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TENDER SPECIFICATION

TENDER NO. BHEL/NR/SCT/ TAPOVAN / HTG/ 695

FOR

Material handling and erection, testing, commissioning & trial operation of Pelton type turbines, generators, switchgear , bus duct, excitation system, C & I etc of 4x130 MW Tapovan Vishnugad Hydro Electric Project of NTPC Limited at Animathgad (Helong), 14 Km from Josimath and 20 Km from Pipalkoti in District -Chamoli,Uttarakhand.

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 9001-2000, 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: 0091-0120-2515457 / 2515464 / 2515479
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TENDER NO. BHEL/NR/SCT/ TAPOVAN / HTG/ 695

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-----

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TENDER NOTICE

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of “Material handling and erection, testing, commissioning & trial operation of Pelton type turbines, generators, switchgear , bus duct, excitation system, C & I etc of 4x130 MW Tapovan Vishnugad Hydro Electric Project of NTPC Limited at Animathgad (Helong), 14 Km from Josimath and 20 Km from Pipalkoti in District -Chamoli,Uttarakhand.”

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QUALIFYING REQUIREMENTS (QR):

SL. NO.	CRITERIA
1.0	Tenderers should have an average annual turnover of minimum of Rupees 360 lacs based on the audited accounts of last three financial years (2006-07, 2007-08 & 2008-09). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.
	AND
2.1	“ Tenderers who wish to participate should have completed erection, testing & commissioning work of at least three Hydro Turbine Generator sets of 30 MW or higher rating in the last seven years. (Relevant document in support of above shall be submitted.)
3.0	Bidder’s selection is subject to customer’s approval
NOTE	<ul style="list-style-type: none"> i) Projects where erection / precommissioning 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. ii) Last 7 years mentioned above will be reckoned as on the Date of Technical Bid Opening iii) If the qualifying work is completed in the 7 year period as specified above, even if it has been started earlier, the same will also be

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	considered as meeting the qualifying requirements.
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OTHER INSTRUCTIONS :

- (i) The Tender Documents comprise of following:
- (a) General Conditions of Contract
 - (b) Special Conditions of Contract, Tender Notice, Project Synopsis etc.
 - (c) Rate Schedule
- (ii) Tender Documents with complete details are hosted in this web page. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit **Rs.1000/- (Rupees One thousand only)** in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer.
- (iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e **upto 07.07.2010** on payment of **Rs.1000/- (Rupees One thousand only)** (non-refundable) either in cash or by crossed demand draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender No. and work.
- (iii) Tenders must be submitted to the undersigned in Room No. 104 **latest by 07.07.2010** before opening of technical bids commences. Technical bids shall **be opened at 15.30 Hrs. on 07.07.2010.**
- (iv) Earnest Money Deposit (EMD): Refundable, Non-interest bearing **EMD of Rs 2,00,000/-** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/ NOIDA. Those bidders who have already deposited ' One Time **EMD of Rs 2,00,000/-** with BHEL, PSNR, NOIDA need not submit EMD with the present tender.
- (v) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.

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- (vi) All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.
- (vii) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.
- (viii) BHEL takes no responsibility for any delay/ loss of documents or correspondences sent by courier/ post.
- (x) Unsolicited rebate/ discount shall not be accepted after bid opening.**
- (xi) BHEL reserves the right to go for a Reverse Auction instead of Opening the submitted sealed bid, which will be decided after technical evaluation.** As such, the bidders should submit their best prices in the 'Sealed Price Bid'. However, bidders are required to confirm their acceptance of "General terms and conditions" governing RA specifically in their technical bid. The "General terms and conditions" governing RA are given in the SCC of the NIT. Bidders are also required to furnish following details in their techno-commercial bid, for this purpose (RA).

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

- A) Name and Designation of official
- B) Postal Address (Complete)
- C) Telephone Nos. (Land line & Mobile both)
- D) FAX No.
- E) E-mail address
- F) Name of Place/ State/ Country, wherefrom he will participate in the RA.

DGM/ SCP

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TENDER NOTICE – NEWS PAPER

LAST DATE OF SALE : 07.07.2010
DATE OF OPENING : 07.07.2010

NIT NO. / NAME OF WORK
<p>TENDER NO. BHEL/NR/SCT/ TAPOVAN / HTG/ 695</p> <p>Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of Material handling and erection, testing, commissioning & trial operation of Pelton type turbines, generators, switchgear , bus duct, excitation system, C & I etc of 4x130 MW Tapovan Vishnugad Hydro Electric Project of NTPC Limited at Animathgad in District -Chamoli, Uttrakhand.”</p>

NOTES:-

1. Please visit our website at www.bhel.com for complete details of the tender.
2. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper.

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PROCEDURE FOR SUBMISSION OF SEALED TENDERS:

The tenderers must submit their tenders as required in **two parts** in separate sealed covers **prominently superscribed as Part-I Technical bid and Part-II ,Price bid** also indicating on each of the cover tender specification no., date and time as mentioned in tender notice.

TECHNICAL BID (COVER-I)

Except **Price bid Part-II**, complete set of tender document consisting of General conditions of Contract, “Technical specification & Special terms and condition” (Part-I) issued by BHEL shall be enclosed in **Part I Technical Bid only**. All schedules, data sheets and details called for in the specification shall also be submitted along with technical bid. All details / Data / Schedules including offer letter duly signed and stamped are to be **submitted in duplicate**.

PRICE BID (COVER-II)

Tenderers may please note that price bid is **to be submitted only in original copy** of Tender i.e. Price bid (Part-II) issued by BHEL and no duplicate copy of same is required.

These Two separate covers i.e. cover I & II shall together be enclosed in a **third envelope (Cover-III)** and this sealed cover shall be superscribed with tender specification No., due date, time and submitted to officer inviting tender as indicated in tender notice on or before due date as indicated.

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PROJECT SYNOPSIS

4X130 MW Tapovan Vishnugad Hydro Electric Project

NTPC LIMITED, with their headquarters at NTPC Bhawan, Scope Complex, 7 Industrial Area, Lodhi Road, New Delhi have placed an order on BHEL of 4X130 MW E&M package at Tapovan Vishnugad Hydro Electric Project.

Tapovan Vishnugad Hydro Electric Project is a run of the river scheme on Dhauliganga river in Chamoli district of Uttrakhand state. 4 Nos. of vertical shaft generating units of 4x130 MW with Pelton turbines are to be installed in underground Power House.

Power House of 4X130MW for Tapovan Vishnugad HEP is near Animathgad (Helong), 14 Km from Josimath and 20 Km from Pipalkoti in Chamoli district of Uttrakhand state. The nearest rail head is Rishikesh about 280 KM away from project site and nearest Airport is at Dehradun.

SPECIAL CONDITION OF CONTRACT**SECTION III-A****INDEX**

Clause	Description
34.	General Scope of Works.
35.	Preliminary & Civil works
36.	Consumables
37.	Tools & Plants / IMTE's
38.	Supervisory staff & workmen
39.	Materials Management at Stores and Power House
40.	Material handling and storage
41.	Preservation of components
42.	Cleaning of equipment
43.	Erection
44.	Welding, NDT
45.	Testing, pre-commissioning and post commissioning
46.	Progress reporting
47.	Drawings & documents
48.	Taxes & Duties
49.	Extra work
50.	Price Variation
51.	Rate schedule
52.	Instructions to tenderers

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4X130 MW TAPOVAN VISHNUGAD HEP

SPECIAL CONDITIONS OF CONTRACT

34.0 GENERAL SCOPE OF WORKS

- 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 House keeping 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 NTPC Limited stores / scrap yard as per the instructions of BHEL engineer
- J. Re-conciliation of materials with BHEL and NTPC Limited.
- K. Erection, Testing , Commissioning and Handing over as per BHEL drawing, contract specifications and as per the instructions of the BHEL engineer.

BHEL has been awarded the work of Design, Manufacture, supply, installation, erection, testing & commissioning of 4X130 MW Tapovan Vishnugad Hydro Electric Power Project . The equipment detail is given in clause No. 53

These 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 stores by road transport. However, delivery of some items may also have to be taken from Godowns of transporters.

Approx. weight to be handled under this contract will be around **7702 MT** and weight for erection will be around **7074 MT**. Brief descriptions of different packages with their weights are indicated under Annexure-I.

The contractor has to handle 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 **Sl. No. 3 of Rate Schedule**. Besides above BHEL, entirely at its discretion may get unloaded / handle at any location in the premises of powerhouse, items like Generator stator sectors, shafts, transformers or any other materials at the discretion of BHEL engineer and availability of space in powerhouse.

- 34.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any methods, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services/ facilities to complete the work or portion of work awarded to him. The quoted/ accepted rates/ lumpsum price shall deem to be inclusive of all such contingencies.
- 34.2 The contractor shall carry out the work in accordance with standard practices/ codes/ instructions/ drawings/ documents/ specification supplied by BHEL/ Customer from time to time.
- 34.3 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies/ departmentally and recoveries will be effected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

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34.4 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices:

- a. Provision of all types of Skilled labour, Adequately qualified and experienced supervisors, Engineers, Watch and ward as required, Tools & plants, Calibrated IMTE equipment as specified and otherwise required for the work and consumables for storage, material handling, fabrication, erection, testing etc. for the entire scope under this contract.
- b. Proper out-turn as per BHEL plan and commitment.
- c. Completion of work as per Schedule given by BHEL.
- d. Good quality and accurate workmanship for proper performances of equipment to the satisfaction of BHEL/ CUSTOMER.
- e. Repair and rectification as per instruction of BHEL engineer.
- f. Preservation / Re-conservation of all components during storage/ erection till handing over.
- g. Keeping all the storage and erection areas neat and clean.
- h. Documentation and records (Films/Movies/Photographs) from embedment to evacuation.

34.5 The contractor under this contract shall also provide free of cost services of skilled persons for a total period of **210 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 **30 manmonths**
- Skilled workers for office, colony, stores, for **60 manmonths**.
- Unskilled workers for office, colony, stores for **120 manmonths**.

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 manmonths 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.

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34.6 Health, Safety & Environment management (HSE)

34.6.1 BHEL-Power Sector (NR) is ISO 9001, ISO 14001, OHSAS 18001, ISO 27001 and SA-8000 certified company. Quality of work, to customer's satisfaction and system requirements is the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, tools, plant, inspection, measuring and testing equipments etc. as per instructions of BHEL engineer.

The contractor shall also comply with applicable legislation and regulations with regards to Health, Safety and Environmental aspects for minimizing risk arising from occupational health & safety hazards, controlling pollution and wastage. The Contractor will be responsible for Health, Safety & Environment management (HSE) at site for the construction activities to be carried out by them in accordance with requirements given under section I (a) of GCC and elsewhere in this tender document. The contractor, who is awarded the work, shall have to sign an MOU w.r.t implementation of HSE conditions with BHEL (Safe Work Practices).

34.6.2 Besides provision with regard to SAFETY under Clause 27 of GCC, the contractor will be responsible for Health, Safety & Environment management at site for the construction activities to be carried out by them in accordance with requirements given under section I(a) of GCC of this document. The contractor shall continuously take special care to ensure the safety and prevention of human and equipment accidents and maintain good sanitary conditions in and around the site. All the construction work and plant operation must be carried out in the safest possible manner. The Engineer reserves the right to stop any process which, in the Engineer's opinion, is being performed dangerously. In this case the contractor must immediately adhere the requisite safety precautions and any delays attributed to the work stoppage on this account shall not affect the agreed contractual finishing dates.

The contractor shall appoint dedicated Safety Officer who shall have full authority to ensure that all necessary safety precautions are observed by the Contractor's employees and sub-contractors. These appointees shall have full responsibility for the safety of all personnel within the contractor's area of the works.

