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# TENDER SPECIFICATIONS

TENDER NO. BHEL/NR/SCT/JHAJJAR/CNI/662

FOR

ERECTION, TESTING, COMMISSIONING AND TRIAL OPERATION OF C&I  
EQUIPMENTS AT 3X500 MW APCPL , JHAJJAR, HARYANA”

## 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 – Northren Region,  
Plot No. 25 , Sector - 16A ,  
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)  
Phone: 0091-0120-2515476 / 2515464 / 2515479  
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Email: [swapan@bhelpsnr.co.in](mailto:swapan@bhelpsnr.co.in) / [msd@bhelpsnr.co.in](mailto:msd@bhelpsnr.co.in)**

**TENDER NO. BHEL/NR/SCT/JHAJJAR/CNI/662**

**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:

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### **TENDER NOTICE**

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of “Erection, testing, commissioning and trial operation of C&I Equipments at 3X500 MW APCPL , JHAJJAR, HARYANA”

### **TENDER NO. BHEL/NR/SCT/JHAJJAR/CNI/662**

#### **QUALIFYING REQUIREMENTS (QR):**

- 1.0 “Tenderers who wish to participate should have executed similar nature work in 195 MW Unit or higher capacity (consisting of Boiler & Steam Turbine control panels and related field instrumentation works) in Power Projects/ Industrial Projects during last seven years”.
  
- 2.0 Tenderers should also have an average annual turnover of minimum of Rupees 345 lacs based on the audited accounts of last three financial years (2005-06, 2006-07 & 2007-08) or (2006-07, 2007-08 & 2008-09). Bidders shall submit audited balance sheets and profit & loss account in support of this.

#### **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 10.11.2009** 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 10.11.2009 before** opening of technical bids commences. Technical bids shall **be opened at 15.30 Hrs. on 10.11.2009.**
- (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.
- (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.
- (ix) Purchase Preference will be given to CPSUs as per Govt. Guidelines.
- (x) **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.
- (xi) Unsolicited rebate/discount shall not be accepted after bid opening.
  - (xii) Bids, once submitted, shall not be returned.

DGM/ SCP



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and OHSAS 18001 certified  
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### DOMESTIC NOTICE INVITING TENDER

LAST DATE OF SALE : 10.11.2009

DUE DATE OF SUBMISSION: 10.11.2009

NIT NO. / NAME OF WORK
------------------------

<p><b>TENDER NO. BHEL/NR/SCT/JHAJJAR/CNI/662</b></p>
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<p>Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of "Erection, testing, commissioning and trial operation of C&amp;I Equipments at <b>3X500 MW APCPL , JHAJJAR, HARYANA</b>".</p>
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#### NOTES

1. Purchase Preference will be given to CPSU as per Govt. Guidelines.
2. Please visit our website at [www.bhel.com](http://www.bhel.com) for details.
3. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper

**DGM**

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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.

## PROJECT SYNOPSIS

1. Name of the Owner : ARAVALI POWER CORPORATION PVT LTD
2. Address : INDIRA GANDHI STPP  
District JHAJJAR  
Haryana
3. Installed capacity : New project
4. New Installation : 3 x 500 MW
5. Nearest Railway station : Jharli -- 3 km  
Jhajjar Town - 35 km  
Bahadurgarh - 70 km  
Delhi – 150 km
6. Nearest City : Bahadurgarh 70 Km
7. Nearest Airport : Delhi - 150 km
8. Maximum Temperature : 48 Deg C
9. Minimum Temperature : Appx 2 Deg C

**SECTION-III  
PART-A**

**SPECIAL CONDITIONS OF CONTRACT**

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Clause	Description
34.0	General
35.0	Civil works, foundation and grouting
36.0	Consumables
37.0	Tools & Plants/ IMTE's
38.0	Supervisory staff & workmen
39.0	Material handling and storage
40.0	Preservation of components
41.0	Welding and NDT
42.0	Progress reporting
43.0	Drawings & documents
44.0.	Income tax, Service Tax & sales tax etc.
45.0	Extra work
46.0	Price Variation
47.0	Rate schedule
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50.0	Security Deposit
51.0	Others

**SECTION-III  
PART `A`**

**SPECIAL CONDITIONS OF CONTRACT**

**34.0 GENERAL**

- 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 method, 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 / 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 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.
- 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 labour, supervisors, Engineers, watch and ward as required, tools & tackles, calibrated inspection, measuring and test equipment as specified and otherwise required for the work and consumable for erection, testing and commissioning including material handling.
  - (b) Proper out-turn as per BHEL plan and commitment.
  - (c) Completion of work as per BHEL Schedule.
  - (d) Good quality and accurate workmanship for proper performances of equipment.
  - (e) Repair, rectification and modification in electrical circuits/wiring involving removal of connections & redoing as per modification.
  - (f) Preservation / Reconservation of all components during storage / erection till handing over.

**34.5 Health, Safety & Environment management (HSE)**

**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 Contractor shall ensure following ;**

34.6.1 Contractor shall maintain contact with local hospital having scanning & other ultra modern medical facilities including ambulance required during emergency.

34.6.2 Contractor shall ensure pre employment medical check for all staff & workers.

34.6.3 Contractor shall ensure that adequate First Aid facilities with trained male nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, the following

- a) Male nurse (in shifts)
- b) Oxygen set up
- c) Breathing apparatus
- d) Eye wash facility
- e) Stretcher
- f) Trauma blanket
- g) Medicines.

**34.6.4 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 Discrimination/Corporal punishment for failure in meeting with relevant requirements.
- (e) The Contractor shall abide the requirement of Contract Labour(Regulation & Abolition) Act,1970 for working hours.
- (f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
- (g) The Contractor shall arrange potable drinking water to its employees & workers.

**34.6.5 It may be noted that non-compliance to safety norms will result in penal action as may be decided by BHEL.**

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 of violations of safety requirements, the Contractor shall be liable for a penalty of Rs. 200/- for the first violation and Rs. 500/- for the subsequent violations. For serious lapses, as decided by BHEL Engineer, fines upto Rs. 5000/- at a time can be imposed.**

The amount towards penalties as above will be deducted from running bills of the Contractor. The amount so collected above will be utilized for supporting the safety activities at site. The decision of BHEL on above will be final and binding on the Contractor.

