER	BHEL	REMARKS
a)	Surface preparation	Yes		
b)	Preservation painting	Yes		Wherever applicable
c)	Touch up painting	Yes		Wherever applicable
d	Intermediate Coat application	Yes		Wherever applicable
e)	Finish Painting	Yes		
f)	Painting of Insulation cladding sheet	Yes		Wherever applicable
g)	Painting of welded surface	Yes		Wherever applicable
h)	Supply of Thinner	Yes		
i)	Supply of Primer	Yes		

j)	Supply of Paint (intermediate/Finish) including bituminous paint	Yes		
k)	Supply of Preservative/anticorrosive paint/protective paint	Yes		
l)	Supply of scaffoldings, platforms, structures & ropes etc	Yes		
m)	Supply of tools e.g wire brush, paint brush, Spray M/c, cleaning agents etc	Yes		
n)	Supply of Other Consumables	Yes		

17.2
Paints and painting work carried at site shall confirm to the following codes and standards:

IS:5 – Colour for ready mixed paints and enamels

IS:101 Part 1 to 9 – Methods of sampling and test for paints, varnishes and related products

IS:1477 Part I&II – Code of practice for painting of ferrous metals in building

IS:2932 – Specifications for enamel, synthetic and exterior,
a) Under Coating
b) Finishing

IS: 9407 – Colour code for identification of pipelines used in thermal power plants.

Contractor shall satisfy himself, availability of all information in the specifications for proper selection of the paints and ensure their applications as per Codes.

17.3 Primer Painting:

a) After surface preparation, two coats of epoxy resin based zinc primer shall be applied. Dry film thickness of each coat shall be as per the recommendations of primer/paint manufacturer. Primer shall be applied by either spraying or bushing ensuring a continuous film without "holidays". Primer coat shall be immediately applied without any time lag after the surface preparation.

b) Any equipment shall be carefully examined and where ever the primer coat is damaged shall be recoated with primer. However over the field welds, bolts and nuts etc. two primer coats as per a) shall be applied.

17.4 Finish Painting

a) After the primer coat has dried out, the surface shall be cleaned of dust without scratching or in any way damaging the primer coat. Over this, dry surface finish painting shall be carried out.

b) Finish painting shall be carried out in two coats. Dry film thickness of each coat shall be as per the recommendation of the primer/paint manufacturer. Minimum thickness including primer and paint coating shall be as per specification.

c) Paint shall be applied either by brushing or spraying. It shall be ensured that brush marks are a minimum and the requirements of workmanship are as specified in IS: 1477 (for site painting works on systems, structures and components).

d) Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of ready mixed type in original sealed containers as packed by the paint manufacturer. Addition of thinners shall not be permitted.

e) No painting shall be done in frost/foggy weather or when the humidity is high enough to cause condensation on the surface to be painted. Paint shall not be applied when the temperature of the surface to be painted is 5o C or below.

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

17.5
Components of TG and auxiliaries will in general be supplied painted by BHEL manufacturing units as per their standard applicable painting schemes. Contractor shall carry out primer and finish painting coats and DFT requirement with colour codes & specifications as per requirement of customer.

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

17.6

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.

17.7

Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of BHEL/Customer'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 for touch-up painting on damaged areas.

17.8

The scope of work includes painting (including supply) 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.

17.9

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.

17.10

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.

17.11

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.

17.12

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

17.13
This work requires working at higher altitudes from ground level to as high as 50 mtr 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.

17.14
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.

17.15
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.

17.16
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/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. Laying of air hose pipe and any other line required shall be done by Contractor at his cost

17.17
Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

17.18
Acceptance of Final Painting for required thickness shall be as per the thickness measured by Alcometer by NPCIL/BHEL Engineer. Contractor shall have to carry out painting till the required thickness is achieved.

17.19 Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. This facility shall be provided by the contractor till the commissioning and handing over of the equipment to the customer. Preservative and touch up painting on equipments covered

under this specification stored at stores/storage yard shall also be carried out by the contractor

17.20 Prior to application of refractory bituminous painting on the equipments is under Contractor scope.

17.25 Painting two coats of bituminous paint on Insulation cladding sheet inner surface.

17.26 **PRESERVATIVE PAINTING**

17.26.1

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.

