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

TENDER NO. BHEL/NR /SCT/PARBATI/HTG&MM/855

FOR

MATERIAL HANDLING AND ERECTION, TESTING &COMMISSIONING OF PELTON TYPE TURBINES, GENERATORS, TRANSFORMERS, SWITCHGEARS, BUS DUCT, EXCITATION SYSTEMS, C&I ETC., OF 4X200 MW PARBATI-II HEP LOCATED AT SAINJ, DISTT-KULLU, HIMACHAL PRADESH

PART I – TECHNICAL BID

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)

ISO 9001, ISO 14001 and OHSAS 18001 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2416273 / 2416296
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TENDER NO. BHEL/NR /SCT/PARBATI/HTG&MM/855

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

Rev 00
6th July
2010

NOTICE INVITING TENDER

(Document No. PS: MSX: NIT)

Bharat Heavy Electricals Limited

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

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To

Dear Sir/Madam,

Sub: NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION	
i	**TENDER NUMBER**	***BHEL/NR /SCT/PARBATI/HTG&MM/855***	
ii	***Broad Scope of job***	***Material Handling and Erection ,testing & Commissioning of Pelton type turbines, generators, transformers, switchgears, bus duct, excitation systems,C&I etc., of 4X200 MW Parbati-II HEP located at Sainj, Distt- Kullu, Pradesh***	
iii	***DETAILS OF TENDER DOCUMENT***		
a	Volume-IA	*Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc*	*Applicable*
b	Volume-IB	*Special Conditions of Contract (SCC)*	*Applicable*
c	Volume-IC	*General Conditions of Contract (GCC)*	*Applicable*
d	Volume-ID	*Forms and Procedures*	
e	Volume-II	*Price Schedule (Absolute value).*	*Applicable*
iv	**Issue of Tender Documents**	***1. Sale from BHEL PSNR,NOIDA office at :*** ***Start : 25/01/2012,Time:From 0900 to 1200 Hrs*** ***Close: 15/02/2012, Time :1200 Hrs*** **2. From BHEL website (www.bhel.com)** Tender documents can however be downloaded from website till due date of submission	*Applicable*
v	**DUE DATE & TIME OF OFFER SUBMISSION**	***Date: 15/02/2012, Time: 1500 Hrs.*** ***Place : Noida (UP)***	*Applicable*
vi	**OPENING OF TENDER**	***1/2 hour after the latest due date and time of Offer submission*** *Notes:* *(1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time.* *(2) Bidder may depute representative to witness the opening of tender*	*Applicable*
vii	**EMD AMOUNT**	***Rs 2,00,000/-***	*Applicable*
viii	**COST OF TENDER**	***Rs 2000/-.***	*Applicable/~~Not Applicable~~*
ix	**LAST DATE FOR**	*Date: 09/02/2012*	

	SEEKING CLARIFICATION	*Along with soft version also, addressing to undersigned & to others as per contact address given below*	*Applicable*
x	**SCHEDULE OF Pre Bid Discussion (PBD)**	***Date :*** _ _/_ _/_ _ _ _ ***, Time :*** ***Place :***	~~*Applicable*~~***/Not Applicable***
xi	**INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)**	Shri Kanwarjit Singh, IRS (Rtd.) D-6/12, Ground Floor, Vasant Vihar, New Delhi - 110 057	***Applicable***~~*/Not Applicable*~~
xii	**Latest updates**	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) **and not in the newspapers**. Bidders to keep themselves updated with all such information	

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

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

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

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

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)

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

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

	CONTAINING THE FOLLOWING:-	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above. **Note:** a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender	
iii.	Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexure, 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/COST of TENDER) TENDER NO : NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: **CONTAINING THE FOLLOWING**:-	
i.	1. Earnest Money Deposit (EMD) in the form as indicated in this Tender **OR** Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender 2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)	

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

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

SPECIAL NOTE: All documents/ annexure submitted with the offer shall be properly annexed and placed in respective places of the offer as per enclosure list mentioned in the covering letter. BHEL shall not be responsible for any missing documents.

7.0 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally be considered by BHEL. Bidders are requested to positively comply with the same.

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

9.0 Assessment of Capacity of Bidders:

Bidders capacity for executing the job under tender shall be assessed as per the following:

I. **Assigning Weightages (A) for Similar Jobs Under-Execution**: Weightages shall be worked out and assigned based on the average number of Similar Works under execution including works yet to be commenced by the agency, in the following manner:

i). Number of Similar Jobs

a) No. of jobs in BHEL, PSER : Say 'J'
b) No. of jobs in BHEL, PSSR : Say 'K'
c) No. of jobs in BHEL, PSWR : Say 'L'
d) No. of jobs in BHEL, PSNR : Say 'M'
e) No. of jobs with other customers* : Say 'N' (*: Other than BHEL PSER, PSSR, PSWR & PSNR)
f) Average No. of Jobs is 'P'= (J+K+L+M+N) divided by 5

ii) Weightage "A" assigned to bidders based on Average Number of jobs "P":

a) If 'P' = 0-1, "A" will be equal to '3'
b) If 'P' = 2-3, "A" will be equal to '2'
c) If 'P' = 4-5, "A" will be equal to '1'
d) If 'P' is Above 5, "A" will be equal to '0'

II. **Weightage "B" for Quarterly Performance Reports of Vendors**: This shall be based on the averages of the net weighted score obtained by the bidder for the jobs under execution (excluding works not commenced) for the quarter previous to the last quarter reckoned from the date of latest due date of submission, in all four Regions i.e. BHEL PSER, PSSR, PSWR & PSNR, in the following manner.

i). Ratings by Power Sector Region:

a) PS ER's Rating 'R**e**r' = ($X_1 + X_2 + .. + X_n$) divided by n
b) PS WR's Rating 'R**w**r' = ($X_1 + X_2 + .. + X_n$) divided by n
c) PS SR's Rating 'R**s**r' = ($X_1 + X_2 + .. + X_n$) divided by n
d) PS NR's Rating 'Rnr' = ($X_1 + X_2 + .. + X_n$) divided by n
e) **Over all Power Sector Region Rating** 'R_{BHEL}'= (R**e**r+ R**w**r+ R**s**r+ R**n**r) divided by 4

(where "$X_1, X_2, X_3,…X_n$" is the net weighted score obtained by the bidder as per the "Evaluation of Contractor Performance (Quarterly)" against the various contracts 'n' under execution in the respective Region).

ii) Weightage "B" assigned to bidders based on Overall Power Sector Rating **(R_{BHEL}):**

a) If R_{BHEL} is 80% and above, "B" will be equal to '6'
b) If R_{BHEL} is > 70% < 80%, "B" will be equal to '5'
c) If R_{BHEL} is > 60% < 70%, "B" will be equal to '4'
d) If R_{BHEL} is = < 60%, "B" will be equal to '0'

III. Evaluation of Bidders capacity to execute the job under tender: shall be based on the sum of scores obtained in 'A' and 'B', as below:

a) 6 or above : Considered 'Qualified' for the job under tender
b) Less than 6: Considered 'NOT Qualified' for the job under tender

IV. **Explanatory note**:

a) Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
b) Quarter shall be as per the quarter defined in the "Evaluation of Contractor performance (Quarterly)". For contracts where annexed Quarterly Evaluation performance was not part of the contract, 'Quarterly Performance Reports' previous to the last quarter reckoned from the date of latest due date of submission, given by the respective project site against the contract will be the basis for evaluation.

c) Vendors who are not executing any jobs presently in the Region and first timers to the Region, may be considered subject to satisfying all other tender conditions

d) 'Under execution' shall mean works in progress upto Boiler Steam Blowing (for Boiler and Auxilliaries) or Synchronisation (for all other jobs including Civil) shall be considered.

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 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. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.

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

12.0 BHEL may decide holding 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 (xi) of 1 above.**

16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation/ techno-commercial bids, approval/ acceptance of customer (as applicable), etc. and date of opening of price bids shall be intimated to only such bidders.

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

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

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

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

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

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

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

23.0 In case Consortium Bidding is allowed as per Pre Qualifying Requirement, then Prime Bidder and Consortium Partner shall enter into Consortium Agreement. Validity period of Consortium Agreement shall be 6 months after which the same can be re validated.

'Stand alone' bidder cannot become a '**prime bidder' or a 'consortium bidder' in a consortium 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. .

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

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

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

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

For BHARAT HEAVY ELECTRICALS LTD

Sr.DGM/SCT

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List.
03. Annexure-3: Reverse Auction (RA) Details.
04. Annexure-4: Integrity Pact (IP)
05. Other Tender documents as per this NIT.

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	*MATERIAL HANDLING AND ERECTION ,TESTING & COMMISSIONING OF PELTON TYPE TURBINES,GENERATORS, TRANSFORMERS, SWITCHGEARS, BUS DUCT, EXCITATION SYSTEMS, C&I ETC. OF 4X200 MW PARBATI-II HEP LOCATED AT SAINJ, DISTT- KULLU, HIMACHAL PRADESH.*
TENDER NO.	BHEL/NR /SCT/PARBATI/HTG&MM/855

SL NO.	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document
A	**Submission of Integrity Pact duly signed (if applicable)**	**APPLICABLE**	
B	**Assessment of Capacity of Bidder to execute the work as per sl no. 9 of NIT (if applicable)**	**APPLICABLE**	
C	**FINANCIAL CRITERIA**		
C1	Tenderers should have an average annual turnover of minimum of Rs 540 Lacs (Rupees Five Hundred Forty Lacs only) based on the audited accounts of last three financial years (2008-09, 2009-10 & 2010-11). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.		
C2	**NETWORTH** Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C1' above should be positive.		
C3	**PROFIT** Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'C1' above based on latest Audited Accounts.		
D	**TECHNICAL CRITERIA**		
	Technical **Tenderers who wish to participate should have completed erection, testing & commissioning work of at least THREE Hydro Turbine Generator sets of 30 (THIRTY) MW each or higher rating in the last SEVEN years**		
E	**Approval of Customer (if applicable)** **Note: Names of bidders who stand qualified after compliance of criteria A to E shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.**	**APPLICABLE**	

NOTES:

(1) Time period for achievement of the Qualification Requirement is in the last 7 years ending on the 'latest date of Bid submission'.

(2) Projects where erection/pre commissioning activity of turbine, generator sets has been completed but commissioning could not be done on account of customer constraints such as non-availability of water/transmission line will also be considered as completed project.

(3) Executed' means the vendor should have achieved the criteria specified in the QRs even if the Contract has not been completed or closed.

(4) Relevant Documents, meeting above requirements at C&D,shall be submitted by bidders

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	Details of Contact person for this Tender	Name : Mr./Ms Designation: Telephone No: Mobile No: 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	BIDDER REPLY
6	Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
7	Audited profit and Loss Account for the last three years	Applicable/Not Applicable	YES/NO
8	Copy of PAN Card	Applicable/Not Applicable	YES/NO
9	Whether all pages of the Tender documents including annexure, 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	Applicable/Not Applicable	YES/NO
20	Analysis of Unit rates	Applicable/Not Applicable	YES/NO

NOTE: STRIKE OFF 'YES' OR 'NO', AS APPLICABLE

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ISO 9001, ISO 14001
OHSAS 18001 and SA 8000 certified company
Sub-Contract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)
Phone: 0091-0120-2416273 / 2416540
Fax 091-0120-2416528
Email: swapan@bhelpsnr.co.in

NOTICE INVITING TENDER

LAST DATE OF SALE: **15/02/2012**
LAST DATE OF SUBMISSION: **15/02/2012: 1500 hrs (IST)**

NIT NO. / NAME OF WORK
TENDER NO. BHEL/ NR /SCT/ PARBATI/ HTG & MM/ 855 **Sealed tenders are invited from the contractors fulfilling qualifying requirements as given in tender document for the Work of "Material Handling and Erection ,testing & Commissioning of Pelton type turbines, generators, transformers, switchgears, bus duct, excitation systems,C&I etc., of 4X200 MW Parbati-II HEP located at Sainj, Distt-Kullu, Himachal Pradesh"**

NOTES:

1. The complete tender documents can be downloaded from BHEL Web Site, **www.bhel.com**.

2. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper**.**

3. Parties qualified in the tender may be considered for registration also,for similar work & category.

Sr. DGM/SCP

ANNEXURE - I

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item / system with detailed scope of supply as per our tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCEDURE" i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. In case BHEL decides to conduct reverse auction, BHEL's service provider shall contact the vendor directly and impart them the training.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. **Total Price quoted shall be inclusive of all taxes except service tax in line with the NIT conditions for the subject work in Indian Rupees (INR), which is to be worked out as per the BOQ (Rate Schedule) given in tender enquiry and subsequent changes made, if any. EXCEL Sheet shall be provided, if applicable.**
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider after completion of event on the same day preferably.
10. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.

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

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

Rev 00
6th JULY
2010

TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED

VOLUME – I A (PART – I) : CONTRACT SPECIFIC DETAILS

1. Project Information

1.1. INTROUCTION

NHPC LIMITED, with their headquarters at NHPC Office Complex, Sector 33, Faridabad-121003, Haryana has placed an order on BHEL for E&M package of 4X200MW PARBATI-II Hydro Electric Project.

PARBATI-II Hydro Electric Project is a run of the river scheme on Parbati river in Kullu district of Himachal Pradesh state. 4 Nos. of vertical shaft generating units of 4X200MW with Pelton turbines are to be installed in surface Power House.

Power House of 4X200 MW PARBATI-II HEP is at Sainj in Kullu district of Himachal Pradesh state of India. Power House site of Parbati II HEP is approx. 40 KM from nearest airport at Bhunter and approx. 190 KM from nearest broad gauge rail head at Kiratpur. The project is located at sainj which is about 25 KM from AUT on Chandigarh-Manali National Highway NH21 at a distance of 260 km from Chandigarh.

1.2. CLIMATIC CONDITIONS

Temperature: In winter, the temperature can drop below freezing point when heavy woolens are required. In summer the temperature rises upto 40 degrees.

2. Scope of works

2.1. Scope of these specifications cover complete work of in two parts

A) MATERIAL HANDLING

BHEL has been awarded the work of Design, Manufacture, supply, installation erection, testing & commissioning of 4X200 MW PARBATI-II Hydro Electric Power Project. These materials will be supplied from our manufacturing units located all over the country as well as our vendors located both inland and overseas.

Total materials involved for material handling under this tender approxi -10000 MT .Out of this approx. 4500 MT has already been receipt, unloaded by other contractor of BHEL at BHEL stores(Saran behali, salah (sainj), Panarsa and Pandoh) and balance plant material approxi-5500 MT are to come from our MUs/vendors.

The scope of work under this tender shall comprise :-

1. **For Balance plant material approxi -5500 MT to come from our MUs/vendors:**
   Receipt, unloading verification, proper storage stacking, preservation of materials/equipment in project stores /closed storage sheds.
2. **For material already unloaded and stored at BHEL stores of plant material approxi-4500 MT**
   Taking over of material already received from other contractor, re handling, Verification, preservation & Re stacking, proper storage stacking
3. **Transportation of total plant material approx.-10000 MT** including loading from project store/closed storage shed to power house or work site including unloading and handing over to erection agency of BHEL .

The plant material shall be unloaded at power house with E.O.T cranes. The E.O.T cranes shall be provided by BHEL on free of cost for unloading the plant material.

Since there was a mismatch of material inflow & negligible outflow due to abnormal delay in start of project, material already received has been stored multilayers in the closed /open stores .The retrieval of required packages may sometime require multiple handling of some other packages for which no extra payment shall be made.

Location of various stores is as below.

SARAN BEHALI & SAINJ STORE

It is about 05 km from Powerhouse. Total materials have been kept in Saran Behali store is approxi-1300MT (details in **Annexure-II**) and Sainj store is approxi-2200 MT (details in **Annexure- III**). ODC consignments kept in Sainj store are difficult to transport from Sainj Store to Powerhouse directly, it is to be transported from Sainj store to Chhani –Nallaha via Sainj Market and from Chhani-Nallaha to Powerhouse via By Pass, Total distance is around 15 km.

PANARSA STORE-

On NH-21, near AUT (Approxi- 25 KM from site) Material has been kept in Panarsa store is approxi-500 MT.

PANDOH STORE

On NH-21 ,near Pandoh (Approx -50 KM From site) (Approx-510 MT plant materials has been kept at Pandoh store and which includes weight of arrangement of shaft-30 MT , runner -22 MT and weight of single consignment of rest of the material is below 12 MT are to be handled & transported to power house.

Note:

1. **In future, if the material outflow will not match the inflow, a new store may be planned, approx. 8 km from Powerhouse. Rate for transportation from this store shall be applicable as per Sl. No. 5.1 of Rate Schedule.**

2. **An independent full time supervisor for each stores separately are to be deputed along with other staff for material management at stores.**

Brief descriptions of different packages with their weights are indicated under chapter – IV.

Description of Equipment for Material Handling & Transportation

Sr.No.	Description	QTY (Nos.)
1	Pelton Turbine and Accessories	04
2	Governing System & Accessories	04
3	Turbine MIV & Accessories (Spherical Valve)	04
4	Penstock Valves & Accessories (Butterfly valve)	02
5	Generator & Accessories	04

6	Static Excitation and DVR	04
7	13.8KV Busduct including CT PTs	04 Sets
8	13.8 KV/ 4000 / √3 KV, 1 Φ 82 MVA Generator step up transformers	14
9	220V and 48V DC System	01 Lot
10	Control & Monitoring system	01 Lot
11	Protection system	01 Lot
12	A. 13.8 KV Tap-off Transformers B. 11 KV Switchgear system	01 Lot
13	A. UAT SST B. 415 V AC Switchgear system	01 Lot
14	Cooling Water system	01 Lot
15	Drainage water system	01 Lot
16	HP & LP Compressed air system	01 Lot
17	Mechanical workshop equipment	01 Lot
18	Spares tools & Devices for all above packages	01 Lot

NOTE:- 3 Nos MOT Cranes of 10T capacity each has been installed in closed storage sheds by other contractor. It is the property of this contractor and shall be dismantled and taken back. Since this contract is being closed.

B) ERECTION, TESTING & COMMISSIONING:

The scope of work under this part of tender consists of the materials Approx**. 9100 MT** weight are to be erected, commissioned & handed over to customer. Brief descriptions of different packages with their weights are indicated under chapter – IV.

Pre-erection assembly, erection, testing (including hydraulic, NDT, electrical, stage & final HV including dry out etc. of relevant equipment's at various stages) during erection, pre-commissioning and commissioning including trial run, handing over to customer NHPC Limited of the following equipment's for four units of 4X200MW PARBATI-II HEP, rated head 789.0 m, rated speed 375 RPM anticlockwise vertical Pelton type hydro turbines, Main Inlet Valve (Spherical type), suspended type hydro generators (stator core building and rotor rim building at site) connected to single phase generator

transformers through 13.8 KV IP Bus duct . Approximate weight for erection will be **9100 MT**.

As most of the component with rubber items or other seals assembled are already supplied long back and are being stored at site, such components prior to actual start of erection of assemblies , during erection /testing/pre commissioning /commissioning /operation of turbine , generator auxiliaries, governing and oil Pressure system, MIV,BFV, Power packs supplied as T&P, Nozzle servomotor, Deflector servomotor, MIV/BFV servomotors, Bypass valve, Decompression Valve, Sealing Valve, Vacuum breaking valve, Gov OPU etc will have to be attended for replacement of rubber items ,seals for normal operation and refurbishment of equipment's. Such pre assembly/pre erection works shall be part of erection/commissioning work to be carried out within the quoted rates and at no extra cost shall be payable to contractor.

Brief Description of Equipment for erection & commissioning

Sr.No.	Description	QTY (Nos.)
1	Pelton Turbine and Accessories	04
2	Governing System & Accessories	04
3	Turbine MIV & Accessories (Spherical Valve)	04
4	Penstock Valves & Accessories (Butterfly valve)	02
5	Generator & Accessories	04
6	Static Excitation and DVR	04
7	13.8KV Busduct including CT PTs	04 Sets
8	13.8 KV/ 4000 / √3 KV, 1 Φ 82 MVA Generator step up transformers	14
9	220V and 48V DC System	01 Lot
10	Control & Monitoring system	01 Lot
11	Protection system	01 Lot
12	A. 13.8 KV Tap-off Transformers	01 Lot

	B.11 KV Switchgear system	
13	A. UAT SST B.415 V AC Switchgear system	01 Lot
14	O&M of EOT Crane during erection, commissioning	01 Lot
15	Cooling Water system	01 Lot
16	Drainage water system	01 Lot
17	HP & LP Compressed air system	01 Lot
18	Mechanical workshop equipment	01 Lot
19	Field testing of Turbine & generator	

NOTE:- Erection of some first stage embedded piping and lower pit liner work of all four units are already carried out by other contractor of BHEL. Balance pipe lines, valves of first stage pipes & embedments like distributor drain, MIV drain, pen stock drain, brake jet pipe, CW pipes etc shall be under scope of this contract Further completion/extension of first stage piping & hatch cover of runner removal opening shall also be in the scope of present contractor.

DETAILED SCOPE OF WORK IS AS GIVEN BELOW:

1. TURBINE SYSTEM

A. Embedded part

The embedded parts comprise central Frame Work and embedded pipes in 1st stage primary concreting.

Central Frame Work:- The Central Frame Work is supplied in grid section which shall be bolted together at site. It shall be provided to permit access to nozzle and runner for general inspection purposes. An opening of ample dimensions shall be provided in the central frame work for lowering the runner with trolley on the rails below the central frame work. Before the E.O.T crane approach available up to unit area ,these grid sections being lighter in weight may be installed with his own arrangement by contractor.

Trolley for the transportation of runner shall be provided. Necessary track (rails) and the support structure etc. shall be supplied.

The embedded pipelines in first stage weighing total about 83.103 MT for all units have been foreseen in primary concreting which mainly comprise penstock drain, distributor drain, decompression valve drain, brake jet valve piping, cooling water sump connecting piping, drainage sump connecting piping etc. All welding shall be checked as per drawings. Fabricated pipe assemblies are supplied shall be routed and modified to suit at site as per requirement Smaller diameter pipes 65 NB and less are supplied in straight length to be bent and laid as per site requirements. The pipes are to be laid and welded at site as per drawing. All welds are to be 100% DP tested. All pipes are to be hydraulically tested as per drawing at site after welding.

B. Foundation parts

The foundation parts comprise mainly Turbine Housings (Outer and Inner), distributor piping, upper pit liner and embedded pipes in secondary concreting.

Outer Turbine Housing:- Outer Turbine Housing is of welded carbon steel construction (Inside Dia 8600 mm, Hight 3500 mm and Thickness – 20 mm) in 4 pieces, designed for efficient evacuation of water from runner buckets and welded together at site. Outer Turbine Housing shall be matched and welded with Inner Turbine Housing at site. A sealing arrangement has been provided in the outer turbine housing to prevent water entering into the deflector levers from beneath. . An opening along with water tight hinged door shall be provided to facilitate entry into discharge pit, below the runner, for inspecting the runner and nozzles.

Inner Turbine Housing:- Inner Turbine Housing is of welded steel construction (Dia-4500 mm and Hight 2400 mm) in single pieces. A flange is provided for supporting the turbine guide bearing.

(Combined weight of Turbine Housings (Outer and Inner) is 71.620 MT

Suitable ejector along with valves and piping's shall be supplied for draining any water that may find its way above the housing. The pressurized water to ejector system shall be supplied from the unit cooling water system.

Distributor Piping:- It shall be of fabricated constructions with branch outlets for six nozzles. It shall be supplied in six segments to site. Welded neck flanges have been provided for six nozzles. Thickness of sections varies from 36 mm to 80 mm.

Five makeup pieces have been provided for alignment and welding of above six segments. Make up segments have been supplied with erection allowance to be cut to match at site. Edge preparation has to be done at site. The welding of distributors are to be tested 100%

by suitable NDT as per drawing requirement. Stress relieving of distributor after welding is to be carried out at site.

The distributor assembly after welding shall be hydraulically tested at site to check for soundness of weld joints. The test cone shall be installed at distributor inlet end for pressure testing. The distributor piping shall be kept pressurized during the process of concreting.

Weight of complete distributor assembly is approximately 136 tonnes.

C. Embedded pipe lines in secondary stage foundation

The embedded pipelines in second stage weighing total about 7.933MT (Drawing no-0-202-08-14401) For various functions for all units embedded pipelines in second stage including air admission pipes, nozzle leakage pipes, sleeves, field efficiency test piping etc have been provided. Necessary cutting in pit liner etc wherever required for the embedded pipelines, acid pickling etc. shall have to be done at site. Fabricated Pipes assemblies are supplied shall be routed and modified to suit at site as per requirement. Smaller diameter pipes 65 NB and less are supplied in straight length to be bent and laid as per site requirements. The pipes are to be laid and welded at site as per drawing. All welds are to be 100% DP tested. All pipes are to be hydraulically tested at site after welding.

D. Nozzle Servomotor and Deflector Servomotor assembly

There are six internal nozzle servomotor / deflector servomotor assembly in one unit. Each set consists of Nozzle Inlet/Spider, Nozzle tip and nozzle tip liner(SS), jet deflector, needle and needle stem, nozzle servomotor, deflector servomotor etc. Since the nozzle and deflector servomotors are supplied long back, before erection these assemblies are to be dismantled and re- assembled after replacing all rubber seals, chevron etc. These re-assembled nozzle and deflector servomotors are required to be hydraulically pre tested for checking its operation and soundness in S/bay. Weight of each nozzle assembly is approximately 10.25 tonnes.

Deflector operating mechanism: It shall consist of servomotor connecting rod, lever, inter connecting links etc.

Oil headers for nozzle servomotor assembly and deflector servomotor assembly: Supplying oil for opening and closing of nozzle servomotors and deflector servomotors oil headers are provided.

E. Runner & shaft assembly

The Pelton type runner assembly with OD 3854.4 mm and height 823.2 mm is in single piece weighting approximately 20.6 MT. Shield for runner is bolted at the bottom of runner.

The turbine shaft is flanged type at both ends with shaft diameter 940 mm. This is bolted to runner at turbine end with fitted sleeve and bolt. Upper flange of turbine shaft is bolted with fitted bolt to generator shaft bottom flange. Total length of shaft is 4350 mm and approx. weight is 32.160 MT.(Drawing no-0-205-01-14401). A rotating oil sump (in one piece) is assembled on runner end flange of shaft and nut guard is provided on top flange of turbine shaft.

F. Turbine guide bearing

Guide bearing shall be of submerged self oil lubricating shell type with internal cooling arrangement and rotating oil sump arrangement. Bearing housing in halves is supported on inner turbine housing and shell in halves with heavy joint flange are supported on bearing housing. Bearing cover is provided at the top of turbine housing Other essential instrumentation for temperature, level sensing etc have been provided. The joints are to be applied with loctite to be arranged by the erection contactor. The dowelling of bearing housing with inner turbine housing shall be done at site after centering of bearing housing.

Weight of turbine Guide bearing assembly is 8.2 MT approx.

H Deflector mechanism

Deflector mechanism consisting of deflector rod, link, lever etc connects all the six deflector and deflector servomotors. After complete setting and final conjugation these levers are required to be dowelled at site.

Weight of Deflector mechanism is 2.5 MT approx.

Other standard assembles

Various assembles like feedback system, top cover drain pumps, brake jet valve, oil pumping system along with oil air receivers for turbine, oil pumping system along with oil air receives for MIV, oil leakage unit as generally provided in any hydro unit are all foreseen which shall be erected at site.

G. Feedback mechanism

It comprises of wire rope mechanism and LVDT to transmit signal of the movement of nozzle servo motor (opening/closing) to the hydro mechanical cabinet (HMC) of governor.

H. Installation of metering instruments

Pressure and temperature measuring instruments are installed on this metering panel to measure the pressures of different points like spiral casing, draft tube, sealing air & water pressures, servomotor closing & opening pressures etc. The pipelines shall be hydraulically tested to required pressure.

I. Cooling Water System, Drainage System, H P Compressed Air System, L P Compressed Air System, Arrangement of Oil Pipe lines, Arrangement of Pipe line for Spherical Valve, Arrangement of Pipe line for Penstock Valve

Laying and clamping /supporting of oil pipe lines, Cooling water pipe lines, drainage pipe lines, pipe lines for Spherical Valve, pipe lines for B F Valve and compressed air pipe lines are shown indicative in respective drawing which can be decided to suit site condition. Fabricated Pipes assemblies are supplied shall be routed and modified to suit at site as per requirement. Smaller diameter pipes 65 NB and less is supplied in straight length to be bent and laid as per site requirements. The pipes are to be laid and welded at site as per drawing. All welds are to be 100% DP tested. All pipes are to be hydraulically tested at site after welding. Cleaning of pipe by acid pickling to be carried out as per drawing requirement.

J. Other Miscellaneous Mechanical assembly

Other miscellaneous mechanical assembly likes, hatch covers, platform and ladders etc. are envisaged.