34.6.6 In order to meet the environmental concerns it is expected that the contractor shall plant , protect and maintain at least 100 trees in the vicinity of the project as per the advice of the Engineer . 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.

## **35.0 CIVIL WORKS, FOUNDATIONS AND GROUTING.**

35.1 Foundation for all equipment shall be provided by client of BHEL. The dimensions and locations of the foundations, pockets, anchor bolt pitch shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All minor adjustments of foundation level, dressing and chipping of foundation surfaces upto 50mm, enlarging the pockets in foundations etc., increasing the existing floor opening for cable entry, fixing panels and repair of same as may be required for the erection of equipment / plants shall be carried out by the contractor.

35.2 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor is to arrange additional packing plates as per requirements provided it is allowed by BHEL Engineer.

35.3 The contractor shall ensure perfect matching of structure / equipment , packer plates including machining , scraping and blue matching with foundation by dressing the foundation. BHEL at its discretion can accept rough chipping of foundations, embedding packer plates in cement mortar

35.4 The contractor shall arrange for grouting of foundation bolt holes of structure/ equipment using port land cement as specified in the drawings /specification or as advised by Engineer after preparing foundation top surface for grouting. **All the arrangement required for grouting including supply of cement, sand & any other material required for grouting, shuttering, nails, wires etc., shall be arranged by the contractor at their cost.**

35.5 Besides grouting as above, any civil 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, etc. any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including

cement and required facilities will have to be arranged by contractor at his own cost.

## 36.0 CONSUMABLES

- 36.1 The contractor shall provide within finally accepted rates, all consumables like, gland packing, all welding electrodes (including alloy steel, Aluminium, stainless steel), filler wires, tig wires, all inert / welding gases, soldering material, dye penetrants, other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, Parmali wood, petrol, CTC / other cleaning agents, petroleum jelly, insulation tape, PVC sealing compound, sleeves, cable ties, gaskets and shims, wooden sleepers, steel required for temporary works such as supports, packing hardware items, sealing compound required for completion of work except those which are specifically supplied by manufacturing unit.
- 36.2 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.
- 36.3 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of electrodes etc. before procurement of welding electrodes / TIG wires. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, 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 electrode will be allowed to be used without valid test certificate.
- 36.4 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 & records maintained.
- 36.5 Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost.
- 36.6 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). Postponement of such recovery is normally not permitted. The decision of Engineer in this regard shall be final and binding on the contractor.
- 36.7 All lubricants and chemicals required for testing, pre-commissioning, commissioning, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL /BHEL's 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 and returned to stores.
- 36.8 All charges on account of Octroi, terminal or sales tax and other duties on materials obtained for the works from any source shall be borne by the contractor.

## 37.0 TOOLS AND PLANTS / IMTE's

- 37.1 T&Ps being provided by BHEL to sub-contractor free of hire charges as per Annexure-I 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, 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 (**As per Annexure-II, III & IV**). 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, and other consumables etc. for the operation. All lubricants, hydraulic oil and grease will be provided by BHEL free of cost for which the contractor will give the requirement well in advance.
- 37.6 The contractor shall engage trained and experienced operators for the operation of BHEL's T&Ps. Their skill / performance will be checked by BHEL Engineer before they are allowed to operate the same. However checking of skills by BHEL does not absolve contractor of his responsibilities for proper and safe handling of equipment, consistent good performance and regular performance evaluation of operators.
- 37.7 The day to day and routine maintenance of BHEL's T&Ps should 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 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 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 cranes supplied by BHEL. For cranes, repair / replacement of filter, batteries, self, dynamo, gaskets hoses, oil seals and rubber parts shall be the responsibility of the contractor. However, the charges of the replacement of the

other 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 All supervision and labour required for 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 Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting contractor at his cost. All necessary manpower, tools, support, consumables, illumination etc. will have to be arranged by contractor at his cost.

37.11 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.

37.12 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.

37.13 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 The contractor shall return BHEL T&Ps and IMTEs issued to him in good working condition 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 / unserviced 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.

37.16 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.

37.17 Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, Manila ropes, winches and slings etc. History card and maintenance 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 Retesting/ 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 retake 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 and/or his Sub-contractors without the prior written approval of the Engineer.
- 37.21 The monthwise 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.
- 37.22 Regular utilisation report of the BHEL T&Ps and IMTEs as per requirement of BHEL shall be furnished by the contractor.

## **38.0 SUPERVISORY STAFF AND WORKMEN**

- 38.1 The contractor shall deploy all the skilled workmen like mill wright fitters, welders, gas cutter, riggers, sarangs, masons, carpenters, electricians, instrument technician etc., in addition to other skilled, semi-skilled and unskilled workmen required for all the works of handling and transporting from site storage to erection site, erection, testing and commissioning as contemplated under these specification. Only fully trained and competent men with previous experience on the job shall be employed. 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 ask for 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 including qualified Engineers 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 coordination with other labour and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

- 38.3 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with other personnel / contractor, coordinating 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 and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.
- 38.6 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, Electricians , operators, 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 recover from the contractor's bills any charges incurred for engaging the additional workmen with overheads.
- 38.7 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.
- 38.8 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 monthwise 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 man power, 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.