17.26.2
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.

17.26.3
All site weld joints falling in steam side shall be painted with two coats of steam washable paint.

17.26.4
All water side surfaces of water chambers including tube plate shall be thoroughly surface prepared and painted.

17.26.5
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.

17.26.6
Prior to hydraulic testing of water side of condenser, interior surfaces of water boxes shall be painted.

17.26.7
After completion of tubing and tube side hydro test, all water side surfaces of water chambers including tube plate shall be painted.

17.26.8
Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the scope of work. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor.

17.26.9
Condenser internal components/parts/surfaces have to be surface protected with steam washable paint as per BHEL standards.

Refer PAINTING SCHEME: "Chapter-XXIII- Painting Scheme"

18 LINING AND INSULATION

18.1 Handling at site stores / storage yard, Transportation to site of work, application of thermal insulation/ spray insulation, finishing, cladding and outer casing etc using their own tools plants, tackles, all consumables, supervisor and men as enumerated under the scope of this tender.

18.2 Application of thermal insulation, sheet metal cladding, welding of hooks / supports to hold insulation and refractory's as wherever necessary for all the equipment covered in this contract are to be carried out as per instruction of BHEL Engineer at site. The systems covers under this contract including but are not limited to the following.

- TG integral piping and tanks & vessels, tanks,
- SG-TG auxiliaries including, but not limited, to heat exchangers, pumps,
- tanks and vessels and other equipments
- TG integral piping including condensate and extraction system piping
- Other equipments including BOI‟s, though not listed above but required for completion,

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

18.4 All insulations and refractory materials including iron components and other sheets casing materials, etc., required as per drawing will be supplied by BHEL and the same have to be erected / applied as per the drawings and specifications of BHEL by the contractor.

18.5 Clean the Surface to be Insulated from Rust, Dust, Grease, Loose scale, Oil, Moisture, etc.. Care shall be taken that flexible insulation is not unduly compressed. After insulating the equipment the gaps / joints shall be filled with loose wool/ moulded insulation as applicable

18.6 Painting of inner side of sheet metal covering over the insulation walls with two coats of anti-corrosive paint (IS-158) to be applied to the entire satisfaction of BHEL Engineer and application of bituminous sealing compound on cladding/ sheet metal joints shall also be carried out by the contractor expeditiously, so as to avoid damage to the insulation from the weather. Retainer type 'A' must be coated with Aluminium paint. All required amount of paint, thinner and other accessories for painting, cleaning the surfaces etc., shall be supplied by the contractor within the

quoted rate. However, if any supply of sealing compound by the BHEL Manufacturing Units, the same will be issued to contractor free of charges.

18.7 It is the responsibility of the contractor to ensure that the insulation, refractory and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions tending to affect its quality. Closed / semi closed sheds or any other arrangements required for this shall be arranged by contractor at his cost. All the insulation, refractory and sheet metal covering etc., issued to the contractor shall be properly stored and handled before application due the same. If any damage occurs to the material due to improper storage or due to any causes attributable to the contractor except for normal breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

18.8 Contractor is liable for the exact accounting of the materials issued to him and any unaccountable losses shall be made good by him. The necessary accounting of the material issued will have to be furnished by the contractor periodically

18.9 The contractor shall provide the required quantity of wire, nails and other materials for centering works at their cost.

18.10 Prior to application of refractory, bituminous painting (including supply) on the equipments and other area is under Contractor scope.

18.11 Wherever iron components are to be welded on non-pressure parts, the contractor shall employ only approved structural welders. It shall also be the responsibility of the contractor to arrange for welding hooks, flats, plates, supports and other fixtures also. All consumables tools and plants etc., required for the work shall be arranged by the contractor at their cost.

18.12 Contractor shall observe all precautions for laying and curing of pourable/castable refractory. Any defective works found shall be re-laid by contractor at his own cost including materials.