K. Main Inlet Valve (Spherical Valve):

Main Inlet Valve: 1800 mm nominal diameter spherical type including inlet pipe, outlet pipe with dismantling joint, Service seal(main seal) on U/S and Maintenance seal on D/S side(piston type), two levers, two servomotors, Bypass valve, Air release/Decompression valve and anti-vacuum valve, drain valve, flow measurement device etc. The main body is machined casting and is in two halves bolted together. The valve door shall be of casting with trunnions on both sides bolted. Weights are mounted on both the levers for closing.

MIV shall be assembled in service bay and shall be hydraulically pressure tested before lowering on foundation

Weight of complete Spherical valve assembly is 172.5 MT approx. .

Inlet pipe of MIV: The inlet taper pipe is in one piece with inlet diameter 1800 mm on valve end. On upstream side it is welded to penstock and at downstream side flanged to MIV. The welding of joints are to be tested 100% by suitable NDT as per drawing requirement. Stress relieving of the welding of this joint is to be carried out at site

Outlet Pipe with dismantling joint: The outlet pipe with dismantling joint is also in one piece with diameter 1800 mm. At upstream side it is flanged to MIV and at downstream side flanged to distributor.

L. Digital Governor & Oil Pressure System for Governor, Oil Pressure system for MIV, Oil Pressure System for Penstock Valve

Microprocessor (MaxDNA based) Electro Hydraulic Governor comprising of hydro mechanical cabinet, micro processed based EHGC, instruments, control panel, hydraulic over speed device, oil sump tank for Governor, Oil sump tank for MIV and oil sump tank for Penstock valve, pressure instruments, emergency slide valve, Electromagnetic type flow meter, Temperature scanner, oil level indicator & controller, Head/tail race measuring equipment, ultrasonic type turbine discharge measuring equipment, MIV hydraulic control panel, MIV electrical panel, Needle control cabinet, Butterfly valve hydraulic control panel, B.F. valve electrical panel and feedback mechanism along with piping and associated equipment.

M. Penstock Valve (Butterfly Valve):

Two nos B F Valve for complete power station is envisaged each comprising of Butterfly Valve Assembly (3500mm dia), servomotor, counterweights, lever arm assembly, needle type by-pass valve, air release & anti vacuum valves, differential pressure switch, over velocity trip mechanism, hydraulic & electric control panel, oil pressure system etc. Since the Penstock Valve Assemblies are supplied long back, before erection these are to be dismantled and re- assembled after replacing all rubber seals, chevron, J seals, main seals etc. These re- assembled Penstock Valve Assemblies are required to be hydraulically pre tested for checking its operation and leakages in S/bay before lowering on foundation.

Weight of complete Penstock Valve (Butterfly Valve) assembly is 44.1 MT approx.

Inlet Pipe of Penstock Valve: It is fabricated from steel plates (25 thick) of penstock pipe material and equivalent diameter of penstock its total length is 1075 mm. On downstream side it is flanged to BF valve and welded to penstock on upstream side. Necessary connection, tapping and fittings for pressure gauge, penstock drains and bypass connection shall be provided on this pipe. NDT testing of welding of inlet pipe with penstock shall be carried out as per drawings.

Weight of Inlet Pipe of Penstock Valve is 4.1 MT approx.

Outlet Pipe with dismantling joint of Penstock Valve: It is fabricated from steel (25 thick) plates of same diameter as penstock. It is flanged to penstock valve at upstream side and welded to penstock at downstream side. Necessary connections, tapings and fittings for

pressure gauges, air release valves, anti-vacuum valves, drainage valve, manhole and bypass connections etc. shall be provided. NDT testing of welding of outlet pipe with penstock shall be carried out as per drawings.

Weight of outlet Pipe of Penstock Valve is 8.5 MT approx. (Drawing no-0-216-05-14401)

2. GENERATOR SYSTEM

A. General:

The generator is of vertical shaft suspended type construction with closed air circuit ventilation and suitable for coupling to a Pelton turbine. Static excitation system is provided for energizing the field winding of rotor. This supply is fed through slip rings located above the generator rotor. The generator thrust cum guide bearing is positioned above the rotor in upper bracket and a guide bearing below the rotor in lower bracket. The bearings are of self-lubricating type and immersed in oil bath in which plug-in type oil coolers are provided.

Air operated brakes are mounted on lower bracket. These are also used for lifting the rotor for maintenance purposes.

For trapping and subsequent evacuation of the brake dust generated during braking operation, brake dust collection equipment has also been provided.

Generator lower guide bearing is positioned below the rotor. The bearing is self-lubricating type, immersed in oil bath with plug in coolers provided for cooling of oil. The upper bracket (top bracket) will be bolted on the stator frame.

Air coolers are directly mounted on the outer steel casing of stator. CO_2 type fire extinguishing system is provided. For monitoring the vibrations on the bearings of the machine, an on-line (continuous) monitoring system has been provided. Creep running of the machine is detected though a creep detector which is in governor scope. Air gap monitor and shaft current monitor are also provided. Portable partial discharge equipment is also provided.

B. Stator: The stator frame has been dispatched to site in four segments. The outside diameter of stator frame A/F is approx 7500 MM. The stator core outside diameter is 5970 mm, inside diameter 4862 mm. and Core height is 3070 mm. **complete core building and winding of stator will be done at site.** Core flux test, HV test and other test as per drawing is to be carried out on complete stator including stage testing at site.

C. Spider: Rotor spider is a fabricated structure single pieces Dim-3700mm ht., dia 2720 on which rotor rim building will be done.

D. Rotor Rim: The rotor rim, which is assembled around rotor spider at site, is built up from sheet steel laminations. The laminations are pressed between steel end plates during assembly and clamped by means of studs. The rim segments do not have equal weight due to variation in thickness. Therefore, all the laminations are required to be degreased, cleaned, de-burring if any, segregated in groups of equal weights by weight measurement

and accordingly assembled. The rim is secured tangentially to the rectangular bars of the spider with sets of 5 part keys having a master key, so as to allow the rim to float freely during operation. As such, no hot wedging shall be required to be carried out. Broaching of the rim shall be done at site .Height of rim is 3270mm and rim punching thickness is 1.8 mm each.

E. **Poles with Field Windings:** There are 16 poles each having 'T' shaped tails to engage with corresponding 'T' shaped slots in rotor rim. Weight of each pole is approx 7.7 Tonnes

F. **Slip Rings & Brush Gear: T**he slip rings are mounted on the tubular shaft during erection. The brush-gear shall be mounted on brush gear casing which is mounted on upper bracket.

G. **Carbon Dust Collection System:** Necessary arrangement is provided to prevent mixing of carbon dust with closed air ventilation system of generator. The carbon dust is collected in the cleanable filters mounted on the brush gear casing.

H. **Bearings:**

Thrust Bearing: Thrust bearing is positioned above the rotor in top bracket. Thrust bearing is of spring mattress with segmental pad type consisting of a set of 12nos. segmental pads. The bearing is of self-lubricating type and immersed in oil bath in which plug-in type of oil coolers are provided.

Top/Bottom Guide Bearings: One no. segmental pad type of guide bearings is provided for generator along with thrust bearing housed in upper bracket. The guide bearing is of pivoted pad type consisting of 12nos. pads.

The generator is also provided with another set of guide bearing below the rotor in bottom bracket. Top guide bearing consisting of 12 no pads.

I. **Hydrostatic Power Pack:** A Portable motorized hydraulic power pack for jacking of the rotor during maintenance with flexible hoses and swivel nuts for connection between power pack and break jack control panel is also provided.

J. **Ventilation:** The generator has closed circuit system of ventilation. Air coolers are to be assembled to the outer periphery of the stator frame.

K. **Upper Bracket:** The upper bracket consists of a fabricated steel structure having a central part and 8 nos. radial arms. The arms are to be bolted to the central part at site. It supports the weights of the stationary parts of upper guide bearing, brush gear, generator covers, mechanical over speed device, creep detector, speed signaling generator (S.S.G) etc.

L. **Lower Bracket:** The lower bracket consists of a fabricated steel structure having a central part and 8 nos. radial arms. The arms are integral to the central part at site. The guide bearing and thrust bearing is housed in it along with oil coolers. Brake-cum-jack units are also mounted on the bracket for rotor braking.

M. **Braking and Jacking System:** has been provided for the braking of the unit during stopping and jacking whenever required through Brake/Jack control panel.

N. **Brake Dust Collection Equipment:** The brake dust collection equipment consists of one extraction unit for each hydro generator, hoppers near the brake assembly for trapping the brake dust and flexible hoses for connecting hoppers to extraction unit.

O. **Cooling Water System:** Cooling water pipe lines along with pressure gauge and flow monitoring instruments are provided to supply cooling water to air coolers and oil coolers. Lagging of pipe line is to be carried out at site.

P. **Major Instruments & Devices:**

- Temperature Transmitter
- Creep detector system
- Rotor temperature indicator.
- Brake dust collector.
- Carbon dust collector.
- Vibration Monitoring System.
- Partial Discharge Analyzer
- Moisture Detector
- Air gap Monitoring System.
- Mechanical over speed device.
- On line vibration monitoring system.
- Air gap sensor
- Air gap monitoring system.
- Speed sensing gear (Turbine scope).
- Shaft current monitor, moisture detector.
- Partial discharge monitoring system
- Lighting system
- Dynamic braking

Q. **CO_2 Type Fire Extinguishing System:** An automatic operated CO_2 type fire extinguishing system has been provided complete with ring headers, discharge nozzles, temperature detector, smoke detector etc.

3. EXCITATION SYSTEM & DVR

The Excitation System shall be of Static, digital, constant voltage type with controlled thyristors. It comprises of 4 sets each of excitation system complete in all respect, excitation transformer, DVRs, power supply units, field flashing equipment's incl. transformer, Field circuit Breaker Panel, digital control and metering equipment, special cables, special tools and mandatory spares. It shall feature a very sensitive, quick acting of generator voltage and reactive respectively.

The power supply for excitation system will be taken via a 3-phase dry type excitation transformer directly from the generator ac terminals from 13.8 kVA bus system between generator terminals and transformers terminals. The field flashing circuit shall be supplied from another transformer/rectifier assembly suitable for connection to a DC supply of adequate capacity.

4. 13.8 KV ISOLATED PHASE BUS DUCT INCLUDING CT,PTs

It mainly comprising of following:
4 sets each of three 1ϕ isolated main bus duct for the connection between generator terminals and generator transformer terminals
4 sets each of bus ducts for delta connection of three 1ϕ generator transformer primary winding
4 sets each of tap off bus ducts for tap off transformer
4 sets each of tap off bus ducts for excitation transformer,

4 sets each of tap off bus ducts for PT & SP cubicles
4 sets each of bus ducts for generator neutral side
4 sets each of CTs in phase and neutral side for relaying and metering scheme including split phase protection
4 sets of NGCs with NG transformer, current limiting resistor, Disconnecting switch etc.
4 sets each of tap off bus ducts for dynamic braking cubicle,
4 sets of PT and SP cubicles with lightening arrester, surge capacitor, 2 PTs with two cores in secondary DVR, metering, relaying and one spare.
4 sets of isolating links in the bus for individual isolation of all the tap off ducts and generator terminal
4 sets of supporting structures, columns, frames, wall plates, hangers mounting plates, hardware etc.
4 sets of items not specified above but are necessary for satisfactory operation of bus ducts.
All special devices, tools, maintenance equipment's etc. required for installation, testing commissioning and maintenance of the bus ducts.

Connection and disconnection of various shorting links etc. during pre-commissioning and commissioning is included in this contract. Welding and NDT shall be carried out as per drawings.

5. GENERATOR TRANSFORMER

It comprised of fourteen (14) 82 MVA, 1ϕ, 13.8/400/√3 kV generator transformers with all accessories including bushings, undercarriage, off-circuit tap charger, coolers, instrumentation, CTs and fittings, fourteen sets of valves, piping, mounting plates, hangers, hardware, etc. for the cooling water supply within the transformer hall, one set of rails for transformers hall extended upto power house service bay etc.

The power generated by generator shall be stepped up to 400 kV from 13.8 kV by 12 nos. generator transformers, three for each generator. The transformers shall be located in transformer hall on the downstream side of powerhouse. HV side of the transformer is to be connected to 420 kV, GIS hall located on separate floor above the transformer hall floor through HV Oil/SF_6 bushings. LV side of the transformer is to be connected to respective generator terminals through 13.8 kV isolated phase bus duct. These shall be oil immersed OFWF cooling.

Two nos. spare transformers included in above mentioned 14 nos. transformers are to be erected at site.

6. DC SYSTEM FOR POWER HOUSE

- 1 set of 220V DC power supply system for power house comprises 2 Nos. maintenance free VRLA type 1500AH battery bank and associated racks, two chargers and distribution system with incoming, outgoing feeders.
- one set of 48 V DC system with one maintenance free VRLA type 250 AH battery bank one charger and distribution system.
- 02 No. 10 KVA UPS systems connected to the 220 V DC distribution systems.

7. CONTROL & MONITORING SYSTEM (Computerized system)

It includes Local Control Boards, man machine interface(MMI) ,Unit Control Board (UCB),Local Control Boards for GIS and Pothead Area, auxiliaries and station services, common services for electrical power supply, , energy meter panel and Computerized system in central control room. Brief description of some of the systems is as follows.

Local Control Boards :- Each sub system shall be controlled from its local control board if the “Local” position is selected. The Local Control Board of each system includes the power supply distribution, interfacing terminals with the process, main redundant

controllers, and MMI. Local control boards with redundant controller units shall be provided

- One no LCB for common serving board with MMI and controller.
- One no LCB for electrical power supply serving board with MMI and controller.
- One no LCB for G.I.S Control board with MMI and controller.
- One no LCB for station service board with MMI and controller.
- One no LCB for Remote Operation of the power plant.

Man Machine Interface

The Man Machine Interface shall have station with colour tactile screen or equivalent, have graphics supervision software, withstand of machine hall environment, connected directly to redundant CPU mechanism, display mimic diagram views with control functions etc.

Unit Control Board (UCB)

The system shall contain the following four (4 nos) unit control boards(UCB) .Each UCB shall be provided with Man Machine Interface (MMI) and necessary keypad /input interface to perform local supervision & control of the unit. The UCB shall be divided physically in the following sections

- Turbine section
- Generator section
- Unit auxiliaries section
- Alarm section
- Data acquisition of other parameters**.**

Four sets each of Control & Monitoring Panel, Temperature Measurement Panel (only empty), Instruments Panel (only empty panels), Gauge Panel (only empty panel) and Remote Panels on floors of different elevation.

Local Control Board for GIS and Pothead Area comprises of:

One suite control & monitoring panel

Unit Control Board: Each Unit Control Board (UCB) of the four UCB are functionally similar and are completely independent systems and it consists of a) Local Control Unit (LCU) with Distributed Processing Unit in redundant mode, I/O modules b)Mosaic based instruments like PB stations, A/M selector stations, trip PBs, meters, switches, indication

lamps, analog/digital indicators (MW, V, A, PF, f etc.) for Control and Monitoring functions c) Electrical Transducers d) Auto and Manual synchronizers e) Operator Work Station computer for control and monitoring of units & their auxiliaries, GT bay breakers. For butterfly valve it UCB consists of unit wise remote I/O (with redundant o/p module for drives) modules of max DNA located in panel in BF Valve house.

Common station Auxiliaries Control Board (CACB): Common Station Auxiliaries Control Board consists of a) LCU with DPU in redundant mode, I/O modules of maxDNA b) Mosaic based instruments like meters, switches, push buttons, indication lamps, indicating meters c) Electrical transducer d) Operator Work station computer for control and monitoring of Common Station Auxiliaries like drain water/dewatering system, fire protection system etc.

Remote Terminal Unit at Barrage: maxDNA based remote processing unit consisting of panel with Distributed Processing Unit in redundant mode, I/O modules of maxDNA b) Auxiliaries relays, for data acquisition & control of barrage gates. RTU shall be located in barrage control room shall be hard wired to control panels of HMC. The RTU shall be connected to power house SCADA using OPGW.

Central Control Room (CCR)

Normal operation of the power plant shall be executed from the central control room for the units and all other systems.CCR will comprise of the following equipment

- Two number of operator workstation with two sets of VDU's.
- Four printers for alarm event.
- One large screen display acting .
- One data acquisition system (DAS).
- Twelve plant Computers and three servers.
- Plant LAN with 24 port gigabit Ethernet LAN switches spread across the power houses area as per drawing.
- Provision for interfacing with other system such as public address systems, security and Surveillance system plant network etc.

Plant bus equipment consisting of: Two no. of 24 port ethernal switches connected to gateway of SCADA and suitable for connecting 10 sets of PCs loaded with MAXVUE software each with CPU, TFT based VDU(21") Keyboard, Mouse and A4 size colour inkjet printer, CCTV interface, two nos. each of A3 & A4 size colour printer.

OWS at NHPCs OS Control Room & HMI System at Barrage Control Room consisting of:

One no. each of Operator work station with CPU, 21" TFT VDU, Keyboard, Mouse & modem with remote MAXVUE software, computer table and chair.

TAP OFF TRANSFORMER AND 11 KV SWITCHGEAR

- The 6.3 MVA Dry Type tap off transformers complete 11 KV switchgear shall comprise of 4 nos tap off transformers complete with cubicles and all necessary accessories.
- Two incoming panels for supply from the grid station
- Two no incoming panels for supply from the diesel generator sets.

The 11 KV switchgear systems shall contain the major equipment's including the necessary cubicles, bus bars and wiring.

8. 415 V SWITCHGEAR,AUXILIRY AND STATION TRANSFORMERS

The UATs, Valve house transformers and associated 415 V systems shall be consisting of
Four 11KV/415V, 1000KVA, unit auxiliary transformers (Dry type) complete with cubicles and all necessary accessories.
Four 11KV/ 415V, 2500KVA, station service transformers (Dry type) complete with cubicles and all necessary accessories.
Four 11KV/415V, 500KVA, valve house transformers (Dry type) complete with cubicles and all necessary accessories.
Four unit auxiliary boards, Two station service board and one valve house board of indoor metal enclosed 415 V switchgear type ,completed with cubicles ,protection, metering bus bar system.

9. COOLING WATER SYSTEM

The closed loop dual circuit cooling water system shall comprise of:

- 6 nos. raw water dry pit sump pump along with local control panel, instrumentation and associated accessories etc.
- 6 nos. secondary water booster pump along with local control panel, instrumentation and associated accessories etc.
- 2 nos. bore well pump along with local control panel, instrumentation and associated accessories etc.
- 6 heat exchangers
- 12 Duplex strainer
- 6 line filters
- 14 motorized valve

- Centralized control panel for cooling water system complete with all wiring instrumentation and associated accessories etc.
- Necessary piping incl. piping for dewatering, on return valves, air scouring arrangement, flow meter, maintenance valves, regulating office, pressure & temperature sensing devices, all type of consumables and other materials including welding electrodes etc.

Closed cooling water system for supplying cooling water to turbine, generator and transformer. The system shall consist of primary and secondary loop circuit. To meet raw water requirement tail race sump shall be provided in each tailrace. Two dry pit sumps shall also be provided, dry pit 1 between tailrace of unit #1 & unit #2 and dry pit 2 between tailrace of unit #3 & unit#4 to accommodate total 6 nos. of raw water pumps, 3 nos. in each dry pit sump. The pumps in dry pit 1 shall take raw water from tailrace sump of unit #1 or unit #2. Similarly pumps in dry pit 2 shall take raw water from tailrace sump of unit #3 or unit #4. All the pumps in dry pit 1 shall discharge water to a common raw water header for unit#1 & unit#2 and all the pumps in dry pit 2 shall discharge water to a common raw water header for unit#3 & unit#4. From the raw water header for unit#1 & unit #2, water is discharged to a common raw water return header specified for same units and similarly water is discharged from raw water header for unit#3 & unit#4 to raw water return header for the same units after meeting water cooling requirement through primary heat exchanger circuit. From raw water return header water shall come to tail race of units. The flow through heat exchanger circuit is being governed by the motorized valve placed in the circuit.

In secondary water circuit there is a common cooling water header and one common return header for all the 6 units. The cooling water header shall be charged from overhead expansion tank. From cooling water header water come to cooling water return header after meeting the requirement of units and recycled to cooling water header through secondary heat exchanger circuit. The cooling water system shall also be provided with check valves, strainers, flow meters, maintenance valves, regulating orifices, pressure and temperature sensing devices etc.

The secondary water requirement shall be fulfilled by a common expansion tank. This tank will be filled up by a bore well pump of sufficient capacity with all necessary arrangements/ provisions. The tank will contain different floats for pump stop; pump start and low level alarm. The same cooling water pumps shall be used for dewatering of the tailrace outside the tailrace gate.

10. DRAINAGE SYSTEMS

comprising of four submersible pump for power house drainage (PH) sump and four submersible pump for dry pit drainage sump along with piping, valves, fittings, level switches, starter panels, flow indicators, maintenance valves. A common drainage system for leakage, seepage, surface water etc. from power house and drainage gallery

is provided. All seepage, leakage, surface water etc. shall be canalised into common drainage trench through different header from different floors of power house. From drainage trench water shall come into drainage sump in the upstream side of the power house. The sump shall be divided into parts. Each part shall be provided with two continuous duty submersible pumps complete with piping, valves and fittings with suitable water level switches for auto starting and stopping of pumps. Water from drainage sump shall be pumped outside the tail race gate.

There is a provision to keep cooling water sump completely dry. This shall be achieved by providing a separate drainage sump tank inside the cooling water sump for each of two sumps. Each drainage sump tank shall be provided with two submersible pump along with pipings, valves, fittings, level switches, starter panels, flow indicators, maintenance valves

11. ONE LOT OF HP & LP COMPRESSED AIR SYSTEM

HP Compressed Air System shall comprise of 2 nos. HP air compressor, 2 nos. Air Dryer, , 1 no. HP Air Receiver, 1 no LP air receiver with, 1 no. Pressure reducer, piping, valves, fittings, starter/control panel, pressure and temperature indicator switches, safety devices, suction filter and accessories. The HP compressed air system shall cater the air requirement for oil pressure unit for turbine and MIV.

LP Compressed Air System shall comprise of 2 nos. LP air compressor, 2 nos. air dryer, 1 no. LP Air Receiver for station services, fittings, hoses, starter/control panel, pressure and temperature indicator switches, safety devices, suction filter and accessories. The LP compressed air system shall cater air requirement at reduced pressure for generator braking system achieved through pressure reducing system. It shall also cater the air requirement for fire protection system of transformer and instrumentation & other service requirement on various floors of power house.

12 . MECHANICAL WORKSHOP EQUIPMENT.

The workshop equipment's shall consist of one Stationary drilling machine ,Five electrical hand drilling machine ,One radial drilling machine, Three portable magnetic electrical drilling machine ,One lathe machine of bed length 2000mm,One lathe machine of bed length 1200 mm, One Universal milling machine, One sharper machine ,One double ended grinding machine ,Three MIG welding machine, two TIG welding machine etc.

2.2 The equipment and piping shall be erected in conformity with the provision of standard/ specification and as may be directed by BHEL. The method of welding (Arc, gas, TIG, MIG/MAG or other method) may be indicated in the detailed drawing/ schedules. BHEL engineer will have option of changing the method of welding as per site requirements.

2.3 On the discretion of BHEL site engineer, some of the material can be directly unloaded in the powerhouse/work site. Contractor shall keep record of the same. For such works contractor shall be paid under Material-handling package.

2.4 EOT cranes (Two nos.) are being installed by BHEL Bhopal/another agency. The EOT cranes shall be provided free of hire charges and on sharing basis. BHEL Bhopal/ another agency shall carryout the AMC of the cranes. The day-to-day routine maintenance shall be in the scope of the present contractor for the period of crane being used for his scope of erection works. The said contractor shall also deploy the requisite number of crane operators (one or two nos. operator simultaneously) as per the instructions of BHEL engineer for operation of the crane for his scope of work in connection with Electromechanical works of BHEL. The crane operator may have to work in overtime also depending upon the work conditions for which no extra charge shall be payable to the contractor. The contractor will also provide the EOT crane services (including the operators) to the other contractors working in the powerhouse for civil and mechanical works.

2.5 Construction drawings and documents shall be provided at site to the successful bidder for erection of work.

2.6 On the discretion of BHEL site engineer**, Construction power to BHEL other contractors/vendors shall be provided by contractor on chargeable basis.**

2.7 Installation, maintenance and operation of 3 No MOT Crane of at least 10T capacity in closed storage shed. The crane shall remain the property of vendor and will have to be dismantled and taken back after completion of work. Approx. span of rail is 9m, however tenderer to verify the span before sending suitable MOT crane to site.

2.8 Details of Major equipment along with weights & Dimensions, supplied by BHEL under this scope are given in (Volume-IA, Part-I, Chapter-IV). However changes on account of change in design may occur, for which no compensation will be payable and contractor shall complete the entire work as detailed in the tender specifications within finally accepted rates/ prices.

2.9 The welding electrodes required for site welding of major components of turbine like Turbine casing, distributors, MIV, BFV, inlet /outlet pipes of MIV & BFV, some high pressure piping and any other special consumables **which are supplied by manufacturing units** along with plant material shall be issued to contractor for subject work free of cost .Contractor shall maintain proper records for all those consumables. However general purpose electrodes & for systems like CW piping ,Transformer piping ,Bus ducts etc electrodes shall be the responsibilities of contractor.

2.10 As per instructions of BHEL site engineer and or due to space constraint at service bay/power house /work site, some of the assemblies, devices like the Stator/rotor lifting devices, hydraulic test device , other T&P may required multiple handling for shifting from power house/work site to BHEL stores and stores to power house /work site. This shall be responsibility of contractor and charges shall be paid to contractor as per sr.no-5 of rate schedule.

2.11 The contractor under this contract shall also provide services of skilled/Unskilled persons for a total period of 288 Man-months exclusively for use by BHEL. This manpower will be required for following services:

- **Highly skilled workers (Qualified computer operators) for office and stores work for 36 man months,**
- **Skilled workers for office, colony, stores, for 72 man months.**
- **Unskilled workers for office, colony, stores for 180 man months.**

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages at Site for the categories given plus 10% will be made from the final bill of the contractor.

3. Time Schedule

MOBILIZATION, TIME SCHEDULE, CONTRACT PERIOD AND GRACE PERIOD

3.1 INITIAL MOBILIZATION

After receipt of LOI, Contractor shall discuss with Project Manager / Construction Manager regarding intitial mobilisation. Contractor shall mobilize necessary resources within 2 weeks of issue of letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

3.2 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 as per requirement to commence the work of erection, testing etc as per scope of work, and progressively augment the resources to match schedule of the project.

3.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Start of erection of foundation parts U#1 shall be considered as "start of contract period". Site mobilization will not be considered as start of contract period.

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

SN	MAJOR MILESTONE	START/ COMPLETION
1	Site Mobilization	2 weeks from Award of LOI or as decided by BHEL
2	Start of contract period (Zero date)	Start of erection of Foundation Parts as decided by Project Manager of BHEL
3	Start of erection of Foundation Parts	Start of 1st Month from zero date
4	Completion of Foundation Parts	end of 5th Month
5	Start of Turbine/Nozzle assembly	Immediately after Gen barrel readiness (8/9 Months)
6	Completion of Turbine/Nozzle assembly	end of 11th Month

7	Start of Lowering of LBB ,Stator, rotor and UBB	Start of 12th Month
8	Completion of lowering of LBB, Stator, rotor and UBB	end of 14th Month
9	Start of Unit axis alignment	start of 15th Month
10	Completion of Unit axis alignment	end of 15th Month
11	Start of Boxing up of UNIT # 1	start of 16th Month
12	Completion of Boxing up of UNIT # 1	end of 18th Month
13	Start of pre-commissioning Unit #1	Start of 19th Month
14	Completion of pre-commissioning	end of 21th Month
15	Commissioning Spinning & handing over of Unit# 1	end of 22th Month
16	Boxing up of UNIT # 2	end of 22th Month
17	Pre Commissioning of unit#2	end of 25th Month
18	Commissioning Spinning & Handing over of Unit# 2	end of 26th Month
19	Boxing up of UNIT # 3	end of 26th Month
20	Pre Commissioning of unit#3	end of 29th Month
21	Commissioning Spinning & Handing over of Unit# 3	end of 30th Month
22	Boxing up of UNIT # 4	end of 30th Month
23	Pre Commissioning of unit#4	end of 33th Month
24	Commissioning Spinning & Handing over of Unit# 4	end of 34th Month

1. Major mobilization shall start from the date of start of erection of Foundation parts of Unit #1.

2. All dates in above schedule are from start of contract period (zero date)

3.4 CONTRACT PERIOD

The contract period for completion of entire work under scope shall be **34 (Thirty Four) MONTHS** from the "**START OF CONTRACT PERIOD**" as specified earlier.

The period from the commencement of preparatory work for erection till the actual "start of contract period" shall not be reckoned for the above purpose.

3.5 CONSEQUENCE OF DELAY

It may be noted that in case the delay in completion is attributable to the contractor and leads to imposition of liquidated damages by BHEL's client, BHEL will impose LD on the contractor as per GCC.

4. Tentative Weight Schedule

4.1 Tentative weight schedule/ Details have been given in Annexure**- I (Enclosed)**

5. Rate Schedule/BOQ

PARBAT-II HEP (4X200 MW) ETC & Material Handling

5.1 Contractor shall fully understand equipment description and scope of work before quoting. The scope of work and responsibility of the contractor as mentioned under these specifications shall be covered within the quoted rates.