## 39.0 MATERIAL HANDLING AND STORAGE

- 39.1 All the equipment and material furnished under this contract ( except those which are mentioned specifically in the scope of work) shall be received from the project stores, sheds/storage yards ( any place within site) and transported to be pre-assembly area/ erection site and stored in the storage spaces in a manner so that they are easily retrievable till they are erected by the contractor. While drawings/ lifting material from BHEL/ customer stores, contractor shall ensure that the balance / other materials are stacked back immediately.
- 39.2 While BHEL will endeavour to store/ stack/ identify materials properly in their open / close / semi closed / tarpaulins covered storage yard/ shed, it shall be contractors responsibility to assist BHEL in identifying materials well in time for erection, taking delivery of the same, following the procedure indicated by BHEL and transport the material safely to pre-assembly yard/ erection site in time, according to programme.
- 39.3 The contractor shall take delivery of components, equipment / consumables from storage area after getting the approval of BHEL Engineer on standard indent forms.
- 39.4 The contractor shall identify and deploy necessary Engineers/ supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope.
- 39.5 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 damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.
- 39.6 Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's 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 damage. In no case piping should be dragged. In case of any damage the cost shall be covered from the contractor.
- 39.7 Approach road conditions from the stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above circumstances without any extra cost to BHEL.
- 39.8 Contractor shall be responsible for examining all the plant and material issued to him and notify the Engineer immediately of any damage, shortage, discrepancy etc. before they are moved out of the stores / storage area. The contractor shall submit to the Engineer every week, a report detailing all the receipts during the week. However, the contractor shall be solely responsible for any shortages or damages in transit , handling, storage and erection of the equipment once received by him. As the erection work will be spread in different areas / locations of the project, contractor has to arrange sufficient no. of watch/ward personal to avoid any pilferage of material. In case any equipment / material is lost / damaged while in the custody of the contractor, the cost of repair / replacement if any to bring back the equipment in original order shall be deducted from the contractor's bill. BHEL's decision in this regard shall be final and binding on the contractor.

- 39.9 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.
- 39.10 All the material in the 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 above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost.
- 39.11 All electrical panels, control gear, motors and such other devices shall be properly dried by heating before they are installed and energised. Exposed parts those required special protection such as bearings, slip rings, commutators shall be protected against moisture ingress and corrosion during storage and are periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.
- 39.12 If the material belonging to the contractor are stored in area other than those earmarked for his operation the engineer will have the right to get it moved to the area earmarked for the contractor at the contractors risk and cost.
- 39.13 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 are installed.
- 39.14 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
- 39.15 The contractor shall ensure that all surplus / damaged / scrap / unused material, packing wood / containers/ special transporting frames etc. are returned to BHEL at a place in project area identified by the Engineer. An account will be maintained by the contractor for all such items received and returned to BHEL and duly reconciled before closing of the contract.**
- 39.16 The contractor shall hand over all parts / materials remaining extra over the normal requirement with proper identification tags to the concerned BHEL / Customer or at a place in project area as directed by BHEL Engineer.
- 39.17 Transformer main tanks , the accessories and oil will be issued to the contractor from BHEL stores / place of stacking for installation. All arrangements for receiving, transporting & handling of tank , accessories, transformer oil drums etc. are to be made by the contractor except those spelt out else where in the contract.
- 39.18 Till the start of erection of respective transformers, supplied oil / Gas filled, it will be contractor's responsibility to maintain the gas pressure and replace/ reactivate silica gel , as applicable . Silica gel will be arranged by contractor within the accepted rates. However the N2 gas if required will be provided by BHEL free of cost & filling etc. will be arranged by the contractor with in the accepted rates for transformer erection & commissioning.

#### **40.0 PRESERVATION OF COMPONENTS**

40.1 After taking delivery from BHEL / 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 stored in such a way that item is at least six inches (6") above the ground
- b) Motors, valves, electrical equipment, control equipment and instruments etc. shall be stored indoors in warehouse provided by contractor. Motor windings shall be kept dry by use of external heat or space heaters.
- c) Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean.

40.2 It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled and erected by him till such time of 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., 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.

40.3 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.

40.4 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.

#### **41.0 WELDING and NDT**

41.1 The method of welding ( ARC, Gas, TIG 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.

41.2 All welders including tack welder , structural and pipe welder shall be tested and approved by BHEL Engineer before they are actually engaged on work. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. All charges for testing of contractor's welders including destructive and non destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. The test coupons raw material will be supplied by BHEL free of cost

41.3 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by a particular welder which, in the opinion of the Engineer will adversely affect the quality of the welding though the welder has earlier passed the tests prescribed by

Engineer. The welder's having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

- 41.4 Faulty welds shall be cut and re-welded at the contractors expenses. The procedure for the repair of defective welds shall be approved by the Engineer prior to any repair being made. Records of such repairs and defects shall be maintained by the contractor as per BHEL Engineer's advice
- 41.5 All charges for testing of contractor's welders including destructive and non destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only.
- 41.6 Only BHEL approved make electrodes will be used. All electrodes shall be baked and dried in the electric electrode baking 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. Electrodes from holding oven shall be transferred to portable ovens. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate will have correlation 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 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.
- 41.7 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.
- 41.8 All welds shall be painted with anticorrosive red oxide paint. Necessary consumables and scaffolding etc. including paints shall be provided by contractor at his own cost. Daily welding reports in the proforma suggested by BHEL should be submitted without fail.
- 41.9 Non-destructive testing are part of erection work and shall be carried out by the contractor in accordance with the quality plan and as per instruction of Engineer. Decision of Engineer shall be final and binding on the contractor.

## **42.0 PROGRESS REPORTING**

- 42.1 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
- 42.2 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.

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

42.4 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 slippages do not accumulate and effect the overall programme.

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

### **43.0 DRAWINGS AND DOCUMENTS**

43.1 The detailed drawings, specifications available with BHEL engineers will form part of this tender specification. These documents 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.

43.2 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.

43.3 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.

43.4 The data furnished in various annexures 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.

43.5 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.

43.6 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimension / details, without specific approval of BHEL.

### **44.0 INCOME TAX , SERVICE TAX AND SALES TAX ETC**

- 44.1 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.
- 44.2 **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.

- 44.3 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.
- 44.4 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.
- 44.5 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 permit as applicable under this contract.

#### **45.0 EXTRA WORK:**

- 45.1 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 commissioning,
  - c) Requiring fresh fabrication of components in place of rejected / replaced components.
- 45.2 The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals.

45.3 The extra works, if any, shall be carried out by a separate gang or beyond working hours which can be identified for certification of manhours. Log book 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 the 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 manhours 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.

## 46.0 PRICE VARIATION

46.1 The finally accepted rates for scope of work as defined in this tender are subjected to price variation provisions as per following formula:

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

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

P0 = Gross billed 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.

46.2 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 contract value (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.**

46.3 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.

## 47.0 RATE SCHEDULE

47.1 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 / price.