18.13 Wool insulations will received at site as bonded, loose bonded and un bonded mattresses in standard sizes. These has to be dressed / cut to suit equipment / site work by the contractor. 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.

18.14 Dressing of insulation bricks to suit site conditions curing the refractory concrete applied, sheet cladding over insulations, form the part of this work

18.15 Removal type of insulation to be provided for valves fittings, expansion joints etc., as per the drawings or as directed by BHEL Engineer.

18.16 All piping insulations shall be carried out in such a manner as to facilitate removal of bolts nuts and washers from the flanges.

18.17 Refractory works at complete combustion chambers, ceiling heat recovery area, oil and coal burner areas and application of castable refractory wherever specified in drawing or as directed by BHEL Engineer have to be carried out.

18.18 Fabrication of covering sheets, Al cladding may be necessary like preparing the sheets to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets crowning of the sheets if necessary shall be carried out by contractor as specified in BHEL drawings or as instructed by BHEL engineer.

18.19 Fixing or welding of hooks/supports to the equipments, piping and other connected items to support wool insulation, applying of primer paint to welded portion parts, welding certain supports on parts other than piping parts to hold refractory's (by engaging approved welders) as per the drawings or as instructed by BHEL Engineer will have to be carried out by the contractor.

18.20 The contractor shall leave certain gap and opening while doing the work as per the instructions of BHEL Engineer to facilitate inspection by Statutory authority such as Boiler Inspector or during commissioning to fix gauges, fittings, instruments. Those gaps will have to be finished as per drawings at a later date by the contractor at his cost, as required by BHEL .

18.21 Cladding sheets shall be suitably pressed along with diagonals to form diamond shape so as to improve the strength of the sheets, to avoid humpiness and to give aesthetic look.

18.22 Plates, bars, rods and other materials that are to be cut, and re-welded from the fabricated places to suit erection requirements for which no extra payment will be made to the contractor.

18.23 A log book shall be maintained by the contractor for the clearance of the area for application of refractory and insulation. If the contractor does the work on his own accord without prior permission the area should be redone at his cost.

18.24 The contractor shall draw only one week's requirement of material for their work from BHEL stores and keep them in their semi-closed shed near to the work area. The materials required for a particular space of work only shall be taken to the work spot. At the end of the day's work the leftover or unused materials shall be taken back to their semi-closed shed for keeping the materials safe. Necessary records

shall have to be maintained by the contractor in respect of the above drawls / deposits, on daily basis as instructed by BHEL.

18.25 Wastages allowance for the materials issued are envisaged as follows:

a) Castable refractory 2%
b) Insulation bricks & mortar 2%
c) Wool mattresses 2%
d) Cladding sheets 3%

18.26 Making structural supporting works for pourable insulation, laying pourable insulation, adhering to all specifications and instructions shall be the responsibility of the contractor.

18.27 Upon completion of daily work , the contractor shall remove from the vicinity of work all scrap packing materials rubbish, unused and other materials and deposit them in places to be specified by BHEL Engineer. Also, the contractor will demolish all the hutments, sheds, offices, constructed by him and shall clean the debris after the contract is over. In the event of his failure to do so, the same will be arranged / removed by BHEL Engineer and the expenses incurred with overhead will be recovered from the contractors.

18.28 Welding of hooks as per pitch, non-pressure parts, applying red oxide paint to the welded portion as directed as per drawings before application of mineral wool mattresses will have to be done by the contractor.

18.29 Applying different layers of mineral wool as directed and as per drawings and specifications for turbine and its auxiliaries, pipelines valves and other vessels and after fixing require holdings materials, suitably if necessary, fabrication of rings etc., and fixing as directed and as per drawings and specifications shall also form part of this work.

18.30 The scope includes; 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.

18.31 If necessary the hooks may have to be made from the rods, raw materials supplied in running lengths. The contractor may have to carry out this work also and use the same hooks. This shall be done within the quoted rates.