34.6.3 Some of the common safety rules to be followed during working are as follows:-

- No body is allowed to enter at construction site without Safety Shoe.
- Never enter work area without Safety helmet & chin strap in place.
- No climbing/working allowed without proper safety belt above 2 m. height.
- Do not exceed the speed limit 25 Kmph within premises.
- No debris obstacles allowed on the roads & passages.
- Do not walk on pipelines or false ceiling.
- Maintain good Housekeeping at work site.
- No photography/ Videography allowed without permission
- All Site supervisors & engineers (including subcontractor's) must be imparted structured training on construction safety before start of the job & record to be maintained.
- Availability of qualified & trained Site Engineer at site during all working hours.
- Site Safety training to be imparted to all workers & plan to be made to cover every worker.
- Tools box talk (5-15 minutes) by supervisor prior to commencement of any job.
- All accident / incidents(Near Miss) to be reported & investigated.(formats & procedure should be finalized)
- Daily Safety Checking by Each Site Engineer along with Safety engineer.
- Weekly co-ordination meeting of all Safety engineers with BHEL safety officer.
- Monthly safety meeting with Site In-charges.
- All Safety equipment must be ISI marked & checked by Safety officer before use.
- Tag system for erection & use of scaffoldings.
- Bamboo/wooden Scaffolding material not allowed.
- LPG cylinders not allowed for gas cutting.
- Good House keeping. Separate waste bins to be used for flammable & non flammable material.
- Safety awareness programs for workers by display of boards, posters, competitions, talks etc.
- Deployment of Safety Supervisors for every 250 workers and part thereof at work site.
- Display of List of First Aid trained persons.
- Testing certificates for lifting tools & tackle.
- Provision & maintenance of fire extinguishers at construction site & material stores.
- Display of emergency telephone numbers at various locations.
- For work in confined space use 24V lamp fitting & use tools with air motors or electric tools with max. 24 V.

- For confined space entry Gas test must be done before & at regular intervals.
- Checking & tag of equipment like grinding machine, welding machine, gas cutting set etc. by supervisors before use.

Further, the contractor is required to provide proper Safety Net System wherever the hazard of fall from height is present as per instructions of BHEL Engineer at site. The safety net shall be fire resistant, duly tested and shall be of ISI mark and the nets shall be located as per site requirement to arrest or to reduce the consequences of a possible fall of persons working at different heights.

34.6.4 Contractor shall ensure following:

- Contractor has to maintain contact with local hospital having ambulance facility to meet the emergency requirement at site.
- Contractor has to ensure pre employment medical check for all staff & workers.
- Contractor has to ensure that adequate First Aid facilities are available at work site for emergency purpose.

34.6.5 The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries. **It may be noted that non-compliance to HSE requirements will result in penal action.**

In case any penalties are levied by law enforcing authorities/customer or lapses as mentioned in I, II, III & IV below takes place. Penalties will be deducted from the running bills of contractor. Some of the penalties are elaborated below:

- I. The site Engineer I/C shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and or property, and /or equipments. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury/ accident and he shall comply to remove short comings promptly. The contractor after stopping specific work can, if felt necessary appeal against the order or stoppage of work to the project manger within 3 days of such stoppage of work and decision of the

project manager in this respect shall be conclusive and binding on the contractor.

If the contractor fails in providing safe working environment as per Safety Rules of NTPC or continues the work even after being instructed to stop the work by Engineer I/C as provided above, the contractor shall be penalized @Rs. 25,000/- per day or part thereof till the instructions are complied with and so certified by the Site Engineer I/C.

- II. If the contractor does not take all safety precautions and/or fails to comply with the safety rules as prescribed by the employer or under the applicable law for the safety of the plant and equipment and for the safety of the personnel and the contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other contractor or BHEL's employees or NTPC's employees or any other person who are at the site or adjacent thereto, the contractor shall be responsible for payment of penalty as per the following schedule:

- a. Fatal injury or accident causing death:

Penalty @10% of contract value or Rs. 5,00,000/- per person, whichever is less.

- b. Major injuries or accident causing 25% or more permanent disablement to workmen or employees.

Penalty @2.5% of contract value or 1,00,000/- per person whichever is less.

Permanent disablement shall have the same meaning as indicated in the Workmen's Compensation Act 1923. The penalty mentioned above shall be in addition to the compensation payable to the workmen/employees under relevant provisions of the Workmen's Compensation Act 1923 and rules framed there under or any other applicable laws as applicable from time to time.

- III. If any contractor worker found working without using the safety equipments like safety helmet, safety shoes, safety belts, etc. Or without anchoring the safety belts while working at height the Site I/C Safety officer shall have the right to penalize the contractor for Rs. 200/- per person per day and such worker shall be sent out the work place immediately and shall not be allowed to work on that day. Site

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I/C Safety officer will also issue a notice in this regard to the contractor.

- IV. If two or more fatal accident occur at site under the contract of contractor during the period of contract and he has:
1. Not complied with keeping adequate PPE's in stock or
 2. Defaulted in providing PPE's to his workmen
 3. Not followed statutory requirement safety rules
 4. Been issued warning notice by head of the project on non observance of safety norms
 5. Not provided safety training to all his workmen

The contractor can be debarred from getting tender documents in BHEL for two years from the date of last accident.

The safety performance will also be one of the overriding criteria for evaluation of overall performance of the contractors by BHEL. The contractor shall submit the accident data including fatal/non fatal accidents for the last 3 years where he has undertaken the construction activities project wise along with the tender documents. This will also be considered for evaluation of tender documents. If the information given by the contractor found incorrect, his contract will be liable to be determined.

Safety Code/Practices of M/s NTPC Limited (BHEL's customer) shall also be applicable.

- 34.6.6 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 Decimation/Corporal punishment for failure in meeting with relevant requirements.

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- 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.

34.6.7 In order to meet the environmental concerns it is expected that the contractor shall plant at least 25 (Twenty five) trees and maintain them throughout the period of Contract in the vicinity of the project as per the available space and as per advise of Engineers. In case no area is earmarked for tree plantation, the contractor may take up any other equivalent environment related project after due approval of the BHEL Engineer.

34.6.8 Tenderer may note that as the place of work is inside the POWER PROJECT and being manned by Security/Safety Force of NTPC Limited, 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.

35.0 PRELIMINARY & CIVIL WORKS

- 35.1 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. The contractor has to deploy a qualified surveyor for carrying out the above works.
- 35.2 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 for working and shall maintain sufficient labour for general cleaning of work areas. Delay of work on this account will not be acceptable.
- 35.3 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.
- 35.4 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.

- 35.5 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.
- 35.6 All matching surfaces of components shall be well cleaned with cleaning agent and burrs shall be removed by filing and blue matched. Wherever necessary sealing/lubricating/anti-sieze 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.
- 35.7 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.
- 35.8 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 refuses to do it.
- 35.9 The contractor shall create all the facility at storage site as per the tender scope of work for unloading the equipment, its safekeeping and proper record and well protected. No material should be lying loose any where in the power house as well as stores.
- 35.10 De-watering of the areas/ floors in general will be carried out by M/s NTPC Limited. 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.
- 35.11 **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.

- 35.12 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.
- 35.13 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.
- 35.14 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.
- 35.15 The contractor shall provide his T&P stores for special tools and instruments at a convenient place near to the working area.
- 35.16 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.
- 35.17 BHEL shall develop the plot area approx. 6500 Sq. m. fenced from all sides with entrance, closed storage shed and open storage yard near Pipalkoti approx 20 KM from Power House. More open area may be provided by Customer subsequently near Power House. These locations shall be used for storage of materials. Contractor has to use these areas for storage of plant material supplied by various manufacturing units of BHEL. BHEL shall be providing the General Security arrangement at stores and powerhouse .

However responsibility of security (watch and ward) arrangement of plant material/equipment during handling, in stores of BHEL, in stores of contractor, in power house and all plant and equipments whether erected/ yet to be erected shall lie with the contractor.

BHEL shall develop the land one time only and temporary works like soling of land from time to time for upkeep of the storage area shall be the responsibility of the contractor.

36.0 CONSUMABLES

- 36.1 The contractor shall provide within finally accepted price, all consumables like gaskets for temporary work, gland packing, general purpose welding electrodes, filler wires, all gases (for inert, welding & cutting), soldering material, dye penetrants, chemicals etc and other erection consumables such as tapes, jointing compound, grease, mobil oil, M-seal, Araldite, Parmali wood, petrol, CRC/ other cleaning agents, wooden sleepers, steel required for temporary works such as supports , packing , H&S , shims etc. hardware items, sealing compound required for completion of work.
- 36.2 All the shims & gaskets which go finally as part of equipment shall be supplied by BHEL free of cost.
- 36.3 It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.
- 36.4 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding supplies of consumables such as welding electrodes/ filler wires/ gases lubricants etc. before procurement. On receipt of consumables at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform to BHEL all details regarding type of consumable batch No. date of expiry etc. and produce test certificate for each lot/ batch with correlation of batch/ lot no. with respective test certificate. No consumable will be allowed to be used without valid test certificate.
- 36.5 Special welding electrodes for main assemblies like distributor piping, distributor inlet pipe, MIV(Spherical valve) and its inlet pipe, Penstock valve, its inlet pipe/outlet pipe, major piping works of turbine eg: CW Systems, drainage/dewatering system etc. shall be provided by BHEL manufacturing units and shall be issued to contractor for subject work free of cost.. Contractor shall maintain proper records for all those consumables. Any additional requirements resulting due to reasons namely but not Limited to avoidable wastages, mis-handling, poor storage, high rate of rejections due to poor quality of welding or deployment of insufficiently experienced welders etc shall be arranged by contractor at his own cost within their quoted price for subject work.. General purpose welding rods shall be arranged by contractor at his own cost.

- 36.6 BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants/ special consumables if it is not found to be of the required standard/ make/ purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained. Storage of all consumables including welding electrodes shall be done as per requirement/ instruction of the Engineer by the contractor at his cost.
- 36.7 In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at market value plus the departmental charges of BHEL from time to time (30% at present). The decision of Engineer in this regard shall be final and binding on the Contractor.
- 36.8 Special consumables that are supplied by manufacturing units for erection and commissioning purposes will be issued by BHEL as free issue item. However the contractor shall use them to the satisfaction of BHEL Engineer and keep proper records for accountability
- 36.9 All lubricants and chemicals required for pre-commissioning, commissioning and testing, and lubricants for trial runs of the equipment shall be supplied by BHEL/ its Client. All services including labour and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. The consumption of lubricants/ chemicals shall be properly accounted for. Surplus material if any shall be properly stacked/ packed and returned to stores.
- 36.10 It shall be responsibility of the contractor to arrange the complete U/T equipment for NDT at site. For carrying out these tests for distributor ,MIV inlet pipe , BFV inlet outlet pipe and embedded piping, the contractor has to do the work as per drawing requirements with the quoted price.
- 36.11 Filling of oil for flushing, first filling of oil and subsequent change over or topping/ making up for generator, turbine, transformer etc till the unit is fully commissioned and handed over to customer is included in scope of BHEL. The contractor shall not waste any oil during flushing/ filling. Such wastages shall be on the account of contractor. The contractor shall return all the empty drums to BHEL / BHEL's client store at no extra cost. Any loss/ damage to above drums shall be to contractor's account.

37.0 TOOLS AND PLANTS / IMTE's

- 37.1 T&Ps and IMTEs (Inspection, Measuring & Testing Equipment), provided by BHEL/ Customer to sub-contractor free of hire charges shall be shared by other sub contractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding.

- 37.2 Besides the T&Ps and IMTEs being made available to contractor free of hire charges by BHEL/ Customer, all other T&Ps and IMTEs which are required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by the contractor at his own cost in working condition. In the event of the failure of contractor to bring necessary and sufficient T&Ps/ and IMTEs, BHEL will be at liberty to arrange the same at the risk and cost of contractor and hire charges as applicable shall be deducted from contractor's bill. Decision of BHEL in this regard shall be final and binding on contractor.
- 37.3 All distribution boards, connecting cables/ welding cables, wire ropes, hoses etc. including temporary air/ water/ electrical connections etc, shall have to be arranged by the contractor at his own cost.
- 37.4 In case of non-availability of the T&Ps to be provided by BHEL due to breakdown, major overhauls, distribution pattern or any other reason, the contractor shall plan/ amend/ alter his activities to meet erection/ commissioning targets in consultation with BHEL.
- 37.5 The operation of all BHEL's T&P being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange at his own cost operators, fuel, mobil oil, grease and other consumables/ lubricants etc. for the operation.
- 37.6 The contractor shall engage trained and experienced operators for the operation of BHEL's T&Ps and IMTEs. Their skill/ performance will be checked by BHEL Engineer before they are allowed to operate the same.
- 37.7 The day to day and routine maintenance of BHEL's T&Ps and IMTEs is to be carried out by contractor as per manufacturer's/ BHEL's maintenance schedule at his cost. These shall be maintained in good working condition during the entire period of use. T&Ps and IMTEs in defective/ damaged condition shall be rectified promptly to the full satisfaction of BHEL engineer. Contractor shall maintain records for maintenance of major T&Ps and IMTEs, which shall be made available for inspection whenever, required. In case of any lapses on the part of the contractor BHEL at its own discretion get the servicing/ repair of equipment done at the risk and cost of the contractor with BHEL overheads.
- 37.8 The contractor shall arrange at his cost all spares needed for upkeep of all T&Ps other than mobile cranes and Hydraulic Test pumps supplied by BHEL. For mobile cranes, repair / replacement of filter, batteries, self, dynamo shall be the responsibility of the contractor. However, the charges of the replacement of the damaged/ worn out parts of BHEL cranes will be borne by BHEL, provided the damage is not due to the negligence of the contractor. However, if there are breakdowns / damages due to negligence of the contractor, the complete

service/ repair charges and cost of all the spares damaged with BHEL overheads shall be to the account of contractor and shall be recovered from his RA bills.