47.2 The tenderer shall quote the rates / Price 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.

47.3 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 payments 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. However, in case of over all variation in Contract value (as indicted in LOI), beyond (minus) 30%, the contractor will be eligible for compensation as per the following provision:

**“The total executed value shall be raised by 10 % subject to the condition that the total value of work executed plus increase as above shall be limited to 70 % of the awarded contract value”**

Contractors are required to take above into account while quoting. The contractor confirms that unit rates quoted above takes care of such variation during execution stage.

## 48.0 INSTRUCTIONS TO TENDERER

48.1 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 should be duly supported by documentary evidences (Refer note below clause-11)

48.2 No deviations to the tender conditions will normally be accepted.

48.3 The tenderers are advised to actually visit the site and fully acquaint themselves with site conditions, location of stores, transportation routes, quantum of work etc. before quoting their rates for this work. BHEL shall not be responsible in any way for non-familirisation 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.

48.4 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 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.

## 49.0 LIQUIDATED DAMAGES(LD)

49.1 LIQUIDATED DAMAGES shall be applicable as per clause no.25.5 of the GCC of the tender.

## 50.0 SECURITY DEPOSIT

50.1 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 should be issued preferably through any of the Member Banks listed on Page No. 34(a) of 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 BHELL.

## 51.0 OTHERS

### 51.1 INSURANCE

51.1.1 Besides provisions under clause no. 29.0 of GCC regarding insurance, the following shall also be applicable. The contractor shall also take care of the same while submitting their offer.

51.1.2 Insurance for all materials pertaining to the Contractor (T&Ps, Construction Materials etc.) during transit, storage and during construction shall be in his (Contractor's) scope.

51.1.3 The Contractor shall provide insurance cover to all persons employed/engaged by him throughout the period of Contract, including the extended period, if any.

51.1.4 In addition to insurance as per Workmen's Compensation Act, Employer's liability and also Group Personnel Insurance for employees are also to be taken by contractor.

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

51.3 The tenderer shall specifically confirm he has inspected the site of work and is fully conversant with the prevailing conditions under which work is to be executed 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.

51.4 The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation / Techno-commercial bids 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.

## SPECIAL CONDITIONS OF CONTRACT

### PART-B

### INDEX

Cl.. No.	Description
52.	Scope of work
53.	Erection
54.	Testing, Pre-commissioning., commissioning and post- commissioning
55.	Finish painting
56.	Facilities to be provided by BHEL/Contractor
57.	Time schedule
58.	Over run
59.	Terms of payment

## SPECIAL CONDITIONS OF CONTRACT

### SECTION-III (PART-B)

#### 52.0 SCOPE OF WORK

52.1 Scope of these specifications cover complete work of handling, transportation of materials from Project storage yard / stores to erection site / place of erection , storage at erection site, preservation, watch and ward, dressing, chipping and levelling of foundations, cleaning , checking, testing, pre-assembly, erection, calibration, alignment, grouting, welding, NDT wherever required, preservative/ touch-up painting including supply of paints etc, earthing of equipment, including other activities required for erection, testing, commissioning, post commissioning, trial operations & handing over of all BTG C&I equipments and items indicated in the rate schedule covered within the scope of these specifications for 3 x 500 MW APCPL , JHAJJAR

52.2 The scope of work shall also include the following within the quoted item rates:

- i.) Re-rolling of cables on drums as required by site engineer.
- ii.) Providing missing hardware/ substitute hard wares and clamps.
- iii.) Grouting by port land cement including arrangement of materials for the same.
- iv.) Providing supports for impulse lines, instruments, air lines, cable trays wherever required by fabricating at site. Required material for these will be provided by BHEL & all consumables including gas, welding electrodes etc. will be arranged by the contractor.
- v.) Obtaining provisional and final approvals from Electricity Authorities.

52.3 The contractor shall also provide the services of skilled/ semi-skilled persons free of cost under this contract for 102 man-months for utilisation in keeping materials records, documents, test results, computer work etc., or else where as needed and decided by the engineer.

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provision shall be fully trained and experienced in the nature of work for which they are deployed. ( Refer CI 56.8 )

52.4 The scope of work also covers all performance tests necessary to ensure that workmanship confirms to relevant standards and that such tests are adequate to demonstrate that the installations complies with the requirements of this specification. All arrangement for conducting tests are to be made by contractor within their quoted rates and tests may have to be repeated to satisfy BHEL / APCPL.

Contractor to ensure services of **TWO qualified and experienced Diploma Electronics / Instrumentation Engineer** having experience in respective field, entirely for commissioning activities from second month of mobilisation till contract completion **in each of the Projects** . This shall be indicated separately in man power deployment plan to be submitted by contractor. These Engineers shall be

reporting directly to the BHEL Engineer and may be assigned works in areas other than those covered in the scope of this contract. These qualified Engineers shall be provided for **Thirty four (34) man-months** as per site conditions. These Engineers are in addition to the regular Erection and Commissioning Team to be deputed for the Commissioning of the Package Equipments ..These Engineers shall be supported by other workmen like electrician, Technicians helpers etc. No separate payment shall be paid for providing the services as per this clause. The contractor shall provide these free of cost services within the quoted rates as per Rate Schedule.

***In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man months as per above provision, fully or partly a lump sum of Rs. 20,000/- (Rupees twenty thousands only) per man month for the unutilised man months will be recovered from the bills of the contractor.***

- 52.5 The brief description of major equipment/ items to be erected, tested and commissioning under the scope of subject work are as described below. However change in design/specification may occur as is usual in any such large work for which no compensation will be payable. Contractor shall complete the entire work as detailed in tender specification within the contractual rates. In case during testing, commissioning, post commissioning, trial operation the IR valves of electrical equipment is found low, the contractor shall make arrangements and dry out the equipment within the quoted rates. Removing & reconnection of equipment will be the part of scope at no extra cost to BHEL.
- 52.6 Contractor shall erect, test, commission all the equipment, cabinets, panels, instruments etc. as per sequence prescribed by BHEL Engineer at site. The sequence of erection / commissioning methodology will be decided by the BHEL Engineer depending upon the availability of materials / work fronts etc. No claim for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection / commissioning adopted in erection / commissioning of similar jobs elsewhere or for any reasons whatsoever.
- 52.7 The customer **APCPL** may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the Engineer. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way if pointed out by the Engineer, without any cost implication to BHEL.
- 52.8 Contractor shall plan and transport equipment / components from storage yard sheds to erection site and erect them in such a manner and in a sequence that material accumulation at site should not lead to congestion. Contractor shall plan activities considering plying of his vehicles on ring road also. Materials shall be stacked neatly, preserved and stored in the contractor's shed and work areas in an orderly manner. If required, the contractor shall arrange shifting of surplus material expeditiously failing which the same will be arranged by BHEL at contractor's risk and cost.