18.32 In case the contractor is required to dismantle and re-erect certain area as and when required for pre-commissioning / commissioning activities the rate as indicated in the rate schedule shall be paid by BHEL for erection. However, for dismantling no extra charge will be paid under any circumstances.

18.33 Wherever additional / clamps, frame works, etc., are required to be fabricated and installed even though not indicated in the drawings shall be fabricated and installed at their cost. Only steel materials shall be given by BHEL free of cost , consumables like electrodes, gases etc., are to arranged by the contractor at his cost.

18.34 Contractor has to arrange required fire retardant covering material at their cost to protect the insulation materials drawn from BHEL before and after erection.

18.35 The contractor shall provide any fixtures, concrete blocks / wooden sleepers, etc., which are required for temporary supporting of the insulation materials at site.

18.36 Delay in clearance of mechanical equipment and piping for insulations is unlikely to happen. However, if any delay occurs, the contractor shall not claim anything extra, like idle charges.

18.37 Welding of iron components directly on Piping is are to be carried out by certified IBR high pressure welders.

18.38 Application of insulation and removal of the same for temporary piping, tanks under scope of erection of this contract is also included in the scope of the work. However, BHEL will supply the insulation materials free of cost.

18.39 Dressing of insulation to suit site conditions, sheet cladding over insulations, form the part of this work.

18.40 The temporary structures / items welded to permanent members / pipes are to be cut and removed without any damage. Any damage so to permanent members / pipes to be made good by the contractor at his cost.

18.41 The contractor will have to follow the instructions provided in the technical manuals, drawings, and specifications provided by BHEL, to the contractor from time to time. In case of ambiguity or deviation the decision / clarification of BHEL Engineer will have to be followed.

18.42 All rectification including painting of Employer's structure which are damaged by contractor during his work.

18.43 The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity.

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

18.44 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length. Application of red oxide paint including supply of paint on welded portions as directed by BHEL is also included in scope of work.

18.45 The mineral wool mattresses (bonded / un-bonded) / LRB mattresses are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.

18.46 The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.

18.47 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing.

18.48 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.

18.49 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractors responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also covered within the scope of this contract.

18.50 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.

18.51 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.

18.52 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.

18.53 If during erection and commissioning any of the parts are to be insulated temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.

19 PRESERVATION & PROTECTION OF COMPONENTS

19.1 At all stages of work, equipments/materials in the custody of Contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents including the primer & paint, for the above work shall be provided by the Contractor.

19.2 The Contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

19.3 Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of Contractor in compliance of this requirement, BHEL will make suitable arrangement at Contractor's risk and cost.

19.4 The entire surplus, damaged, unused materials, drums, packaging materials / containers, special transporting frames, gunny bags, etc shall be returned to BHEL stores by the Contractor.

19.5 The Contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the Contractor. Decision of BHEL on this will be final and binding on the Contractor.

19.6 For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

20.1 Receipt of materials (02 nos of 1750KVA and 01 set of 500KVA of DG Sets) from BHEL's/Customer's Store/storage yards; handling at BHEL's/Customer's Store / storage yards / site of works; Transportation between BHEL's/Customer's Store / storage yards and site of works.

20.2 Preparation of foundations (chipping/ levelling of concrete) ; fabrication of packer plates from raw materials, cutting of required shims, drilling, tapping, grinding, cleaning, blue matching, pre-assembly/trial assembly, dismantling of certain items/equipment/components for checking & cleaning, blue matching, erection, leveling and alignment of loose components of 3 sets of the DG Sets; grouting of foundation bolts, Sole / Base plates, etc. with non-shrink grout materials Conbextra GP-2; testing; trial run, commissioning and handing over to customer.

20.3 Arrangement of T&P, special tools and tackles for handling, complete planning, monitoring of work, site supervision, testing and trial run of the DG Sets (3 sets).

20.4 Any scaffolding, temporary platforms, ladders etc. that may be required for the purpose of the DG Sets erection shall be arranged by the vendor for the execution of work. All miscellaneous steel, if required, necessary for the DG Sets erection and commissioning are to be arranged by the Contractor / bidder.