- 37.9 Supervision and labour required for Routine maintenance and attending breakdowns shall be arranged by the contractor at his own cost. Specialist supervision shall be arranged by BHEL as assessed by BHEL Engineer.
- 37.10 Consolidation of ground and arrangement of sleepers / sand bag filling etc. for safe operation/ movement of equipment including cranes / trailers etc. shall be the responsibility of the contractor at his cost.
- 37.11 In the event of contractor not using and maintaining BHEL T&Ps and IMTEs according to BHEL's instructions, BHEL will have the right to withdraw such item without any notice and no claim in this regard shall be entertained and contractor shall be responsible for delay in execution on this account.
- 37.12 Regular utilisation report of the BHEL T&Ps and IMTEs as per requirement of BHEL shall be furnished by the contractor.
- 37.13 Any loss/ damage to any part of BHEL T&Ps and IMTEs shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss.
- 37.14 It shall be responsibility of the contractor to take delivery of T&Ps and IMTEs from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL store/ place as intimated by BHEL Engineer in project site in good working conditions after use.
- 37.15 Replacement cost including BHEL overheads in respect of irreparable/ completely damaged/ non return of T&Ps and IMTEs shall be recovered from the contractor's running bills.
- 37.16 The contractor shall return all BHEL T&Ps and IMTEs issued to him in good working condition (as handed over to him) as and when desired by BHEL (on completion or reduction of work load). If return of T&P and IMTE is delayed by contractor, hire charges as applicable shall be levied by BHEL from time, it was requisitioned till the time of actual return. Hire charges shall also be charged on the T&Ps and IMTEs returned in damaged/ un-serviced condition to BHEL till its satisfactory repair. T&Ps & IMTEs returned in damaged/ unserviced condition shall be got repaired by BHEL at its own discretion and entire cost of repair with BHEL overheads shall be recovered from the contractor.
- 37.17 The Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, Manila ropes, winches and slings, jacks of

different sizes & capacity, test pump etc. History card, maintenance and valid fitness certificates of records for major T&Ps will be maintained by the contractor and will be made available to BHEL Engineer for inspection as and when required. Identification for such T&Ps will be done as per BHEL Engineer's advice.

37.18 Contractor shall ensure deployment of reliable and calibrated IMTEs (Inspection, measuring and Test equipment). The IMTEs shall have test/ calibration certificates from authorised/ Govt. approved/ accredited agencies traceable to National/ International standards. Each IMTE shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.

37.19 Re-testing/ re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer with in the contract price. The contractor will also have alternate arrangements for such IMTE so that work does not suffer when the particular instrument is sent for calibration. Also if any IMTEs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall i.e. repeat the readings taken by that instrument. Failing which BHEL may deploy IMTEs and re-take the readings at contractor's cost.

37.20 BHEL shall have lien on all T&PS, IMTEs & other equipment of the Contractor brought to the Site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of Contract. No material brought to the Site shall be removed from the Site by the Contractor or his Sub-contractors without the prior written approval of the Engineer.

37.21 The month-wise T&P deployment plan to be submitted as per format (at Annexure - D to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account.

38.0 SUPERVISORY STAFF AND WORKMEN

38.1 The contractor shall deploy all the skilled, semi-skilled and un-skilled workmen and experienced supervisors/ engineers required for all the work under this specification. Only fully trained and competent persons with previous adequate experience on the job shall be deployed. They shall hold valid certificates wherever necessary. BHEL reserves the right to decide on the suitability of the workers and other personnel who will be deployed by the contractor. BHEL reserves the right to

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insist on removal of any employee workman of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.

38.2 The supervisory staff deployed by the contractor, shall ensure proper out-turn of work and discipline on the part of the labour put on the job by the contractor and in general see that the works are carried out in a safe and proper manner and in co-ordination with other labour and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

The bidders may note that apart from their site In-Charge, they have to deploy within the awarded rates necessary numbers of Mechanical and Electrical supervisors having working experience at Hydro Electric Project, as per the plan given by the BHEL Engineer.

The contractor shall specifically mention the deployment of the above person in the deployment plan so submitted by him along with the tender.

38.3 The work shall be executed under the usual conditions without affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with other personnel/ contractor, co-ordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

38.4 The contractor's supervisory staff shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. The contractor shall be responsible to ensure that assembly and workmanship conform to the dimensions and tolerances given in the drawings/ documents/ instructions given by BHEL Engineer from time to time.

38.5 The contractor shall deploy the necessary number of qualified/ certified and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.

38.6 It is the responsibility of the contractor to engage his workmen in shifts or on overtime basis for achieving the targets set by BHEL and also during the period of commissioning and testing of unit. The contractor's finally accepted rates/ prices shall include all these contingencies.

38.7 During the course of erection, if the progress is found unsatisfactory or if the target dates fixed from time to time for every mile stones are to be advanced or in the opinion of BHEL if it is found that the skilled workmen like fitters, operators, welders, technicians etc. deployed are not sufficient, BHEL after giving reasonable opportunity to the contractor, will induct on the work the required workmen in addition to contractor's workmen to improve the progress and

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recover from the contractor's bills any charges incurred for engaging the additional workmen with overheads.

38.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wire, trees or any other property or to any part of erected components etc., the contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

38.9 The month wise manpower deployment plan to be submitted as per format (at Annexure-C to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work It shall be the contractor's responsibility to deploy the required manpower, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account. Separate persons shall be identified at site for Quality control and Safety by the contractor as per ISO9002/OHSAS18001 REQUIREMENT.

39.0 MATERIAL MANAGEMENT AT STORES & POWERHOUSE

39.1 The scope of work mainly involves receipt, unloading from road carriers (Trucks/Trailers etc) of total materials for four units of 130 MW of BHEL (like Hydro-turbines, valves, generators, bus-duct, piping, auxiliaries equipment, C&I, BOP and other miscellaneous materials/ equipment) at site or bringing from road carrier godowns 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, security (for details refer cl. 35.17) arrangement of plant material/equipment shall lie with the contractor. Fire fighting equipments including fire extinguishers is to be provided in closed, open storage yard and power house. Scope also includes transportation of materials to erection site as and when required. The contractor is to use Cranes (provided by BHEL) and trucks/trailers (arranged by contractor) for the above work. Any other T&P required for transportation and material handling shall be arranged by the contractor.

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

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also assist BHEL for all correspondence regarding the insurance including preparation of claims.

- 39.2 Approx. weight for four units as indicated in Annexure- I is of the order of 7702 MT (Approx.) for material handling and **7074 MT** (approx) for erection. But the contractor required handling 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 Mobile Crane provided by BHEL .In this case, the rate (Sl. No. 3 of Rate Schedule) of unloading by EOT Crane will be applicable.

- 39.3 Annexure - I 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.
- 39.4 Some consignments mainly small/ parcels may also be received at carriers godown through road at Joshimath, Pipalkoti, Rishikesh, Hardwar. The contractor shall have to handle such consignments also as per rate quoted/ accepted.
- 39.5 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.
- 39.6 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.
- 39.7 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.

- 39.8 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.
- 39.9 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.
- 39.10 Payment of all demurrages/ wharfages 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/ wharfage 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.
- 39.11 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.
- 39.12 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.
- 39.13 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.
- 39.14 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.

39.15 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.

39.16 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.

39.17 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.

39.18 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.

39.19 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.

39.20 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.

39.21 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.

- 39.22 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 authorised representative of BHEL at their residence, if required, and obtain instructions to make suitable arrangements.
- 39.23 In the event unloading from the carrier is delayed by the contractor, the detention charges, if any, will be contractors account.
- 39.24 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.
- 39.25 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.
- 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 except for steel 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. (50% on installation and 50 % on dismantling and return of material to BHEL Store).
- 39.26 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.
- 39.27 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.
- 39.28 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.

39.29 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.

39.30 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.

39.31 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 weighing of the same within the project premises if required).

39.32 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.

39.33 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.

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39.34 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.

39.35 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.

40.0 MATERIAL HANDLING, STORAGE AND TRANSPORTATION TO POWERHOUSE

40.1 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.

40.2 Contractor shall store / stack/ identify materials properly in open/ closed/ tarpaulin covered storage yard/ shed and it shall be contractors responsibility to assist BHEL in identifying material well in time for erection according to programme.

40.3 The contractor shall identify and deploy necessary engineer/ supervisor/ workmen for the above work in sufficient number.

- 40.4 All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes/ slings etc. shall be used for unloading/ handling. The equipment shall be properly protected to prevent any damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved the actual location at the appropriate time so as to avoid damage of such equipment at site.
- 40.5 Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated manufacturer drawings. Slings/ shackles of proper size shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damages. In no case piping should be dragged. In case of any damage the cost shall be recovered from the contractor.
- 40.6 Contractors shall be responsible for examining all the plant material received by them and notify the engineer immediately any damage, shortages, discrepancies etc. The contractor shall submit to the engineer every week a report detailing all the receipt during the week, however the contractor shall be solely responsible for any shortages or any damages in stores, storage yard, handling, storage at erection site and erection of equipment once received by them.
- 40.7 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. Responsibility of security (for details refer cl.35.17) arrangement shall lie with the contractor. 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.
- 40.8 The contractor shall maintain an accurate and exhaustive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.
- 40.9 All the material in custody of contractor and stored in the open or dusty locations must be covered with suitable weather proof/ fire retardant covering material wherever applicable and shall be blocked up on raised level about ground. The contractor at his cost shall arrange all covering materials and blocks and sleepers.
- 40.10 If the material belonging to the contractor are stored in area other than those earmarked for this operation the engineer will have the right to get it moved to the area earmarked for the contractor at the contractors risk and cost.
- 40.11 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

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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.

- 40.12 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.
- 40.13 The contractor shall be responsible for making suitable indoor storage facilities to store all equipment (drawn by the contractor from BHEL/ Customer stores), which require indoor storage till the time of their installation. The Engineer will direct the contractor in this regard which item in his opinion will require indoor storage and the contractor shall comply with Engineer's decision.
- 40.14 The contractor shall ensure that all surplus damaged scrap/ unused, packing wood/ containers / special-transporting frames etc. are returned to BHEL at a place in project area identified by the Engineer. All account will be maintained by the contractor for all such items received and returned to BHEL. Any shortage in returning such items shall be chargeable to the contractor excepting an amount of 20% allowable against wastage for packing wood only.
- 40.15 The contractor shall hand over all parts/ materials remaining extra over the normal requirement with proper identification tags to the concerned BHEL Engineer.
- 40.16 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.
- 40.17 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.

41.0 PRESERVATION OF COMPONENTS

- 41.1 After taking delivery from BHEL/ customer/ transporter of manufacturing units/ customer's stores, plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere.

- a. Items stored outdoors shall be blocked up above the ground suitably
- b. Generator, poles,
- c. Insulating materials, valves, electrical equipment, control equipment and instruments, rubber items etc. shall be stored indoors in warehouse provided by BHEL/ its Client. Windings shall be kept dry by use of external heat or space heaters.
- d. Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean.
- e. Insulation materials shall be stored indoors/ protected against getting wet.

41.2 It shall be the responsibility of the contractor to apply preservatives/ touch up paints (primer) on equipment handled and erected by him till final painting. It shall be contractor's responsibility to arrange for required paints (Primer), thinners, labour, scaffolding materials, cleaning materials like wire brush, emery sheets, etc. Contractor shall carry out cleaning of surface and provide one coat of preservatives/ paints (primer) from time to time as decided by BHEL engineer. The accepted rate shall include this work also. It is to be noted that such painting may have to be done as and when required till such time the final painting is carried out.

41.3 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts then and there for their protection.

41.4 Any failure on the part of contractor to carry out works according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.

42.0 CLEANING OF EQUIPMENT

42.1 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.

42.2 The 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 avoid use of cotton waste for cleaning any equipment. The electrical equipment before erection shall be cleaned with dry air/ vacuum cleaner.

42.3 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 within the contract. Disposal of chemical has to be carried out by the contractor at his own cost.

43.0 ERECTION

43.1 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.

43.2 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.

43.3 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.

43.4 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.

43.5 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.

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

43.7 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.