### 53.0 ERECTION

- 53.1 All works such as cleaning, checking, levelling, aligning, assembling, temporary erection for alignment, dismantling of certain equipment for checking, cleaning, surface preparation, fabrication at site, cutting, grinding, straightening, blue matching, chamfering, filing, chipping, drilling, machining, surface grinding, shaping, fitting up etc. as may be applicable in such erection works are to be treated as incidental to erection and necessary to complete the work satisfactorily and shall be carried out by the contractor as part of the work.
- 53.2 Any fixtures, scaffolding materials, concrete block supports, steel structures required for temporary supporting, for pre-assembly or checking, welding, lifting and handling during pre-assembly and erection shall be arranged by contractor at his cost.
- 53.3 The following provisions cover the technical requirements for some of equipment installation. The brief idea about the work involved is indicated below however the work is to be carried out in accordance with the recommendations of the equipment manufacturer drawings, documents furnished to the contractor by BHEL or as directed by BHEL Engineer.

**A) CONTROL PANELS ( LTMCCs, AVR, MAX CONTROL PANEL, 11 kV Switchgear , OTHER / LOCAL CONTROL PANELS etc.)**

Erection at site / control room including chipping of floor, fabrication and fixing of base channel frame, levelling & alignment with spirit level, welding the base channel to the embedded plates / channels, grouting , fixing of anti-vibration pads, termination of inter panel connections, mounting / connections of loose instruments, inter panel bus bar connections, commissioning including loop checking, system checking, and putting necessary controls on automatics. Terminations of cables will be by conventional screwed connections, wire wrapping and maxi-termi point crimping connections. Checking of internal wiring, rectification, testing and calibration of equipment mounted inside is in the scope of contractor. The contractor may have to change / replace items found faulty without any extra cost, however materials for this shall be provided by BHEL. Mostly panels will be delivered fully wired. However wherever required termination of loose wires , bus wires is to be done. Canopy for panels will be supplied loose & shall be installed by the contractor after erection of panels. The cleaning of panels have to be done with electrical vacuum cleaner, besides conventional cleaning with brush etc. The drilling of holes in the gland plates for cable entry shall be part of panel erection. All blank holes / gaps in the gland plates / boxes etc. shall be properly sealed. The base frames shall be painted suitably. The contractor shall carry out the plugging and sealing of left out holes in the gland plates and other openings at the bottom of panels at his own cost by using fire retardant mortar or good quality sealing material as advised by BHEL . **Any minor alterations required in the bus bar arrangement, wiring in the panels/ cubicles shall also form part of the work. During testing, commissioning, some equipment / modules may need replacement / repairs. All such replacements / repairs and assistance during commissioning and running of the unit till handing over to the Customer are part of the scope as some of the test / commissioning will have to be done after the machine is running on various loads.**

**B) VFD System:**

The VFD System consists of VFD Panels , 11 / 2.3 kV Oil Filled Transformers , 11 Kv Switchgear Panels as indicated in the Item Schedule . Erection of the panels and switchgear will be as per the specifications mentioned in clause –A .  
 . Scope of work for Transformers includes checking and preparation foundation, erection of accessories and auxiliaries, carrying out minor modification wherever required; Preparation of oil and oil filling under vacuum, dry out of transformer, testing of transformer, oil and other auxiliaries, laying of cable trays upto marshalling box, cabling upto marshalling box and termination for auxiliaries, earthing of accessories to earth conductor / riser, testing of all auxiliaries, pre-commissioning , charging of transformers , operational stabilization etc  
 Painting of Transformer with paint as approved by BHEL Engineer .

**C) CABLE RACK AND TRAY**

Cable trays shall be supplied either ladder, prefabricated, slotted or duct type. **Cost of cable tray erection as per BOQ Cum Rate Schedule shall include fabrication of supports to suit site requirement, fixing of support in position by welding as per Engineers instruction , erection and fixing of cable trays and racks by welding or by bolts and nuts. No separate payment will be released for fabrication / fixing / painting of support structure for cable trays. Approximately 5 kg of steel structure is envisaged to be fabricated / erected for every meter of cable tray, on an average. However, contractor will be paid extra for fabrication / erection of cable tray supports only for the weight in excess of weight calculated by multiplying total length of cable trays erected by 5. The payment for this additional supports, if any, will be paid as per applicable rates for structural steel fabrication / erection and shall be released after completion of cable tray erection / reconciliation of total material used in fabrication / erection of cable tray supports.** Jointing of trays can be carried out by bolting / welding as per direction of Engineer. Contractor shall carryout cutting of tray only by Hacksaw for obtaining proper routing from standard lengths supplied. The cutting & welding points on trays will be painted by primer & Al paint by the contractor including supply of paint within the erection price and no extra cost to BHEL Materials for support fabrication like flats, channels, angles etc. shall be supplied by BHEL free of cost. All support structure erected is to be painted by 2 coats of primer and 1 coat of synthetic enamel paint to obtain a proper finish within quoted price .

These cable trays may also be required for laying copper tubing, plica type / GI flexible conduits, local cabling and metal temp. thermocouples.

Beside above angles / channels of various sizes may have to be fabricated / erected, for use as cable trays, from structural steel to be supplied by BHEL free of cost. Payment for fabrication / erection of these type trays shall be released as per applicable rates for structural fabrication.

In many cases, trays are supplied with tray covers. These covers have to be erected after completion of bottom cable tray and laying of cables tubes etc. The covers are to be properly secured on the bottom trays and no separate payment will be made for putting these covers. If required, GI / Al strip clamps to be used.