20.5 Arranging of Tools; calibrated MME [(Measuring and Monitoring Equipment) traceability to National and International standards] like High Precision Spirit Level, Vernier Calipers, Filler Gages, inside/outside Micrometers, Dial gauges, Measuring Tapes, Surface plate, etc. etc. required for the DG Sets erection & alignment; required capacity of slings & D-shackles; Trailer with prime mover; loading, unloading, shifting of materials shall be in the scope of the Contractor / bidder.

20.6 For grouting of the DG Sets foundation bolts and Base / Sole plates etc. (as required for completion of erection of DG Sets) with fresh non-shrink (free flow) grout materials Conbextra GP-2 cement including form work & shuttering materials is to be arranged by the Contractor / bidder at his cost. Batch certificate of Conbextra GP-2 cement should be submitted well in advance for verification and acceptance of the same for use.

20.7 All electrical equipment have to be tested for IR & PI values prior to the trial run. If required, dry out of electrical equipment may have to be carried out by using external heating source (Halogen lamps) using own manpower and other resources. No separate payment is envisaged for the same.

20.8 The contractor/ bidder shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from the action

of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL's Engineers instructions. The machined/finished surfaces should be greased and covered.

20.9 Required manpower assistances are to be provided during the course of commissioning with required hand tools.

20.10 Arranging of required sizes of Allen Keys and Ring spanners / D-spanners spanners required for erection of the DG Sets are to be arranged by bidder. Torque wrenches of required capacity, if/ as required, are also to be arranged by the bidders. The list of consumables, T&P, MME etc. etc. mentioned in various clauses are not intended to be exhaustive. Contractor / bidder shall arrange at his cost all approved consumables, Conbextra GP-2 cement, T&P, MME etc. required though not listed specifically.

20.11 All welders shall be tested and approved by BHEL / Customer engineers before actually they are engaged on work.

20.12 Welding of necessary instrumentations to be provided for the DG Sets are covered within the scope of this specification. The contractor/bidder shall at his cost perform any services, test etc. although not specified but nevertheless required for the completion of work. Access to site for inspection by BHEL/Customer engineers shall be made available by contractor all times.

Annexure I - BHEL T&P Hire Charges – Enclosed in Vol-IE

Annexure II - Approved Welding electrode suppliers – Enclosed in Vol-IE

- Annexure III A - Painting Scheme for Generator, Steam Turbine, Condenser and Aux Painting Scheme-10852_Rev-01_Bhusawal
- Annexure III B - Painting Scheme For RE Joint, Flash Tank and Misc Tanks - Painting Specification Bhusawal

Above annexures are enclosed in Vol-IE

Annexure IV - Guidelines for selection of NDE and Heat Treatment agencies at Site

- Enclosed in Vol-IE

Following drawings are enclosed in Vol-IE for reference;

- Annexure V Reference Drawing1 - TG Equipment layout at Ground Floor (0.0m) PE-DG-415-100-M003-R3
- Annexure V Reference Drawing2 - TG Equipment layout at Mezzanine Floor (8.5m) PE-DG-415-100-M004-R2
- Annexure V Reference Drawing3 - TG Equipment layout at Misc Floors above operating floor in BC Bay PE-DG-415-100-M006-R2
- Annexure V Reference Drawing4 - TG Equipment layout at Operating Floor (17.0m) PE-DG-415-100-M005-R2
- Annexure V Reference Drawing5 - Main Plant Cross Section PE_DG_415_100_M007_R2
- Annexure V Reference Drawing6 - Laydown Space for Steam Turbine Coponents 113100W5016_Rev 00
- Annexure V Reference Drawing7 - CW CV pump of 1x800MW Wanakbori site for reference
- Annexure V Reference Drawing8 - 1750 KVA LAYOUT PLAN AND SECTION FOR DG SETS IS-4-DG-715-800-A011 –
- Annexure V Reference Drawing9 - 500 KVA DG SET LAYOUT- FGD FOR BHUSAWAL TPS