5.2 The tenderer shall quote the rates as per the rate schedule only. No cutting/ erasing / over writing shall be done.

RATE SCHEDULE CUM BOQ

Sl. No	DESCRIPTION OF WORK	Rate in Rupees / MT (in figures and words)
1.	**Lumpsum price** for fabrication, erection, testing ,commissioning and handing over the entire work of 4x200 MW Parbati-II HEP Refer Clause 2.1 B (Chapter-II,Vol-IA, Part-I)	**LUMPSUM PRICE**
2	**PANARSHA STORE , SAINJ/SARAN BEHALI AND OTHER BHEL STORES** **Rate in Rs./ MT** for entire scope of work as defined in this tender specification in respect of receipt, unloading (from trucks/ trailers), its verification, proper storage, stacking , preservation of materials / equipment's in **project stores / closed storage shed**. (Approx. tonnage involved is 5000 MT) Refer Clause 2.1 A (Chapter-II,Vol-IA,Part-I)	
3	**DIRECT RECEIPT AT POWER HOUSE/WORK SITE.** **Rate in Rs./ MT** for entire scope of work as defined in this tender specification in respect of receipt, unloading of materials/equipment's from Trucks/Trailer at powerhouse/work site sites , its verification, proper storage, stacking and preservation of materials / equipment's and handing over to erection agency of BHEL /Customer. **(Approx. tonnage involved is 500 MT**	

4	**<u>MATERIAL ALREADY RECEIVED AT STORES.</u>** **<u>Rate in Rs./ MT</u>** for rehandling, verification, proper storage, stacking, restacking and preservation of materials / equipment's in project stores / closed storage shed already unloaded by other contractor in project stores/closed storage .(Approx. tonnage involved up to Max. 4500 .MT) (As decided by Construction Manager /Site Engr. of BHEL)	
5	**TRANSPORTATION OF MATERIALS TO POWER HOUSE /WORK SITE FROM POJECT STORES.**	
5.1	**<u>SAINJ/SARAN BEHALI STORE (With in .- 5 KM FROM SITE)</u>** **Rate in Rs./ MT** for transportation of materials / equipment's including packing (if required) and loading from project stores / closed storage shed to power house or work site ,unloading with EOT Crane and handing over to erection agency of BHEL /Customer. (Approx. tonnage involved is 5700 MT)	
5.2	**<u>PANDOH STORE (Approx.- 50 KM FROM SITE)</u>** **Rate in Rs./ MT** for transportation of materials / equipment's including packing (if required) and loading from project stores / closed storage shed to power house or work site ,unloading with EOT crane and handing over to erection agency of BHEL /Customer. (Approx. tonnage involved is 510 MT)	
5.3	**<u>PANARSA STORE, (Approxi-25 KM FROM SITE)</u>** **Rate in Rs./ MT** for transportation of materials / equipment's Including packing (if required) and loading from project stores / closed storage shed to power house or work site, unloading with EOT crane and handing over to erection agency of BHEL /Customer. (Approx. tonnage involved is 3500 MT)	
6	Loading of material from BHEL stores/ yards which includes packing (if required) in the truck/ trailers to be placed by carriers at site/ stores for dispatch of material to MU or outside the project area. Rate in Rs./ MT	

7	Loading of materials including packing (if required) in their own Trucks / Trailers and transporting same to Carriers Godown at following locations & booking of the same to destination as per instructions of Engineer. Mandi Rate in Rs./ MT	
8	Loading of materials including packing (if required) in their own Trucks / Trailers and transporting same to Carriers Godown at following locations & booking of the same to destination as per instructions of Engineer. Kullu/Bhunter Rate in Rs./ MT	
9	**Lumpsum Price for installation, maintenance and operation of 3 No MOT Cranes of at least 10T capacity each in closed storage shed. The crane is to be dismantled and taken back after completion of work.**	**LUMPSUM PRICE**

Note: For evaluation purpose weight of 15 MT each shall be considered against items at Sl no 6,7, & 8.

6. Terms of Payment

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

6.2 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.

6.3 Shortage / damage reports to be submitted on BHEL standard materials management forms. No payment shall be released till the contractor submits these reports and are verified by the Engineer.

6.4 **PRICE VARIATION COMPENSATION-**In reference to clause no. 2.17.3 of GCC, Please note that component (K) for labour oriented packages will be applicable for the scope of work covered under this tender**.**

6.5 **RETENTION AMOUNT AND PAYMENTS: -** Retention amount shall be withheld from each RA bill as per provision of clause 2.22 and 2.23 of GCC regarding retention amount and payments.

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

6.6.1 Interest bearing recoverable advance: Applicable as per clause No. 2.13 of GCC.

6.6.2 PROGRESSIVE PAYMENT SHALL BE RELEASED ON PRORATA BASIS

(A) ITEM 1 OF THE RATE SCHEDULE

100 % of contract rate of item No. 1 of rate schedule shall be payable as detailed **in Annexure -A (**enclosed)

NOTE: Further break-up and/or minor changes in the Annexure A referred above, if required depending upon the site conditions, can be done at site entirely at the discretion of BHEL site.

(B) ITEM 2 OF THE RATE SCHEDULE

(i) **50**% of the rate shall be payable on prorata basis after the materials are safely unloaded , shifted to stores and updation in store material register / store stocks registers as per BHEL practices such as GR/LWB/loading advice/box packing slip subject to furnishing of following information along with the bills as per above clause

- Proof of claim lodged with Railways/Transporters in respect of shortage/open delivery.
- Material Management forms duly filled/Records generated in stocks (Stock registers and computers) and certified by Engineer.

(ii) **40%** of the rate shall be payable on prorata basis after stacking /safekeeping, proper verification in line with documents and records and proper preservation as per BHEL standards is ensured. Opening of cases/ repacking, wherever necessary (with contractors own T&P and labour) ,updation of verification records ,filling other reports & submission of information as per Material management forms by contractor immediately after verification of materials are to be completed within three weeks of receipt of packages at site , failure of which 5% , out of 40% shall be forfeited as certified by BHEL Engineer. Required Performa would be supplied by site.

(iii) **10 %** of the rate shall be payable on pro-rata basis for preservation till these are transported to Power house/Work site.

(C) ITEM 3 OF RATE SCHEDULE

(I) **60** % of the rate shall be payable on prorata basis after the materials are safely unloaded directly in the Power House using the EOT crane of the Power house and recorded in stocks as per BHEL practices such as GR/LWB/loading advice/box packing slip subject to furnishing of following information along with the bills as per above clause

- Proof of claim lodged with Railways/Transporters in respect of shortage/open delivery.
- Material Management forms duly/Records generated in stocks (Stock registers and computers) and certified by Engineer.

(ii) **40 %** of the rate shall be payable on prorata basis after proper safekeeping/stacking, proper verification in line with documents , records ,proper preservation as per BHEL standards and Handing over to erection agency at Power house /work site. Opening of cases/ repacking, wherever necessary (with contractors own T&P and labour), submission of information as per Material management forms by contractor immediately after verification of materials are to be completed within three weeks of receipt of packages at site failure of which 5% out of 40% shall be forfeited as certified by Engineer. Required Performa would be supplied by site.

(D) ITEM 4 OF RATE SCHEDULE

(I) 80% of the rate shall be payable on prorata basis after proper re handling, verification, proper storage, stacking, restacking and preservation of materials / equipment's in project stores / closed storage shed. Verification of materials are to completed within 05 months from date of site mobilized. Sequence for verification of packages shall be

decided by BHEL Engineer as per site requirement ,failure of which 10% out of 80% shall be forfeited as certified by Engineer

(II) 20 % of the rate shall be payable on pro-rata basis for preservation till these are transported to Power house/work site.

(E) ITEM 5.1 ,5.2,5.3 ,6,7 & 8 OF RATE SCHEDULE

100 % of the rate shall be payable on prorata basis on completion of particular item.

(F) ITEM 9 OF RATE SCHEDULE

(i) **78%** shall be paid after satisfactory installation and commissioning of 3 no MOT crane in closed store. Further sub division of this rate shall be done at site with BHEL site engineer.

(ii) **22%** shall be distributed and paid @ 2% on quarterly basis by the site engineer on satisfactory operation and maintenance of MOT

7. Taxes and Other Duties

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

7.1 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services.
Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. The Service Tax Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract.

For the purpose of claiming any Service Tax from BHEL, the following procedure shall be adopted :

Contractor shall submit serially numbered Service Tax and Cess Invoices, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely:

a) The name, address and registration number of the contractor
b) The name and address of the party receiving taxable service (BHEL)
c) Description, classification and value of taxable service provided and
d) The Service Tax payable thereon.

All the four conditions shall be fulfilled in the invoice for payment of Service Tax by BHEL. Where more than one nature of Service under Service Tax Rules is involved, the invoice mentioned above shall contain the breakup of all values for each nature of Service.

7.2 VAT (Sales Tax /WCT)

Civil Works:

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Contractor shall obtain prior written consent of BHEL before billing the amount towards such taxes. In case contractor opts for composition, it will be with the prior express consent of BHEL.The VAT Rules permit more than one option or methodology for discharging the liability of tax/levy/duty and BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor. BHEL also reserves the right to demand "Tax Invoice" under the relevant VAT Act, from the Contractor. Where such taxes are required to be paid by the contractor subject to the above, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only.

Works other than Civil Works:

The rates quoted by the Contractor shall be inclusive of VAT/Sales Tax and BHEL shall not reimburse any amount on this account due to any reason whatsoever.

Common to all Works (Both Civil and Other than Civil)

The Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill.

Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing all their material, plant and equipment etc at site for the execution of the work, including arrangement of Road Permits if and as applicable under the relevant VAT Act.

7.2.1 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

7.2.2 New Taxes/Levies

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

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

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8. Facilities Matrix in the scope of contractor/BHEL

PART I : ESTABLISHMENT/ FACILITY

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.1.0	**ESTABLISHMENT**			
1.1.1	**FOR CONSTRUCTION PURPOSE:**			
A	Open space for office of BHEL	Yes		
B	Open space for storage	Yes		
C	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
D	Bidder's all office equipment's, office / store / canteen consumables		Yes	
E	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
F	Fire fighting equipment's like buckets, extinguishers etc		Yes	
G	Fencing of storage area, office, canteen etc of the bidder		Yes	
1.1.2	**FOR LIVING PURPOSES OF THE BIDDER**			
A	Open space		Yes	
B	Living accommodation		Yes	
1.2.0	**ELECTRICITY**			
1.2.1	**POWER FOR CONSTRUCTION PURPOSE (to be specified whether chargeable or free)**			Chargeable

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.2.1.1	Responsibilities of obtaining connection	Yes		1) Connection of approx. 250KW is being arranged By BHEL. However electricity bill raised by power supplier is to be paid by bidder .The bill may include fixed charges, minimum consumption charges, taxes, duties etc. 2) Bidder shall also install his 125 KVA silent type DG set for construction power to be used during initial months till regular connection is obtained by BHEL and for backup power subsequently till completion project.
1.2.1.2	Charges for obtaining connection	Yes		
1.2.1.3	Single point of power source at PH	Yes		
1.2.1.4	Payment of electricity consumption		Yes	**As per bill of power supply agency up to completion of project.**
1.2.1.5	Maintenance of lighting, distribution boards of power at suitable working areas		Yes	
1.2.1.6	Providing of the consumables such as sockets, switches, MCCB, bulbs etc .		Yes	
1.2.1.7	Further distribution for the work to be done which include supply of materials and execution		Yes	
1.2.2	**POWER FOR BHEL STORE**			
1.2.2.1	Responsibilities of obtaining connection	Yes		Connection of approx. 50KW is being arranged By BHEL.

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.2.2.2	Charges for obtaining connection	Yes		
1.2.2.3	Payment of electricity consumption		Yes	Electricity bill raised by power supplier is to be paid by bidder . The bill may include fixed charges, minimum consumption charges, taxes, duties etc.
1.2.2.4	Maintenance of lighting, distribution boards of power at suitable working areas		Yes	
1.2.2.5	Providing of the consumables such as sockets, switches, MCCB, bulbs etc .		Yes	
1.2.3	**POWER for the office, stores, etc of the bidder**		Yes	
1.2.3.1	Responsibilities of obtaining connection		Yes	
1.2.3.2	Charges for obtaining connection		Yes	
1.2.3.3	Payment of electricity consumption		Yes	
1.2.3.4	Distribution from single point including supply of materials and service		Yes	
1.2.3.5	Demobilization of the facilities after completion of works		Yes	
1.2.4	**Power for BHEL office** (Porta Cabins) in/near POWER HOUSE.		Yes	**Located in vicinity of power house** **Contractor will install a separate meter for consumption reading and actual monthly electricity bill shall be paid to contractor by BHEL. Rates for per unit is as per HPSEB tariff rates.**
1.3.0	**WATER SUPPLY**			

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.3.1	**For construction purposes AT PH:**		Yes	
1.3.1.1	Making the water available at single point		Yes	
1.3.1.2	Further distribution as per the requirement of work		Yes	
1.3.2	**Water supply for bidder's office, stores, etc**		Yes	
1.3.2.1	Making the water available at single point		Yes	
1.3.2.2	Further distribution as per the requirement of work		Yes	
1.3.3	**Water supply for BHEL office, and stores, etc**			
1.3.3.1	Water supply for BHEL office, near power house.		Yes	
1.3.3.2	Making the water available at BHEL Store		**Yes**	
1.4.0	**LIGHTING/ ILLUMINATION**			
1.4.1	For construction work (supply and execution of all the necessary materials such as lamps, extension boards, hand lamps, cable etc): 1. At construction site 2. At preassembly area 3. At storage area		Yes	
1.4.4	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
1.5.0	**COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER**		YES	
1.6.0	**COMPRESSED AIR SUPPLY**			

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
1.6.1	Supply of Compressor and all other equipment's (including pipes, valves, storage systems etc) required for supply of compressed air at site		Yes	
1.6.2	Installation of the above system and operation and maintenance of the same.		Yes	
1.6.3	Supply of the all the consumables for the above system during the contract period		Yes	

PART II : ERECTION RFACILITIES

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.1.0	**Engineering works for construction**	**yes**		
2.1.1	Providing the erection drawings for all the equipment's covered under this scope	Yes		
2.1.2	Drawings for construction methods	Yes		In consultation with BHEL
2.1.3	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		Bidder to help BHEL in making as built drawings
2.1.4	Shipping lists etc for reference and planning the activities	Yes		
2.1.5	Preparation of site erection schedules and other input requirements	Yes	Yes	Bidder to prepare in consultation with BHEL
2.1.6	Weekly erection schedules based on Sl No 2.1.5	Yes	Yes	"

Sl.No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
2.1.7	Daily erection / work plan based on Sl No 2.1.7		Yes	”
2.1.8	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	To be jointly done on regular basis
2.1.9	Visit of the senior official (atleast once in every two months) of the bidder to site to review the progress so that works are completed as per schedule.		Yes	
2.1.10	Preparation of preassembly bay		Yes	

9. T&P and MMEs to be deployed by Contractor

INDICATIVE LIST OF TOOLS AND PLANTS FOR ERECTION TO BE ARRANGED BY THE CONTRACTOR AT HIS OWN COST

S.NO.	ITEM/ DESCRIPTION	QTY.(Nos.)	REMARKS
1	Hydra crane - 14T	01	
2	Truck -10 T	01	1 no. always at site. ADDL 1-2 NOS AS PER REQMT.
3	Trailer with pulling unit - 20 T	1	
4	Trailer with pulling unit -60/70 T	As Per Requirement	As Per Requirement
5	Fork lift – 3 T	1	
7	Fire extinguishers 10 Kg A,B,C & dry powder type	Minimum 15 nos	
8	General purpose material handling T&P	As Per Requirement	
9	Torque Wrenches up to 2000 NM	1 set	
10	Impact Wrench (Pneumatic) up to 2400 NM	1 set	
11	Chain pulley block of various capacities (2T, 5T, 10T), Pull lift	Min.2 nos each or as required	
12	Turn Buckle (2 T, 5 T, 10T etc)	4 each	
13	Hydraulic / Mechanical Jacks of various capacities (5-10-20-50 T)	4 each	
14	Gas cutting set (Acetylenes Cylinder, Oxygen Cylinder cutting set with hose & regulator.	As Per Requirement	
16	Air Arc Gouging Arrangement	1 no.	
17	Electrode Oven	4 nos	
18	Pneumatic straight grinders	4 nos	
19	Pneumatic Angle grinders	4 nos	
20	Hydraulic test pump (100 Kg/cm2)with pressure gauge	1 no	
21	Air Compressor	As Per Requirement	
22	Hydraulic pump (hand operated).	1 no	

23	High vacuum filter machine (2000 L P H)	1 no	
24	Vacuum pump for evacuation of transformer tank.	1	
25	Oil Tank – 10000 L	1	
26	Hydraulic Jacks 50 Tons	4	
27	Welding machine set .	10 set	
28	MIG Welding machine set .	2 set	
29	Gas cutting set with gas & cutting set.	3 set	
30	**125 KVA DG set**	01 no	w.r.t from start of project
31	Precision tools (IMT) TENTATIVE QUANTITY 1. 0.02 accuracy block level-2 nos 2. Dumpy level with accessories- 1 no 3. Theodolite work station-01 no 4. Inside micrometer – as per requirement 5. Outside micrometer-0-25, 25/50, 50-75, 75-100, 100-150 6. Vernier callippers150, 300 – 2 each 7. Telescopic gauge- 2 sets 8. Slip gauge- 1 set 9. Feeler gauges- as per requirement 10. Dial gauge with magnetic stand- 12 nos	As Per Requirement	

Note:

1. The above list specifies only major T & P (may not be complete in items or numbers) to be deployed by the contractor. All additional/ other tools and plants required for timely and satisfactory completion of works/ testing etc. shall also be deployed by the contractor with in the finally accepted rates/ prices.
2. Other terms and conditions regarding above shall be as per the special condition of the contract clause clause no. 4.2.1 (Tools & Plants, IMTEs)
3. Consignments which cannot be handled by above cranes of contractor/BHEL, has to be unloaded / handled by sleeper jack method. Alternatively suitable capacity crane is to be arranged by contractor for handling such consignments. The bidders are required to take note of it while submitting their offer.

INDICATIVE LIST OF IMTE`s (ELECTRICAL) TO BE ARRANGED BY THE CONTRACTOR AT HIS OWN COST			
S.NO.	**ITEM**	**QTY.(Nos.)**	REMARKS
1	Analog Multimeter voltage AC/DC 2.5-2500Vcurrent AC /DC-100Ma to 10A, Resistance upto 200 Mohm	03	
2	Digital Multimeter 4&half digit	06	
3	Meggar hand operated 500V / 1000V 200 Mohms	02	
4	Meggar motorized 2500V / 500V 2500 00 Mohms	01	
5	Phase sequence indicator 110-450V	02	
6	Frequency meter 0-100 HZ (0-110-230-415 V)	01	
7	Tong tester	02	
8	Single phase variac 0-220 V, 8A	03	
9	Three phase variac 0-415,15A	01	
10	Rheostat 0-250 ohms 2A, 0-8 Ohms 15A, 0-8 Ohms 15A, 0-26 Ohms 5A, 0-165 ohms 2 Amps	03 each	
11	Hand tachometer(Digital) 0-15000 r.pm	01	
12	Digital micro Ohm meter	01	
13	A.C. H.V. Test Kit	01	
14	Dead weight Tester for calibration of pressure gauge.	02	
15	Digital Recorder	01	
16	Stop watch	02	
17	Precision Thermometer	02	
18	Sound level meter 150 db.	01	
19	Digital Handhold Temperature meter	01	

Note:

1. The above list specifies only major IMTE – Electrical (may not be complete) to be deployed by the contractor. All additional/ other IMTEs required for timely and satisfactory completion of works/ testing etc. shall also be deployed by the contractor within the finally accepted rates/ prices.
2. Other terms and conditions regarding above shall be as per the special condition of the contract clause no. 4.2.1 (Tools & Plants, IMTEs).
3. The IMTEs marked BHEL in the remarks column shall be arrange by BHEL

10. LIST OF T&P BEING PROVIDED BY BHEL FOR USE OF CONTRACTOR FREE OF HIRE CHARGES ON SHARING BASIS

S.NO.	EQUIPMENT	CAPACITY	QTY
1.	HYDRA CRANE	14/20 MT	01
2.	MOBILE CRANE	55/75 MT	01
3.	EOT CRANE (Main power House)	200 / 30 MT	02
4.	EOT CRANE (BFV house)	100/20 MT	01

NOTE: The above mentioned suitable capacity crane without slings & lifting tackles will be provided by BHEL on sharing basis. The operation and maintenance of cranes shall be the responsibility of contractor. The fuel/power shall be also given by contractor.

1. EOT cranes in the power house will be erected / commissioned by another agency of customer and may become operational any time during the period of subject work. These EOT cranes will also be provided by BHEL free of hire charges & on sharing basis for subject work with exclusions as advised. The major maintenance of EOT crane will be carried out by M/s BHEL. Routine maintenance shall be taken care by the contractor under this scope of work. However, contractor will not be entitled for any compensation due to non-availability of EOT crane.

2. The contractor will have to provide qualified operator for operating the mobile and EOT cranes round the clock.

3. All other terms & conditions shall be as per SCC clause no. 4.2.1 & 4.2.2.

4. **PANDOH STORE: BHEL crane shall not be available at Pandoh store for material handling purpose .Contractor has to load/handle material by sleeper jack method or alternatively suitable capacity crane is to be arranged by contractor at his own cost.**

PARBATI-II HEP (4X200 MW)

PACKAGE WEIGHTS & DIMENSIONS

BUTTERFLY VALVE & ACCESSORIES

S.NO.	DESCRIPTION	No. of pieces per BF Valve		Dimension			WEIGHT FOR ONE BF VALVE	TOTAL WT. (2 NOS. BF VALVE) FOR
				L	W	H		
				(mm)	(mm)	(mm)	(T)	(T)
1.00	Valve Body with accessories	1.00		------In suitable no. of packages------			50.00	100.00
2.00	Servomotor with accessories	2.00		------In suitable no. of packages------			10.00	20.00
3.00	Inlet pipe	1.00		------In suitable no. of packages------			5.00	10.00
4.00	Outlet pipe	1.00		------In suitable no. of packages------			10.00	20.00
5.00	By pass valve	1.00		------In suitable no. of packages------			2.00	4.00
6.00	Tools, tackles and erection devices for BF valve	1 lot		------In suitable no. of packages------				2.00
7.00	testing devices for BF Valve	1 lot		------In suitable no. of packages------				5.00
8.00	Oil & Water Pipes,Vaccum breaking valve and accessories	1 lot		------In suitable no. of packages------				2.00
9.00	Pipes	1 lot						1.40
	SUB TOTAL WEIGHT							**164.40**

TURBINE (Pelton) & ACCESSORIES

S.NO.	DESCRIPTION	No. of pieces per unit	Total no. of pieces	Dimension			UNIT WEIGHT	TOTAL WT. (4 UNITS)
				L	W	H		
				(mm)	(mm)	(mm)	(T)	(T)
A)	**TURBINE (each)**							
1.00	Runner (22 nos. of Buckets)	1.00	4.00	------In suitable no. of packages------			30.00	120.00
2.00	Shaft	1.00	4.00	------In suitable no. of packages------			30.00	120.00
3.00	Tools & Tackles for runner and shaft							11.42
4.00	Top cover each in 6 sections	6.00	24.00	------In suitable no. of packages------			80.00	320.00
5.00	Nozzle servomotor assembly (6 jets)	6.00	24.00	------In suitable no. of packages------			61.50	246.00
6.00	Tools & tackles for Nozzle Testing							2.00
7.00	Brake jet (2 jets)	2.00	8.00	------In suitable no. of packages------			0.65	2.60
8.00	**Distributor piping**							0.00
9.00	Distributor segments	6.00					130.00	520.00
10.00	Make Up segemnts	5.00					15.00	60.00
11.00	Accessories	-		'------In suitable no. of packages------			0.50	2.00
12.00	Turbine Housing	7.00		------In suitable no. of packages------			80.00	320.00
13.00	Tools & Tackles for distributor and turbine housing	1 set		------In suitable no. of packages------				6.05
14.00	Testing device for distributor piping	1 set		------In suitable no. of packages------				18.08
15.00	Deflector Servomotors with rod	6.00					2.51	10.04
16.00	Pit Liner(Lower)	2.0	8.00	------In suitable no. of packages------			20.00	80.00
17.00	Guide Bearing	1.00	4.00	------In suitable no. of segments------			8.16	32.62
18.00	1st stage pipes and embedments	.------In suitable no. of packages------						83.50
19.00	Pipes and embedment in 2nd stage	.------In suitable no. of packages.------					8.00	32.00
20.00	Embedded tubes for field efficiency test	.------In suitable no. of transportable segment boxes.------						0.00
B)	**MAIN INLET VALVE (each)**							
1.0	Sph. Valve door	1.0	4.0	------In suitable no. of packages------			20.0	80.00
2.0	Valve Body	2.0	8.0	------In suitable no. of packages------			40.0	160.00
3.0	Lever	2.0	8.0	------In suitable no. of packages------			20.0	80.00
4.0	Counter Weight	16.0	64.0	------In suitable no. of packages------			70.0	280.00
5.0	Rest part of Sph. Valve	1 lot	1 lot	------In suitable no. of packages------			40.0	160.00
6.0	Servomotor for Sph. Valve	1.0	4.0	------In suitable no. of packages------			10.0	40.00
7.0	Bypass Valve	1.0	4.0	------In suitable no. of packages------			1.0	4.00
8.0	Test equipments for Sph. Valve	1 set	1 set	------In suitable no. of packages------				20.30
9.0	Piping and accessories	1 set	1 set	------In suitable no. of packages------				5.00
C)	**AUXILIARIES (one set for complete power house)**							
1.00	Cooling Water System	1 set		------In suitable no. of boxes------				30.00
2.00	HP compressed Air system for turbine	1 set						15.00
3.00	HP Air receiver	1 set						12.15
4.00	LP Compressed Air system for turbine	1 set						14.00
5.00	Compressed Air System for BF Valve hou	1 set						3.65
6.00	Drainage system	1 set		------In suitable no. of boxes------				6.90
7.00	Misc. piping, valves, fittings for C-1 to C-6			------In suitable no. of boxes------				10.00
	SUB TOTAL WEIGHT							**2907.31**

PARBATI-II HEP (4X200 MW)

PACKAGE WEIGHTS & DIMENSIONS

MAJOR ITEMS OF GOVERNING SYSTEM AND ACCESSORIES

S.NO.	DESCRIPTION	NO. OF PACKAGES	PACKAGE DIMENSIONS (EACH)			WT.OF EACH PACKAGE	TOTAL WT. OF PACKAGE	TOTAL WT. (4 UNITS)
			L	W	H			
			(mm)	(mm)	(mm)	(KG)	(KG)	(T)
1.00	HYDRO MECHANICAL CABINET (HMC)	4.00	1110.00	980.00	2520.00	1300.00	5200.00	5.20
2.00	ELECTRO HYDRAULIC GOVERNOR CONTROLLER(EHGC)	4.00	1200.00	1000.00	2520.00	1200.00	4800.00	4.80
3.00	OIL SUMP TANK (TURBINE)	4.00	3275.00	2600.00	2430.00	4600.00	18400.00	18.40
4.00	OIL SUMP TANK FOR MIV	4.00	3750.00	3260.00	3525.00	8600.00	34400.00	34.40
5.00	HYDRAULIC CONTROL PANEL FOR MIV.	4.00	1200.00	1000.00	2500.00	900.00	3600.00	3.60
6.00	GAUGE PANEL	4.00	1200.00	1000.00	2520.00	800.00	3200.00	3.20
7.00	NEEDLE CONTROL PANEL	4.00	1200.00	1200.00	2520.00	1300.00	5200.00	5.20
8.00	PRESSURE RECEIVER (TURBINE)	4.00	1334.00	1334.00	3857.00	3300.00	13200.00	13.20
9.00	PRESSURE RECEIVER (MIV)	4.00	2110.00	2110.00	4676.00	11750.00	47000.00	47.00
10.00	CONTROL AND GAUGE PANEL (MIV)	4.00	1200.00	1000.00	2520.00	550.00	2200.00	2.20
11.00	PP SET (FOR BF VALVE)	2.00	2900.00	2100.00	2450.00	4600.00	9200.00	9.20
12.00	PRESSURE RECEIVER (FOR BF VALVE)	2.00	1600.00	1600.00	4000.00	4650.00	9300.00	9.30
13.00	HYDRAULIC CONTROL PANEL FOR BF VALVE	2.00	1020.00	820.00	2450.00	1350.00	2700.00	2.70
14.00	ELECTRICAL CONTROL PANEL FOR BF VALVE	2.00	1200.00	1000.00	2600.00	800.00	1600.00	1.60
	SUB TOTAL WEIGHT							**160.00**