**D) INSTRUMENTS (TRANSMITTERS / GAUGES / SWITCHES / TEMPERATURE SENSING ELEMENTS LIKE RTDs & THERMOCOUPLES)**

For instruments supplied loose, the scope includes issue from stores, calibration, erection (including fabrication and fixing of frames / stands by welding to steel structure or by chipping & grouting with RCC columns / floor) and charging / loop checking. The work includes installation of housing connecting manifold / PG valve on supports / racks to be suitably fabricated for the instruments being supplied loose.

For instruments supplied duly mounted on skids / racks, the scope includes dismantling from skids / racks, reinstallation after testing / calibration, restoring electrical connections, if any, pressure testing of connected piping and charging / loop checking. Servicing of manifolds PG valves shall also form part of erection job within the quoted prices.

Some instruments may need repeated calibration / replacement. The same will be carried out by the contractor at no extra cost to BHEL including calibration of instruments needed for replacement, which will be supplied by BHEL. Erection of thermoelements like RTDs & Thermocouples includes erection of thermowells, wherever required, at no extra cost to BHEL. Tags on all the instruments will be provided by the contractor as directed by BHEL Engineer at no extra cost to BHEL. **Tenderer may note that fabrication / fixing / painting of stands for instruments will be included in quoted / accepted price of respective instrument. However in case the supporting structure required to be fabricated for installation of above equipment is more than 25 Kg. Per Instrument, the contractor will be paid extra for fabrication etc. for excess of structure as per item rate for structure work (Item No. 105 of BOQ cum Rate Schedule).**

**While individual instruments will be paid as per the above clause , Installation of PreFabricated Instrument Racks shall be paid under Item 43 of the BOQ and Instrument Enclosures shall be paid under Item 42 of the BOQ .**

#### **D) DETECTORS / VIBRATION , SPEED & OTHER TURBOVISORY PICK UPS:**

Blue matching with the assembly fixtures / main equipment surface, trial fixing, fixing by drilling / tapping, final doweling. Moreover some detectors may have piggy-backs signal detectors mounted on them as such these forms part of detectors assembly. The integral cables of the above shall be routed & dressed properly up to their JB / Proximeter. **Erection of proximitors, proximitor housings / JB required for respective pick up and calibration / commissioning of pick ups will be included in quoted / accepted item rate of respective pickup.**

#### **E) PNEUMATIC TUBES (COPPER / SS TUBING) :**

Fabrication and erection of single angle supports / tray supports for single multi run tube. Laying tubes in the angles / trays from the panel to the equipment, instrument to instrument, air supply line to drive / instrument, air line connections, clamping properly as per standard ferruling and termination at both ends. This includes all fittings and needle valves, stop valves etc. also. Proper tagging of valves and pneumatic tubes on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any

modification carried out after laying of pneumatic tubes / draft pipe lines due to site requirement in general.

#### F) IMPULSE LINE (AS / CS / SS)

Fabrication and erection of channel / angle / slotted angle supports, cleaning impulse pipe with wire brush and compressed air, edge preparation, cold bending, laying to the required slopes, clamping, welding of isolation / drain valves and fittings by butt / socket welding / swage lock joints. Servicing of valves, connecting with the process end and to the instruments, NDT, Hydraulic testing the impulse lines, and painting the lines as per requirement of BHEL engineer. The impulse line may have to be cleaned chemically for removing grease / rusting. Proper tagging of valves and impulse lines on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of Impulse / draft pipe lines due to site requirement in general.

#### G) CABLE LAYING

Laying, dressing & clamping ( by Nylon / PVC ties or Aluminium strips or any other method specified by BHEL Engineer ) of the cables in the cable trays / angles. The final dressing of all cables laid by the contractor and in all cable trays erected by the contractor shall also be done with Nylon Cord / Aluminium strip. **Cost of cable laying as per BOQ Cum Rate Schedule shall include the cost of Nylon / PVC ties & Aluminium strip required for dressing / clamping.**

The cable run number shall be provided by punching Aluminium Tag plates and tying suitably with nylon ties ( at both ends and at regular intervals as advised by BHEL Engineer ) which shall be arranged by contractor at his cost.

While laying cables, existing cable tray covers and false flooring may require to be removed and re-fixed. The same has to be done at no extra cost to BHEL.

The screen of signal cables shall be run in insulated sleeve ( of approved quality to be provided by the Contractor ) and shall be terminated as per the instruction of the BHEL Engineer .

#### H) CABLE TERMINATION

**For Cables, the Cost Of Cable Laying As Per BOQ Cum Rate Schedule shall also include the cost of Termination with Suitable Crimping Type Lugs and Ferrules.** Only Cable Glands and Cable Lugs Shall Be Issued By BHEL as Free Issue Item. Drilling of holes in gland plates of HT / LT switchgear, control panels, JB's etc as per requirement shall also be part of cabling at no extra cost to BHEL.

The contractor shall carryout insulation testing, simulation testing etc. as per the instructions of Engineer at site.

Screen of signal cables shall run in insulated sleeve (to be arranged by contractor at no extra cost) and shall be terminated as per the instructions of the BHEL Engineer.

#### I) JUNCTION BOX AND PUSH-BUTTONS

Includes assembly / fabrication, welding of semi-prefabricated limbs of the racks / cable ducts / other related supporting structural parts, chipping of floor and grouting etc. drilling of bottom gland plates for cable entry and earthing with earth pads. For fabrication of steel items Hacksaw cutting or shearing by machine only is permitted. **Tenderer may note that fabrication / fixing / painting of JB's and LPB's will be included in quoted / accepted price of respective equipment . However in case the supporting structure required to be fabricated for installation of above equipment is more than 25 Kg. Per Instrument the contractor will be paid extra for fabrication etc. for excess of structure as per item rate for structure work (Item No. 105 of BOQ cum Rate Schedule)..**

#### **J) RIGID PIPE/CONDUITS**

Cutting / threading of standard lengths of conduits, laying on fabricated supports or on floor, using screwed fittings, clamping, sealing of open ends. Approved Good quality sealant shall be supplied by the Contractor to make the joint water proof.