- 43.8 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.
- 43.9 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.
- 43.10 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.
- 43.11 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.
- 43.12 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.
- 43.13 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.
- 43.14 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.
- 43.15 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.
- 43.16 Normally the valves fittings 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. All valves are to be pressure tested before installation.

- 43.17 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.
- 43.18 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.
- 43.19 The adjustment of all supports erected for maintaining the proper slopes of piping wherever required is also included in the scope of the contractor.
- 43.20 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.
- 43.21 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.
- 43.22 Contractor shall install piping in such a way that no excessive or destructive expansion forces exist under any condition.
- 43.23 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.
- 43.24 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.
- 43.25 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.

- 43.26 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.
- 43.27 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.
- 43.28 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.
- 43.29 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 handling and erection in the annexures 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 lumpsum price for subject works for handling and erection works.
- 43.30 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
- 43.31 Erection of embedded parts and foundation parts may have to be carried out by mobile crane(To be provided by BHEL/Customer) due to non availability of EOT crane in power house.This shall be part of erection work within the quoted rates.
- 43.32 During erection /testing/pre commissioning /commissioning /operation of turbine and generator auxiliaries, Governing and oil Pressure system such as MIV,BFV, Nozzle servomotor, Deflector servomotor ,MIV/BFV servomotors, Bypass valve, Decompression Valve, Sealing Valve, Vacuum breaking valve, Gov OPU etc

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may have to be attended for replacement of rubber items and for mal operation. This shall be part of erection/commissioning work within the quoted rates.

44.0 WELDING, HEAT TREATMENT AND OTHER NON-DESTRUCTIVE TESTING

44.1 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 distributor piping, 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 distributor piping in maximum of two months period.

44.2 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 contractors site mobilisation completion.

44.3 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.

44.4 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' shaving passed qualification tests does not absolve contractor of contractual obligation to continuously check the welder's performance.

44.5 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.

- 44.6 All charges for testing of contractor's welders including consumables for welding / destructive and non destructive 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.
- 44.7 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.
- 44.8 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.
- 44.9 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 .
- 44.10 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
- 44.11 All welds shall be painted with anticorrosive red oxide paint once stress relieving works are over. Necessary consumables and scaffolding etc. including paints shall be provided by contractor at his own cost.

- 44.12 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.
- 44.13 Pre-heating, Ultrasonic and other NDT tests, post heating and stress relieving after welding of distributor, MIV inlet / outlet pipes, BFV inlet/outlet pipes 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.
- 44.14 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 chinks, 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..
- 44.15 The contractor shall also be equipped for carrying out other NDT like DP, MPI, UT etc. as required as per welding schedule/ drawings within the finally accepted price/ rates on all equipment welding in distributor piping, inlet pipe, MIV(SPH), 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.
- 44.16 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.
- 44.17 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.

- 44.18 Heat treatment 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.
- 44.19 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.

45.0 TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST-COMMISSIONING.

- 45.1 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.
- 45.2 The contractor shall carry out the required tests as instructed by BHEL using contractor's own consumables, labour and scaffoldings.
- 45.3 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.
- 45.4 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.
- 45.5 For testing of Distributor Piping, MIV and Penstock Valve, 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.

- 45.6 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.
- 45.7 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.
- 45.8 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.
- 45.9 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.
- 45.10 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.
- 45.11 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.
- 45.12 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.
- 45.13 Cleaning & servicing of all the filters/ strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.
- 45.14 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.

45.15 During erection /testing/pre commissioning /commissioning /operation of turbine and generator auxiliaries, Governing and oil Pressure system such as MIV,BFV, Nozzle servomotor, Deflector servomotor ,MIV/BFV servomotors, Bypass valve, Decompression Valve, Sealing Valve, Vacuum breaking valve, Gov OPU etc may have to be attended for replacement of rubber items and formal operation. This shall be part of erection/commissioning work within the quoted rates.

46.0 PROGRESS REPORTING

46.1 Contractor is required to draw mutually agreed monthly erection programmes in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed programme and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.

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

46.3 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases/ electrodes) report and other reports as per Performa considered necessary by the Engineer.

46.4 The progress report shall indicate the progress achieved against planned, with reasons indicating delays, if any, and shall give the remedial actions which the contractor intends to take to make good the slippage or lost time, so that further works again proceed as per the original programme and the slippage's do not accumulate and effect the overall programme.

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

47.0 DRAWING AND DOCUMENTS

47.1 The detailed drawings, specifications available with BHEL engineers will form part of this tender specification. These document will be made available to the contractor during execution of work at site. The contractor will also ensure availability of all drawings / documents at work place.

- 47.2 Necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan which shall be returned to BHEL Engineer at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.
- 47.3 The contractor shall maintain a record of all drawings and documents available with him in a register as per format given by BHEL Engineer. Contractor shall ensure use of pertinent drawings/ data/ documents and removal of obsolete ones from work place and returning to BHEL.
- 47.4 The data furnished in various annexes enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work.
- 47.5 Should any error or ambiguity be discovered in the specification or information the contractor shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.
- 47.6 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimension / details, without specific approval of BHEL.
- 48.0 TAXES AND DUTIES.**
- 48.1** TDS under Income Tax, Sales Tax, VAT and surcharge etc, if any, shall be deducted at prevailing rates on gross invoice value from the running bills unless Exemption Certificate from appropriate Authority / Authorities is furnished.
- 48.2** Price quoted shall be inclusive of all taxes except service tax. The service tax, as legally leviable & payable by the contractor under the provisions of applicable law/act, shall be paid by BHEL as per contractor's bill. However, contractor shall have to submit proof of service tax deposited by them immediately after the deposit but not later than the next bill submitted after the due date of deposit. The contractor shall furnish proof of Service Tax registration with Central Excise Division covering the services covered under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by contractor on BHEL for this project The contractor shall obtain prior approval of BHEL before billing the service tax amount and should submit proper CENVATABLE invoice as per Service Tax Rules.
- With introduction of Cenvat credit rules 2004 which came into force w.e.f. 10.09.2004, excise duty paid on input goods including capital goods used for providing the output service and service tax paid on input service can be taken credit of against the service tax payable on output service. As such, while offering the rates, the contractors may take into account the benefit of above provisions as the cost of input to contractors will be the cost net of excise duty

and service tax and adjust their offer price accordingly to make it more competitive.

- 48.3** In VAT applicable States, "Tax Invoice" if required under the relevant State VAT law shall be submitted alongwith other compliances as per concerned VAT Act.
- 48.4** Contractor shall get his organization registered with concerned sales tax/VAT authorities within 15 days of award of this contract, if applicable. The delay on this account and delay in bringing the material shall be to contractor's account and no extension of time shall be allowed on this account. The sales tax/VAT registration for this contractor shall be forwarded to BHEL within 30 days from the date of LOI. In case the contractor is already registered for sales tax/VAT with Govt. Authorities he must quote his registration no, while submitting their tender.
- 48.5** Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing their materials, plants, and equipment at site for the execution of the work, including arrangement of Road permits as applicable under this contract.

49.0 EXTRA WORK:

49.1 BHEL may consider for payment of extra works on manhour basis @ Rs.30/- (Rupees thirty only) per manhour only for such of those works which:

- a. Require major revamping or rework and which are totally unusual to normal erection work.
- b. Require rectification / modification for improvement in the design during testing/ commissioning,
- c. Requiring fresh fabrication of components in place of rejected/ replaced components.

49.2 The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals

49.3 The extra works, if any, shall be carried out by a separate gang or beyond working hours which can be identified for certification of man-hours. Logbook should be maintained and should be signed jointly by the contractor's representative and the BHEL Engineer on day to day basis. However, signing of log book does not necessarily mean acceptance of the extra works which would be identified by Engineer whether work is covered in one of the above categories. Only those works and man-hours, which are certified by the BHEL Engineer-in-charge, will be considered for payment. The decision of BHEL in this regard shall be final and binding on the contractor.

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50.0 PRICE VARIATION

50.1 The finally accepted rates for scope of work as defined in this tender are subjected to price variation provisions as per following formula. The required documents shall be submitted by contractor :

$$P1 = \frac{0.75 \times P0 (F1 - F0)}{F0}$$

P1 = Increase / decrease in billed amount (variation) for the particular month of billing

P0 = Billing amount for the month as per contract provisions.

F1 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month under consideration i.e. for which bill has been raised.

F0 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month of opening of technical bid.

50.2 The contractor will be required to raise the bills for price variation payments on a monthly basis irrespective of the facts whether any increase or decrease in CPI. Price variation as per above formula will be calculated and paid/deducted on the total value of work done (excluding payments towards extra works and over run, if any) on month-to-month basis. BHEL however reserves the right to freeze variation for that much of duration of delays, from time to time, which are entirely attributable to the contractor. **Average of applicable price indexes paid shall be taken as index for PVC for final 5 % amount.**

50.3 With the provision of price variation as above NO CLAIM / COMPENSATION on account of any increase whatsoever, (irrespective of whether variation are steep / unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, electrodes, gases or any other item / reason) will be payable during the entire period of execution including extended period, if any.

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51.0 RATE SCHEDULE

- 51.1** 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.
- 51.2** The tenderer shall quote the rates as per the rate schedule only, in Part II price bid (Original). Conditional price bids or price bids with any deviation/ clarification etc. are liable to be rejected. No cutting/ erasing / over writing shall be done.
- 51.3** Contractor's total quoted price as per Rate Schedule will be taken as tentative only. The contractor undertakes to erect/commission actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payment will also be regulated for the same. The quantities indicated against each item may vary to any extent and no compensation will be payable in variation of individual quantity.

52.0 INSTRUCTIONS TO TENDERER

- 52.1** Offers received without data/ information required to be submitted under tender clauses-11.1 to 11.11 are liable to be rejected. All these data/ information documentary evidences should be duly supported by documentary evidences (Refer note below clause 11)
- 52.2** No deviations to the tender conditions will normally be accepted.
- 52.3** The tenderers are advised to actually visit the site and fully acquaint themselves with site conditions, location of stores, transportation routes, Local taxes, toll charges and levies, local labour minimum wages & prevailing wage agreements at site, quantum of work etc. before quoting their rates for this work. BHEL shall not be responsible in any way for non-familiarisation of site conditions. Once the tenderer has quoted for the work, it is implied that he has ascertained various site condition and NO CLAIM whatsoever will be entertained by BHEL on any such account.
- 52.4** The contractor in the event of this work awarded to him, shall establish a site office at site and keep posted an authorised responsible officer who should hold a valid power of attorney for the purpose of the contract. Any or order or instruction of the Engineer or his duly authorised representative shall be communicated to the contractor's representative at site office and the same will be deemed to have been communicated to the contractor at his legal address. .

52.5 Contractor has to insure his T&P against all risks. In addition to Insurance under workman compensation act, all statutory insurances including employers liability insurance has to be arranged by the contractor.