MAJOR ITEMS OF HYDRO GENERATOR

S.NO.	NAME OF COMPONENT	NO. OF PACKAGES PER M/C	TOTAL NO. OF PACKAGES	DIMENSION			WT. OF EACH PACKAGE	TOTAL WT. (4 UNITS)
				L	W	H		
				(m)	(m)	(m)	(T)	(T)
1.00	Stator frame segments	4.00	16.00	5.80	4.30	2.00	20.00	320.00
2.00	Stator punching	75.00	300.00	1.10	0.75	1.20	3.00	900.00
3.00	Stator bars	8.00	32.00	5.20	2.50	1.00	3.00	96.00
4.00	Core assembly	16.00	64.00	3.50	0.90	0.80	10.00	640.00
5.00	Rim punching	67.00	268.00	1.70	1.20	0.60	3.00	804.00
6.00	Rotor spider	1.00	4.00	3.35	3.35	3.50	30.00	120.00
7.00	Top shaft	1.00	4.00	4.80	2.15	2.00	20.00	80.00
8.00	Thrust collar	1.00	4.00	2.00	2.00	1.30	10.00	40.00
9.00	Bottom shaft	1.00	4.00	3.75	2.50	2.15	30.00	120.00
10.00	Top brackest center	1.00	4.00	3.85	3.85	1.70	40.00	160.00
11.00	Top bracket arm	8.00	32.00	2.00	0.80	1.85	4.10	131.20
12.00	Bottom bracket	1.00	4.00	4.60	4.60	1.25	15.00	60.00
13.00	Plug in type oil cooler for top bearing	8.00	32.00	1.00	1.00	1.00	1.00	32.00
14.00	Plug in type oil cooler for bottom bearing	8.00	32.00	0.80	0.80	0.70	0.25	8.00
15.00	Air coplers	8.00	32.00	2.20	0.60	3.00	2.00	64.00
16.00	H.S. lub unit	1.00	4.00	1.80	1.00	1.80	2.00	8.00
17.00	Brake jack control panel	1.00	4.00	1.30	0.50	1.40	1.00	4.00
18.00	Fire extinguishing	1.00	4.00	2.50	1.00	2.30	1.00	4.00
	MISCELLANEOUS		0.00					0.00
19.00	Large packages	15.00	60.00	2.50	2.00	1.00	2.00	120.00
20.00	Medium packages	20.00	80.00	2.00	1.50	0.80	2.00	160.00
21.00	Small packages	25.00	100.00	1.50	1.00	0.80	1.00	100.00
	SUB TOTAL WEIGHT							**3971.20**

GENERATOR TRANSFORMER

S.NO.	NAME OF COMPONENT	QTY. PER GEN	TOTAL NO. OF QUANTITY	DIMENSION			WT. PER QTY.	TOTAL WT. (4 UNITS)
				L	W	H		
				(m)	(m)	(m)	(T)	(T)
1.00	Generator transformer	3.00	14.00	------In suitable no. of packages------			80.00	1120.00
2.00	Weight of filling	3.00	12.00	------In suitable no. of packages------			30.00	360.00
	SUB TOTAL WEIGHT							**1480.00**

PARBATI-II HEP (4X200 MW)

PACKAGE WEIGHTS & DIMENSIONS

BUS DUCT

	TENTATIVE LENGTH IN M							
S NO.	DESCRIPTION	LENGTH PER UNIT	DIMENSIONS (EACH)			Unit Weight	Weight for one Unit	TOTAL WT. (4 UNITS) for ERECTION
		(m)	(m)	(m)	(m)	((KG)/m)	(KG)	(T)
A	Isolated Phase Bus duct (Main)	70.00	----In suitable no. of packages------			160.00	11200.00	44.80
B	Isolated Phase Bus duct (Tap - off)	50.00	----In suitable no. of packages------			110.00	5500.00	22.00
C	Isolated Phase Bus duct (delta)	25.00	----In suitable no. of packages------			60.00	1500.00	6.00
D	PT and Surge Protection 3 Nos.	3.00	3400.00	1550.00	2900.00	–	1800.00	5.40
E	NG CUBICLES 4 Nos.		2200.00	1600.00	2000.00	–	1500.00	4.50
F	Miscellaneous Items Packages	–	----In suitable no. of packages------			–	2000.00	2.00
	SUB TOTAL WEIGHT =							**84.70**

HSE PACKAGES (Electrical)

S.NO.	DESCRIPTION	NO. OF PACKAGES FOR ALL 4 UNITS	PACKAGE DIMENSIONS (EACH)			WT.OF EACH PACKAGE	TOTAL WT. OF PACKAGE	TOTAL WT. (4 UNITS)
			L	H	W			
			(mm)	(mm)	(mm)	(T)	(T)	(T)
1.00	**DC SYSTEM**							
	220 V DC System							
	Battery having 110 nos.cells for each battery incl. racks	2.00	1.50	2.00	1.25	13.50	27.00	27.00
	UPS	2.00	1.50	1.50	1.00	0.50	1.00	1.00
	Charger	2.00	1600.00	2000.00	800.00	1.00	2.00	2.00
	DCDB	2.00	2000.00	3000.00	800.00	0.80	1.60	1.60
	48 V DC SYSTEM							0.00
	Battery having 24 nos.cells for each battery incl. racks	**1.00**				**0.75**	0.75	0.75
	Charger	1.00	1200.00	2000.00	800.00	0.75	0.75	0.75
	DCDB	1.00	1600.00	2000.00	400.00	0.50	0.50	0.50
								0.00
2.00	**STARTER PANEL**	25.00	1.50	1.00	1.50	0.50	12.50	12.50
		6.00	2.00	1.00	3.00	1.00	6.00	6.00
		8.00	3.00	1.50	3.00	1.50	12.00	12.00
3.00	**Protection System**	**1 set**	**--In suitable no. of packages------**				**10.00**	10.00
	SUB TOTAL WEIGHT							**74.10**

HSE(MECHANICAL) & EMRP PACKAGES

S.NO.	DESCRIPTION	NO. OF BOXES	PACKAGE DIMENSIONS (EACH)			WT.OF EACH PACKAGE	TOTAL WT. PACKAGE	TOTAL WT. (4 UNITS)
			(m)	(m)	(m)	(KG)	(T)	
A	**Mechanical Workshop Equipments (All covered store)**							
	Stationary drilling machine	1.00				3000.00	3.00	3.00
	lathe machine 1200 mm bed length	1.00				4000.00	4.00	4.00
	hollow spindle centre length	1.00				10.00	0.01	0.01
	electrical hand drilling machine	1.00				4.80	0.00	0.00
	radial drilling machine	1.00				4600.00	4.60	4.60
	portable magnetic electrical drilling machir	1.00				36.00	0.04	0.04
	double ended grinding machine	1.00				6.50	0.01	0.01
	universal milling machine	1.00				3800.00	3.80	3.80
	shaper machine	1.00				3700.00	3.70	3.70
	thyristorised welding machine	5.00				380.00	1.90	1.90
	mig welding machine	3.00				410.00	1.23	1.23
	tig welding machine	2.00				400.00	0.80	0.80
	pipe bending machine	1.00				28.00	0.03	0.03
	electrical fork lifter	1.00				850.00	0.85	0.85
	mobile air compressor unit	1.00				100.00	0.10	0.10
	oxy-acetylene welding and cutting equipm	4.00				15.00	0.06	0.06
	electrical angle grinders	6.00				6.50	0.04	0.04
	flexible shaft grinder	6.00				6.50	0.04	0.04
	electrical hand horizontal sanders	6.00				5.00	0.03	0.03
	power hacksaw	1.00				250.00	0.25	0.25
	electrical hand piercing saw	3.00				6.00	0.02	0.02
	welding generator	2.00				265.00	0.53	0.53
	SUB TOTAL WEIGHT						25.03	**25.03**

PARBATI-II HEP (4X200 MW)

PACKAGE WEIGHTS & DIMENSIONS

SCHEDULE OF PANEL/DESK FOR CONTROL & MONITORING SYSTEM (Computerized System)

S.NO.	DESCRIPTION	NO. OF SETS	NO. OF PANELS/ SUITES/ DESKS PER SET	Size of each panel/suite/desk			WEIGHT OF EACH PANEL	TOTAL WT. (4 UNITS)
				W	D	H		
				(mm)	(mm)	(mm)	(KG)	(T)
1.00	**LOCAL CONTROL BOARDS/PANELS**							
1.10	**Unit Control Board (UCB)**							
1.1.1	Control & Monitoring Panel	4.00	1 suit	(750+750+750+750)	800.00	2320.00	2500.00	10.00
1.1.2	Temp. Measurement Panel	4.00	1.00	950.00	800.00	2320.00	800.00	3.20
1.1.3	Instruments Panel	4.00	1.00	950.00	800.00	2320.00	900.00	3.60
1.1.4	Gauge Panel	4.00	1.00	10000.00	800.00	2320.00	500.00	2.00
1.1.5	Remote Panel on floor 1342m	4.00	1.00	750.00	800.00	2320.00	800.00	3.20
1.1.6	Remote Panel on floor 1338m	4.00	1.00	750.00	800.00	2320.00	800.00	3.20
1.20	**Local Control Board for GIS and Pothead Area**							
1.2.1	Control & Monitoring Panel	1.00	1suite	(750+750+750+750)	800.00	2320.00	2000.00	2.00
1.30	**Local Control Board for Common Services**							
1.3.1	Control, Monitoring with alarm annuciation system	1.00	1suite	(750+750+750)	800.00	2320.00	1500.00	1.50
1.3.2	Remote Panel on floor 1338m	1.00	1.00	750.00	800.00	2320.00	800.00	0.80
1.40	**Local Control Board for Electrical Power Supply**							
1.4.1	Control, Monitoring with alarm annuciation system	1.00	1suite	(750+750+750)	800.00	2320.00	1500.00	1.50
1.50	**Interface For Remote Control**							
1.5.1	Control, Monitoring with alarm annuciation system	1.00	1suite	(750+750+750)	800.00	2320.00	1500.00	1.50
1.60	**Energy meter panel**	1.00	1.00	1000.00	800.00	2320.00	750.00	0.75
2.00	**Computerizd system in Central Control Room**							
2.10	Operator Stations	1 set	2 Desk	1800.00	800.00	1100.00		
2.20	Simulator Station	1 set	1 Desk	1800.00	800.00	1100.00		
2.30	Engineer's Station	1 set	1 Desk	900.00	800.00	1100.00		
2.40	Printers	1 set	1 table	3000.00	750.00	1000.00		
2.50	trolly for mobile operator ststion	1 no	1 trolly	900.00	800.00	1100.00		10.00
3.00	**Large Screen Display Unit**	**1.00**	**1.00**	**3000.00**	**2000.00**	**1000.00**		
4.00	**Network Intrface Panel**	**1.00**	**1.00**	**750.00**	**750.00**	**2250.00**		
5.00	**UPS for MMI/DAS**	**1.00**	**1.00**	**4x1000**	**800.00**	**2200.00**		
6.00	**Global Positioning System**	**1.00**	**1.00**					
	SUB TOTAL WEIGHT =							**43.25**

SCHEDULE OF PANELS FOR STATIC EXCITATION SYSTEM

S.NO.	SCOPE OF SUPPLY	NO. OF PANELS PER SET	NO. OF SETS	DIMENSION			WIGHT OF EACH SET	TOTAL WT. (4 UNITS)
				W	D	H		
				(m)	(m)	(m)	(KG)	(T)
1.00	REG+FF CUBICLES	4.00	2.00	1150+1150	1200.00	2295.00	2000.00	16.00
2.00	FB+TY1+TY2 CUBICLES	4.00	3.00	1500+680+680	1200.00	2295.00	2500.00	30.00
3.00	ACB+AUX TR. CUBICLE	4.00	2.00	1150+1500	1200.00	2295.00	2500.00	20.00
4.00	ISOLATOR CUBICLE	4.00	1.00	2800.00	1500.00	2550.00	2000.00	8.00
5.00	EXC. TRANSFORMER CUBICLE	4.00	1.00	3500.00	2000.00	2550.00	1500.00	6.00
	SUB TOTAL WEIGHT							**80.00**

415V SWITCHGEAR,AUXILIARY AND STATION SERVICE TRANSFORMER

S.NO.	DESCRIPTION		TOTAL QTY.	DIMENSION, MM			WEIGHT PER QTY.	TOTAL WT. (4 UNITS)
				L	W	H		
				(mm)	(mm)	(mm)	(KG)	(T)
1.00	11 kV/415V , 1000 kVA, dry type UAT complete with cubicles and accessories		4.00	2800.00	2300.00	3200.00	5000.00	20.00
2.00	11 kV/415V , 2500 kVA, dry type SST complete with cubicles and accessories		4.00	3200.00	2600.00	3400.00	5000.00	20.00
3.00	11 kV/415V , 500 kVA, dry type Valve house transformers complete with cubicles and accessories		2.00	2400.00	2100.00	2500.00	5000.00	10.00
4.00	UAB		4.00	4500.00	1500.00	2450.00	3000.00	12.00
5.00	SSB		2.00	4500.00	1500.00	2450.00	3000.00	6.00
6.00	Misc. Board		1.00	1200.00	600.00	2300.00	500.00	0.50
	SUB TOTAL WEIGHT =							**68.50**

PARBATI-II HEP (4X200 MW)

PACKAGE WEIGHTS & DIMENSIONS

TAP OFF TRANSFORMER AND 11KV SWITCHGEAR

S.NO.	DESCRIPTION		TOTAL QTY.	DIMENSION, MM			WEIGHT PER QTY.	TOTAL WT. (4 UNITS)
				L	W	H		
				(mm)	(mm)	(mm)	(KG)	(T)
1.00	6.3 MVA , 13.8/11 kV Dry Type tap-off transformer		4.00	3600.00	2900.00	3800.00	18500.00	74.00
2.00	Incoming panels for supply from grid		2.00	------In suitable no. of packages------			1250.00	2.50
3.00	Incoming panels for supply from DG sets		2.00	------In suitable no. of packages------			1250.00	2.50
4.00	Incoming panels for four tap off transformer		4.00	------In suitable no. of packages------			1250.00	5.00
5.00	Out going panels for UAT, SST, Valve House Transformer and Parbati III dam		14.00	------In suitable no. of packages------			500.00	7.00
6.00	CTs, PTs and miscellaneous		1 lot	------In suitable no. of packages------			5000.00	5.00
	SUB TOTAL WEIGHT =							**96.00**

MISCELLANEOUS

S.NO.	DESCRIPTION	NO. OF QTY.	PACKAGE DIMENSIONS (EACH)			UNIT WEIGHT	TOTAL WT.	TOTAL WT. (4 UNITS)
			(mm)	(mm)	(mm)	(T)	(T)	(T)
1.00	**SPARES**	------In suitable no. of boxes------						300.00
2.00	Tools tackles, handling & testing devices	------In suitable no. of boxes------						300.00
3.00	Other miscellaneous Mechanical/Electrical assemblies							250.00
	SUB TOTAL WEIGHT =							**850.00**
	SUM TOTAL FOR MATERIAL HANDLING							**10004.49**
	SUM TOTAL FOR ERECTION							**9154.49**

Note :

1. Weights and package size mentioned for the above items are tentative and may change during detail design.
2. Number of Panels for complete Control & Monitoring system, excitation system,starter panels etc.shown are tentative and likely to change during detail design.

BILLING BREAK UP FOR SUB CONTRACTOR FOR PARBATI-II HEP ETC PART

SR. NO.	ACTIVITY		UNIT NO.				COMMON	TOTAL
			I	II	III	IV		
1	**Pelton Turbine and Accessories**							
1.1	Erection of first stage pipings(Balance) , turbine housing& central frame work		0.2	0.2	0.2	0.2		0.8
1.2	erection of foundation parts comprising distributor , inlet pipe to distributor,including hydralic testing etc.		2	2	2	2		8
1.3	Nozzle servomotor, deflector servomotor assembly		1	1	1	1		4
1.4	Shaft and runner assembly		0.2	0.2	0.2	0.2		0.8
1.5	Guide bearing including pad scraping		0.4	0.4	0.4	0.4		1.6
1.6	OPU with sump tank and associated piping for Governor and MIV		0.2	0.2	0.2	0.2		0.8
1.7	OPU adjustment, Dry stroking and time adjustment of Nozzle Servomotor, Deflector Servomotor etc		0.1	0.1	0.1	0.1		0.4
2	**Governing system & Accessories**							
2.1	Installation of Governor HMC and EHGC		0.25	0.25	0.25	0.25		1
2.2	Erection of governor control oil pipeline.		0.25	0.25	0.25	0.25		1
3	Turbine MIV & Accessories (Spherical Valve)							
3.1	MIV(Spherical), inlet pipe,outlet pipe,,accessories, servomotors assy and testing		1.5	1.5	1.5	1.5		6
4	Penstock Valves & Accessories (Butterfly valve)							
4.1	Penstock Valve(BF), inlet/outlet pipe and associated equipments incl. OPU System		1		1			2
5	Generator & Accessories							
5.1	Dressing of foundations		0.05	0.05	0.05	0.05		0.2
5.2	Stator core building and Core flux test of stator at S/bay .		1	1	1	1		4
5.3	Stator winding & HV test of complete stator		1	1	1	1		4
5.4	Stator shifting to pit and its alignment, levelling etc		0.1	0.1	0.1	0.1		0.4
5.5	Rotor assembly in service bay, HV etc		1.8	1.8	1.8	1.8		7.2
5.6	Rotor lowering in pit		0.1	0.1	0.1	0.1		0.4
5.7	Instt of lower brkt in pit, alignment etc		0.1	0.1	0.1	0.1		0.4
5.8	Assembly of brake and jack system		0.1	0.1	0.1	0.1		0.4
5.9	Upper bracket assembly including Generator flooring in service bay		0.25	0.25	0.25	0.25		1
5.10	Instt of upper brkt in pit, alignment etc		0.2	0.2	0.2	0.2		0.8
5.11	Blue matching of bearing pads and thrust bearing components assy.		0.2	0.2	0.2	0.2		0.8
5.12	Installation of stator air coolers including CW piping and lagging on pipelines .		0.2	0.2	0.2	0.2		0.8
5.13	Water sprinkler type fire protection system of generator.		0.05	0.05	0.05	0.05		0.2
5.14	Erection of brake dust collector		0.05	0.05	0.05	0.05		0.2
5.15	Generator instrumentation, gauge panel including caliberation		0.2	0.2	0.2	0.2		0.8
5.16	Rotor/ generator shaft coupling including any correction for alignment of gen shaft.		0.1	0.1	0.1	0.1		0.4
5.17	Extension shaft, slip ring, brush gear, CCL etc		0.3	0.3	0.3	0.3		1.2
6	Static Excitation and DVR		0.3	0.3	0.3	0.3		1.2
7	13.8KV Busduct including CT PTs							
7.1	13.8KV Busduct including CT PTs		2	2	2	2		8
8	13.8 KV/ 4000 / √3 KV, 1 Φ 82 NVA Generator step up transformers							
8.1	**Erection of Generator transformer and auxillaries *(Assy of 01 no spare Gen. transformer with unit #1 and 01 no Spare Gen.transformer with Unit#3)**		2*	1.5	2*	1.5		7
9	220V and 48V DC System							
9.1	220V for Power House						0.3	0.3
9.2	48 DC system for power house						0.2	0.2

Annexure - A

BILLING BREAK UP FOR SUB CONTRACTOR FOR PARBATI-II HEP ETC PART								
SR. NO.	ACTIVITY		UNIT NO.				COMMON	TOTAL
			I	II	III	IV		
10	Control & Monitoring system							
10.1	Control & Monitoring (SCADA) sys incl computers, VDU's, printers,RTUs, optic fibre cable(all control desk and control panels in control room including Alarm & annunc.,sync panels, instruments, relays, automatic energy metering system etc		1	1	1	1		4
11	Protection system		0.4	0.4	0.4	0.4		1.6
12	13.8 KV Tap-off Transformers & 11 KV Switchgear system							
12.1	11 kV Air Insulated Switchgear with all accessories		0.2	0.2	0.2	0.2		0.8
12.2	2 nos. 6300 kVA TAP OFF Transformer.						0.2	0.2
13	UAT ,SST & 415 V AC Switchgear system							
13.1	415 V LT Switchgear						0.3	0.3
13.2	4 nos. 1000 kVA UAT, 2 nos. 2500 kVA SST, 2 nos. 500KVA Valve House Transformer.						0.3	0.3
14	Cooling Water system							
14.1	CW system (one for each unit) with primary & secondary loop circuit for Turbine, generator and transformer, piping etc		1	1	1	1		4
15	Drainage water system							
15.1	Drainage water pumps and piping etc for PH						1	1
15.2	Anti condensating insulation for Cooling water & Drainage water pipe lines						0.4	0.4
16	HP & LP Compressed air system							
16.1	HP Compressed System & LP comp air system with compressors, accessories, piping etc		0.1	0.1	0.1	0.1	0.2	0.6
17	**MECHANICAL WORKSHOP EQUIPMENT.**						**0.2**	**0.2**
18	Unit axis alignment		0.75	0.75	0.75	0.75		3
19	Boxing up of units		1	1	1	1		4
20	Pre commissioning checks		1	1	1	1		4
21	Painting of equipment		0.2	0.2	0.2	0.2		0.8
22	Spining and bearing run of unit		1	1	1	1		4
23	Synchronising including commissioning tests prior to synchronising		1	1	1	1		4
24	Field efficiency test of turbine and generator including preparatory works						0.5	0.5
							TOTAL	100

Sr .No	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No	Unit	Description	Weight
1	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10000	79	1	BY PASS VALVE FOR MIV	30	157	3	STATOR PUNCHING	3000	235	4	RIM PUNCHING	2850
2	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10000	80	1	TESTING DEVICE FOR DISTRIBU	20	158	3	STATOR PUNCHING	3000	236	4	RIM PUNCHING	2800
3	1	OIL PIPE LINE	700	81	1	TESTING DEVICE FOR DISTRIBU	50	159	3	STATOR PUNCHING	3000	237	4	RIM PUNCHING	2850
4	2	OIL PIPE LINE	700	82	2	BY PASS VALVE FOR MIV	30	160	3	STATOR PUNCHING	3000	238	4	RIM PUNCHING	2850
5	3	OIL PIPE LINE	700	83	2	RAILING IN TURBINES	25	161	4	RIM PUNCHING	2850	239	1	ROTOR TEMPERATURE INDICATOR	80
6	4	OIL PIPE LINE	700	84	2	METERING INSTRUMENT	20	162	4	RIM PUNCHING	2850	240	2	ROTOR TEMPERATURE INDICATOR	80
7	1	OIL PIPE LINE	700	85	2	PIPE EMBEDMENTS	2650	163	4	RIM PUNCHING	2850	241	3	SET OF WOUND POLE ASSY	8250
8	2	OIL PIPE LINE	700	86	2	INST OF TURBINE HOUSING	100	164	4	RIM PUNCHING	2820	242	4	STATOR WDG DETAILS	720
9	3	OIL PIPE LINE	700	87	1	CYLINDER	4500	165	4	RIM PUNCHING	2820	243	1	ARRG OF BUSH GEAR BARREL	75
10	4	OIL PIPE LINE	700	88	2	THRUST COLLER &RUNNER DISC	10500	166	4	RIM PUNCHING	2820	244	2	ARRG OF BUSH GEAR BARREL	75
11	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10000	89	2	SET OF WOUND POOL ASSY	8250	167	4	RIM PUNCHING	2800	245	3	ARRG OF BUSH GEAR BARREL	60
12	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10000	90	1	ROTOR RIM BUILDING EQUIPMEN	700	168	4	RIM PUNCHING	2820	246	4	JT BAR ASSY	500
13	1	ARRG OF DC CONN.	170	91	1	STATOR WDG DETAILS	250	169	4	RIM PUNCHING	2850	247	3	SET OF WOUND POLE ASSY	8250
14	1	TOP & BOTTOM AIR BAFLE FIXING	400	92	1	STATOR WDG DETAILS	680	170	4	RIM PUNCHING	2820	248	4	THRUST COLLER AND RUNNER DISC	10000
15	1	ARRG OF C/W PIPING	2000	93	2	SET OF WOUND POOL ASSY	8250	171	4	RIM PUNCHING	2850	249	2	PRESSING PLATE ASSY	2200
16	1	ARRG OF C/W PIPING	420	94	1	TESTING DEVICE FOR DISTRIBU	1150	172	4	RIM PUNCHING	2850	250	3	PRESSING PLATE ASSY	2250
17	2	ARRG OF ROTOR FAN	320	95	2	SET OF WOUND POOL ASSY	8250	173	3	STATOR PUNCHING	3000	251	3	SET OF WOUND POLE ASSY	8250
18	2	ROTOR ASSY	60	96	2	SET OF WOUND POOL ASSY	8250	174	3	STATOR PUNCHING	3000	252	1	TOPM AIR GUIDE FIXING ARRG.	650
19	2	TOP & BOTTOM AIR BAFLE FIXING	400	97	1	INST OF TURBINE HOUSING	0	175	3	STATOR PUNCHING	3000	253	3	SET OF WOUND POLE ASSY	8250
20	2	ARRG OF C/W PIPING	2000	98	1	THRUST COLLER AND RUNNER D	10500	176	3	STATOR PUNCHING	3000	254	2	NUT GUARD ASSY	600
21	2	ARRG OF C/W PIPING	420	99	1	SET OF WOUND POLE ASSY	8250	177	3	STATOR PUNCHING	3000	255	3	ROTOR RIM END PLATE	8350
22	3	ROTOR ASSY	60	100	1	INST OF TURBINE HOUSING	200	178	3	STATOR PUNCHING	3000	256	4	RIM PUNCHING	2850
23	3	ARRG OF C/W PIPING	420	101	1	DEFLECTOR MACHANISM	650	179	3	STATOR PUNCHING	3000	257	4	RIM PUNCHING	2850
24	4	ROTOR ASSY	60	102	1	SET OF WOUND POLE ASSY	8250	180	3	STATOR PUNCHING	3000	258	4	RIM PUNCHING	3150
25	4	ARRG OF C/W PIPING	420	103	2	DEFLECTOR MACHANISM	482	181	3	STATOR PUNCHING	3000	259	1	STATOR WDG DETAILS	170
26	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10000	104	2	ARRG OF PR RECIVER	400	182	3	STATOR PUNCHING	3000	260	1	RIM PUNCHING	40
27	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10000	105	1	SET OF WOUND POLE ASSY	8250	183	3	STATOR PUNCHING	3000	261	1	TUBLAR SHAFT FIXING LINE OUT	15
28	1	TOOL FOR NOZZLE DEFLECTOR ALINGMENT	150	106	1	WATER CABLE INDICATOR	50	184	3	STATOR PUNCHING	3000	262	1	ROUTING OF CABLES	40
29	1	TOOL FOR NOZZLE DEFLECTOR ALINGMENT	25	107	1	INST OF TURBINE HOUSING	800	185	3	STATOR PUNCHING	3000	263	1	ARRG OF TOP BRACKET FIXING	790
30	1	AUTOMATIC SHUT OFF VALVE	100	108	2	INST OF TURBINE HOUSING	200	186	3	STATOR PUNCHING	3000	264	1	PIT AIR SOLE ASSY	10
31	1	ARRG OF BRUSH GEAR	850	109	2	SET OF WOUND POLE ASSY	8250	187	3	STATOR PUNCHING	3000	265	1	GLASS THERMOMETER	20
32	2	AUTOMATIC SHUT OFF VALVE	40	110	2	INST OF TURBINE HOUSING	400	188	4	RIM PUNCHING	2800	266	2	ARRG OF AIR COOLER	110
33	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	3600	111	2	SET OF WOUND POLE ASSY	8250	189	4	RIM PUNCHING	2850	267	2	JT BAR ASSY	520
34	3	ARRG OF SPHERICAL VALVE	2713	112	2	PIT OIL COOLER	400	190	4	STATOR PUNCHING	3000	268	2	ROTOR RIM ASSY	40
35	3	ARRG OF BRUSH GEAR	900	113	2	PIT OIL COOLER	400	191	4	RIM PUNCHING	2850	269	2	ARRG OF ROTOR LEAD	100
36	1	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	10200	114	1	SET OF WOUND POLE ASSY	8250	192	4	RIM PUNCHING	2850	270	2	ROTOR LEAD ASSY	15
37	1	DEFLECTOR MECHANISM	1250	115	1	TESTING DEVICE FOR DESTRIBU	70	193	4	RIM PUNCHING	2850	271	2	LINE OUT ASSY OF SHAFT THRUST	210
38	2	INST OF DISTRIBUTER	871	116	1	DEFLECTOR MACHANISM	70	194	3	STATOR PUNCHING	3000	272	2	GLASS THERMOMETER	20
39	3	INST OF DISTRIBUTER	871	117	1	DECOMPESSION VALVE	120	195	4	STATOR PUNCHING	3000	273	2	PRESSURE GUAGE FOR CW PIPING	35
40	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	440	118	1	SET OF WOUND POLE ASSY	8250	196	4	STATOR PUNCHING	3000	274	2	ROUTING OF CABLES	100
41	3	MAIN INJECTOR WITH NOZZLE SERVOMOTOR	440	119	2	DEFLECTOR MACHANISM	70	197	3	STATOR PUNCHING	3000	275	3	ARRG OF AIR COOLER	110
42	4	INST OF DISTRIBUTER	871	120	2	DECOMPESSION VALVE	120	198	3	STATOR PUNCHING	3000	276	3	STATOR KEY BAR ASSY	1600
43	1	OIL SUMP TANK FOR BF VALVE	4500	121	1	STATOR WDG DETAILS	1100	199	3	STATOR PUNCHING	3000	277	3	STATOR FRAME &CORE ASSY	40
44	1	TOOL FOR NOZZLE DEFLECTOR ALINGMENT	1650	122	2	STATOR WDG DETAILS	1100	200	4	RIM PUNCHING	2800	278	3	SET OF WOUND POLE ASSY	8250
45	1	STATOR PUNCHING SPACER	550	123	2	SET OF WOUND POLE ASSY	8250	201	4	RIM PUNCHING	2800	279	3	ROUTING OF CABLES	40
46	2	SET OF WOUND POOL ASSY	8550	124	1	SET OF WOUND POLE ASSY	8250	202	4	RIM PUNCHING	2850	280	4	ROTOR RIM ASSY	40
47	1	PIT OIL COOLER	350	125	1	SET OF WOUND POLE ASSY	8250	203	4	RIM PUNCHING	2850	281	1	ARRG OF BUSH GEAR BARREL	200
48	2	STATOR PUNCHING SPACER	700	126	2	ARRG OF TURBINE HOUSING	800	204	4	RIM PUNCHING	2850	282	2	ARRG OF BUSH GEAR BARREL	200
49	2	SET OF WOUND POOL ASSY	8250	127	1	SET OF WOUND POLE ASSY	8250	205	4	RIM PUNCHING	2850	283	3	ARRG OF BUSH GEAR BARREL	200
50	2	PIT OIL COOLER	350	128	1	DEFLECTOR MACHANISM	482	206	4	STATOR PUNCHING	3000	284	3	ARRG OF BRAKE PIPING &CONDUIT	130
51	1	STATOR PUNCHING SPACER	700	129	1	DEFLECTOR MACHANISM	321	207	4	STATOR PUNCHING	3000	285	4	ARRG OF BRAKE PIPING &CONDUIT	130
52	2	SET OF WOUND POOL ASSY	8250	130	1	INST OFDISTRIBUTER	1041	208	4	STATOR PUNCHING	3000	286	4	ROTOR RIM ASSY	7250
53	2	PIT OIL COOLER	1000	131	1	DEFLECTOR SERVO MOTOR	250	209	4	STATOR PUNCHING	3000	287	1	ARRG OF ROTOR LEAD	40
54	1	STATOR PUNCHING SPACER	700	132	1	OIL PIPE LINES	30	210	4	RIM PUNCHING	2800	288	1	ROTOR LEAD ASSY	20
55	2	SET OF WOUND POOL ASSY	8250	133	1	TOOLS &TACKELS FOR GEN	170	211	4	RIM PUNCHING	2850	289	1	ROTOR LEAD ASSY	15
56	1	PIT OIL COOLER	350	134	2	ARRG OF PR RECIVER	100	212	3	STATOR PUNCHING	3000	290	1	FIXING ARRG OF TOOTH WHEEL	10
57	1	SET OF WOUND POOL ASSY	8250	135	2	ARRG OF PR RECIVER	100	213	4	STATOR PUNCHING	3000	291	1	THRUST COLLER AND RUNNER DISC	350
58	2	PIT OIL COOLER	1000	136	2	DEFLECTOR SERVO MOTOR	250	214	4	RIM PUNCHING	2850	292	1		350
59	2	PIT OIL COOLER	1000	137	2	OIL PIPE LINES	30	215	4	STATOR PUNCHING	3000	293	1	ARRG HS LUBRICATION SYSTEM	90
60	1	SET OF WOUND POOL ASSY	8250	138	2	TEMPERATURE SCANER	170	216	4	RIM PUNCHING	2500	294	1	ARRG OF DC CONN &BUSH GEAR	15
61	2	SET OF WOUND POOL ASSY	8250	139	2	ARRG OF PR RECIVER	4552	217	1	ROTOR RIM END PLATE	8400	295	1	DUPLEX RTJ FOR CW PIPING	10
62	1	PIT OIL COOLER	1000	140	1	STATOR WDG DETAILS	700	218	1	TOP& BOTTOM AIR GUID	300	296	1	ROUTING OF CABLES	100
63	1	SET OF WOUND POOL ASSY	8250	141	2	STATOR WDG DETAILS	350	219	2	TOP& BOTTOM AIR GUID	300	297	2	ARRG OF STATOR SOLLE PLATE KE	225
64	2	PIT OIL COOLER	4000	142	2	SET OF WOUND POLE ASSY	8250	220	2	ARRG OF TOP BRACKET	790	298	2	FIXING ARRG OF TOOTH WHEEL	10
65	2	SET OF WOUND POOL ASSY	8250	143		WATER COOLER	7300	221	4	ROTOR RIM END PLATE	8500	299	2	ROUTING OF CABLES	90
66	1	PIT OIL COOLER	350	144	1	SET OF WOUND POLE ASSY	8250	222	4	NUT GUARD ASSY	600	300	2	ROTOR LEAD ASSY	20
67	2	SET OF WOUND POOL ASSY	8250	145	1	BULK HEAD	10000	223	2	STATOR WDG DETAILS	350	301	2	TUBLAR SHAFT FIXING LINE OUT	15
68	2	PIT OIL COOLER	400	146	2	Stator Punching	3000	224	2	ROUTING OF CABLES	40	302	2	ARRG HS LUBRICATION SYSTEM	90
69	1	SET OF WOUND POOL ASSY	8250	147	2	Stator Punching	3000	225	3	SET OF WOUND POLE A	8250	303	2	PIT AIR SOLE ASSY	10
70	1	PIT OIL COOLER	1000	148		WATER COOLER	7300	226	4	ARRG OF GENERATOR	400	304	2	DUPLEX RTJ FOR CW PIPING	10
71	1	STATOR WINDING BAR	750	149		WATER COOLER	7300	227	1	STATOR WDG DETAILS	400	305	1	NOISE LEVEL INDICATOR	20
72	1	SET OF WOUND POOL ASSY	8250	150		WATER COOLER	7300	228	1	STATOR WDG DETAILS	180	306	3	ARRG HS LUBRICATION SYSTEM	90
73	1	SET OF WOUND POOL ASSY	8250	151	2	SET OF WOUND POLE ASSY	8250	229	1	STATOR FRAME &CORE	35	307	3	THRUST COLLER AND RUNNER DISC	5
74	1	PIT OIL COOLER	1000	152	4	RIM PUNCHING	2800	230	2	ROTOR RIM END PLATE	8400	308	3	PIT AIR SOLE ASSY	10
75	1	PIPE EMBEDMENTS	1600	153	4	RIM PUNCHING	2800	231	2	STATOR FRAME &CORE	35	309	3	DUPLEX RTJ FOR CW PIPING	10
76	1	ARRG OF TURBINE HOUSING	100	154	4	RIM PUNCHING	2800	232	4	STATOR WDG DETAILS	360	310	3	ARRG OF GENERATOR HEATER	40
77	1	ROUTING IN TURBINES	25	155	3	STATOR PUNCHING	3000	233	4	RIM PUNCHING	2800	311	4	STATOR PUNCHING	666
78	1	METERING INSTRUMENT	20	156	3	STATOR PUNCHING	3000	234	4	RIM PUNCHING	2850	312	4	STATOR PUNCHING (SPACER)	660
			226716				**255283**				**218190**				**102236**