#### **K) PLICA FLEXIBLE CONDUIT**

Laying of conduits in cable trays, end connection with instrument / J.B. / panel, using suitable connectors / unions etc. (which shall be supplied by BHEL). Suitable thread / Plica sealant shall be used to make the conduit system water proof. Aluminum painting, clamping and tagging in tray / angle forms part of erection job.

#### **L) COMPUTERS / PLC BASED EQUIPMENTS**

All computer related items / equipment like diagnostic station, CRT, monitors, printers, key boards, pre-fabricated connecting leads etc shall be installed in control room and control desk as per direction of BHEL Engineer. **Cost of PC set ( including printer, monitor, UPS, interconnecting leads etc) installation as per BOQ Cum Rate Schedule shall also include the cost of installation / placement of furniture ( to be issued by BHEL as free issue item) as per requirement / instruction of BHEL Engineer.** The Software installation and commissioning is not included in the scope of this contract. However, any assistance required for testing / commissioning have to be provided by the contractor within the quoted price. Hardware found defective during testing / commissioning and till handing over to Customer, have to be removed for repair / replacement and reinstalled within the quoted rates.

#### **L) EWLI , RRS SYSTEM**

EWLI includes fixing of electrodes, local and remote indicator panel / display units and interconnection of these by cables. Only cost of laying cables for interconnection of EWLI system shall be measured and paid separately. Erection of all other equipments / panels/ display units forming EWLI system shall be included in the quoted rate per system. The same scope is applicable for RRS System

#### **M) CALIBRATION OF CONTROL VALVES , DAMPERS**

The work also includes minor rectification / alterations in tubing, servicing of accessories, setting of limit switches, calibration of Actuators and position feedback transmitters.

**M) POWER CYLINDER ERECTION**

Platforms on which Power Cylinders are to be mounted are usually provided by the Civil Contractor / other agency. However minor structure work required shall form a part of the work within the quoted rate of the the respective cylinder . Fabrication / erection of stands for mounting of the cylinders The work also includes minor rectifications/alteration in the tubing , servicing of accessories , setting of limit switches , calibration of actuators and feedback position transmitters .

- 53.4 Any cutting of masonry work, which is necessary shall be done by the contractor at his own cost and shall be made good to match the original work. The Contractor shall obtain prior approval before cutting any masonry / concrete work.
- 53.5 Conduits shall be thoroughly cleaned before pulling in the cable.
- 53.6 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 with sufficient bends. Bends upto 80 mm Nb will have to be fabricated at site.
- 53.8 Contractor shall fabricate and erect stands / supports for Junction boxes, push button stations, fixing of push button and plugging of holes in JB's. This is considered inclusive in the item erection.
- 53.9 Calibration log-sheets / history cards of all the instruments, panels, drives, relay testing etc. under the scope shall be recorded and submitted on BHEL approved formats. Proper logging will form a part of calibration / erection activity for the purpose of monthly running bills payments.
- 53.10 For calibration of pneumatic valves / controllers / power cylinders etc., the contractor shall attend to minor leakages from the tubing etc., and prepare exact cam-profiles as part of the work, if required.
- 53.11 DRIP SHIELDS shall be fabricated for all field mounted panels / instruments / instrument racks / JB Racks / control cabinets etc. The hardware / material shall be supplied by BHEL. The fabrication forms part of erection work.
- 53.12 The contractor shall use only SHEARING machine or HACKSAW for cutting angles, flats, channels and trays. No gas cutting is permitted . Drill machine shall be used for drilling holes.
- 53.13 The contractor should note that after execution of work they will hand over marked up drawings "as erected" drawings to BHEL Engineer at site for preparation of firm "as built" drawings. "As erected" drawings will bear the signature of BHEL Engineer and contractor.
- 53.14 The contractor shall paint the name / put tag numbers on all the equipment / instruments / cables etc. erected by him. Materials for tagging shall be supplied by BHEL. The adhesive etc. shall be arranged by contractor at his cost.

53.15 The Motors, power cylinders, control valve actuators, motorised valves actuators and solenoid valves will be erected by other agency. However their electrical and C&I commissioning is to be carried out by the agency within the subject scope of work. The staff earmarked for commissioning will carry out the work in association and guidance of BHEL Engineer as a part of system commissioning for which no extra cost will be paid by BHEL.

53.16 Certain instrumentation like gauges, transmitters, switches and indicators are received in assembled condition and will be erected along with main equipment by other agency. Contractor for subject work will get these equipment dismantled for calibration and will reinstall them in original location as and when directed by BHEL. Payment for above work shall be released as per respective items indicated in the price bid

**54.0 TESTING PRE-COMMISSIONING, COMMISSIONING AND POST-COMMISSIONING.**

54.1 Site testing shall be required for all equipment installed by the contractor to ensure proper installation, setting, connection and functioning in accordance with drawings, specifications and manufacturer's recommendations.

54.2 Commissioning protocols are to be prepared as advised by BHEL Engineer for getting approved by customer/ Consultant.

54.3 Testing, and pre-commissioning checks shall be as per relevant codes / practices and BHEL drawings / specifications/ approved commissioning Protocols and same shall include, but not be limited to the following :

**(I) INSTRUMENTATION**

(a) All instruments shall be checked for proper installation, supports, impulse lines, cabling etc. and corrected, wherever required.

(b) All instruments shall be calibrated before installation and proper calibration record shall be maintained to the satisfaction of BHEL Engineer. Instruments received in assembled condition in panels etc. shall also be dismantled, calibrated and re-assembled as per advise of BHEL Engineer.

(c) All impulse and pneumatic lines shall be properly cleaned (oil flushed / chemical cleaned / air blown/ steam blown/ Hydraulic tested etc.) before being charged.

(d) Some of the instruments may require re-calibration during commissioning. The contractor shall remove such instruments, recalibrate and install within the quoted rates.

**(II) DRIVES AND CONTROLLERS**

(a) All drives such as power cylinders, pneumatic / motorised valves / dampers etc. and controllers shall be checked for proper installation supports etc. before commissioning.