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SECTION III-B

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Clause	Description
53.	Scope of work
54.	Finish Painting
55.	Facilities to be provided by BHEL/Customer(NTPC)/Contractor
56.	Time schedule
57.	Over run
58	Insurance
59	Terms of Payment
60	Performance Guarantee
61	Liquidated Damages (LD)
62	Security Deposit
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TAPOVAN VISHNUGAD HEP 4X130 MW

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SECTION III-B

53.0 SCOPE OF WORK:

53.1 Scope of these specifications cover complete work of

(A) Material Handling

Complete material handling at site which includes unloading of all the incoming material of all packages including packages not in erection scope of PSNR but in scope of Other BHEL Units - Bhopal, ISG and TBM groups of BHEL/ their vendors, by truck / trailer / carriers, reporting damages, providing necessary helps in insurance claim lodging, shifting of material to open/ closed storage yards, proper storing and stacking, material verification and shortage reporting, material preservation as per instructions, On receipt of demand for material from erection site, loading of material on truck/ trailer/ carriers, transporting the same to powerhouse/ erection place. The total material to be handled shall be approximately **7702 MT** but the contractor shall have no extra claim in the event of reduction of quantity of material. The details of total materials to be handled shall be as per **Annexure-I**. Accordingly the bidders are required to quote their rates against **Sl. No. 2 & 3 of Rate Schedule. (Some material/equipment shall be unloaded near stores /service bay by EOT crane / Mobile cranes. However Preservation and record keeping of same shall be in this scope of work)**

BRIEF DESCRIPTION OF EQUIPMENT FOR MATERIAL HANDLING:

- 1) 4 sets of Embedded Parts including embedded pipelines,
- 2) 4 sets of Distributor pipings
- 3) 4 sets of Pelton Turbine & accessories
- 4) 4 sets of Electro hydraulic Digital Governing System & accessories
- 5) 4 sets of MIV & Accessories (Spherical Valve with coating)
- 6) 2 sets of Penstock Valve (BF valve) & accessories with coating
- 7) 4 sets of Generator & auxiliaries system including automatic water sprinkler type fire fighting system for Generator

- 8) 4 sets of Static Excitation system & DVR
- 9) 4 sets of 15.5KV IP Bus Duct including CTs & PTs, LAVT, VT & NG cubicles
- 10) 4 sets of 15.5 KV Generator circuit breaker
- 11) 1 lot of 415 V Non segregated Phase Bus duct
- 12) 4 sets of Cooling Water system including Pipings
- 13) 1 lot of Dewatering & station Drainage systems including Pipings
- 14) 1 lot of Fire Detection & Fire Protection system
- 15) 1 lot of Ventilation & Air conditioning system
- 16) 1 lot of 11 KV Air Insulated switchgear
- 17) 1 lot of HP compressed air system
- 18) 1 lot of LP compressed air system
- 19) 2 nos. of 150/30T EOT crane
- 20) 1 nos. of 75/20T EOT crane
- 21) 1 no. of 10T EOT crane
- 22) 2 nos. of Passenger Lifts
- 23) 1 lot of 33 KV GIS
- 24) 1 lot of LT Switchgear in Power House, Pothead Switchyard, Barrage Area, Tailrace Outfall, B/F Valve cavern & surge shaft Top
- 25) 2 nos. of 13.8kv/11.5 kv,6.300MVA cast resin Dry Type station aux. Transformers
- 26) 4 nos. of 13.8kv/0.433kv,630KVA, cast resin Dry Type unit aux. Transformers
- 27) 2 nos. of 11kv/0.433 kv,2MVA cast resin Dry Type Transformers
- 28) 2 nos. of 11kv/34.5kv,4MVA oil filled Transformers for Colony/Barrage area supply
- 29) 6 nos. of 11kv/0.433 kv,250 KVA cast resin Dry Type Service Transformers for supply to B/F Valve, tailrace area & surge shaft area
- 30) 2 nos. of 33kv/0.433kv,1MVA oil filled Transformers for Barrage area supply
- 31) 2 nos. of 11kv/0.433 kv,500 KVA cast resin Dry Type Service Transformers for Pot –Head yard
- 32) Lighting Transformer as per requirement
- 33) 4 nos. Dry Type cast Resin Excitation Transformers
- 34) 4 nos. Cubicle of Excitation Transformer
- 35) 1set of 220V DC Systems for Power house
- 36) 1 set of 220V DC Systems for Barrage Area
- 37) 2 nos. of 1250KVA/11KV Power House diesel unit
- 38) 1 no. of 300KVA, 415V Spillway diesel unit

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- 39) 1 lot of Earthing circuit & lightening protection
- 40) 1 lot of Illumination
- 41) 1 lot of water level monitoring system
- 42) 1 lot of Flood detection system
- 43) 1 lot of Fire detection system
- 44) 1 lot of False floor
- 45) 1 lot of Control & Monitoring system including SCADA
- 46) 1 lot of Cables & cable carrier system, power & control cables including cable trays & accessories
- 47) 1 lot of Fiber optic cables as required including OPGW between barrage and power house
- 48) 1 lot of Telecommunication System
- 49) 1 set of Mechanical workshop
- 50) 1 set of Electrical Workshop
- 51) 1 no. of 300KVA, 415V Mobile diesel unit (Barrage area)
- 52) 1 lot of CCTV system
- 53) 1 lot of Public Address System
- 54) Spares of all above system
- 55) Other miscellaneous Mechanical/Electrical assemblies
- 56) Field testing turbine equipments
- 57) Field testing generator equipments
- 58) 1 lot of Any other item not covered above but included in our contract with NTPC

BHEL has taken land near Pipalkoti approx 20 KM from power house for development of Storage Yard and may hire some land for storage in nearby area or near power house.

Some of the testing / handling devices like distributor testing device, MIV testing device, BF Valve testing device, Stator / Rotor lifting device etc after completion of work of respective unit may have to be transported back to store due to space constraint in power house. Contractor will be paid on per ton handling basis. Since verification and long duration preservation is not required, contractor shall be paid 60% of the rate mentioned in Sl. No. 2 of Rate Schedule each way.

(B) Erection & Commissioning:

Pre-erection assembly, erection, testing (including hydraulic, NDT, electrical, stage & final HV including dry out etc of relevant equipments at various stages during erection), pre-commissioning and commissioning including trial run,

handing over to customer NTPC Limited of the following equipments for four units of 4X130MW Tapovan Vishnugad HEP, rated head 483.0 m, rated speed 300 RPM anticlockwise vertical Pelton type hydro turbines, Main Inlet Valve (Spherical type), semi umbrella type hydro generators (stator core building and rotor rim building at site) connected to three phase generator transformers (Gen. Transformers not in BHEL scope) through 15.5KV IP Bus Duct. Approximate weight for erection will be **7074 MT**.

During erection /testing/pre commissioning /commissioning /operation of turbine and generator auxiliaries, Governing and oil Pressure system such as MIV,BFV, Nozzle servomotor, Deflector servomotor ,MIV/BFV servomotors, Bypass valve, Decompression Valve, Sealing Valve, Vacuum breaking valve, Gov OPU etc may have to be attended for replacement of rubber items and formal operation. This shall be part of erection/commissioning work within the quoted rates.

Contractor please note that mobilization of skeleton staff for unloading/storage/preservation will start 15 days from zero date. Major mobilization shall be as per clause 56.2 of this tender.

BRIEF DESCRIPTION OF EQUIPMENT FOR ERECTION & COMMISSIONING

- 1) 4 sets of Embedded Parts including embedded pipelines,
- 2) 4 sets of Distributor pipings
- 3) 4 sets of Pelton Turbine & accessories
- 4) 4 sets of Electro hydraulic Digital Governing System & accessories
- 5) 4 sets of MIV & Accessories (Spherical Valve with coating)
- 6) 2 sets of Penstock Valve (BF valve) & accessories with coating
- 7) 4 sets of Generator & auxiliaries system including automatic water sprinkler type fire fighting system for Generator
- 8) 4 sets of Static Excitation system & DVR
- 9) 4 sets of 15.5KV IP Bus Duct including CTs & PTs, LAVT, VT & NG cubicles
- 10) 4 sets of 15.5 KV Generator circuit breaker
- 11) 1 lot of 415 V Non segregated Phase Bus duct
- 12) 4 sets of Cooling Water system including Pipings
- 13) 1 lot of Dewatering & station Drainage systems including Pipings
- 14) 1 lot of 11 KV Air Insulated switchgear
- 15) 1 lot of HP compressed air system
- 16) 1 lot of LP compressed air system
- 17) 1 lot of 33 KV GIS
- 18) 1 lot of LT Switchgear in Power House, Pothead Switchyard, Barrage

- Area, Tailrace Outfall, B/F Valve cavern & surge shaft Top
- 19) 2 nos. of 13.8kv/11.5 kv, 6.3 MVA cast resin Dry Type station aux. Transformers
 - 20) 4 nos. of 13.8kv/0.433kv,630KVA, cast resin Dry Type unit aux. Transformers
 - 21) 2 nos. of 11kv/0.433 kv,2MVA cast resin Dry Type Transformers
 - 22) 2 nos. of 11kv/34.5kv,4MVA oil filled Transformers for Colony/Barrage area supply
 - 23) 6 nos. of 11kv/0.433 kv,250 KVA cast resin Dry Type Service Transformers for supply to B/F Valve, tailrace area & surge shaft area
 - 24) 2 nos. of 33kv/0.433kv,1MVA oil filled Transformers for Barrage area supply
 - 25) 2 nos. of 11kv/0.433 kv,500 KVA cast resin Dry Type Service Transformers for Pot –Head yard
 - 26) Lighting Transformer as per requirement
 - 27) 4 nos. Dry Type cast Resin Excitation Transformers
 - 28) 4 nos. Cubicle of Excitation Transformer
 - 29) 1 Set of 220V DC Systems for power house
 - 30) 1 Set of 220V DC Systems for barrage area
 - 31) Earthing circuit and lightening protection
 - 32) 1 lot of Control & Monitoring system including SCADA
 - 33) 1 lot of Cables & cable carrier system, power & control cables including cable trays & accessories
 - 34) 1 lot of Fiber optic cables as required including OPGW between barrage and power house
 - 35) Other miscellaneous Mechanical/Electrical assemblies
 - 36) Field efficiency testing piping and assistance during field testing of turbine
 - 37) Field testing of Generator

DETAILED SCOPE OF WORK IS AS GIVEN BELOW:**1. TURBINE SYSTEM****A. Embedded part**

The embedded parts comprise mainly of Turbine Housing (Housing cone, Top cover) Lower Pit Liner, Central Frame Work and embedded pipes in 1st stage primary concreting.

Housing Cone: Housing cone is of welded steel construction (Inside Dia-9250 mm,Height-5010 mm and Thickness – 20mm) in five pieces, designed for efficient evacuation of water from runner buckets and welded to top cover at site. A flange is provided for supporting the turbine guide bearing. Labyrinth seal rings shall be provided in bottom portion where shaft passes through the cover, to prevent water inside the cover leaking out along the opening. ID 9250 MM ,Hight -

Top Cover: Top cover is of welded construction in (Inside Dia-9250 mm,Height-1860 mm and Thickness – 20mm) in five pieces, shall be welded together and to the lower pit liner at site. A sealing arrangement shall be provided at top cover 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
(Combined weight of Housing and Top cover is 56.5 T)

Suitable ejector along with valves and pipings 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.

Lower Pit Liner: It shall be of welded steel construction and is in two halves.This will be welded together and to top cover at site. The pit liner ID is 9250 mm and height is 5800 with plate thickness of 10mm. Weight of lower pit liner is 20 T aprox..

Central Frame Work: The Central Frame Work is supplied in 12 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.

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

The embedded pipelines (Carbon Steel and SS) weighing total about 143 tonnes for all units have been foreseen in primary concreting which mainly comprise penstock drain, distributor drain, brake jet valve piping etc. All welding shall be checked as per drawings. Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement. For medium and large size pipes, regular bends will not be supplied and therefore bends shall have to be fabricated at site within the quoted rates. 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.

The embedded tubes for field efficiency test of turbine weighing 1 T approx for all the units have been foreseen. Major portion of this piping will be embedded in first stage concreting, rest is exposed piping.

B. Foundation parts

The foundation parts comprise mainly distributor piping, inlet pipe to distributor and upper pit liner and embedded pipes in secondary concreting.

Distributor Piping: It shall be of fabricated constructions with branch outlets for six nozzles.. It shall be supplied in 7.segments to site. Welded neck flanges has been provided for six nozzles.Thicknes of sections varies from 26mm to 63 mm.

5 makeup piece have been provided for alignment and welding of above 7 segments. Make up piece have been supplied with erection allowance to be cut to match at site. Edge preparation have to be done at site. The welding of distributor to be tested 100% ultrasonically 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.

C. Embedded pipe lines in secondary stage foundation

For various functions for all units embedded pipelines 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. Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement. For medium and large size pipes, regular bends may not be supplied and therefore bends shall have to be fabricated at site within the quoted rates . 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. Before erection, complete nozzle and deflector

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assembly are to be pre testing in S/bay. Weight of each nozzle assembly is approximately 11 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 3779 mm and height 912.6 mm is in single piece weighting approximately 20 tonnes.

The turbine shaft is flanged type at both ends with guide bearing journal of diameter 1200 mm. This is bolted to runner at turbine end with shear bush and fitted bolt. Upper flange of turbine shaft is bolted with fitted bolt to generator shaft bottom flange. Total length of shaft is 6088 mm and aprox. weight is 33 tonnes.

The shaft is provided with a collar to support the runner and shaft assembly on the turbine guide bearing housing when uncoupled from generator end.

F. Turbine guide bearing

Guide bearing shall be of submerged self oil lubricating shell type with internal cooling arrangement. Combined bearing support and shell in halves with heavy joint flange are provided. 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 turbine housing top cover shall be done at site after centering of bearing housing.

G. Turbine sealing

Conventional shaft sealing arrangement is not provided in pelton turbine. For shaft sealing serrations is provided in bottom cone of turbine housing

H. Other standard assemblies

Various assemblies like feedback system, top cover drain pumps, oil pumping system, oil air receives, oil leakage unit as generally provided in any hydro unit are all foreseen which shall be erected at site.

I. 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.

J. 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.

K. Oil, water, air pipelines

Laying and clamping /supporting of oil pipe lines ,water pipe lines and compressed air pipe lines are shown indicative in respective drawing .which can be decided to suit site condition. Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement. For medium and large size pipes, regular bends may not be supplied and therefore bends shall have to be fabricated at site within the quoted rates .The pipes are to be 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 acid pickling to be carried out as per drawing requirement.