Sr .No	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No	Unit	Description	Weight
313	4	STATOR PUNCHING (SPACER)	660	387	4	STATOR PUNCHING	660	460	4	STATOR PUNCHING	3000	550	1	ARRG OF ROTOR FAN	800
314	4	STATOR PUNCHING (SPACER)	660	388	4	PRESSING PLATE ASSY	2150	461	4	STATOR PUNCHING	3000	551	2	STATOR WDG DETAILS	270
315	4	STATOR PUNCHING (SPACER)	660	389	1	ARRG HS LUBRICATION SYSTEM	210	462	4	STATOR PUNCHING	3000	552	2	STATOR WDG DETAILS	400
316	4	STATOR PUNCHING (SPACER)	660	390	2	ARRG HS LUBRICATION SYSTEM	210	463	4	STATOR PUNCHING	3000	553	2	TOP GUIDE PADS	329
317	4	STATOR PUNCHING (SPACER)	660		1	ARRG OF BRAKE PIPING &CONDU	120	464	4	STATOR PUNCHING	3000	554	2	BOTTOM GUIDE BEARING PADS	380
318	4	STATOR PUNCHING (SPACER)	520	391	2	ARRG OF BRAKE PIPING &CONDU	120	465	4	STATOR PUNCHING	3000	555	3	ARRG OF ROTOR FAN	800
319	4	STATOR PUNCHING (SPACER)	10	392	3	SET OF WOUND POLE ASSY	8250	466	4	STATOR PUNCHING	3000	556	3	ARRG OF SPIDER COVER	240
320	4	ARRG HS LUBRICATION SYSTEM	90	393	3	ARRG HS LUBRICATION SYSTEM	210	467	3	STATOR PUNCHING	3000	557	4	ARRG OF ROTOR FAN	800
321	4	ARRG OF STATOR	30	394	4	ARRG HS LUBRICATION SYSTEM	210	468	3	STATOR PUNCHING	3000	558	4	ARRG OF ROTOR FAN	800
322	4	ARRG OF STATOR	40	395	2	PRESSING PLATE ASSY	2250	469	4	STATOR PUNCHING	3000	559	1	ARRG OF AIR GAP MONITORING EQU	400
323	1	PRESSURE GUAGE FOR CW PIPING	35	396	2	PRESSING PLATE ASSY	2200	470	4	STATOR PUNCHING	3000	560	2	ARRG OF AIR GAP MONITORING EQU	400
324	1	DUPLEX RTJ FOR CW PIPING	70	397	2	TOP & BOTTOM AIR BAFFLE FIXIN	270	471	4	STATOR PUNCHING	3000	561	4	ARRG OF AIR GAP MONITORING EQU	400
325	1	ARRG OF GENERATOR HEATER	40	398	3	PRESSING PLATE ASSY	2200	472	3	STATOR PUNCHING	3000	562	1	ARRG OF AIR GAP MONITORING EQU	875
326	1	ARRG OF BUSH GEAR BARREL	40	399	3	PRESSING PLATE ASSY	2250	473	3	STATOR PUNCHING	3000	563	1	SPARE PARTS FOR TURBINES	10000
327	1	ROUTING OF CABLES	15	400	4	POLE KEY	1500	474	4	STATOR PUNCHING	3000	564	1	ARRG OF AIR GAP MONITORING EQU	52
328	1	ARRG OF ROTOR LEAD	80	401	4	SET OF CORE	1600	475	4	STATOR PUNCHING	3000	565	1	SPARE PARTS FOR TURBINES	10000
329	2	PRESSER PLATE ASSY	2125	402	4	STATOR FRAME &CORE ASSY	1450	476	3	STATOR PUNCHING	3000	566	3	ARRG OF AIR GAP MONITORING EQU	400
330	4	PRESSER PLATE ASSY	2150	403	2	Arrgt. Of Stator Sole Plate	3340	477	3	STATOR PUNCHING	3000	567	1	ARRG OF SHAFT	350
331	2	ARRG OF GENERATOR HEATER	40	404	1	STATOR WINDING BAR	550	478	4	STATOR PUNCHING	3000	568	1	OIL PIPE LINES	300
332	2	DTT FOR CW PIPING	70	405	2	PRESSING PLATE ASSY	2200	479	3	ROTOR RIM KEY	750	569	1	OIL PIPE LINES	336
333	2	ARRG OF BUSH GEAR BARREL	40	406	3	PRESSING PLATE ASSY	2250	480	4	SET OF WOUND POLE A	8250	570	2	OIL PIPE LINES	320
334	2	ROUTING OF CABLES	15	407	4	STATOR WDG DETAILS	1200	481	2	ROTOR RIM KEY	750	571	2	OIL PIPE LINES	300
335	3	HORSE SHOE PLATE	2070	408	1	RIM SEG WITH SPACER ASSY	4600	482	4	SET OF WOUND POLE A	8250	572	3	UPPER GUIDE PADS	350
336	3	ROTOR RIM ASSY	40	409	1	BUSH GEAR ASSY	160	483	1	SET OF WOUND POLE A	8250	573	3	OIL PIPE LINES	320
337	3	ARRG OF TOP BRACKET FIXING	790	410	2	COLLECTOR FAN ASSY	650	484	3	STATOR PUNCHING	3000	574	3	OIL PIPE LINES	300
338	3	ROTOR TEMPERATURE INDICATOR	80	411	3	STATOR WDG DETAILS	650	485	1	SET OF WOUND POLE A	8250	575	4	OIL PIPE LINES	300
339	3	TOP & BOTTOM AIR BAFFLE FIXING	150	412	3	STATOR PUNCHING (SPACER)	700	486	3	PIPE EMBEDMENTS	60	576	4	THRUST BEARING PADS	1150
340	3	PRESSURE GUAGE FOR CW PIPING	35	413	3	STATOR WDG DETAILS	360	487	4	DEFLECTOR SERVO MO	450	577	4	UPPER GUIDE PADS	350
341	3	DTT FOR CW PIPING	70	414	2	STATOR KEY BAR ASSY	1650	488	4	FUNCTION BAR OF GOV	50	578	4	BOTTOM GUIDE BEARING PADS	350
342	3	ARRG OF BUSH GEAR BARREL	40	415	1	PIT AIR SOLE ASSY	350	489	4	JUNCTION BOX FOR MI	50	579	1	PIPE LINE FOR SPHERICAL VALVE	800
343	4	ARRG OF AIR COOLER	120	416	1	ROUTING OF CABLES	225	490	3	JUNCTION BOX FOR GO	50	580	1	PIPE LINE FOR SPHERICAL VALVE	775
344	3	THRUST COLLER AND RUNNER DISC ASSY	10500	417	2	STATOR FRAME &CORE ASSY	750	491	4	SET OF WOUND POLE A	8250	581	2	PIPE LINE FOR SPHERICAL VALVE	800
345	4	PRESSING PLATE ASSY	2200	418	2	NUT GUARD ASSY	400	492	4	DEFLECTOR SERVO MO	385	582	2	PIPE LINE FOR SPHERICAL VALVE	775
346	4	PRESSING PLATE ASSY	2200	419	2	BOTTOM OIL VAPOR SEAL	185	493	4	DEFLECTOR SERVO MO	385	583	3	PIPE LINE FOR SPHERICAL VALVE	800
347	1	ARRG OF ROTOR LEAD	100	420	2	MOTORISE POWER PACK	250	494	4	DEFLECTOR SERVO MO	385	584	3	PIPE LINE FOR SPHERICAL VALVE	775
348	1	LINE OUT ASSY OF SHAFT THRUST	200	421	3	INSTALLATION OF AIR DUCT COV	350	495	2	CORE PACKET ASSY	1925	585	4	PIPE LINE FOR SPHERICAL VALVE	800
349	3	SET OF WOUND POLE ASSY	8250	422	3	STATOR FRAME &CORE ASSY	750	496	1	NUT GUARD ASSY	650	586	4	PIPE LINE FOR SPHERICAL VALVE	775
350	3	ARRG OF DC CONN &BUSH GEAR	160	423	3	ROUTING OF CABLES	230	497	1	NUT GUARD ASSY	625	587	4	PRESSURE GUAGE FOR SPHERICAL	10
351	4	FIXING ARRG OF POLE	240	424	4	INSTALLATION OF AIR DUCT COV	350	498	1	TOP & BOTTOM AIR BAF	150	588	1	PIPE LINE FOR SPHERICAL VALVE	1000
352	1	BLANKING PLATE	400	425	4	NUT GUARD ASSY	600	499	2	ARRG OF STATOR SOLL	90	589	1	PIPE LINE FOR SPHERICAL VALVE	750
353	2	ARRG OF BOTTOM BRACKET SOLE PLATE	480	426	4	MOTORISE POWER PACK	250	500	2	NUT GUARD ASSY	600	590	1	PIPE LINE FOR SPHERICAL VALVE	236
354	3	SET OF WOUND POLE ASSY	8250	427	1	TOP & BOTTOM AIR BAFFLE FIXIN	270	501	2	TOP & BOTTOM AIR BAF	150	591	2	PIPE LINE FOR SPHERICAL VALVE	800
355	1	STATOR WDG DETAILS	50	428	3	PRESSING PLATE ASSY	2125	502	2	ROUTING OF CABLES	320	592	2	PIPE LINE FOR SPHERICAL VALVE	750
356	2	ARRG OF SOLE PLATE	385	429	3	PRESSING PLATE ASSY	2125	503	3	MOTORISE POWER PAC	250	593	2	PIPE LINE FOR SPHERICAL VALVE	236
357	3	SET OF WOUND POLE ASSY	8250	430	3	FIXING ARRG OF POLE	240	504	3	ROUTING OF CABLES	320	594	3	PIPE LINE FOR SPHERICAL VALVE	1000
358	4	STATOR WDG DETAILS	80	431	3	THRUST BEARING SPG	450	505	4	TOP & BOTTOM AIR BAF	300	595	3	PIPE LINE FOR SPHERICAL VALVE	750
359	1	ARRG OF GENERATOR HEATER	120	432	4	PRESSING PLATE ASSY	2150	506	4	ARRG OF STATOR SOLL	400	596	3	PIPE LINE FOR SPHERICAL VALVE	236
360	2	ARRG OF GENERATOR HEATER	120	433	4	PRESSING PLATE ASSY	2150	507	4	SET OF CORE	950				**44140**
361	3	ARRG OF GENERATOR HEATER	120	434	4	HORSE SHOE PLATE	2350	508	4	SET OF CORE	2000				
362	4	ARRG OF GENERATOR HEATER	120	435	4	TOP BRACKET CENTER ARM ASS	410	509	4	SET OF CORE	2000				
363	2	ROUTING OF CABLES	230	436	1	TERMINAL BLOCK ASSY	120	510	4	ARRG OF BOTTOM BRA	500				
364	3	SET OF WOUND POLE ASSY	8250	437	1	SET OF CORE	1000	511	1	INST OF AIR DUCT COVE	350				
365	1	COLLECTOR FAN ASSY	650	438	2	TERMINAL BLOCK ASSY	120	512	2	INST OF AIR DUCT COVE	350				
366	1	NUT GUARD ASSY	400	439	3	TERMINAL BLOCK ASSY	120	513	2	HORSE SHOE PLATE	600				
367	3	STATOR WINDING BAR	675	440	3	STATOR PUNCHING (SPACER)	700	514	2	STATOR FRAME &CORE	1450				
368	3	STATOR PUNCHING	700	441	3	STATOR PUNCHING (SPACER)	700	515	3	ARRG OF STATOR SOLL	3000				
369	3	STATOR PUNCHING	700	442	3	STATOR PUNCHING (SPACER)	700	516	3	STATOR PUNCHING	3000				
370	2	RIM SEG WITH SPACER ASSY	4500	443	3	STATOR PUNCHING (SPACER)	700	517	4	STATOR FRAME &CORE	18				
371	2	THRUST BEARING SPG	450	444	3	STATOR PUNCHING (SPACER)	700	518	3	SET OF WOUND POLE A	8250				
372	1	ARRG OF STATOR SOLLE PLATE KEY	3400	445	3	STATOR PUNCHING (SPACER)	700	519	1	ARRG OF PR RECIVER	35				
373	1	POLYSTER SLINGS	240	446	3	SET OF CORE	1000	597	4	PIPE LINE FOR SPHERIC	1000				
374	1	ROUTING OF CABLES	330	447	4	TERMINAL BLOCK ASSY	120	598	4	PIPE LINE FOR SPHERIC	750				
375	2	PRESSING PLATE ASSY	2125	448	4	STATOR PUNCHING	3000	539	3	ARRG OF ROTOR FAN	688				
376	2	BOTTOM AIR GUIDE FIXING ARRG	600	449	4	STATOR PUNCHING	3000	540	4	STATOR WDG DETAILS	600				
377	3	STATOR FRAME &CORE ASSY	1430	450	4	STATOR PUNCHING	3000	541	4	ARRG OF RADIAL JACKS	846				
378	4	ARRG OF TOP BRACKET FIXING	820	451	3	STATOR PUNCHING	3000	542	1	SPARE PARTS FOR TUR	10000				
379	1	LOOSE ITEMS FOR WOUND STATOR	200	452	3	STATOR PUNCHING	3000	543	1	ROTOR RIM ASSY	3025				
380	1	SET OF CORE	1975	453	3	STATOR PUNCHING	3000	544	1	ARRG OF ROTOR FAN	800				
381	2	PIT AIR SOLE ASSY	350	454	3	STATOR PUNCHING	3000	545	1	BOTTOM SHAFT LIFTING	1200				
382	3	PIT AIR SOLE ASSY	350	455	3	STATOR PUNCHING	3000	546	2	ARRG OF ROTOR FAN	800				
383	4	STATOR PUNCHING	660	456	3	STATOR PUNCHING	3000	547	2	THRUST BEARING PADS	1100				
384	4	STATOR PUNCHING	660	457	3	STATOR PUNCHING	3000	548	3	THRUST BEARING ARRG	1100				
385	4	STATOR PUNCHING	660	458	3	STATOR PUNCHING	3000	549	3	BOTTOM GUIDE BEARIN	380				
386	4	STATOR PUNCHING	660	459											
			85345				**100810**				**155137**				

Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight
1	1	RIM PUNCHING	2900	97	2	RIM PUNCHING	2900	193	3	RIM PUNCHING	2900	289	3	ARRG OF STATOR INSTRUMENT	15
2	1	RIM PUNCHING	2900	98	1	STATOR PUNCHING	3100	194	1	RIM PUNCHING	2900	290	3	ARRG OF TOP BEARING INSTRUMENT	20
3	1	RIM PUNCHING	2900	99	1	STATOR PUNCHING	3100	195	1	RIM PUNCHING	2900	291	3	ARRG OF TOP BEARING INSTRUMENT	15
4	1	RIM PUNCHING	2900	100	1	STATOR PUNCHING	3100	196	1	RIM PUNCHING	2900	292	3	ARRG OF BOTTOM GUIDE BEARING INS	15
5	1	RIM PUNCHING	2900	101	1	STATOR FRAME &CORE ASSY	4000	197	3	RIM PUNCHING	2900	293	2	ARRG OF D C CONNECTOR	160
6	1	RIM PUNCHING	2900	102	1	STATOR FRAME &CORE ASSY	750	198	3	RIM PUNCHING	2900	294	2	ARRG OF BOTTOM BRACKET SOLE PLAT	3150
7	1	RIM PUNCHING	2900	103	1	STATOR FRAME &CORE ASSY	2050	199	3	RIM PUNCHING	2900	295	2	ARRG OF SHAFT CURRENT MONITOR	160
8	1	RIM PUNCHING	2900	104	1	INSTN OF SOLE PLATE	380	200	4	PRESSURE GUAGE FOR C W PIPI	35	296	2	POLE KEY	1300
9	1	RIM PUNCHING	2900	105	1	ARRGT. OF AIR COOLERS	110	201	4	DUPEX RTD FOR CW PIPING	10	297	2	THRUST BEARING ARRG	6
10	1&2	FLEXIBLE HOSE PIPE	1200	106	1	STATOR PUNCHING	3000	202	4	DTT FOR CW PIPING	70	298	2	TOP GUIDE BEARING ARRG	145
11	1	RIM PUNCHING	2930	107	1	STATOR PUNCHING	3000	203	4	ROTOR LEAD ASSY	60	299	2	TOP AIR GUIDE FIXING ARRG	1100
12	1	RIM PUNCHING	2930	108	1	STATOR PUNCHING	3000	204	4	ROTOR LEAD ASSY	20	300	2	ARRG OF D C CONNECTOR	15
13	1	RIM PUNCHING	2930	109	1	STATOR PUNCHING	3000	205	4	ROTOR LEAD ASSY	15	301	2	ARRG OF D C CONNECTOR	30
14	1	STATOR PUNCHING	3000	110	1	STATOR PUNCHING	3000	206	3	COLLECTOR FAN ASSY	650	302	2	ARRG OF D C CONNECTOR	10
15	1	STATOR PUNCHING	3000	111	1	STATOR PUNCHING	3000	207	3	ARRGT OF ROTOR LEADS	60	303	2	AIR &OIL VAPOUR PIPING BOTTOM	180
16	1	STATOR PUNCHING	3000	112	1	PRESS PLATE ASSY	2300	208	3	ARRGT OF ROTOR LEADS	100	304	2	GUIDE PAD ASSY	10
17	1	RIM PUNCHING	2930	113	1	STATOR KEY BAR ASSY.	1625	209	3	ARRGT OF ROTOR LEADS	40	305	2	ARRG OF BOTTOM GUIDE BEARING INS	120
18	1	RIM PUNCHING	2930	114	1	STATOR STOOL ASSY	3456	210	3	ROTOR LEAD ASSY	35	306	2	OIL LEVEL SWITCH BOTTOM BRACKET	10
19	1	RIM PUNCHING	2930	115	2	RIM PUNCHING	2850	211	3	ROTOR LEAD ASSY	15	307	2	OIL LEVEL SWITCH TOP BRACKET	10
20	1	STATOR PUNCHING	3000	116	2	RIM PUNCHING	2900	212	2	ARRGT OF STATOR INSTRUMENT	100	308	2	ARRG OF BOTTOM GUIDE BEARING INS	50
21	1	STATOR PUNCHING	3000	117	2	RIM PUNCHING	2900	213	1	ARRGT OF STATOR INSTRUMENT	25	309	2	ARRG OF BOTTOM GUIDE BEARING INS	20
22	1	STATOR PUNCHING	3000	118	1	RIM PUNCHING	3000	214	1	ARRGT OF STATOR INSTRUMENT	10	310	2	ARRG OF BOTTOM GUIDE BEARING INS	15
23	1	RIM PUNCHING	2900	119	1	RIM PUNCHING	3000	215	1	ARRGT OF STATOR INSTRUMENT	20	311	2	TOP BEARING INSTRUMENT	15
24	1	RIM PUNCHING	2900	120	1	RIM PUNCHING	3000	216	1	ARRGT OF STATOR INSTRUMENT	60	312	2	BOTTOM GUIDE BEARING INSTRUMENT	20
25	1	RIM PUNCHING	2900	121	2	RIM PUNCHING	2900	217	1	ARRGT OF STATOR INSTRUMENT	70	313	2	TOP BEARING INSTRUMENT	50
26	1	STATOR PUNCHING	3000	122	2	RIM PUNCHING	2900	218	1	ARRGT OF STATOR INSTRUMENT	100	314	2	TOP BEARING INSTRUMENT	15
27	1	STATOR PUNCHING	3000	123	2	RIM PUNCHING	2900	219	1	ARRGT OF STATOR INSTRUMENT	30	315	2	MOISTURE DETECTOR FOR TOP BEARIN	30
28	1	STATOR PUNCHING	3000	124	3	ARRGT OF SPIDER	610	220	1	ARRGT OF STATOR INSTRUMENT	20	316	2	TOP BEARING INSTRUMENT	20
29	1	RIM PUNCHING	2900	125	3	ROTOR RIM ASSY.	7250	221	1	FIXING ARRG OF POLE	240	317	2	MOISTURE DETECTOR FOR TOP BEARIN	40
30	1	RIM PUNCHING	2900	126	3	ROTOR RIM ASSY.	450	222	1	POLE KEY	600	318	2	BOTTOM GUIDE BEARING INSTRUMENT	10
31	1	RIM PUNCHING	2900	127	2	HYDRULIC OVER SPPED DEVI	30	223	1	FIXING ARRG OF POLE	600	319	1	TOP GUIDE BEARING ARRG	120
32	3	RIM PUNCHING	2900	128	4	PIPES & EMBEDMENTS	100	224	2	STATOR INSTRUMENT	20	320	1	ARRG OF AIR & OILVAPOR PIPING	180
33	3	RIM PUNCHING	2900	129	1	DISTRIBUTER SEGMENT-6	5975	225	1	ARRGT OF FOUNDATION SLEEVE	250	321	1	BOTTOM AIR GUIDE FIXING ARRG	650
34	3	RIM PUNCHING	2900	130	1	DISTRIBUTER SEGMENT-4	1541	226	2	HEATER THERMOSTATE	10	322	1	BOTTOM AIR GUIDE FIXING ARRG	1425
35	3	RIM PUNCHING	2900	131	2	ARRGT OF SPIDER	610	227	2	DTT FOR HOT &COLD AIR	60	323	1	ARRG OF SHAFT CURRENT MONITOR	160
36	3	RIM PUNCHING	2900	132	2	ROTOR RIM ASSY.	7250	228	2	RTD FOR HOT &COLD AIR	20	324	2	TOP AIR GUIDE FIXING ARRG	650
37	3	RIM PUNCHING	2900	133	2	ROTOR RIM ASSY.	450	229	2	ARRG, OF STATOR INSTRUMENT	30	325	1	COPPER CABLE FOR FLUX TEST	2650
38	1	STATOR PUNCHING	3000	134	1	STATOR PUNCHING	3100	230	2	ARRG, OF STATOR INSTRUMENT	70	326	1	POLE KEY WITHDRAWAL ASSY	65
39	1	STATOR PUNCHING	3000	135	1	STATOR PUNCHING	3100	231	2	ARRGT OF FOUNDATION SLEEVE	250	327	1	THRUST BEARING ARRG	6
40	1	STATOR PUNCHING	3000	136	1	STATOR PUNCHING	3100	232	3	FIXING ARRG OF TOOTH WHEEL	10	328	1	ARRG OF OIL LEVEL SWITCH BOTTOM	10
41	3	RIM PUNCHING	2900	137	1	STATOR SOLE PLATE	7350	233	3	ARRGT OF FOUNDATION SLEEVE	250	329	1	BOTTOM GUIDE BEARING INSTRUMENT	50
42	3	RIM PUNCHING	2900	138	3	RIM PUNCHING	2900	234	4	ARRG. OF ROTOR LEADS	100	330	1	BOTTOM GUIDE BEARING INSTRUMENT	20
43	3	RIM PUNCHING	2900	139	3	RIM PUNCHING	2900	235	4	ARRG OF D C CONNECTOR	160	331	1	BOTTOM GUIDE BEARING INSTRUMENT	15
44		ARRG.OF PIT DOOR	1803	140	3	RIM PUNCHING	2900	236	4	ARRGT OF FOUNDATION SLEEVE	250	332	1	TOP BEARING INSTRUMENT	15
45	1	STATOR PUNCHING	3000	141		BREAK DUST COLL. ASSY.	1968	237	1	SPEED SIGNAL GEN	300	333	1	TOP BEARING INSTRUMENT	20
46	1	STATOR PUNCHING	3100	142	2	PIPES & EMBEDMENTS	250	238	1	TURBINE BEARING LEVEL RELAY	20	334	1	TOP BEARING INSTRUMENT	50
47	1	STATOR PUNCHING	3100	143	3	PIPES & EMBEDMENTS	250	239	1	TURBINE BEARING LEVEL RELAY	20	335	1	TOP BEARING INSTRUMENT	15
48	2	RIM PUNCHING	2950	144	2	OIL DETECTOR	32	240	1	BRAKE JET VALVE	617	336	1	BOTTOM GUIDE BEARING INSTRUMENT	15
49	2	RIM PUNCHING	2750	145	1	DISTRIBUTER SEGMENT3	2688	241	2	SPEED SIGNAL GEN	300	337	1	MOISTURE DETECTOR FOR TOP BEARIN	30
50	2	RIM PUNCHING	2750	146	2	DISTRIBUTER SEGMENT3	2688	242	2	TURBINE BEARING LEVEL RELAY	20	338	1	TOP BEARING INSTRUMENT	40
51	2	RIM PUNCHING	2850	147	1	DISTRIBUTER SEGMENT5	795	243	2	TURBINE BEARING LEVEL RELAY	20	339	1	TOP BEARING INSTRUMENT	20
52	2	RIM PUNCHING	2850	148	1	SPACER FLANGE	2300	244	2	BRAKE JET VALVE	617	340	4	Arrangement of Bottom Braket Soal Plate	4480
53	2	RIM PUNCHING	2850	149	2	TERMINAL BOX MIV	50	245	3	SPEED SIGNAL GEN	300	341		RUST PREVENTIVE YELLOW	25
54	2	RIM PUNCHING	2850	150	2	TURBINE BOX WITH TUR. PIT	50	246	3	OIL LEVEL INDICATOR	20	342		RUST PREVENTIVE YELLOW	25
55	2	RIM PUNCHING	2850	151	1	DISTRIBUTER SEGMENT1	3948	247	3	OIL LEVEL RELAY	20	343		RUST PREVENTIVE BLACK	20
56	2	RIM PUNCHING	2850	152	1	DISTRIBUTER SEGMENT2	2768	248	4	SPEED SIGNAL GEN	300	344		RUST PREVENTIVE BLACK	20
57	3	RIM PUNCHING	2900	153	2	DISTRIBUTER SEGMENT4	1451	249	4	OIL LEVEL INDICATOR	20	345		RUST PREVENTIVE BLACK	20
58	3	RIM PUNCHING	2900	154	1	RUBBER CORD	20	250	4	OIL LEVEL RELAY	25	346		RUST PREVENTIVE BLACK	20
59	3	RIM PUNCHING	2900	155	1	STATOR PUNCHING	3100	251	3	ARRG OF STATOR SOLE PLATE	90	347		DERUSTING SOLUTION	33
60	3	RIM PUNCHING	2900	156	1	STATOR PUNCHING	3100	252	3	ARRG OF STATOR SOLE PLATE	400	348		DERUSTING SOLUTION	33
61	3	RIM PUNCHING	2900	157	1	STATOR PUNCHING	3100	253	3	ARRG OF D C CONNECTOR	10	349		DERUSTING SOLUTION	33
62	3	RIM PUNCHING	2900	158	1	STATOR PUNCHING	3100	254	3	TOP OIL VAPOR SEAL	240	350	1	ARRG OF BOTTOM BRACKET SOLE PLAT	4480
63	2	RIM PUNCHING	2900	159	1	STATOR PUNCHING	3100	255	3	TOP AIR GUIDE FIXING ARRG	1100	351	3	ARRG OF BOTTOM BRACKET SOLE PLAT	4480
64	2	RIM PUNCHING	2900	160	1	STATOR PUNCHING	3100	256	3	ARRG OF D C CONNECTOR	15	352	2	ARRG OF STATOR INSTRUMENT	25
65	2	RIM PUNCHING	2900	161	3	RIM PUNCHING	2900	257	3	DC CONNECTOR BRUSH GEAR AS	30	353	3	ARRG OF STATOR INSTRUMENT	10
66	3	RIM PUNCHING	2900	162	3	RIM PUNCHING	2900	258	3	MOISTURE DETECTOR FOR TOP B	40	354	4	ARRG OF STATOR SOLE PLATE	68
67	3	RIM PUNCHING	2900	163	3	RIM PUNCHING	2900	259	3	ARRG OF TOP BEARING INSTRUM	15	355	4	STATOR FRAME &CORE ASSY	740
68	3	RIM PUNCHING	2900	164	2	RIM PUNCHING	2900	260	3	THERMOSTATE TOP BEARING	20	356	4	THRUST BEARING ARRG	10
69	1	STATOR PUNCHING	2900	165	2	RIM PUNCHING	2900	261	3	ARRG OF STATOR INSTRUMENT	30	357	4	TOP AIR GUIDE FIXING ARRG	150
70	1	STATOR PUNCHING	2900	166	2	RIM PUNCHING	2900	262	3	ARRG OF STATOR INSTRUMENT	20	358	4	ARRG OF D C CONNECTOR	15
71	1	STATOR PUNCHING	2900	167	2	RIM PUNCHING	2900	263	3	ARRG OF STATOR INSTRUMENT	60	359	4	ARRG OF D C CONNECTOR	30
72	2	RIM PUNCHING	2900	168	2	RIM PUNCHING	2900	264	3	ARRG OF STATOR INSTRUMENT	70	360	4	ARRG OF D C CONNECTOR	10
73	2	RIM PUNCHING	2900	169	2	RIM PUNCHING	2900	265	3	ARRG OF STATOR INSTRUMENT	100	361	4	GUIDE PAD ASSY	10
74	2	RIM PUNCHING	2900	170	1	STATOR PUNCHING	3000	266	3	ARRG OF STATOR INSTRUMENT	30	362	4	BOTTOM OIL VAPOUR SEAL	180
75	2	RIM PUNCHING	2900	171	1	STATOR PUNCHING	3000	267	3	OIL LEVEL SWITCH BOTTOM BRA	10	363	4	PIT AIR SEAL ASSY	10
76	2	RIM PUNCHING	2900	172	1	STATOR PUNCHING	3000	268	3	OIL LEVEL SWITCH BOTTOM BRA	10	364	4	ARRG OF STATOR INSTRUMENT	10
77	2	RIM PUNCHING	2900	173	1	JUNCTION BOX FOR GOV.	50	269	3	BOTTOM GUIDE BEARING INSTRU	50	365	4	ARRG OF STATOR INSTRUMENT	20
78	1	RIM PUNCHING	2930	174	1	HYDRULIC OVER SPPED DEVI	24	270	3	BOTTOM GUIDE BEARING INSTRU	20	366	4	ARRG OF STATOR INSTRUMENT	100
79	1	RIM PUNCHING	2930	175	1	OIL DETECTOR	32	271	3	TOP BEARING INSTRUMENT	50	367	4	ARRG OF STATOR INSTRUMENT	20
80	1	RIM PUNCHING	2930	176	1	JUNCTION BOX FOR MIV	50	272	3	SHAFT CURRENT MONITOR	160	368	4	OIL LEVEL SWITCH	10
81	1	RIM PUNCHING	2930	177	1	BF VALVE	50	273	3	THRUST BEARING ARRG	6	369	4	BOTTOM GUIDE BEARING INSTRUMENT	15
82	1	RIM PUNCHING	2930	178	1	TURBINE BOX WITH TUR. PIT	50	274	3	ARRG OF AIR OIL VAPOUR PIPING	180	370	4	OIL LEVEL SWITCH	10
83	1	RIM PUNCHING	2930	179	1	TEMPREATURE SCANER	170	275	3	GUIDE PAD ASSY	10	371	4	TOP BEARING INSTRUMENT	15
84	3	RIM PUNCHING	2900	180	1	PIPES & EMBEDMENTS	150	276	3	TOP &BOTTOM AIR BAFFLE	300	372	4	BOTTOM GUIDE BEARING INSTRUMENT	15
85	3	RIM PUNCHING	2900	181	1	PRESS PLATE ASSY	2300	277	1	STATOR LIFTING ARRG	3880	373	4	MOISTURE DETECTOR FOR TOP BEARIN	40
86	3	RIM PUNCHING	2900	182	1	HORSE SOE PLATE	1550	278	1	STATOR LIFTING ARRG	3880	374	1	RTD FOR LOWER GUIDE BEARING	80
87	3	RIM PUNCHING	2900	183	1	STATOR FRAME &CORE ASSY	1500	279	4	ROTOR RIM ASSY.	450	375	1	STATOR LIFTING ARRG	330
88	3	RIM PUNCHING	2900	184	1	PRESS PLATE ASSY	2300	280	4	ARRG OF ROTOR LEADS POLE TO	40	376	1	STATOR LIFTING ARRG	440
89	3	RIM PUNCHING	2900	185	2	RIM PUNCHING	2900	281	4	ROUTING OF CABLES	15	377	1	TOP GUIDE BEARING ARRG	30
90	3	RIM PUNCHING	2900	186	2	RIM PUNCHING	2900	282	4	TOP GUIDE BEARING ARRG	50	378	1	TOP GUIDE BEARING ARRG	145
91	3	RIM PUNCHING	2900	187	2	RIM PUNCHING	2900	283	4	TOP &BOTTOM AIR BAFFLE	160	379	1	ARRG OF AIR OIL VAPOUR PIPING	500
92	3	RIM PUNCHING	2900	188	2	DISTRIBUTER SEGMENT-6	5975	284	4	ARRG OF AIR OIL VAPOUR PIPING	180	380	1	ARRG OF DC CONNECTOR	1100
93	1	RIM PUNCHING	2930	189	2	SPACER FLANGE	2755	285	4	ARRG OF STATOR INSTRUMENT	60	381	1	TOP AIR GUIDE FIXING ARRG	10
94	1	RIM PUNCHING	2930	190	1	STATOR PUNCHING	3000	286	4	ARRG OF STATOR INSTRUMENT	70	382	1	ARRG OF DC CONNECTOR	120
95	1	RIM PUNCHING	2930	191	1	STATOR PUNCHING	3000	287	4	ARRG OF STATOR INSTRUMENT	30	383	1	GUIDE PAD ASSY	10
96	2	RIM PUNCHING	2850	192	1	STATOR CORE BUILDING	3150	288	4	ARRG OF BOTTOM GUIDE BEARIN	50	384	1	GUIDE PAD ASSY	120
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Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight
385	2	RIM PUNCHING	2850	482	1	STATOR SOLE PLATE KEY	200	579	4	ARRG OF BOTTOM GUIDE BEARIN	20	676	1	ARRG OF BOTTOM GUIDE BEARING INS	480
386	2	RIM PUNCHING	2850	483	3	RAIL SEC. & EQUAL ANGLE	3264	580	4	ARRG OF TOP GUIDE BEARING IN	15	677	1	ARRG OF BOTTOM BRACKET SOLE PLAT	10
387	2	RIM PUNCHING	2900	484	4	RAIL SEC. & EQUAL ANGLE	3264	581	4	ARRG OF TOP GUIDE BEARING IN	20	678	1	OIL LEVEL SWITCH FOR TOP BRACKET	40
388	2	RIM PUNCHING	2900	485	2	WATER DETECTOR CONTROLL	22	582	4	ARRG OF TOP GUIDE BEARING IN	50	679	1	MOISTURE DETECTOR FOR TOP BEARIN	30
389	2	RIM PUNCHING	2900	486	4	LOWER PIT LINER-2	1867	583	4	SHAFT CURRENT MONITOR	150	680	1	ARRG OF BOTTOM GUIDE BEARING INS	10
390	1	RIM PUNCHING	2900	487	4	LOWER PIT LINER-3	1867	584	4	ARRG OF BOTTOM GUIDE BEARIN	10	681	1	ARRG OF BOTTOM GUIDE BEARING INS	40
391	1	RIM PUNCHING	2900	488	4	INSTN OF LINER SEG-1	1900	585	4	ARRG OF TOP GUIDE BEARING IN	20	682	1	STATOR LIFTING BEAM CENTER ARM AS	40
392	1	RIM PUNCHING	2900	489	4	INSTN OF LINER SEG-4	1900	586	1	TOP OIL VAPOR SEAL	230	683	1	STATOR LIFTING ARRG	3880
393	1	RIM PUNCHING	2900	490	4	INSTN OF LINER ASSY	1513	587	1	ARRG OF BOTTOM BRACKET SOL	3150	684	1	STATOR LIFTING ARRG	3880
394	1	RIM PUNCHING	2900	491	1	STATOR PUNCHING	3000	588	1	SET OF HAND TOOL	200	685	2	ARRG OF BOTTOM BRACKET SOLE PLAT	4400
395	1	RIM PUNCHING	2900	492	1	STATOR PUNCHING	3000	589	3	NUT GUARD ASSY	625	686	1	ARRG OF DC CONNECTOR	350
396	1	ROTOR RIM BUILDIN	1300	493	1	STATOR PUNCHING	3000	590	4	THRUST BEARING SPRING	450	687	1	TOOL &TACKELES FOR ERECTION	338
397	1	JOINT BAR ASSY	510	494	2	RIM PUNCHING	2900	591	2	TOP GUIDE BEARING ARRG	120	688	1	TEST EQUIPMENT FOR SPHERICAL VALV	10
398	1	PRESS PLATE ASSY	2300	495	2	RIM PUNCHING	2900	592	2	TOP GUIDE BEARING ARRG	50	689	1	ARRG FOR GUIDE BEARING HANDLING	250
399	1	PRESS PLATE ASSY	2300	496	2	RIM PUNCHING	2900	593	2	TOP OIL VAPOR SEAL	240	690	1	TOOL &TACKELES FOR GEN	250
400	1	PRESS PLATE ASSY	2300	497	2	DISTRIBUTER SEG-1	3948	594	2	TOP AIR GUIDE FIXING ARRG	150	691	1	TOOL &TACKELES FOR GEN	25
401	1	ROTOR RIM ASSY.	7250	498	2	DISTRIBUTER SEG-2	2768	595	2	ARRG OF D C CONNECTOR	360	692	1	TOOL &TACKELES FOR GEN	90
402	1	ROTOR RIM ASSY.	416	499	2	DISTRIBUTER SEG-5	795	596	4	ARRG OF AIR & OILVAPOR PIPING	500	693	1	INSTALATION OF RATING PLATE	50
403	1	ROTOR RIM BUILDIN	500	500	2	INST OF DISTRIBUTER	1041	597	4	BOTTOM AIR GUIDE FIXING ARRG	575	694	1	SPARE PARTS FOR GEN	20
404	1	ARRGT. OF SPIDER	610	501	2	INST OF DISTRIBUTER	20	598	3	POLE KEY	1300	695	1	PEDSTAL FOR HMC	300
405	1	ARRG.STATOR SOLE	110	502	2	PIPES & EMBEDMENTS	150	599	3	LINE OUT ASSY	210	696	1	TRANSMITTERS	35
406	1	STATOR PUNCHING	3000	503	3	PIPES & EMBEDMENTS	150	600	3	ARRG OF AIR & OILVAPOR PIPING	500	697	1	EHT TESTER	25
407	1	STATOR PUNCHING	3000	504	1	OIL DETECTOR	22	601	3	TOP GUIDE BEARING ARRG	50	698	1	THRUST BEARING SPRING	450
408	1	STATOR PUNCHING	3000	505	2	JUNNCTION BOX FOR BF VALV	50	602	3	TOP GUIDE BEARING ARRG	150	699	1	BOTTOM OIL VAPOUR SEAL	160
409	2	RIM PUNCHING	2900	506	3	RIM PUNCHING	2900	603	3	ARRG OF BOTTOM BRACKET SOL	500	700	2	TRANSMITTERS	35
410	2	RIM PUNCHING	2900	507	3	RIM PUNCHING	2900	604	3	ARRG OF BOTTOM GUIDE BEARIN	15	701	2	INSTALATION OF RATING PLATE	30
411	2	ARRG OF BOTTOM G	15	508	2	ARRG OF SPH VALVE DIA 1800	4300	605	2	DEFLECTOR SERVOMOTOR	370	702	2	STATOR PUNCHING	3000
412	3	MOISTURE DETECTO	30	509	2	ARRG OF SPH VALVE DIA 1800	4300	606	2	DEFLECTOR SERVOMOTOR	370	703	2	STATOR PUNCHING	3000
413	3	TOP AIR GUIDE FIXIN	650	510	1	ARRG OF SPH VALVE DIA 1800	8450	607	2	DEFLECTOR SERVOMOTOR	400	704	2	STATOR PUNCHING	3000
414	3	INSTALATION OFDIS	20	511	1	ARRG OF SPH VALVE DIA 1800	8450	608	3	OIL PIPE LINE	250	705	2	STATOR PUNCHING	3000
415	3	DIA 100BRACKET JE	650	512	2	SPHERICAL VALVE	4300	609	3	OIL PIPE LINE	120	706	2	STATOR PUNCHING	3000
416	3	TRANSMITTERS	40	513	2	SPHERICAL VALVE DIA 1800	4300	610	3	DEFLECTOR SERVOMOTOR	400	707	2	STATOR PUNCHING	3000
417	2	ARRG OF AIR & OILV	500	514	2	SPHERICAL VALVE DIA 1801	4300	611	4	OIL PIPE LINE	250	708	2	STATOR PUNCHING	3000
418	3	TUBLAR SHAFT FIXIN	15	515	4	ARRG OF PR RECIVER FOR GO	9000	612	4	OIL PIPE LINE	120	709	2	STATOR PUNCHING	3000
419	3	BOTTOM OIL VAPOU	200	516	1	PIPE EMBEDMENTS	7500	613	1	OIL PIPE LINE	180	710	2	STATOR PUNCHING	3000
420	3	BOTTOM AIR GUIDE	600	517	1	ASBESTOS CLOTH	1150	614	1	TOOL & TAKELS FOR ERECTION	325	711	2	STATOR PUNCHING	3000
421	4	TOP AIR GUIDE FIXIN	650	518	3	FLOOR SEG. ASSY	7320	615	1	MAIN INJECTOR WITH NOZZLE SE	10200	712	2	STATOR PUNCHING	3000
422	1	ARRG OF STATOR C	8400	519	2	MAIN INJECTOR WITH NOZZLE	10500	616	1	ARRG OF PR RECIVER	70	713	2	STATOR PUNCHING	3000
423	1	POLE LIFTING ARRG	160	520	2	MAIN INJECTOR WITH NOZZLE	10500	617	2	OIL PIPE LINE	180	714	2	STATOR PUNCHING	3000
424	1	HORIZENTAL POLE L	60	521	2	MAIN INJECTOR WITH NOZZLE	10500	618	3	OIL PIPE LINE	180	715	2	STATOR PUNCHING	3000
425		VALVES FROM GOBI	3230	522	2	MAIN INJECTOR WITH NOZZLE	10500	619	3	ARRG OF PR RECIVER	70	716	2	STATOR PUNCHING	3000
426	1	EHT SPACER	700	523	2	ARRG OF PR RECIVER FOR BF	3167	620	4	ARRG OF PR RECIVER	30	717	2	STATOR PUNCHING	3000
427	1	TOOL TACKELS FOR	1200	524	1	ARRG OF PR RECIVER FOR BF	4552	621	4	ARRG OF PR RECIVER	70	718	2	STATOR PUNCHING	3000
428	1	PR RECIVER FOR BF	20	525	1	ARRG OF SPHERICAL VALVE D	4300	622	4	PIPE EMBEDMENTS	80	719	2	STATOR PUNCHING (SPACER)	700
429	1	AUTOMATIC AIR REF	15	526	1	ARRG OF SPHERICAL VALVE D	4300	623	4	TRANSMITTER	25	720	2	STATOR PUNCHING (SPACER)	700
430	1	HR/TR INDICATOR PA	350	527	2	ARRG OF SPHERICAL VALVE D	4300	624	4	FEEDBACK MECHANISM	207	721	2	STATOR PUNCHING (SPACER)	700
431	1	HR/TR WATER LEVEL	60	528	1	ARRG OF SPHERICAL VALVE D	4300	625	4	OIL PIPE LINE	180	722	1	STATOR PUNCHING (SPACER)	700
432	2	PR RECIVER FOR BF	20	529	1	ARRG OF SPHERICAL VALVE D	4300	626	1	DEE HOOK TROLLY	885	723	1	STATOR PUNCHING (SPACER)	700
433	2	AUTOMATIC AIR REF	15	530	1	ARRG OF SPHERICAL VALVE D	4300	627	1	TROLLY	2441	724	1	STATOR PUNCHING (SPACER)	700
434	4	DIA 100 BRACKET JE	650	531	1	ARRG OF SPHERICAL VALVE D	4300	628	1	SUPPORT RING	2040	725	1	STATOR PUNCHING (SPACER)	700
435	4	HYDRAULIC CONTRO	2000	532	1	ARRG OF SPHERICAL VALVE D	4300	629	1	TOOL & TAKELS FOR ERECTION	2441	726	1	STATOR PUNCHING (SPACER)	700
436	3	HYDRAULIC CONTRO	2000	533	1	ARRG OF SPHERICAL VALVE D	4300	630	2	OIL SUMP TANK FOR GOV	4500	727	1	STATOR PUNCHING (SPACER)	700
437	2	HYDRAULIC CONTRO	2000	534	4	ARRG OF PR RECIVER	4300	631	3	OIL SUMP TANK FOR GOV	4500	728	1	STATOR PUNCHING (SPACER)	700
438	2	HYDRAULIC CONTRO	1400	535	2	ARRG OF SPHERICAL VALVE D	4300	632	4	OIL SUMP TANK FOR GOV	4500	729	2	PIT OIL COOLER	400
439	1	HYDRAULIC CONTRO	1400	536	3	ARRG OF PR RECIVER	4300	633	1	MAIN INJECTOR WITH NOZZLE SE	10200	730	2	PIT OIL COOLER	400
440	1	FLOOR SEG. ASSY	7460	537	2	MAIN INJECTOR WITH NOZZLE	10500	634	3	DEFLECTOR MECHANISM	425	731	2	STATOR PUNCHING (SPACER)	700
441	2	FLOOR SEG. ASSY	7430	538	2	SPH VALVE	4300	635	3	DEFLECTOR MECHANISM	1500	732	2	STATOR PUNCHING (SPACER)	700
442	1	PIPE EMBEDMENTS	70	539	1	SERVOMOTOR FOR SPH VALV	4300	636	3	DEFLECTOR SERVOMOTOR	650	733	2	STATOR PUNCHING (SPACER)	700
443	1	FOUNDATION PLATE	3822	540	1	ARRG OF SPHERICAL VALVE	4300	637	4	DEFLECTOR MECHANISM	425	734	2	STATOR PUNCHING (SPACER)	550
444	1	BRACKET JET NOZZL	70	541	1	TOOL & TAKELS FOR ERECTIO	688	638	4	LVDT FOR JUNCTION BOX	50	735	1	STATOR WDG DETAILS	2500
445	1	PIPE EMBEDMENTS	302	542	1	ARRG OF SPHERICAL VALVE D	4300	639	1	MAIN INJECTOR WITH NOZZLE SE	10200	736	2	STATOR PUNCHING	3000
446	2	FOUNDATION PLATE	3822	543	1	ARRG OF SPHERICAL VALVE D	3113	640	1	OIL PIPE LINE	600	737	2	STATOR PUNCHING	30000
447	2	BRACKET JET NOZZL	60	544	1	OUT LET PIPE	3607	641	2	OIL PIPE LINE	600	738	1	STATOR PUNCHING (SPACER)	700
448	2	PIPE EMBEDMENTS	303	545	2	MAIN INJECTOR WITH NOZZLE	10500	642	3	OIL PIPE LINE	600	739	1	STATOR PUNCHING (SPACER)	700
449	1	GROUTING PLATE	1000	546			240	643	4	OIL PIPE LINE	600	740	1	STATOR PUNCHING (SPACER)	700
450	1	ROTOR ASSY	570	547	1	ARRG OF SPHERICAL VALVE D	13946	644	1	FEEDBACK MECHANISM	140	741	2	STATOR PUNCHING (SPACER)	700
451	1	ARRG OF SPIDER CO	240	548	1	BOTTOM AIR GUIDE FIXING	370	645	1	MAIN INJECTOR WITH NOZZLE SE	10200	742	2	STATOR PUNCHING (SPACER)	700
452	1	ARRG OF GEN FLOO	150	549	1	POLE KEY	360	646	4	DEFLECTOR MECHANISM	1500	743	2	STATOR PUNCHING (SPACER)	700
453	1	ARRG OF RADIAL JA	2500	550	1	BRUSH HOLDER	60	647	2	DEFLECTOR MECHANISM	1500	744	2	STATOR PUNCHING (SPACER)	700
454	1	DC CONNECTOR ANI	80	551	1	CARBON BRUSH	10	648	1	MAIN INJECTOR WITH NOZZLE SE	10200	745	2	STATOR PUNCHING (SPACER)	700
455	1	MONOGRAM &RATIN	20	552	1	RTD FOR AIR CIRCUIT	10	649	1	DEFLECTOR SERVOMOTOR	400	746	2	BAR STATOR WIND	2500
456	1	OIL COOLER	750	553	1	DIAL TYPE THERMOMETER	120	650	2	DEFLECTOR SERVOMOTOR	400	747			0
457	2	ARRG OF ROTOR LE	60	554	1	OIL LEVEL SWITCH	25	651	2	ARRG OF SPHERICAL VALVE	2713	748	1	STATOR WINDING BAR	7665
458	2	ARRG OF SPIDER CO	240	555	1	PRESSURE GUAGE	30	652	4	RIM SEG WITH SPACER	4400	749		STATOR WINDING BAR	7665
459	2	FIXING ARRG OF PO	225	556	2	GUIDE PAD ASSY	125	653	1	STATOR LIFTING ARRG	600	750	1	STATOR WINDING BAR	7835
460	2	ARRG OF GEN FLOO	150	557	2	BOTTOM AIR GUIDE FIXING	370	654	1	UPPER GUIDE BEARING	360	751	2	STATOR WINDING BAR	7835
461	2	ARRG OF DC CONN.	80	558	3	TOP GUIDE BEARING ARRG	125	655	1	BOTTOM GUIDE BEARING	370	752	2	STATOR WINDING BAR	7835
462	2	MONOGRAM &RATIN	20	559	3	TOP GUIDE BEARING ARRG	135	656	1	ARRG OF SHAFT	80	753	1	STATOR WINDING BAR	7835
463	3	ARRG OF GEN FLOO	7000	560	3	ARRG OF DC CONN.	80	657	1	THRUST PAD	1100	754	4	RIM PUNCHING	2800
464	3	ARRG OF GEN FLOO	150	561	3	GUIDE PAD ASSY	125	658	1	TEMPERATURE RECORDER	200	755	4	RIM PUNCHING	2850
465	1	ARRG OF GEN FLOO	7000	562	3	ARRG OF STATOR SOLE PLATI	33	659	1	VIBRATION MONITOR	120	756	4	RIM PUNCHING	2850
466	2	ROTOR ASSY	570	563	3	ARRG OF STATOR SOLE PLATI	225	660	2	ARRG OF DC CONN.	170	757	2	STATOR WINDING BAR	7835
467	3	ARRG OF STATOR S	220	564	4	ROTOR ASSY	570	661	2	BOTTOM AIR GUIDE FIXING	1400	758	4	STATOR WINDING BAR	7820
468	3	ARRG OF STATOR S	7728	565	4	TUBLAR SHAFT	13	662	2	TEMPERATURE RECORDER	200	759	4	STATOR WINDING BAR	7820
469	3	ROTOR ASSY	570	566	4	TOP GUIDE BEARING ARRG	135	663	2	ARRG OF SHAFT CURRENT MONI	80	760	4	STATOR WINDING BAR	7820
470	3	ARRG OF DC CONN.	340	567	4	TOP OIL VAPOUR SEAL	200	664	2	VIBRATION MONITOR	120	761	3	STATOR WINDING BAR	7835
471	3	MONOGRAM &RATIN	20	568	4	PIT AIR SEAL ASSY	340	665	3	JT BAR ASSY	510	762	3	STATOR PUNCHING	3000
472	1	THERMOSTATE	60	569	4	ROUTING OF CABLES	250	666	3	ROTOR RIM END PLATE	3050	763	3	STATOR PUNCHING	3000
473	1&2	PLATE FROM RAILIN	450	570	4	ARRG OF BRUSH GEAR	60	667	3	ARRG OF BOTTOM GUIDE BEARIN	130	764	3	STATOR PUNCHING	3000
474	1	PIPE EMBEDMENTS	60	571	4	ARRG OF BRUSH GEAR	60	668	3	TEMPERATURE RECORDER	200	765	4	STATOR PUNCHING	3000
475	1	ARRG FOR GUIDE BE	200	572	4	ARRG OF BRUSH GEAR	60	669	3	ARRG OF SHAFT CURRENT MONI	75	766	4	STATOR PUNCHING	3000
476	1	TOOL TACKELS FOR	650	573	4	MAIN INJECTOR WITH NOZZLE	450	670	3	VIBRATION MONITOR	120	767	4	STATOR PUNCHING	3000
477	1	PLATE FROM STAIR	100	574	1	VISUAL FLOW INDICATOR	70	671	4	ARRG OF ROTOR FAN	320	768	4	STATOR PUNCHING	3000
478	2	LVDT FOR NEDDLE F	50	575	1	OIL LEVEL SWITCH	120	672	4	LINE OUT ASSY OF SHAFT	200	769	4	STATOR PUNCHING	3000
479	3	LVDT FOR NEDDLE F	50	576	1	OIL LEVEL SWITCH	130	673	4	GUIDE PAD ASSY	120	770	4	STATOR PUNCHING	3000
480	2	FEEDBACK MECHAN	150	577	1	ROTOR RIM BUILDING EQUIPM	1250	674	4	BOTTOM GUIDE BEARING	115	771	3	STATOR PUNCHING	3000
481	2	FEEDBACK MECHAN	150	578	1	ROTOR RIM BUILDING EQUIPM	500	675	4	TEMPERATURE RECORDER	200	772	3	STATOR PUNCHING	3000
			146188				**279135**				**112187**				**247578**

Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight	Sr .No.	Unit	Description	Weight
773	2	PIPE EMBEDMENTS	111	866	1	MOTORISE POWER PACK	250	958	4	ARRG OF CURRENT MONITOR	75	1050	3	STATOR PUNCHING	3000
774	2	PLATFORM RAILING	100	867	2	OIL LEVEL SWITCH	120	959	4	VIBRATION MONITOR	120	1051	4	STATOR PUNCHING	3000
775	1	PIPE EMBEDMENTS	756	868	2	OIL LEVEL SWITCH	130	960	1	DRAINAGE SYSTEM	400	1052	4	STATOR PUNCHING	3000
776	1	PIPE EMBEDMENTS	1560	869	2	VISUAL FLOW INDICATOR	70	961	1	ARRG OF STATOR LIFTING	4800	1053	4	STATOR PUNCHING	3000
777	2	PIPE EMBEDMENTS	800	870	3	ARRG OF RADIAL JACKES	2500	962	1	BRAZING EQUIPMENT	300	1054	4	Stator winding bar	7820
778	2	STEEL LADIRS	126	871	3	ARRG OF BOTTOM BRACKET S	3200	963	2	ROTOR RIM END PLATE	3020	1055	1	Arrgrt of Pr. Receiver for MIV	11607
779	2	PLATFORM RAILING	680	872	3	OIL LEVEL SWITCH	130	964	1	FINISHING PAINT	70	1056	1	Specified spare for Pen Stock valve	1600
780	3	PIPE EMBEDMENTS	800	873	3	VISUAL FLOW INDICATOR	70	965	1	ARRG OF ROTOR FAN	320	1057	4	Main injector with servomotor	10500
781	1	STATOR LIFTING	5350	874	4	ARRG OF GEN FLOORING	7000	966	1	FIXING ARRG OF BEARING SUPPO	570	1058	4	Main injector with servomotor	10500
782	3	TOP & BOTTOM AIR I	260	875	4	TOP AIR GUIDE FIXING ARRG	1100	967	1	FIXING ARRG OF BEARING SUPPO	570	1059	1	Oil pipe line	75
783	4	ROUTING OF CABLES	210	876	2	FIXING ARRG OF POLE	560	968	1	ARRG OF THRUST PAD	8	1060	2	Oil pipe line	75
784	2	ARRG OF GEN FLOO	7000	877	1	ROTOR ASSY	60	969	1	INDUCTION BRAZING EQUIPMENT	600	1061	3	Oil pipe line	75
785	1	TOOL TACKELS FOR	450	878	1	TOP OIL COLLECTOR	80	970	1	INDUCTION BRAZING EQUIPMENT	650	1062	4	Oil pipe line	75
786	2	DIA 300 BYPASSVALV	650	879	2	TOP OIL COLLECTOR	80	971	1	INDUCTION BRAZING EQUIPMENT	20	1063	1	Specified spare parts for Turbine	100
787	3	ARRG OF BOTTOM G	10	880	2	ARRG OF RADIAL JACKES	2500	972	3	ARRG OF ROTOR FAN	320	1064	3	Oil pipe line	30
788	1	ARRG OF INLET PIPE	10	881	2	BOTTOM OIL COLLECTOR	140	973	3	ARRG OF C/W PIPING	2000	1065	4	Oil pipe line	30
789	1	OUT LET PIPE	15	882	3	FIXING ARRG OF POLE	580	974	4	ARRG OF DC CONN.	75	1066	1	Arrgt of drainage system	140
790	1	FEEDBACK MECHAN	550	883	3	TOP OIL COLLECTOR	80	975	4	ARRG OF C/W PIPING	2000	1067	1	Arrgt of drainage system	60
791	1	FEEDBACK MECHAN	85	884	3	OIL LEVEL SWITCH	120	976	1	ARRG OF STATOR CORE PRESSIN	5700	1068	1	Hydro mechanical cabinet	1800
792	1	FEEDBACK MECHAN	55	885	3	ROUTING OF CABLES	100	977	1	ARRG OF THRUST PAD REMOVE	150	1069	2	Hydro mechanical cabinet	1800
793	2	FEEDBACK MECHAN	550	886	4	FIXING ARRG OF POLE	560	978	3	BOTTOM AIR GUIDE FIXING	1400	1070	2	Oil sump tank for BFV	4500
794	2	FEEDBACK MECHAN	85	887	4	THRUST COLLER &RUNNER DI	5	979	4	BOTTOM AIR GUIDE FIXING	1400	1071	2	Outlet pie with dismentaling joint	13839
795	2	PIPE EMBEDMENTS	40	888	4	TOP GUIDE BEARING ARRG	120	980		RAILS	7992	1072	1	Oil sump tank for GEN	4500
796	2	MAIN INJECTOR WITI	3482	889	4	TOP & BOTTOM AIR BAFLE FIX	270	981		FOUNDATION PLATE	100	1073	3	Hydro mechanical cabinet	2500
797	3	PIPE EMBEDMENTS	59	890	4	ARRG OF GEN FLOORING	150	982	2	STATOR PUNCHING	3000	1074	4	Hydro mechanical cabinet	2500
798	3	LVDT FOR NEDDLE F	50	891	4	TOP GUIDE BEARING ARRG	80	983	2	STATOR PUNCHING	3000	1075	4	STATOR WINDING BAR	7820
799	3	FEEDBACK MECHAN	85	892	4	ARRG OF BOTTOM BRACKET S	3150	984	2	STATOR PUNCHING	3000	1076	4	ARRG OF SPHERICAL VALVE	4300
800	3	FEEDBACK MECHAN	550	893	4	BOTTOM OIL COLLECTOR	140	985	2	STATOR PUNCHING	3000	1077	4	ARRG OF SPHERICAL VALVE	4300
801	4	FEEDBACK MECHAN	550	894	4	OIL LEVEL SWITCH	120	986	2	STATOR PUNCHING	3000	1078	4	ARRG OF SPHERICAL VALVE	4300
802	4	FEEDBACK MECHAN	85	895	4	OIL LEVEL SWITCH	130	987	2	STATOR PUNCHING	3000	1079	4	ARRG OF SPHERICAL VALVE	4300
803	1	STEEL LADIRS	126	896	4	VISUAL FLOW INDICATOR	70	988	2	STATOR PUNCHING	3000	1080	4	ARRG OF SPHERICAL VALVE	4300
804	1	SERVOMOTOR FOR	7163	897	4	ROUTING OF CABLES	90	989	2	STATOR PUNCHING	3000	1081	4	ARRG OF SPHERICAL VALVE	4300
805	1	TEST EQUIPMENT FO	9775	898	1	INLET PIPES	19941	990	2	STATOR PUNCHING	3000	1082	4	ARRG OF SPHERICAL VALVE	4300
806	1	TOOL &DEVICE FOR	15	899	1	OUT LET PIPE	13839	991	2	STATOR PUNCHING	3000	1083	4	ARRG OF SPHERICAL VALVE	4300
807	4	FLOOR SEG. ASSY	7420	900	1	STATOR WINDING BAR	3640	992	2	STATOR PUNCHING	3000	1084	4	ARRG OF SPHERICAL VALVE	4300
808	1	SERVOMOTOR FOR	7163	901	1	STATOR WINDING BAR	3650	993	2	STATOR PUNCHING	3000	1085	4	Oil pipe line	335
809	4	COLLECTOR FAN AS	650	902	1	ERECTION PLATE	40	994	2	STATOR PUNCHING	3000	1086	1	Arrgt of Sph valve	1200
810	4	ARRG OF STATOR S	7728	903	1	PEDASTAL ASSY	30	995	2	STATOR PUNCHING	3000	1087	1	Special spare for Turbine	10000
811	1	ARRG OF SPH VALVE	4300	904	1	BOTTOM OIL COLLECTOR	140	996	2	STATOR PUNCHING	3000	1088	1	Special spare for Turbine	335
812	1	ARRG OF SPH VALVE	4300	905	3	BOTTOM OIL COLLECTOR	140	997	2	STATOR PUNCHING	3000	1089	1	ARRG OF PR RECIVER	15
813	2	ARRG OF SPH VALVE	4300	906	4	ROUTING OF CABLES	35	998	2	STATOR PUNCHING	3000	1090	1	ARRG OF PR RECIVER	15
814	2	ARRG OF SPH VALVE	4300	907	1	OIL PIPE LINE	250	999	2	STATOR PUNCHING	3000	1091	2	ARRG OF PR RECIVER	15
815	2	ARRG OF SPH VALVE	4300	908	1	OIL PIPE LINE	120	1000	2	STATOR PUNCHING	3000	1092	2	ARRG OF PR RECIVER	15
816	2	ARRG OF SPH VALVE	4300	909	1	DEFLECTOR SERVOMOTOR	380	1001	2	STATOR PUNCHING	3000	1093	3	ARRG OF PR RECIVER	15
817	2	ARRG OF SPH VALVE	4300	910	1	DEFLECTOR SERVOMOTOR	500	1002	2	STATOR PUNCHING	3000	1094	4	ARRG OF PR RECIVER	15
818	2	ARRG OF SPH VALVE	4300	911	1	TOOL & TAKELS FOR ERECTIO	70	1003	2	STATOR PUNCHING	3000	1095	1	RUNNER	19
819	1	ARRG OF SPH VALVE	4300	912	1	TOOL & TAKELS FOR ERECTIO	150	1004	2	STATOR PUNCHING	3000	1096	1	ARRG OF SHAFT	10
820	1	ARRG OF SPH VALVE	4300	913	1	TOOL & TAKELS FOR ERECTIO	70	1005	2	STATOR PUNCHING	3000	1097	1	ARRG OF SHAFT	350
821	1	ARRG OF SPH VALVE	4300	914	2	OIL PIPE LINE	250	1006	2	STATOR PUNCHING	3000	1098	1	UNIT GUAGE PANEL	10
822	1	ARRG OF SPH VALVE	4300	915	2	OIL PIPE LINE	120	1007	2	STATOR PUNCHING	3000	1099	1	OIL PIPE LINES	36
823	2	ARRG OF SPH VALVE	4300	916	2	ARRG OF SPH VALVE DIA 1800	40	1008	2	STATOR PUNCHING	3000	1100	1	SPARE PARTS FOR TURBINES	3000
824	2	ARRG OF SPH VALVE	4300	917	2	DEFLECTOR SERVOMOTOR	370	1009	2	STATOR PUNCHING	3000	1101	1	ARRG OF PR RECIVER	170
825	1	SPARE PARTS	31	918	3	PIPE LINE FOR SPHERICAL VA	350	1010	2	Oil retainer Assembly	400	1102	2	Stator Frame and Core ASSY	2050
826	1	ARRG OF DRAINAGE	150	919	4	PIPE LINE FOR SPHERICAL VA	350	1011	3	Oil retainer Assembly	400	1103	3	Stator Frame and Core ASSY	2050
827	1	ARRG OF DRAINAGE	85	920	4	PIPE LINE FOR SPHERICAL VA	235	1012	4	Oil retainer Assembly	400	1104	2	Arrgt. Of Brush Gear Casing	800
828	2	OIL PIPE LINES	36	921	1	Slot U Packer	25	1013	4	Shaft Arrgt.	29000	1105	4	Arrgt. Of Brush Gear Casing	800
829	2	ARRG OF PR RECIVE	150	922	1	Stator winding Details	150	1014	2	Shield Of Runner	1500	1106	4	Arrgt. Of DC connec. And Brush Gear	325
830	2	ARRG OF PR RECIVE	40	923	2	shaft mechining	28900	1015	3	Shield Of Runner	1500	1107	2	Arrgt. Of Inlet Pipe	19941
831	3	OIL PIPE LINES	36	924	4	space heater	450	1016	2	Runner Arrgt.	20	1108	2	Stator Wdg Bar	5500
832	4	OIL PIPE LINES	36	925	1	SET OF WOUND POLE ASSY	8250	1017	3	Runner Arrgt.	15	1109	3	Stator Frame and Core ASSY	4000
833	1	PIPE LINE FOR SPHE	750	926	2	arregt of shaft	1000	1018	2	Arrgt. Of Sphreical Valve	1200	1110	1	ROTOR RIM BUILDING EQUIPMENT	5600
834	2	PIPE LINE FOR SPHE	750	927	2	arrgt of shaft	350	1019	2	Servo motor for spherical valve	4000	1111	1	Butterfly Valve	1650
835	3	PIPE LINE FOR SPHE	750	928	2	ARRGT OF PR RECEIVER	11608	1020	2	Arrgt. Of Rotor Load	30	1112	1	Butterfly Valve	1650
836	4	PIPE LINE FOR SPHE	750	929	3	SHAFT MACHINING	30000	1021	3	Stator Winding Detail items	600	1113	1	Railing Assy.	350
837	1	PIPE LINE FOR SPHE	10	930	1	Arrgt. Of Shaft	325	1022	3	Stator Winding Detail items	40	1114	2	Railing Assy.	350
838	2	PIPE LINE FOR SPHE	10	931	1	Arrgt. Of Shaft	3250	1023	3	Stator Winding Detail items	390	1115	3	Railing Assy.	350
839	3	PIPE LINE FOR SPHE	10	932	2	Arrgt. Of Shaft(Rotor core 6x4 m)	10	1024	3	Stator Winding Detail items	160	1116	4	Stator wdg Details	350
840	1	PIPE LINE FOR SPHE	450	933	3	Arrgt. Of Shaft(Oil sump)	1000	1025	3	Arrgt. Of DC connec. And Brush Gea	200	1117	2	Stator Frame and Core Assy.	4000
841	2	PIPE LINE FOR SPHE	450	934	3	Arrgt. Of Shaft	325	1026	4	Arrgt. Of DC connec. And Brush Gea	200	1118	2	Arrgt. Of Shaft	3200
842	3	PIPE LINE FOR SPHE	450	935	3	Arrgt. Of Shaft(Rotor core 6x4 m)	10	1027	1	Brake Jack Control Panel	450	1119	2	Arrgt. Of Shaft	300
843	4	PIPE LINE FOR SPHE	450	936	s	Needle M/C(spare for turbine)	500	1028	2	Brake Jack Control Panel	450	1120	3	Arrgt. Of Shaft	325
844	1	PIPE LINE FOR SPHE	350	937	s	Needle M/C(spare for turbine)	1000	1029	3	Brake Jack Control Panel	450	1121	1	Bottom Shaft and Oil Retaining Sleeve Assy.	23000
845	2	PIPE LINE FOR SPHE	350	938	1	Needle M/C(spare for turbine)	420	1030	4	Brake Jack Control Panel	450	1122	4	Runner Arrgt.	25000
846	3	PIPE LINE FOR SPHE	350	939	1	Needle M/C(spare for turbine)	500	1031	2	Arrgt. Of Bottom Guide Bearing Instru	30	1123	4	Shield Of Runner	1250
847	4	PIPE LINE FOR SPHE	350	940	1	Nozzle Seat ring	870	1032	3	Arrgt. Of Bottom Guide Bearing Instru	25	1124	4	Runeer Arrgt.	19
848	3	PIPE LINE FOR SPHE	50	941	s	Nozzle Seat ring	1000	1033	4	Arrgt. Of Bottom Guide Bearing Instru	25	1125	1	Tublar Shaft assy.	1300
849	3	ARRG OF PR RECIVE	11607	942	s	Nozzle Seat ring	1000	1034	1	Arrgt. Of Botttom Guide Bearing	35	1126	1	Generator Spare	30
850	3	ARRG OF SPCER HE	450	943	1	Arrgt. Of air system(HP Comp)air	700	1035	2	Arrgt. Of Botttom Guide Bearing		1127	1	Stator Wdg Detail	150
851	2	ARRG OF SPCER HE	450	944	1	Arrgt. Of air system(HP Comp)air	700	1036	3	Arrgt. Of Botttom Guide Bearing		1128	1	Stator Wdg Detail	100
852	1	FAB FIELD COIL WITI	1950	945	1	Arrgt. Of LP Compreeor System(a	800	1037	4	Arrgt. Of Botttom Guide Bearing		1129	1	Slot U Packer	50
853	1	FAB FIELD COIL WITI	1950	946	1	Arrgt. Of LP Compreeor System(a	800	1038	2	Arrgt. Of top guide bearing		1130	2	Slot U Packer	50
854	1	VISUAL FLOW INDICA	70	947	4	Arrgt. Of shaft(oil sump in one pcs	1000	1039	3	Arrgt. Of top guide bearing	60	1131	3	Slot U Packer	50
855	1	ARRG OF PR RECIVE	11608	948	4	Arrgt. Of shaft (Nitrile rubber cord	50	1040	4	Arrgt. Of top guide bearing	60	1132	4	Arrgt. Of shaft	325
856	1	FAB FIELD COIL WITI	1950	949	s	Spare for Turbine(Needle M/C)(0	400	1041	1	Arrgt. Of top guide bearing	35	1133	4	Arrgt. Of shaft	350
857	1	FAB FIELD COIL WITI	1950	950	2	Rubber(M/C G)	23200	1042	2	Arrgt. Of top guide bearing	50	1134	4	Arrgt. Of shaft	3000
858	1	ARRG OF SPCER HE	450	951	2	Arrgt. Of Spherical valve dia 1800	13904	1043	3	Arrgt. Of top guide bearing	50				
859	2	Arrgt. Of Pressure rece	11607	952	3	Arrgt. Of Shaft	3200	1044	4	Arrgt. Of top guide bearing	50				
860	3	Arrgt. Of Pressure rece	20	953	3	Arrgt. Of runner(M/C G)	23200	1045	1	Set of Inside Micrometer	60				
861	3	Arrgt. Of Pressure rece	20	954	3	Stator Wedge Detail items	2700	1046	1	Set of Inside Micrometer	60				
862	1	Arrgt. Of Drainage Sye	750	955	4	Stator Wedge Detail items	2700	1047	4	STATOR WDG DETAILS	120				
863	1	TOOLS &TACKELS &	250	956	3	Stator Wedge Detail items	135	1048	3	Stator Wdg Bar	6000				
864	1	PIPE LINE FOR SPHE	350	957	1	Oil retainer Assembly	400	1049	2	Stator Wdg Detail Item	700				
865	2	PIPE LINE FOR SPHE	350												
			177980				**233297**				**165875**				**256466**

VOLUME – I A (PART – II) :

TECHNICAL SPECIFICATIONS

CONTENTS

VOLUME – I A (PART – II) : TECHNICAL SPECIFICATIONS

1.0 GENERAL

BHEL has been awarded the work of Design, Manufacture, supply, installation, erection, testing & commissioning of 4X200 MW Parbati-II HYDRO ELECTRIC POWER PROJECT

1.1 SCOPE OF WORK

(A) Receiving and Unloading of consignments from the Trucks/Trailers arriving from BHEL manufacturing units and its suppliers/vendors.

(B) Proper Stacking and Preservations of all the material.

(C) Keeping records and status of all materials as per BHEL practices. Verification of all the material received by contractor. Prepare shortages/damaged reports, if any.

(D) Transportation of materials from site stores to the powerhouse service bay or the pre assembly area as per site requirement and the instructions of site engineer.

(E) Construction of temporary shelters on some of the special items as per the instruction of the site engineer.

(F) Unloading and stacking of certain items in the service bay / work area with the help of EOT cranes / loading arrangement as per the instruction of BHEL engineer.

(G) Proper Housekeeping and safe working.

(H) Handing over of all the spares to customer at their stores.

(I) Handling and Transportation of scrap from power house to NHPC stores / scrap yard as per the instructions of BHEL engineer

(J) Re-conciliation of materials with BHEL and NHPC.

(K) Erection, Testing , Commissioning and Handing over as per BHEL drawing, contract specifications and as per the instructions of the BHEL engineer.

The materials will be supplied from our manufacturing units located all over the country as well as our vendors located both inland and overseas. The scope of work under this tender consists of taking delivery of the materials from transporters, unloading, shifting to their designated locations, verification & stacking etc. The delivery of these materials will mostly be inside the project campus by road transport. However, delivery of some items may also have to be taken from Godowns of transporters.

Total materials involved for material handling under this tender approxi -10000 MT .Out of this approx. 4500 MT has already been receipt, unloaded by other contractor of BHEL at BHEL stores(Saran behali, salah (sainj), Panasrsa and Pandoh) and balance plant material approxi-5500 MT are to come from our MUs/vendors.Approx. whatever actual materials are dispatched for the project irrespective of any variations and payments shall be released for the actual gross tonnage handled for material handling purposes.

Though most of the material is being planned to be made available at site well in time for erection requiring proper handling, verification and storage. However certain items may be delayed, requiring direct delivery at site for erection. In such cases contractor has to unload the material directly in powerhouse/ work place and verification to be carried out. Contractor for subject work will be eligible for payment as per the rate schedule. Besides above BHEL at its discretion may get the material handling/ unloading done at any location in the premises of powerhouse, store depending upon availability of space in powerhouse/ stores.

1.2 In order to meet the environmental concerns the contractor shall **plant at least 100 trees and maintain the trees throughout the period of Contract** in the vicinity of the project as per advice of Engineers.

1.3 The contractor shall comply with following towards Social Accountability;

(a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.

(b) The contractor shall not engage Forced/Bonded Labour and shall abide by abolition of Bonded Labour System(Abolition) Act, 1976.

(c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour(Regulation & Abolition) Act,1970.

(d) The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Discrimation/Corporal punishment for failure in meeting with relevant requirements.

(e) The Contractor shall abide the requirement of Contract Labour(Regulation & Abolition) Act,1970 for working hours.

(f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

(g) The Contractor shall arrange potable drinking water to its employees & workers.

1.4 Tenderer may note that as the place of work is inside the project area and the premises is being manned by Security/Safety Force of NHPC, all necessary system related to entry of men, vehicle & material, safety & security systems, work permit system etc. as applicable will have to be followed by the contractor

2.0 Preliminary & Civil Works

2.1 The contractor shall as a first field activity check all the foundations for the correctness of the same as per the drawings and satisfy himself in all respects such as location of foundations, absence of voids, **levels**, correctness of **bolt holes, pocket levels**, centre lines etc. and all measurements should be recorded and submitted to engineer **for approval** before erection.

2.2 Before starting erection job, contractor shall ensure that area connected to his scope of work is sufficiently enclosed against ingress of dust and water and all debris have been cleared of from the floor to a designated area as per instruction of engineer. The contractor shall arrange to get the working area and surroundings cleared daily to ensure the dust free atmosphere **and free from seepage water** for working and shall maintain sufficient labour for general cleaning of work areas. Delay of work on this account will not be acceptable.

2.3 The contractor shall cover all opening on floor and put temporary hand railing on all sides of the floor to avoid any accident to the working personnel.

2.4 Contractor shall fix up and maintain plates, supports for X & Y axis and elevation at different locations as required for each unit and **transfer the same from bench mark and XY axis given at one point by BHEL's client.** Joint protocol records for such benchmarks shall be got signed from BHEL's Engineer, customer's Supervisory and QA Engineer.

2.5 Once X-Y axis and elevation are fixed at different floors and protected, marking for other equipment's shall be transferred from these and joint protocol as above shall be got signed for each equipment or as required as per drawings.

2.6 All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filling and blue matched. Wherever necessary sealing/lubricating/anti-seize compounds shall be applied as per recommendation of Engineer. Machining/grinding required for fitting of keys, pins, packers , dowels etc. shall be carried out by contractor.

2.7 The accuracy of all equipment/ instruments and their functioning shall be established before they are permitted for use on the job. If the Engineer doubts the accuracy of the precision tools, at any time during erection, the contractor shall arrange the checking of tools/ equipment/ instruments at his cost.

2.8 All the works shall be performed to the lines, grades and elevations indicated on the drawings. The contractor shall be responsible to locate and layout the works. The

horizontal & vertical control points established by the engineer shall be used as datum for the works under this contract. Any work done without being properly located may be removed and dismantled by the Engineer at the contractor's expenses if the contractor refuse to do it.

2.9 The contractor shall create all the facility at storage site as per the tender scope of work for unloading the equipment, its safekeeping, protection and proper record . No material should be lying loose any where in the power house as well as stores.

2.10 De-watering of the areas/ floors in general will be carried out by M/s SJVNL. However contractor has to take care of general cleanliness in his area of work. For area cleaning within the premises of his work, the cleanliness shall be the total responsibility of contractor. Contractor within his scope of work shall keep the separate gang of workers for cleanliness operations. If the area under the scope is found unclean, BHEL can take measures on its own for cleaning and deduct the amount so spent from the running bills of contractor.

2.11 Necessary civil works shall be provided by BHEL client. The dimensions & locations shall be checked by the contractor for their correctness as per drawings. Further, top elevation and axis/ centrelines of all the foundations shall be checked with respect to benchmark etc. During the civil works, contractor shall check for all the block-outs, dimensions as required in their various mechanical drawings for installation of components/ assemblies and help BHEL wherever required for checking. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 25 to 50 mm, enlarging the pockets in foundations etc., and repair of same as may be required for the erection of equipment shall be carried out by the contractor within the finally accepted rates.

2.12 Besides above, any works required for safe and efficient operation of tools and tackles like grouting/ excavation/ casting of foundation/ anchor points for derricks, winches, guy ropes fastening scaffoldings etc. or any other temporary supports shall also be the contractor's responsibility. For these works all materials including cement/ steel and required facilities will have to be arranged by contractor at his own cost.

2.13 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required as per drawings/ manufacturing unit, the embedded sole plates shall be scraped and checked with Prussian blue to get the required contact with frames at no extra cost to BHEL.

2.14 The contractor shall ensure perfect matching of packer plates including scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of equipment to the satisfaction of BHEL Engineer.

2.15 The contractor shall provide his T&P stores for special tools and instruments at a convenient place near to the working area.

2.16 All mechanical works of machine related to civil works including foundations, grouting, concreting, erection of chequered plates along with embedment in concrete, grouting of liners, any civil works relating to setting of anchor bolts and foundation bolts including preparation of bolt holes will be in the scope of contractor.