L. Other Miscellaneous Mechanical assembly

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

M. Main Inlet Valve (Spherical Valve):

Main Inlet Valve: 2200 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 is 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 fabricated construction and is in two halves bolted together. The valve door shall be of casting with trunnions on both sides bolted.MIV shall be assembled in service bay and shall be hydraulically pressure tested before lowering on foundation. Weight closure is envisaged.

Inlet pipe of MIV: The inlet pipe (70mm thick) is in one piece of diameter 2200 mm at upstream side it is welded to penstock and at downstream

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side flanged to MIV. Welding shall be subjected to ultrasonically tested as per drawings.

Outlet Pipe with dismantling joint:__The outlet pipe with dismantling joint is in one piece of diameter 2200 mm and its length is approximately 620 mm. At upstream side it is flanged to MIV and at downstream side flanged to distributor.

N. Digital Governor & Oil Pressure System for Governor, Oil Pressure system for MIV, Oil Pressure System for Penstock Valave

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, piston accumulators, set of Nitrogen bottle for keeping the system pressurized upto required pressure, 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, B.F. valve electrical panel and feedback mechanism along with piping and associated equipment.

O. Penstock Valve (Butterfly Valve):

Two nos. 3600mm dia Butterfly Valves, each comprising of servomotors, counterweight, 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.

Inlet Pipe of Penstock Valve: It is fabricated from steel plates of penstock pipe material and equivalent diameter of penstock. 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 of inlet pipe with penstock shall be carried out as per drawings.

Outlet Pipe with dismantling joint of Penstock Valve: It is fabricated from steel 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.

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2. GENERATOR SYSTEM

A. General:

The generator is of vertical shaft semi Umbrella 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 on a tubular shaft. The generator thrust cum guide bearing is positioned below the rotor in lower bracket and a guide bearing above the rotor in upper bracket. The bearings are of self-lubricating type PTFE and immersed in oil bath in which plug-in type oil coolers are provided.

Air operated brakes are mounted on lower bracket arms. 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 upper guide bearing is positioned above 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. Water Sprinkler 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 through 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. Anti condensation

B. Stator: The stator frame shall be dispatched to site in four segments. The outside diameter of stator frame A/F is approx 7900 MM. The stator core outside diameter is 6800 mm, inside diameter 5670mm. and Core height is 2000 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-3500mm 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 tight fitted 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. No broaching of the rim shall have to be done at site. Height of rim is 2070mm and rim punching thickness is 1.8 mm each.

- E. Poles With Field Windings:** There are 20 poles each having 3 no. 'T' shaped tails to engage with corresponding 'T' shaped slots in rotor rim. Weight of per pole is approx 4.5 Tonnes
- F. Slip Rings & Brush Gear:** The 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 below the rotor in bottom bracket. Thrust bearing is of spring mattress with segmental pad type consisting of a set of 20nos. 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 lower bracket. The guide bearing is of pivoted pad type consisting of 8nos. pads.
- The generator is also provided with another set of guide bearing above the rotor in top bracket. Top guide bearing consisting of 8 nos 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.

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- 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 4 nos. radial arms. The arms are to be bolted 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
 - Rotor temperature indicator.
 - Mechanical over speed device.
 - On line vibration monitoring system.
 - Air gap monitoring system.
 - Creep detector system.
 - Speed sensing gear (Turbine scope).
 - Shaft current monitor, moisture detector.
 - Partial discharge monitoring system
 - Lighting system
 - Brake dust collector
 - Dynamic braking
- Q. Water Sprinkler Type Fire Extinguishing System:** An automatic operated water sprinkler system has been provided complete with ring headers, discharge nozzles, temperature detector, smoke detector etc.

3. DRAINAGE/DEWATERING SYSTEMS

comprising of two submersible pump(one acting and one standby) along with piping, valves, fittings, starter panels, flow indicators, pressure gauge. Also one no. of submersible pump motor set provided along with valve, pipe etc. to dewater the pit directly to the tailrace in case of emergency.

4. ONE SET OF LP COMPRESSED AIR SYSTEM

For generator brakes and other station requirements comprising mainly of compressors, dryers, air receiver, filters, fittings, instruments, valves, piping, starter panels along with piping and other associated equipment. One separate local air receiver is provided for generator brakes for each unit.

5. COOLING WATER SYSTEM

Four sets (one for each unit) of cooling water system for supplying cooling water to turbine, generator and transformer. The system shall consist of primary and secondary loop circuit. The cooling water for primary circuit shall be tapped from cooling water sump and shall be discharged into tailrace. Primary circuit consists two vertical turbine type motor sets(one main, other standby), two automatic self cleaner strainer, one plate type heat exchanger and one set of NRVs, isolating valves, piping and fittings etc. necessary for operation. Secondary circuit (closed water system) consists of two horizontal centrifugal pump motor sets (one main & other standby), two Y-type strainers, one set of NRV, isolating valves, pipings, fittings etc. necessary for operation, one motorized valve at inlet of each unit, two vertical turbine pumps(common for all units) placed in cooling water cooling water sump for emergency feeding of overhead tank (overhead tank is in scope of M/s NTPC Ltd.), two automatic self cleaning strainer (common for all units) for emergency feeding of overhead tank and one set of piping make up water tank to NTPC's clean water tank with valves, fittings etc.

Erection of 1st stage embedded, 2nd stage embedded and surface/ exposed air, oil, water or any other pipelines for all above systems including fabricating/making site bends, cleaning, clamping, flushing, hydraulic testing as per drawing requirements and standard practices etc.

Pipes shall in general be supplied in straight lengths and to be bent at site as per requirement. For medium and large size pipes, regular bends may not be supplied and therefore bends shall have to be fabricated at site as per BHEL drawings.The ends of the pipelines shall be kept covered during concreting and/or other civil works. Thermal insulation of the pipelines as per requirements given in the relevant drawings of different systems shall be done at site.

6. MICROPROCESSOR BASED EXCITATION SYSTEM

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Microprocessor Based Excitation System with Dynamic Braking Systems and AVR's consisting of excitation transformers, AVR's, rectifier system, power supply units, field flashing circuits , field flashing panel, Field Breaker Panel, Thyristor Panel , digital control and metering equipment, special cables , special tools and mandatory spares.

The generator excitation system shall be of the thyristor controlled rectifier type, complete with supply transformer (dry type) and micro processor based voltage regulator and rectifier controls. The power supply for excitation system will be taken directly from the generator ac terminals, through excitation transformer. The field flashing circuit shall be supplied from another transformer/rectifier assembly suitable for connection to a 415V, 50 Hz, 3 phase supply/station dc supply of adequate capacity.

7. 15.5 KV ISOLATED PHASE BUS DUCT

It mainly comprising of 4 sets each of main bus duct, tap off bus duct for connecting UAT, SAT, Excitation Transformer, Isolator cubicle, Dynamic breaking cubicle, LAVT cubicle & NG cubicle, VT Cubicle, Galvanized Steel Structure and Earth Switch, sets of tap off bus duct for connecting SST, Isolators, 2 sets of Air Pressurizing Equipment along with various rubber bellows, seal off bushings, CTs, VTs and other associated equipment. Power frequency voltage withstand test, Ohmic Resistance test – DC etc., 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 drawing

8. 415V NON SEGREGATED BUS DUCT

Non segregated LT Bus Duct for interconnection between Station Service Boards 1 & 2, from Station Service Boards to Station Service Transformers is provided.

9. THE TOTAL CONTROL & MONITORING SYSTEM (SCADA system based on maxDNA DDCMIS)

The SCADA system is based on BHEL's maxDNA DDCMIS system. It includes Control Boards, Central Control Room Equipment, 1 set of Ethernet Bus System (maxNET) for SCADA, Plant Bus Equipment, 1 set of Interface panel for Remote Control, 1 set of UPS in Power House, 1 set of UPS in Barrage, 4 sets of 24 V DC Battery system for units, 1 set of GPS based Time Synchronisation System, 1 set of Unit Control desk & Furniture for HMI system, OWS at NTPC's OS Control Room, HMI system at barrage control room, 1 set of individual UPS for

computers, PCs for the use of 400kV S/yard SCADA supplier and Mandatory spares.

Control Boards comprises of:

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 unitwise remote I/O (with redundant o/p module for drives) modules of maxDNA 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 equipment comprises of:

2 sets of OWS (maxSTATIONS) each with CPU, dual TFT based VDU, keyboard and mouse, LVS based OWS (maxSTATIONS) with two nos. of large Video screen and spare lamps, two nos. each of A3 colour laser printer, dot matrix (line impact) printer, laptop based maxSTATION, EWS, Gateways for providing interface to s/yard SCADA, RCC, dispatch centre with IEC 101 protocol, NTPC Plant Bus, remote maxVUE station at OS control room through dialup facility of employer's VSAT equipment, BHEL-EDN's remote maxVUE facility through dial up modem thru dedicated ISDN telephone line provider by employer, Historians with CPU, 21" TFT VDU, Keyboard & Mouse for data storage and LAN servers for Plant LAN

Plant bus equipment consisting of:

Two no. of 24 port ethernet switches connected to gateway of scada and suitable for connecting 10 sets of PCs loaded with maxVUE software each with

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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 NTPCs 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.

10. POWER, CONTROL AND INSTRUMENTATION CABLES

Complete with cable terminals, accessories, **trays/ support structures**, cabling/-wiring, proper dressing, identification tags, clamping of cables on trays for all the hydro generating equipment in Power House area and Barrage area along with associated items & auxiliaries BUT excluding the cabling between BHEL & Customer equipments (excluding between generator transformer and DCDB/ACDB panel of BHEL), between Customer equipment's, all outgoing feeders from Barrage intake area, switchgear 1&2 and 415V emergency boards 1 &2 to equipments/systems which are not in BHEL scope, 33kV cables from 33kV SSB 1&2 to colony.

11. AUXILIARY TRANSFORMERS AS BELOW

- 2 nos. of 13.8kv/11.5 kv,6.300MVA cast resin Dry Type station aux. Transformers
- 4 nos. of 13.8kv/0.433kv,630KVA, cast resin Dry Type unit aux. Transformers
- 2 nos. of 11kv/0.433 kv,2MVA cast resin Dry Type Transformers
- 2 nos. of 11kv/34.5kv,4MVA oil filled Transformers for Colony/Barrage area supply
- 6 nos. of 11kv/0.433 kv,250 KVA cast resin Dry Type Service Transformers for supply to B/F Valve, tailrace area & surge shaft area
- 2 nos. of 11kv/0.433 kv,500 KVA cast resin Dry Type Service Transformers for Pot –Head yard
- Lighting Transformer as per requirement
- 5 nos. (1 no. spare) Dry Type cast Resin Excitation Transformers

12. DC SYSTEM FOR POWER HOUSE

1 set of 220V power supply system for power house comprises 4 Nos. each of 700AH, PLANITE, 220V/400AH, NI-CD, 220V batteries, Charger and DC Distribution Boards with incoming, outgoing feeder, 1 No. of Pothead Yard DCDB with incoming, outgoing feeder and all mandatory spares and accessories.

13. DC SYSTEM FOR BARRAGE AREA

1 set of 220V power supply system for power house comprises 2 Nos. each of 175AH, PLANITE, 220V/100AH, NI-CD, 220V batteries, Charger and DC Distribution Boards with incoming, outgoing feeder and all mandatory spares and accessories.

Finish painting of equipment as per drawing requirements. Paints shall be supplied by BHEL. Painting may also be required on embedded / foundation parts prior to concreting etc.

Some of the main tests apart from the routine tests during erection, pre commissioning and commissioning shall include HV, SCC, OCC, load rejection tests upto 110 %, emergency stop tests, over speed tests, turbine & generator output tests, vibration measurement & balancing, etc on each units and field efficiency test and type test on one unit. Inspection of the units shall be carried out after load throw off tests and re-tightening of wedges, fasteners etc if required shall be carried out.

53.2 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.

53.3 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.

53.4 EOT cranes 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 carry 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.