3.0 Material Management at Stores & Power House

3.1 The scope of work mainly involves receipt, unloading from road carriers (Trucks/Trailers etc) of total materials for four units of 4X200 MW MW of BHEL (like Hydro-turbines, valves, generators, transformers, bus-duct, piping, auxiliaries equipment, C&I, BOP and other miscellaneous materials/ equipment) at site or bringing from road carrier godown to site stores/ storage yards and shifting from place of unloading to actual storage area (stores developed by BHEL), proper storing, stacking/ restacking of materials/ equipment (in closed store sheds/ open storage yards/ project site), verification of components including opening of cases, re-packing/ stacking and preservation of the same after verification including liasioning with carrier for waiver/ reduction of demurrage, watch and ward, to provide fire fighting equipment including fire extinguishers in closed and open storage yard wherever required. Also transportation of material to erection site as and when required. The contractor is to use equipments (supplied by BHEL or arranged by contractor) like suitable cranes/ trucks/ tractor-trailers and other material handling equipment including all necessary small/ major T&P required for the same for the above work.

The contractor shall maintain record of material such as receipts, issue, return, in Day – Book, ledgers, stock registers and computers, issue gate passes, record of shortages & MDR etc as per BHEL procedures and instructions. The contractor shall also assist BHEL for all correspondence regarding the insurance including preparation of claims.

3.2 Approx. weight to be handled for four units as indicated in **Volume -IA, Part- I , Chapter – IV** is of the order of 10000 MT (Approx.). But the contractor has to handle whatever actual materials are dispatched for the project irrespective of variations in weight and sizes.

Some equipment as per the direction of engineer may be unloaded in powerhouse with the help of EOT crane from the truck/ trailers depending upon the requirement. The bidders are required to take note of above points while quoting.

In the absence of EOT Crane at Power House, some of the packages may have to be unloaded by the Contractor using own crane / suitable arrangement. In this case , the rate of unloading at BHEL Store will be applicable . In case the same is unloaded using BHEL crane , the rate of unloading by EOT Crane will be applicable .

Volume-IA, Part- I, Chapter-IV gives the general idea for tender's information about the weights and dimensions of some major components/ equipment. The weights and dimensions shown are approximate and are liable to vary. No increase in quoted/ accepted rates/ prices should be allowed due to change in weights and dimensions of the equipment/ materials.

3.3 The contractor shall deploy adequate number of supervisors, storekeepers, riggers, carpenter, fitters and other skilled and unskilled workers as per requirement having adequate experience of jobs of similar nature till completion of work.

3.4 Contractor shall provide all necessary preservatives, paints, thinners, rust preventives, grease, lubricants etc. for preservation of components. All tools and tackles and other consumables required for the contractor at his own cost shall also provide preservation of components including supervision. Preservation of components also includes applying preservatives, paints, rust preventives, greasing of threaded portions, repainting of work order Nos./ DU nos./component codes etc. After preservation wherever necessary, components will be stacked properly as per original stacking for which no additional payment shall be made.

3.5 It shall be the responsibility of the contractor to keep in touch with Engineer at site and find out arrival of road consignments. The Contractor shall collect all the lorry waybills from BHEL site office either personally or through an authorised representative. The customer or his authorised representative shall, for the purpose, visit the said office every day and collect available LWB, PWB etc. While collecting the LWB, PWB contractor or his authorised representative will sign the register maintained for the purpose indicating the date and time of collection. The contractor shall keep in touch with carriers and arrange to effect delivery of consignments immediately on their receipts. Delay may cause deterioration of goods apart from attracting demurrage charges. Contractor shall also maintain a register indicating date of LWB, PWB date of collection of the materials from road transport agencies/ lorries and date of stacking them at storage yard of BHEL.

3.6 The contractor is required to find out and follow up regularly with carriers regarding arrival of consignments even prior to the receipt of GR, if any, and take delivery of the same on 'INDEMNITY BOND'. Indemnity bonds would be executed by BHEL when the Contractor furnishes intimation regarding arrival of consignment.

3.7 It is possible that in certain cases, LWBs, PWB may not be received in time but BHEL may receive Photostat copies of the same, it is, therefore, the responsibility of contractor to collect such Photostat copies while furnishing indemnity bond from BHEL authorities at site.

3.8 Payment of all demurrages/ warfages that results due to contractor's faults would be the responsibility of contractor and to his account. If BHEL have to make payment of demurrage/ warfage together with freight, the amount so paid as demurrage/ wharfage for the reasons stated above shall be paid by the contractor forthwith or would be recovered from bills of the contractor.

3.9 In any case contractor will pursue with concerned Carrier authorities at all level (local/ HQ etc) for waiver/ reduction to the minimum of such demurrage /wharfage charges. Whenever such demurrages/ wharfages become payable due to reasons not attributable

to contractor, contractor will immediately bring it to the notice of BHEL with specific request to bear such charges. The decision of the Engineer in such case will be final and binding on the contractor.

3.10 The contractor has to ensure the unloading and removal of materials from unloading place within the permitted time and ensure to keep the area free and avoid jamming. Any loss to BHEL on this account shall be recovered from the contractor.

3.11 Any discrepancy/ shortage/ damage found in the consignment after taking delivery from the carriers after giving clear receipt would be the responsibility of the contractor and the amount liable to be lost by BHEL on such accounts is recoverable from the contractor.

3.12 In case of apparent damages/ shortages in consignments/ packing noticed by the contractor, such cases shall be brought to the notice of BHEL and cleared only with their consent/ approval. The contractor shall provide all the necessary assistance to BHEL for lodging the insurance claim and all correspondence with the insurer, surveyor and transport agency. The contractor shall also help in maintaining all the records in connection of insurance claims.

3.13 It would be responsibility of the contractor to examine the packages, consignments etc. on arrival and bring to the notice of carriers and BHEL authorities regarding loss/ damages, if any, observed in the consignments proposed to be taken delivery of.

3.14 Before taking delivery, particularly of consignments in 'smalls' the weight of the package shall be checked with the invoiced weight of the packages and any discrepancy shall be reported immediately to BHEL/ carriers. In all case of loss/ damages the contractor will take open delivery from the carriers and forward such open delivery certificates (ODC) to the engineer with in 15 days of receipt of such consignment. All expenses connected there with shall be to the account of contractor. BHEL reserves right to claim losses, if any, accrued to BHEL in the event of contractor non-compliance to above.

3.16 In case of short delivery and non-delivery, immediate notice of loss shall be filed with the carrier at places of dispatch and destination as also at any intermediate stations, if it is different one, under intimation to BHEL authorities at site. \

3.17 BHEL reserves the right to recover from the contractor any loss which arises out of undue delay/ discrepancy/ shortage/ damages or any other cause during transit between the carriers godown/ weigh bridges and BHEL storage yard/ store sheds/ project site or during unloading at carrier godown/ storage yard/ store shed/ project site or during stacking or any time during the custody of contractor. This is applicable for optional items.

3.18 Unloading from lorries, transportation, unloading at storage area/ work site of heavy sophisticated equipment like stator, panels etc. shall be done in the presence of and as per the directions of BHEL representative, including stacking and re-stacking, if necessity arises.

3.19 Certain packages are likely to be received by BHEL by passenger bus. The relevant waybills will also be handed over to the contractor for clearing the from the Bus station. It is the responsibility of the contractor to clear the same at the bus station, transport and hand over to BHEL authorities at site under the scope of the contract. All the tender provisions indicated in the tender shall be applicable in this case also.

3.20 Since the trucks/ trailers are expected to arrive during any time of the day/ night, the contractor shall have his workmen round the clock at site as well as other places as required to unload the materials.

3.21 Consignments coming on Sundays and Holidays are also required to be handled by the contractor promptly. It will be the responsibility of the contractor to contact the site engineer /his authorized representative of BHEL at their residence, if required, and obtain instructions to make suitable arrangements.

3.22 In the event unloading from the carrier is delayed by the contractor, the detention charges, if any, will be contractors account.

3.23 Under the scope of this contract, it shall be the responsibility of the contractor to provide all necessary facilities to open the packages in the presence of the engineer, verifying the contents of the packages, repackaging where ever and whenever necessary, properly stacking them as may be directed by the engineer so as to facilitate proper handling, periodical verification of material, receipt position, stock taking etc. for this, the contractor shall have experienced person at site who can maintain the records of dispatch/ receipt/ stacking/ verification/ shortages/ damage/ missing items etc. The verification of materials shall be carried out with in 15 days and report shall be submitted as a documentary proof.

3.24 All material shall be stored 6 inches above ground level by use of concrete or wooden sleepers. No material shall be left to remain on ground at any time. Material shall not be stacked in low-lying areas where it is likely flooded during rains. Wooden sleepers/ concrete block and tarpaulins for this purpose, wherever deemed necessary be arranged by the contractor. These items shall be stacked/ stored properly at the location(s) specified by BHEL when not in use.

3.25 It is possible that certain heavy items/ consignments will require fabrication of temporary steel coverings over it. These shelters will be covered with suitable CGI sheets or tarpaulin. The contractor will be required to fabricate such sheds. All materials for these will be provided by Contractor. All expenses towards manpower, T&P, consumables, etc. will be borne by the contractor. After completion of the work the contractor will dismantle the same and return the same to BHEL stores. Contractor shall be paid @ Rs 10000/MT for such works.

3.26 The material/ equipment requiring indoor storage will be handed and stacked inside the storage shed (provided by BHEL) by the contractor using material handling equipment like Hydra crane, Fork lift etc.

3.27 For checking/ verification of the components with packing slips/ LWB/ PWB etc. The contractor shall provide sufficient experience persons and other facilities as and when required by the engineer.

3.28 Stacking of the material shall be done as per the instruction and to the satisfaction of engineer. The materials shall be so stacked that the same should facilitate easy handling. In the event of any improper stacking BHEL may ask the contractor to restock the material properly or failing which BHEL may get the job done by another agency at the risk and cost of the contractor.

3.29 The contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence. Any loss to BHEL due to contractor's lapse /negligence shall have to be made good by the contractor.

3.30 In case contractor is not able to unload, transport, stack the material at a pre-determined area, as per direction of the engineer for any reason whatsoever (including non-availability of crane, tractor, trailer and other T&P etc.) BHEL shall be at liberty to get the work done by engaging other agency/ equipment / T&P etc at the risk and cost of the contractor.

3.31 It shall be responsibility of the contractor to keep the storage areas (closed/ open) in neat and tidy conditions. Any vegetation like grass, bushes, sarkandas etc. shall be cut in open storage area and removed as per requirement and instruction of BHEL engineer within the contractual value. All surplus/ unusable packing materials shall be removed and deposited at location(s) specified by BHEL within the project premises (including weighment of the same within the project premises if required).

3.32 Normally the consignments from BHEL manufacturing units/ their sub-suppliers are sent on freight paid basis. In case any consignment is received at any place or freight to pay basis, it will be the responsibility of the contractor to pay the freight and take delivery of such consignments. The amount of freight paid by the contractor at any point of time in such cases will be limited to Rs.5000/-. However, the freight paid by the contractor will be reimbursed by BHEL within a week's time on production of relevant receipt. In case of freight amounts exceed Rs.5000/- contractor may request BHEL well in time to issue cheque/ Draft for such additional amounts in favour of carriers towards freight charges. Receipt of payment and proof of taking delivery of consignment shall be submitted to BHEL by the contractor. Delay in issuance of cheque/ drafts as above shall not in any case be taken as a cause of delay in taking delivery of consignment resulting in wharfage / demurrage leviable by carriers.

3.33 In case some materials are required to be dispatched from Site to Manufacturing Units, other sites or any other place, the contractor may be asked by the engineer to get the same packed, transport it to the nearest railway station, carriers godown and get the same booked. The contractor are therefore, requested to quote their rate for this work in rate schedule. In case of material required to be booked as freight paid the freight for the consignment limited to Rs. 3000/- shall be paid by the contractor. However it shall be reimbursed by BHEL on submission of receipt within a weeks time. The funds for freight charges exceeding Rs. 3000/- shall be arranged by BHEL. Packing material required shall be provided by BHEL free of cost.

3.34 In case of consignment to be dispatched on full truck/ trailer load basis, where the carriers will place their fleet inside the plant for loading the contractor may be asked to collect them from different locations of stores shed / yard and load by using his crane and labour. Tenderers are required to quote rates for the work in rate schedule.

3.35 For any exigencies during execution of the contract, the contractor shall have to depute his personnel for collection/ delivery of any material meant for site from/ to outstation if desired and instructed by the Engineer. The contractor will however be reimbursed expenses incurred for such work for person deputed, as below:

a) 2nd class train fare worth reservation / supplementary charges/ bus fare subject to furnishing details regarding ticket nos., journey details, amount of fare etc.
b) Local conveyance charges (Actual bus/ cycle rickshaw/ auto rickshaw fare for local journeys at outstation) as permitted by the Engineer.
c) Daily allowances @ Rs.100/- per day and @ Rs.250/- per day for lodging.
d) Postal/ telegraph/ telephone charges if any subject to production of proof of having incurred such expenditure.
e) Freight and other charges, if any, paid on production of actual receipts.

Payment for the above will be made by BHEL with in a month from the date of submission of bill along with details/ desired documents by the contractor subject to completion of work assigned to contractors personnel and to the entire satisfaction of engineer.

4.0 Material Handling and Storage & Transportation to Powerhouse

4.1 Contractor shall plan in consultation with BHEL engineer, plant/ material to be received/ delivered in powerhouse as per erection progress/ schedules and fill in the requisite formats in standard forms.

4.2. **As the storage & erection work can be spread in different areas/ locations of the project, contractor has to arrange sufficient numbers of watch & ward personals to avoid any pilferage of material.** In case any equipment/ material is lost/ damaged while in the custody of the contractor, the cost of repair/ replacement if any to bring back the equipment in original order shall be deducted from the contractor's bill. BHEL's decision in this regard shall be final and binding on the contractor.

4.3 All electrical panels, control gear, motors and such other devices shall be dried by heating before they are installed and energized. Exposed parts those required special protection such as bearings, slip rings, commutators and other fragile items shall be protected against moisture ingress and corrosion during storage and are periodically inspected.

4.4 The contractor shall ensure that all the packing materials and protective devices used for various equipment during transit and storage are removed before the equipment is installed.

4.5 Contractor shall also ensure that lifting heavy equipment such as generator rotor, stator, Main inlet valve, shafts etc. shall be done strictly in accordance with drawing given for the purpose and using of lifting tackles supplied for the purpose. Wherever required rubber/ leather pads shall be given between the slings and the machined parts to avoid any damages, scratches to the machined surface. Contractor shall cover bearing journals with grease and cloth as per direction of engineer to avoid damages to the surface.

4.6 As per the erection requirement contractor shall deliver material to powerhouse/ work site. The maximum care has to be taken during that time of loading the material at storage area, transportation and unloading at powerhouse. No untoward damage should occur to the material at that time. Any loss of item/ damages shall be to the contractors account.

5.0 Preservation of components

Preservation of all material received at store/site shall be in the scope of contractor.

For further details regarding preservation refer to Chapter 6 of SCC clause no 6.2.

6.0 Cleaning of Equipment

6.1 The contractor shall thoroughly clean all the components before installation of the components whose surfaces are coated with protective coating and sent to site are to be thoroughly cleaned by suitable mechanical/ chemical means as per the approved procedure.

6.2 Contractor shall ensure that the items identified by BHEL shall be cleaned with kerosene/ petrol/ CRC before assembly and erection of the equipment. For cleaning purposes he shall use only soft cotton cloth. Contractor shall never use cotton waste for cleaning any equipment. The electrical equipment before erection shall be cleaned with dry air/ vacuum cleaner.

6.3 The contractor shall clean inside of all pipes and fittings from dirt, sand and loose scales, mechanically/ chemically and by air blowing before being erected. All pipe lines be thoroughly blown/ flushed. If necessary certain pipelines may have to be cleaned by acid pickling/ chemical cleaning. The procedure for the same shall be provided by BHEL. All chemicals and inhibitors shall be arranged by the contractor with in the contract. Disposal of chemical has to be carried out by the contractor at his own cost.

7.0 Erection

All works such as cleaning, checking, levelling, blue matching, aligning, assembling, temporary erection for alignment dismantling of certain equipment for checking, cleaning, surface preparation, fabrication at site, cutting, grinding, straightening, chamfering, filing, chipping, drilling, reaming, dowelling, scrapping, machining, surface grinding, shaping, fitting up welding, tube expansion etc. as may be applicable in such erection works are to be treated as incidental to erection and necessary to complete the work satisfactorily & shall be carried out by the contractor as part of the work.

7.2 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost within the finally accepted rates.

7.3 No members of the ladder/ structure/ platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify/ repair in a manner acceptable to BHEL/ customer without any additional cost.

7.4 The contractor shall erect scaffolding/ temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion & removed from work site.

7.5 Corrections like straightening of ladders, tube support plates adjustment/ removal of ovulates in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carry out such work within finally accepted price/ rate as per instructions of Engineer.

7.6 The contractor shall fabricate pipes, special bends, etc. threading and welding as required and carry out the chemical cleaning of fabricated piping.

7.7 The servicing and realignment of skid-mounted equipment if required or if directed by BHEL shall be carried out by the contractor at no extra cost to BHEL.

7.8 The contractor shall completely erect & test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves & accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning & painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to the lines & elevation as indicated in the drawings.

7.9 Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths. Bends shall be prepared and/or fabricated at site.

7.10 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.

7.11 Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/ add extra lengths to suit the final layout after preparing edges a fresh by adopting specified heat treatment procedures, at no extra cost.

7.12 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.

7.13 The contractor shall be responsible for any modifications of shop fabricated pipes prior to installation to accommodate minor site alteration in pipe routing at no extra cost.

7.14 All vents and drains for piping equipment covered in the scope whether shown in the drawings or not shall terminate in atmosphere and to pit as directed by BHEL.

7.15 Wherever piping erected by the contractor is connected to equipment/ piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor of this specification.

7.16 Normally the valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like `T' pieces, weld neck flanges, reducers etc., shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection after chemical cleaning and during commissioning.

7.17 The contractor shall be responsible for correct orientation of all valves so that seats, stems & 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.

7.18 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.

7.19 The adjustment of all supports erected for maintaining the proper slopes of piping wherever required is also included in the scope of the contractor.

7.20 No temporary supports should be welded on the piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases heat treatment if required, shall be carried out by the contractor as part of subject work.

7.21 All supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and provided by the contractor. The raw materials required for fabricating such supports shall be arranged by BHEL.

7.22 Contractor shall install piping in such a way that no excessive or destructive expansion forces exist under any condition.

7.23 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. All the torque wrenches shall be calibrated at the start of each days work and at least once during the day. The bolting work shall be carried out by the competent technicians.

7.24 The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer.

7.25 Layout of small bore piping as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection or from aesthetic point of view which should be carried out at no extra cost.

7.26 All the valves, including motorised valves, flap valves, 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.

7.27 Additional platforms and ladders of permanent nature incidental to the job for approaching different equipment/ valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor. The materials required will be supplied by BHEL free of cost.

7.28 Erection and welding of necessary instrumentation tapping points, valves to be provided on equipment, auxiliaries and pipe lines covered within the scope of this specification will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer at no extra cost.

7.29 All the items will be supplied in pieces/ loose and are to be assembled bolted and welded at site. Contractor has to work as per the drawings and instruction issued at site for erection and testing purposes. Weights for erection in the annexure-I are indicative only. **No claim will be entertained on account of variations in weights or change from conventional design e.g from bolted to welded connections and vice versa, increase in number of pieces etc. The bidders should take care of this point while quoting lump sum price for subject works for erection works.**

7.30 In view of the tight erection schedule, limited area in the service bay and rotor assembly being in critical path, whatever pre-erection preparatory works can be carried out in BHEL store area shall have to be planned accordingly. In particular, the cleaning, de-burring, de-greasing and segregation of rim punching by weight.

Since the subsequent units shall have to be erected/ commissioned with a gap of 30 days from the previous unit, the contractor shall have to complete the **rotor assembly in the service bay around 2 months by working round the clock in this area. Moreover, two-shift working shall have to be adopted by the contractor to meet the erection schedule**

8.0 Welding & NDT

8.1 The equipment and piping shall be erected in conformity with the provisions of standard/ specification and as may be directed by BHEL The method of welding (arc, gas, TIG, MIG or other method) may be indicated in the detailed drawings/ schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements.

In order to save time of assembly/erection of foundation parts, the welding shall be carried out by MIG process as far as possible. Two shifts or preferably three shifts working with deployment of sufficient number of certified welders, fitters etc shall be adopted to ensure completion of foundation parts assembly within two months period.

8.2 Welding being a special process, all-welding shall be carried out by skilled and experienced welders holding valid certificates as per requirements of ISO 9002. The certificate shall be checked by BHEL before allowing the welders to be engaged on welding. BHEL at its own discretion may ask any or all welders to under go welder Qualification Test as per Standard Procedure in accordance with requirements of ISO 9002 and as per welding manual of BHEL**. The deployment of qualified welder and subsequent site testing of requisite numbers of welders shall be one of the prerequisite of contractor's site mobilization completion.**

8.3 All welders including tack welder, structural and pipe welder shall be tested as per ASME section IX and approved by BHEL Engineer before they are actually engaged on work though they may possess the certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor in Performa given by BHEL Engineer shall maintain the records of qualification of welders. All the welders qualified for the work will be issued an identity card by BHEL Engineer and welder will keep the same with him at work place.

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

8.5 Faulty welds caused by the poor workmanship shall be cut and re-welded at the **contractor's expenses including cost of materials**. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. Radiography or any

other NDT on completed field welds shall be conducted as per drawings or instructions of BHEL engineer.

8.6 The contractor shall carry out the root run welding of all piping, valves, instrumentation, tapping points etc. by TIG/ SMAW / MIG welding process. The contractor shall have to carry out full TIG welding of butt weld joints of tubes /pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas in case of stainless steel. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.

8.7 All charges for testing of contractor's welders including consumables for welding / destructive and nondestructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. The test coupons raw material will be supplied by BHEL free of cost.

8.8 The regulators used on welding machines shall be calibrated before putting these into use for work. Periodic calibration for the same shall also be arranged by the Contractor at his cost.

8.9 Only **BHEL/CUSTOMER approved electrodes and filler wire** will 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 will have co-relation with the lot No. /batch No given on electrode packets. No electrodes will be allowed to 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. Periodical calibration for the same shall also be arranged by the contractor within the finally accepted rates.

8.10 All butt / fillet welds shall be subject to dye penetration test as per drawing and document requirement and have to be carried out as per the instructions of the engineer within the quoted / finally accepted rates for this contract .

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

8.12 All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc. including paints shall be provided by contractor at his own cost.

8.13 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL. Wherever possible machining or automatic flame cutting will be allowed only wherever edge preparation otherwise is impractical. All slag's / burrs shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of engineer.

8.14 **Pre-heating, radiography and other NDT tests, post heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of Engineer. All equipment and consumables essential for carrying out the above process shall be arranged by contractor at his cost.**

8.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. Also the contractor shall have to arrange for labour, heating elements, thermocouples, etc. insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. 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. The contractor has to provide thermal chalks, temperature recorders, thermocouple attachment units, graphs sheets, etc. for checking within the finally accepted rates. 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 BHEL Engineer or his representative on the chart of the recorder after setting up the weld joints for heat treatment operation prior to the starting..

8.16 **The contractor shall also be equipped for carrying out other NDT like Radiography , DP, MPI , UT etc. as required as per welding schedule/ drawings within the finally accepted price/ rates on all equipment welding in foundation parts , inlet pipe, MIV(BFV), MIV inlet pipe, Penstock valve (BFV), Inlet/Outlet Pipe for Penstock Valve and also in piping and other areas as applicable Necessary help including surface preparation and scaffolding required for conducting all the shall be rendered by contractor at his own cost.**

8.17 The technical particulars, specification and other general details for NDT work shall be in accordance with ASME, ISO or as specified by Drawings and Manuals of BHEL / CUSTOMER.

8.18 Low speed high contrast, fine grain films (D-7 or equivalent) in 10cm. width only be used for weld joint radiography. Film density shall be between 2.0 to 4.0.

8.19 Iridium – 192 / any other approved shall be used by contractor for radiography work. The geometric un-sharpness shall not exceed 0.05 mm. Taking adequate safety precautions shall be the responsibility of the contractor while carrying out radiography. Necessary safe guards required for radiography (including personnel from BARC) shall be arranged by contractor at his own cost.

8.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrometer as per ASME or ISO must be used for each exposure.

8.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract no., joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

8.22 Lead intensifying screens for front and back of the film should be used as per the above referred ASME specification.

8.23 The joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the downstream side of the weld.

8.24 For multiple exposure, an overlap of about 25 mm of film should be provided.

8.25 Radiography personnel with sufficient experience and certified by M/s BARC as Radiographer 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 BARC for film badge service.

8.26 All arrangements for carrying out radiography work including dark room with air conditioner/ blower and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and/or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

8.27 The contractor shall have a dark room fully equipped with radiography equipment, film (unexposed), chemicals and any other dark room accessories such as Air conditioner/ Blower etc. There should be adequate number of radiography personnel with sufficient experience and certified by M/s BARC as Radiographer for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection. These personnel should also be registered with BARC for film badge service.

8.28 Contractor shall note that 100% radiography will be done at the initial stages on all the welding joints as specified in the drawings. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out.

8.29 All the Radiographs shall be properly preserved and shall become the property of BHEL.

8.30 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC certificate/permission letter to be provided before taking up the work.

8.31 Radiography of joints shall be so planned that it does not interfere with the ongoing erection works keeping in mind the safety of the persons due to radiation exposure. The testing of the welding joints shall also be planned in a way that it is carried out at the earliest possible so as to assess the soundness of the weld joints and performance of HP welders. If the performance of welder is unsatisfactory, he shall be replaced immediately.

8.32 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radio graphed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if the defect persists after first repair, as per radiograph, carrying out 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.

8.33 If the contractor does not carry out radiography work due to non-availability of source / film / chemical / operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.

8.34 Heat treatment and radiography 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, supervisors/ Engineer required for the work as per directions of BHEL.

8.35 The contractor shall assist BHEL Engineer in preparing complete field welding schedule/procedure 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. Such schedules shall be strictly adhered to by the contractor.

9.0 Testing, Pre-Commissioning, Commissioning and Post-Commissioning

9.1 On completion of erection of equipment, the contractor shall get the equipment checked up by the CUSTOMER , BHEL, and their deputed supervisors, specialists concerned with the particular item of work. The testing of various equipment will be carried under the supervision of BHEL/ CUSTOMER with the assistance of the Contractor in the manner decided by and in the presence of the owner and other authorised supervisors concerned, and to their entire satisfaction. On completion of these preliminary checks by the equipment supplier, the contractor shall make the equipment ready for conducting the test. The contractor shall rectify all defects found during the checking / testing as directed by the BHEL/ Consortium partner /Owner to ensure satisfactory operation of the equipment.

9.2 The contractor shall carry out the required tests as instructed by BHEL using contractor's own consumables, labour and scaffoldings.

9.3 All the tests shall be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. Contractor shall also carry out repair of all the welded joints (site and suppliers) failed during testing.

9.4 The scope of testing 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, or for any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents.

9.5 For testing of distributer, the necessary test pump and bulk heads shall be supplied by BHEL. Any other item which may be required additionally shall be arranged by contractor. The necessary blanks, pressure gauge, valve etc for testing of piping system including hardware shall be arranged by the contractor within his scope of work.

9.6 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors including necessary consumables, T&Ps, IMTEs etc., and any other assistance required during testing of equipment and attending any problem in the equipment erected by the contractor till handing over. Association of BHEL's/ Client's staff during above period will not absolve contractor from above responsibilities.

9.7 It shall be specifically noted that the above 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 contractor's finally accepted rates/ price shall be inclusive of all these factors also.

9.8 In case, any rework is required because of contractor's faulty erection which is noticed during testing, the same has to be rectified by the contractor at his cost. If any equipment/ part is required to be inspected during testing, the contractor will dismantle /open up the equipment / part and reassemble / redo the work without any extra claim.

9.9 During testing, opening/ closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price shall also include all such work.

9.10 The contractor shall make all necessary arrangements including making of temporary closures on piping/ equipment for carrying out the hydro test on all piping equipment covered in the specification at no additional cost.

9.11 In case any defect is noticed during tests 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 realignment are necessary, the same shall be done as per Engineer's instructions including repair, rectification and replacement work by the contractor at his cost. The parts to be replaced shall be provided by BHEL.

9.12 The contractor shall carry out cleaning and servicing of valves prior to testing of the equipment under his scope. 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 are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap / grind valve seats.

9.13 Cleaning & servicing of all the filters/ strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.

9.14 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the Engineer and incorporate the same at no extra cost.

10.0 Finish painting

10.1 Primer painting wherever peeled off or damaged or if required is to be carried out after thoroughly cleaning of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL and the same being inspected and approved by the engineer before painting. Bare surfaces / unpainted surfaces shall be provided with two coats of suitable primer. The gas cut stubs / weld seams would require to be cleaned / ground before painting. After applying the primer paints all the equipments / items shall be finished with two coats of enamel paint or any other paint as issued by BHEL. The exterior surface may have to be cement / coal tar painted as directed by BHEL

10.2 As the equipment/ items are to be spray painted, the contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job/ site shall be permitted only items approved by the owner / Engineer.

10.3 While the primers and paints will be issued by BHEL as free issue item, all tools and other consumables including scaffolding materials required for finish painting shall be supplied by contractor within their quoted rate.