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

- 53.6** Most of the items / consignments will be despatched directly to site by road. However some consignments mainly small parcels may also be received at Rishikesh/Hardwar town through road / rail. The contractor may have to handle such consignments also.
- 53.7** Details with weights & Dimensions of Major equipment supplied by BHEL under this scope are given in Annexure-I. However, changes in design may occur as is usual 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.
- 53.8** EOT crane may not be available for the erection of embedded parts and foundation parts. The contractor has to carry out the works by his own T&P within the awarded rates. BHEL will provide mobile crane free of cost, with the condition that operator and diesel/lubricants have to be provided by the contractor.
- 53.9** During erection /testing/pre commissioning /commissioning /operation of turbine and generator auxiliaries, Governing and oil Pressure system such as MIV,BFV, Nozzle servomotor, Deflector servomotor ,MIV/BFV servomotors, Bypass valve, Decompression Valve, Sealing Valve, Vacuum breaking valve, Gov OPU etc may have to be attended for replacement of rubber items and for mal operation. This shall be part of erection/commissioning work within the quoted rates.

54.0 FINISH PAINTING

- 54.1** 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
- 54.2** 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.
- 54.3** 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.

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55.0 FACILITIES TO BE PROVIDED BY BHEL/ CUSTOMER(NTPC)/CONTRACTOR

55.1 The Contractor will have to arrange for open space for their site office and store . It is the responsibility of the contractor to construct temporary sheds for his use, and to dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.

55.2 BHEL/CUSTOMER shall not provide space for labour colony. Contractor shall have to arrange accommodation for his workmen/ staff on his own within the awarded rates. Contractor shall be responsible for providing all necessary facilities to staff and workmen like construction of residential accommodation with electricity, water, sanitation, transport, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations.

55.3 NTPC is providing construction power free of charges for erection / testing / commissioning for complete E & M Packages at one point. Contractor at his cost shall do further distribution. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply. Contractor has to arrange electric connection and distribution for BHEL stores located in Pipalkoti / project area for the total period. Electric consumption charges for complete store including area lighting shall be borne by the contractor.

Although NTPC is providing free construction power for erection / testing / commissioning of complete E & M Package, **Contractor has to install 100 kV DG set for backup power for erection / commissioning.**

Following may be noted by the bidders:

Note: Construction power will be provided at 11 KV systems at one point near power house site for meeting underground requirements. Contractor shall arrange and install all necessary equipments and protections which are necessary like 11 KV breakers, switchgear, 11KV/415V transformers of adequate rating, LT panel, cabling, earthing etc.

For over ground/system agency may be provided power at 415V from the LT substation installed in the nearby vicinity. Necessary cables for power extension will be arranged by the contractor

55.4 The Contractor will arrange for construction water & drinkable water and shall lay network of pipelines at his cost to various work spots requiring construction water.

For shortage of water, Contractor will be responsible for alternative arrangements.

55.5 Provision of distribution lines of electrical power from Construction power to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper/ Brass clamps, copper conductor, change over switches pipes etc.

at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

55.6 In case of power cuts/ load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

55.7 Adequate lighting arrangement such as flood lights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, storage area etc within finally accepted rates.

55.8 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.

56.0 TIME SCHEDULE

56.1 The contractor is required to commence the work within 15 days from the date of issue of letter of intent unless BHEL decides to fix any other later date. However, BHEL Engineer will certify the actual date of start of work after adequate mobilisation of manpower, T&P and other pre-requisites as stated in the contract.

56.2 Entire work as detailed in the tender specifications shall be completed **within 30 months** from the date of start of work (as decided by BHEL) as per the milestones of Unit- 1 mentioned below :

a) Zero Date	Date of LOI
b) Site Mobilization for Matl Handling/start of work	15 Days from date of LOI
c) Major site mobilization for start of erection	start of 6 th Month
d) Start of erection of 1 st Stage Embedments	start of 6 th Month
e) Completion of 1 st Stage Embedments	end of 7 th Month
f) Start of erection of Foundation Parts	start of 10 th Month
g) Completion of Foundation Parts	end of 12 th Month
h) Start of Lowering & Unit axis alignment	start of 16 th Month
i) Compln of Lowering & Unit axis alignment	end of 18 th Month
j) Start of pre-commissioning & Boxing up	start of 19 th Month
k) Completion of pre-commissioning & Boxing-up	end of 21th Month
l) Spinning of Unit	22 th Month
m) Commissioning of Unit	23 th Month
n) Handing Over of Unit	24 th Month

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Note:

1. Major mobilization shall start from the date of start of erection of 1st stage embedments which is at the start of 6th month from the zero date. All milestones are applicable from zero date.
2. Keeping phase difference of 2 months, the handing over of Unit #2, Unit #3 and Unit #4 will be in 26th , 28th and 30th month respectively.

56.3 In case if there is suspension in work beyond three months due to reasons not attributable to contractor, **then the contractor will be permitted to demobilize their man power and establishment subject to the condition that the required manpower with T & P's will be made available for balance works, which will be as per scope / condition of the contract. In such case, the contractor has to remobilize required manpower Tools and Plants etc & take up the site works within fifteen days of intimation. For this purpose the contractor shall be paid a fixed lumpsum of Rs.1,00,000/- towards demobilization and remobilization. Out of this Lumpsum amount of Rs.1,00,000/- for this activity, Rs.40,000/- will be paid after demobilization and Rs.60,000/- will be paid after complete remobilization as per site requirement. No over run compensation shall be paid for this period.**

56.4 The work under the scope of this contract is deemed to be completed in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

57.0 OVER RUN

57.1 In case due to reasons not attributable to the contractor, the erection work gets delayed and scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of **three months** after the contractual completion date. In case the scheduled completion time gets extended beyond **three months** as stated above, the contractor shall be considered for payment of fixed over run charges @ **Rs. 1,50,000/- PM (Rupees One lacs fifty thousand per month only)** for entire scope of work on receipt of advance notice intending to claim over run and on fulfillment of following conditions:-

- a. The reasons for delay in completion of work are not attributable to contractor but however subject to the provisions of clause – 31.
- b. Contractor achieves the targets fixed during the over run period. However, the over run charges shall be Limited to 10% of the contract value.

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57.2 Once the claim of over run charges is admitted no other compensation whatsoever (like for delays in receipt of materials, availability of fronts etc.) will be entertained.

57.3 The contractor shall maintain sufficient work force and other resources required for completion of the job expeditiously for the entire contractual period including total extended period.

58.0 INSURANCE

58.1 All equipment will be insured by M/s BHEL /Customer up to the time of completion of their erection, testing and commissioning within the comprehensive MCE policy. The MCE policy so taken shall have provisions for deductible franchise. Subject to provisions of GCC clause No. 29.0 the deductible franchise shall be borne by contractor. The Contractor shall take an insurance policy for all the workmen employed by him against accidents and injuries as per the statutory requirements.

59.0 TERMS OF PAYMENT

59.1 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.

59.2 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.

59.3 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.

59.4 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:

(A) Sl. No. 1 of the Rate Schedule

92% of contract rate of Item **No. 1 of Rate Schedule (PRICE BID PART II)** shall be payable as detailed in **Billing Breakup of subcontractor Annexure IX** enclosed.

(B) Sl. No. 2 of the Rate Schedule

(i) 32% of the rate shall be payable on prorata basis for material handling after the materials are safely unloaded 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 filled/Records generated in stocks (Stock registers and computers) and certified by Engineer.

(ii) 20% of the rate shall be payable on prorata basis after safekeeping/stacking, 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),submission of information as per Material management forms by contractor immediately after verification of materials as certified by Engineer. Required Performa would be supplied by site.

(iii) 40 % of the rate shall be payable on prorata basis after materials are loaded in trucks/trailors from stacked area, transported and unloaded at requisite place (a) with his own arrangements/BHEL/ EOT crane and proper handing over to erection group.

(C) Sl. No. 3 of Rate Schedule

(i) 52% of the rate shall be payable on prorata basis for material handling after the materials are safely unloaded directly in the Power House using his own labour and T&P and 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 and records and proper preservation as per BHEL standards is ensured. 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 as certified by Engineer. Required Performa would be supplied by site.

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(D) Payment Related To Resource Augmentation/Cleanliness

1. An amount limited to 1.7% of the awarded contract value shall be payable in one or more instalments, solely at the discretion of Construction Manager/BHEL at different stages of the contract execution to facilitate resources augmentation or to meet or any exigency of work. In case of its non-utilization 'OR' its part utilization, the entire/balance payment against this category shall be released along with commissioning of HTG.

2. An amount limited to 1.3% of the awarded contract value shall be payable in 30 instalments @ 0.043% per month, solely at the discretion of Construction Manager/BHEL on account of maintaining cleanliness at work places and following safety norms.

(E) Balance 5% of the value shall be payable as under

(i). **2.5%** of the contract value as executed, shall be payable on completion of all pending works, which includes settlement of all outstanding issues, reconciliation of material wherever required, area cleaning etc.

(ii) The balance **2.5%** of the contract value as executed will be payable after 3 months on contractors discharging his responsibilities as stipulated in this contract and on passing of final bill. The certificate of Engineer regarding such approval and passing of sums shall be final and conclusive against the contractor.

Note:

1) **Above payment at (E)** shall be released after adjustment of the contract value based on actual work carried out.

2) No payment shall be made for handling of items issued from BHEL stores for storing, stacking of materials and their return.

60.0 PERFORMANCE GUARANTEE:

Irrespective of provisions in tender else where, in view of nature of work, performance guarantee is required under this contract.

61.0 LIQUIDATED DAMAGES (LD)

This clause shall be applicable as per clause no. 25.5 of the GCC of the tender.

62.0 SECURITY DEPOSIT

The contractor shall submit Security Deposit within 15 days from the date of issue of LOI as per clause no. 16.2 of the General Conditions of Contract (GCC). In case the contractor opts to furnish Bank Guarantee as a part of Security Deposit, the BG shall be issued as per the Performa enclosed as per Annexure-H of the GCC and also that the BG

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should be issued preferably through any of the Member Banks listed in the GCC. For BG through any other Nationalized Bank (Not covered in the list of Member Banks of GCC), the discretion of its acceptance shall lie solely with BHEL.

63.0 OTHERS

63.1 In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.

63.2 The tenderer shall specifically confirm that he has inspected the site of work and acquired full knowledge and information about the site conditions, wage structure, Industrial climate, total work involved and will not raise claim of any nature due to lack of knowledge of site condition. He will also confirm that local taxation laws at the site have been clearly understood by him.

63.3 **The Price Bids / Reverse Auction 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 and acceptance of customer. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.**

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ANNEXURE-II

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	02 No.
2.	Mobile Crane	55/75 MT	01 No.
3.	EOT Crane for Power House	150/30 MT	02 No.
4.	EOT Crane for Butterfly Valve House	75/20 MT	01 No.
5.	EOT Crane for GIS Hall	10 MT	01 No.

Note:

1. The above mentioned suitable capacity crane without slings & lifting tackles will be provided by BHEL on sharing basis. The operation and maintenance of crane shall be the responsibility of contractor. The fuel shall be also given by contractor. All other terms & conditions shall be as per tender clause no. 37
2. 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. The major maintenance of EOT crane will be carried out by NTPC. 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.
3. The contractor will have to provide qualified operators along with assistant for operating the cranes provided by BHEL as indicated above including EOT cranes.

ANNEXURE-III

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.	TRUCK -10 T	01 NO.	
2.	TRAILOR WITH PULLING UNIT - 20 T	AS PER REQUIREMENT	
3.	TRAILOR WITH PULLING UNIT -60/70 T	AS PER REQUIREMENT	
4.	FORK LIFT – 3 MT	1 NO.	
5.	FIRE EXTINGUISHERS 10KG ABC DRY POWDER TYPE	MINIMUM 15 NOS.	
6.	GENERAL PURPOSE MATERIAL HANDLING T&P	1 SET	
7.	TORQUE WRENCHES UPTO 2000 NM	1 SET	
8.	CHAIN PULLEY BLOCK , PULL LIFT	2 NOS.	
9.	TURN BUCKLE (2 T, 5 T)	4 EACH	
10.	HYDRAULIC / MECHANICAL JACKS (5-50 MT)	4 EACH	
11.	GAS CUTTING SET (ACETYLENE CYLINDER, OXYGEN CYLINDER CUTTING SET WITH HOSE & REGULATOR.	AS PER REQUIREMENT	
12.	WELDING GENERATOR (300/ 600 A) WITH CABLE & HOLDER	AS PER REQUIREMENT	
13.	AIR ARC GOUGING ARRANGEMENT	1 NO.	
14.	ELECTRODE OVEN	4 NOS	
15.	AIR COMPRESSOR	AS PER REQUIREMENT	
16.	HYDRAULIC PUMP HAND OPERATED.	1 NO	
17.	HYDRAULIC JACKS 50 TONS	4 NO.	
18.	WELDING MACHINE SET.	10 SET	
19.	PRECISION TOOLS (IMT) TENTATIVE QUANTITY 1. 0.02 ACCURACY BLOCK LEVEL-1 NO. 2. DUMPY LEVEL WITH ACCESSORIES- 1 NO 3. INSIDE MICROMETER – AS PER REQUIREMENT 4. OUTSIDE MICROMETER-0-25, 25/50, 50-75, 75-100, 100-150 5. VERNIER CALLIPERS 150, 300 – 2 EACH 6. TELESCOPIC GAUGE- 1 SET		

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|--|-----------------------------------------------------------------------------------------------------------|--|--|
| | 7. SLIP GAUGE- 1 SET
8. FEELER GAUGES- AS PER REQUIREMENT
9. DIAL GAUGE WITH MAGNETIC STAND- 6 NOS. | | |
|--|-----------------------------------------------------------------------------------------------------------|--|--|

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 of section III A (Tools & Plants, IMTEs) Clause no. 37 | | | |
| 3. Consignments which can not be handled by Mobile Crane provided by 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. | | | |

ANNEXURE-IV

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	3 Nos.	
2.	Digital multimeter	2+2 nos.	2 nos. For BHEL use
3.	Meggar hand operated 500V / 1000V 200 Mohms	2 Nos.	
4.	Power meggar 2500v / 500v 2500 00 mohms	1 no.	
5.	Phase sequence indicator 110-450V	1 No.	
6.	Digital Tong tester of different rating	2 Nos.	
7.	Single phase variac 0-220 V, 8/15A	1 No.	
8.	Three phase variac 0-415, 8/15A	1 No.	
9.	Rheostat 0-250 ohms 2A, 0-8 Ohms 15A, 0-8 Ohms 15A, 0-26 Ohms 5A, 0-165 ohms 2 Amps	As per requirement	
10.	Hand tachometer(Digital) 0-15000 r.pm	As per requirement	
11.	Function Generator - Input/ output 220V AC/ 30 V DC, 20 VA	As per requirement	
12.	A.c. H.v..test kit 0-40 kv, 400 kva with provision of 20 kv floating voltage	As per requirement	
13.	Dead weight Tester for calibration of pressure gauge.	As per requirement	
14.	Kelvin's double bridge	As per requirement	
15.	C.T.'s 50/100/200/500 by 5A	As per requirement	
16.	P.t's 3.3/6.6/11/13.8by 110 V	As per requirement	
17.	D.c. Shunt 2000a / 10 mv	As per requirement	
18.	Stop watch	As per requirement	

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19.	Precision thermometer	As per requirement	
20.	Laptop	1 No.	For BHEL use
21.	Desktop Computer set including Printer cum Scanner	1 set	For BHEL use

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 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 no. 37 of section III A (Tools & Plants, IMTEs)
3. BHEL supplied special T&Ps/ IMTE's for Erection & testing will be issued to contractor on Free of charge basis.

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ANNEXURE -V

CERTIFICATE OF DECLARATION

FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS

We,..... Hereby declare and confirm that we have visited the project site under the subject namely,and **acquired full knowledge and information about the site conditions, wage structure, Industrial climate and total work involved.** We further confirm that the above information is true and correct and we will not raise any claim of any nature due to lack of knowledge of site condition.

Tenderers Name and Address

Place:

(Signature of the Tenderers with stamp)

Date:

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ANNEXURE-VI

**NON DISCLOSURE AGREEMENT
Memorandum of Understanding**

BHEL PSNR is committed to Information Security Management System as per Information Security Policy.

M/s....., providing.....service to BHEL PSNR, Noida hereby undertake to comply with the following in line with Information Security Policy of BHEL PSNR;

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.
- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL PSNR.

()
M/s. BHEL, PSNR

()
M/s.....

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ANNEXURE-VII

FORMAT FOR E-PAYMENT DETAILS : - BHEL-PSNR-NOIDA

(To be given in Company letterhead)

Beneficiary Name :

Bank Name & Branch :

M ICR Code (9 Digit) :

IFSC CODE :
(VALID FOR NEFT)

Beneficiary Account No. :

Beneficiary E-mail ID :
(for payment confirmation)

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ANNEXURE -VIII

**FORMAT OF UNDERTAKING
(To be submitted in the bidder's letter head)**

REF:

Dt.

**Bharat Heavy Electricals Limited
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar,
NOIDA – 201 301.INDIA**

Sub.: Material handling and erection, testing, commissioning & trial operation of Pelton type turbines, generators, switchgear , bus duct, excitation system, C & I etc of 4x130 MW Tapovan Vishnugad Hydro Electric Project of NTPC Limited at Animathgad (Helong), 14 Km from Josimath and 20 Km from Pipalkoti in District -Chamoli,Uttarakhand

TENDER NO. BHEL: NR (SCT): TAPOVAN VISHNUGAD: HTG: 695

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited Tapovan Vishnugad [site](#) before submission of our offer and noted the job content & site conditions etc.

We also confirm that we have not changed / modified the tender documents as appeared in the website and in case of observance at any stage; it shall be treated as null and void. We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT and confirm our acceptance to reverse auctioning process and we hereby convey our unqualified acceptance to all terms and conditions as stipulated in the tender and NIT. In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer strictly in accordance with tender instructions.

Thanking you,
Yours faithfully,

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

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ANNEXURE-IX

BILLING BREAK UP FOR SUB CONTRACTOR FOR TAPOVAN VISHNUGAD HEP ETC TENDER								
SR. NO.	ACTIVITY		UNIT NO.				COM-MON	TOTAL
			I	II	III	IV		
1	TURBINE	26						
i)	Embedded parts comprising primary embedded piping, lower turbine housing, top cover, pit liners, central frame work etc		1	1	1	1		4
ii)	Foundation parts comprising distributor piping, inlet pipe to distributor, upper pit liner including hydraulic testing, secondary embedded piping etc		1.25	1.25	1.25	1.25		5
iii)	Nozzle servomotor, deflector servomotor assembly		0.5	0.5	0.5	0.5		2
iv)	Shaft and runner assembly		0.3	0.3	0.3	0.3		1.2
v)	MIV(Spherical), inlet pipe, outlet pipe, accessories, servomotors assy and testing		0.75	0.75	0.75	0.75		3
vi)	Guide bearing including pad scraping		0.4	0.4	0.4	0.4		1.6
vii)	Penstock Valve(BF), inlet/outlet pipe and associated equipments incl. OPU System		0.7		0.7			1.4
viii)	OPU with sump tank and air pressure accumulator for Governor and MIV and associated piping		0.15	0.15	0.15	0.15		0.6
ix)	OPU adjustment, Dry stroking and time adjustment of Nozzle Servomotor, Deflector Servomotor etc		0.1	0.1	0.1	0.1		0.4

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x)	Gov. oil piping and MIV piping etc		1	1	1	1		4
xi)	Instrumentation and box up for readiness for spinning		0.2	0.2	0.2	0.2		0.8
xii)	Pre commissioning checks		0.5	0.5	0.5	0.5		2
								26
2	GENERATOR	30						
i)	Dressing of foundations		0.05	0.05	0.05	0.05		0.2
ii)	Stator core building and winding & HV test of complete stator		1.4	1.4	1.4	1.4		5.6
iii)	Stator shifting to pit and its alignment, levelling etc		0.1	0.1	0.1	0.1		0.4
iv)	Rotor assembly in service bay, HV etc		1.8	1.8	1.8	1.8		7.2
v)	Rotor lowering in pit		0.1	0.1	0.1	0.1		0.4
vi)	Lower bracket assembly in service bay		0.05	0.05	0.05	0.05		0.2
vii)	Instt of lower brkt in pit, alignment etc		0.1	0.1	0.1	0.1		0.4
viii)	Assembly of brake and jack system		0.2	0.2	0.2	0.2		0.8
ix)	Upper bracket assembly including Generator flooring in service bay		0.25	0.25	0.25	0.25		1
x)	Instt of upper brkt in pit, alignment etc		0.1	0.1	0.1	0.1		0.4
xi)	Blue matching of bearing pads and thrust bearing components		0.2	0.2	0.2	0.2		0.8
xii)	Shaft and thrust bearing assembly in service bay		0.25	0.25	0.25	0.25		1
xiii)	Shifting thrust bearing, shaft assembly to pit incl final installation		0.05	0.05	0.05	0.05		0.2
xiv)	Installation of stator air coolers including CW piping and lagging		0.3	0.3	0.3	0.3		1.2
xv)	Water sprinkler type fire protection system of generator and brake dust collector		0.1	0.1	0.1	0.1		0.4

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xvi)	Generator instrumentation, gauge panel including calibration		0.25	0.25	0.25	0.25		1
xvii)	Rotor/ turbine shaft coupling including any correction for alignment		0.1	0.1	0.1	0.1		0.4
xvii i)	Rotor/ generator shaft coupling including any correction for alignment		0.1	0.1	0.1	0.1		0.4
xix)	Extension shaft, slip ring, brush gear, CCL etc		0.5	0.5	0.5	0.5		2
xx)	Unit axis alignment		0.4	0.4	0.4	0.4		1.6
xxi)	Box up of bearings, air baffles, generator		0.8	0.8	0.8	0.8		3.2
xxii)	Pre commissioning checks		0.3	0.3	0.3	0.3		1.2
								30
3	Exc sys with AVR, Ex trans etc	2	0.5	0.5	0.5	0.5		2
4	15.5 kV Isolated phase bus duct & its tap off, terminal cubicles etc	5	1.25	1.25	1.25	1.25		5
5	415 V Non segregated Phase Bus Duct	1					1	1
6	220V DC system for Power House	0.5					0.5	0.5
7	220V DC system for Barrage	0.5					0.5	0.5
8	Control & Monitoring (SCADA) sys incl computers, VDU's, printers, RTUs, optic fibre cable(all control desk and control panels in control room including Alarm & announc.,sync panels, instruments, relays, automatic energy metering system etc	2	0.5	0.5	0.5	0.5		2
9	Power, control & instrumentation cabling, cable trays, support structures,	4	1	1	1	1		4
10	11 kV Air Insulated Switchgear with all accessories	0.8	0.2	0.2	0.2	0.2		0.8

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11	2 nos. 6300 kVA SAT, 4 nos. 630 kVA UAT, 2 nos. 2MVA DTT, 2 nos. 4 MVA oil filled transformer for colony/barrage, 6 nos. 250 KVA DT transf for BF Valve, tailrace & surge shaft area, 2 nos. 1 MVA oil filled transf for Barrage area, 2 nos. 500 KVA Service transf for Pot Head Yard, Lighting transf, 4 nos. Dry Type Cast Resin Exc transf, 4 nos. Cubicle of Excitation transf	4					4	4
12	15.5 kV Generator Circuit Breaker	0.4	0.1	0.1	0.1	0.1		0.4
13	CW system (one for each unit) with primary & secondary loop circuit for Turbine, generator and transformer, piping etc	2	0.5	0.5	0.5	0.5		2
14	Drainage water pumps and piping etc for PH	1					1	1
15	Dewatering system pumps and piping etc	1					1	1
16	HP Compressed System (N ₂ System) & LP comp air system with compressors, accessories, piping etc	0.6	0.1	0.1	0.1	0.1	0.2	0.6
17	33 kV GIS	0.4					0.4	0.4
18	LT Switchgear in PH,Pothead S/yard, Barrage, Tailrace outfall, , B/F valve cavern & surge shaft cavern	0.5					0.5	0.5
19	Grounding/Earthing system (Earth Mat) for power house, transf cum GIS cavern and Bus Duct Gallaery/ Connecting tunnel	1.9	0.35	0.35	0.35	0.35	0.5	1.9

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20	Fibre optic cables as required incl. OPGW between PH and Barrage	1					1	1
21	Painting of equipment	1	0.25	0.25	0.25	0.25		1
22	Spining and bearing run of unit	1	0.25	0.25	0.25	0.25		1
23	Synchronising including commissioning tests prior to synchronising	2	0.5	0.5	0.5	0.5		2
24	Load throw off tests and unit inspection	0.4	0.1	0.1	0.1	0.1		0.4
25	Field efficiency test of turbine and generator including preparatory works	1					1	1
26	Arrangement of Power in line with cl. 55.3 of SCC including the Note	2					2	2
	TOTAL	92						92
27	As per clause No. 59.4 D	3						3
28	On completion of trial run and handing over the units to NTPC OR 3 months after the contractor has discharged his responsibilities as per contract including which ever is earlier, including handing over of spares	2.5						2.5
29	2.5% of the contract value shall be payable on completion of all pending works, which includes settlement of all outstanding issues, reconciliation of material wherever required, area cleaning and handing over surplus materials and spares to NTPC/ BHEL and submission of final bill.	2.5						2.5
								100
	TOTAL	100						

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ANNEXURE-X

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	