- (b) All transmitters shall be calibrated and limit switches shall be adjusted.
- (c) All pneumatic and impulse lines shall be cleaned as per instructions of BHEL Engineer.
- (d) All drives shall be operated by simulating various conditions to ensure healthiness of components of the system.
- (e) Re-calibration / rectification wherever required shall be carried out by the contractor within the quoted rates.
- (f) Remote operation of all drives, valves, dampers shall be checked from control room as per instruction of BHEL Engineer.

### **(III) PANELS**

- a) Checking of complete wiring and insulation resistance as per requirement . For 11 kV Panel Hipot test is to be carried out
- b) IR test and loop checking of all field wiring in the panel.
- c) Checking of all protection, metering and indicating schemes.
- d) Calibration of all indicating and measuring instruments, relays, timers.
- e) Checking of all auxiliary schemes e.g. space heating, illumination.
- f) Checking of operation of all relays, switches and other indicators.
- g) Commissioning of total scheme including relevant internal equipment.
- h) Carrying out suitable modifications as per system requirement.
- i)
- j) Carrying out primary injection, secondary injection, stability checks etc.

### **( IV ) TRANSFORMERS**

- (a) Insulation resistance and earth resistance checks.
- (b) Oil testing like BDV of oil of each drum before pouring, after processing and in the course of dry out, moisture content tests as and when required. Provision should be made for preparation of oil in a separate tank before filling in the main transformer tank.
- (c) Checking of Buchholz Relay, oil level indicator PRV, calibration of OTI, WTI etc.
- (d) Winding resistance, vector group, turns ratio test on different taps, magnetising current, core balance check etc.
- (d) After installation the contractor will get oil samples tested at an accredited test lab as per relevant IS as advised by BHEL Engineer and submit the test results, in case the test results are found unsatisfactory the tests will be got repeated by the contractor after reprocessing of oil & submitted to BHEL for approval/acceptance.

- (e) Turns ratio, polarity, insulation resistance and winding resistance checks on all CT's.
- 54.4 Contractor shall carry out air leak test, pressure drop test for pneumatic tubes, impulse and air lines to the satisfaction of BHEL's Engineer as per test procedures of manufacturing units or advised by BHEL Engineer.
- 54.5 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc. the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and 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.
- 54.6 During this period, though the BHEL's / Client's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, labour, consumable, T&P and IMTEs required till such time the commissioned units are taken over by the BHEL's customer.
- 54.7 During commissioning activities and for carrying out various tests, gauges, manometers etc. have to be temporarily erected and commissioned to suit the commissioning activities. Contractor will provide the necessary gauges and equipment. Contractor has to carry out the erection, calibration, dismantling of the same. After completion of activities the temporary systems have to be removed and to be taken back at no extra cost to BHEL.
- 54.8 During erection of various equipment, prior to commissioning and after commissioning, protocols have to be made with BHEL's customer. The proforma and formats as approved have to be printed by the contractor in adequate numbers. The pre-commissioning activities will start with various trials, commissioning operations shall continue till units are handed over to customer. Simultaneous commissioning activities will be progress in various areas, checking of equipment erected, making ready for trial runs, alkali flushing, chemical cleaning, mass flushing etc., all these works need specialised gangs including electricians / instrument technicians in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. The manpower shall not be disturbed or diverted.
- 54.9 It shall be the responsibility of the contractor to provide workmen of various categories in sufficient numbers along with Engineers/ Supervisors including necessary consumables, T&P etc. during pre-commissioning, commissioning and post commissioning period for commissioning of equipment and attending any problem in equipment erected by the contractor till handing over. The rates quoted shall include all these contingencies also.
- 54.10 It shall be specifically noted that the above employees of the contractor may have to work round the clock alongwith BHEL commissioning Engineer and hence overtime payment by the contractor to his employees may be involved. The contractor's accepted rates shall be inclusive of all these factors also.

- 54.11 In case, any rework is required because of contractor's faulty erection which is noticed during commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during commissioning, the contractor will dismantle / open up the equipment / part and reassemble/redesign the work without any extra claim.
- 54.12 During commissioning, opening and closing of valves, attending to leakage, changing of gaskets, modifications in wiring, realigning of equipment, re-calibration of instrument, attending to leakage, minor adjustments of erected equipment may arise. The accepted rates shall include all such works.

## 55.0 FINISH PAINTING

- 55.1 All equipment within the scope of these specifications shall be received duly painted. However during storage and handling the same may get peeled off / damaged / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer / finish paint matching with shop paint / approved final colour. Besides above two coats of approved primer paint and at least two coats of approved finish paint to get the desired dry film thickness, is to be applied on various loose equipment, all impulse lines and structures fabricated and erected at site. **All paints, tools and other consumables including scaffolding materials required for painting shall be arranged and provided by contractor within the quoted rates. Paint and other materials so purchased shall be ISI marked and painting should be as per colour scheme and quality approved / specified by Engineer.** Valid Test certificate for the paint so supplied shall be made available before use of the same on work. The contractor shall provide legend on equipment in size specified by Engineer. Letter writing shall be done in Hindi / English or in both language. The printer have to under go test and only qualified painters will be allowed to work.
- 55.2 Certain equipment shall require spray painting (touch up). The contractor shall make arrangements of the required equipment for spray painting of such equipment at his own cost. Spray painting at the job site shall be permitted only at times and locations approved by the owner / Engineer.

## 56.0 FACILITIES TO BE PROVIDED BY BHEL/CONTRACTOR

- 56.1 BHEL shall provide limited open space for office and labour colony at site free of charge. It is the responsibility of the contractor to construct sheds, provide all utilities like electricity, drinking water etc. He is to dismantle and clear the site after completion of work or as and when required within the accepted rates.
- 56.2 The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.
- 56.3 The contractor shall submit to the Engineer his electrical power requirements. **Construction power shall be provided free of charge at one point each for each unit near erection site as required and to be decided by Engineer. Contractor at his cost shall do further distribution. Electricity for labour colony will be**

supplied at one single point on chargeable basis at the rate as fixed by BHEL's Customer. (For this the meter has to be arranged by the Contractor as per the approved makes ) 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.

- 56.4 Water for construction purposes shall be provided free of charge at a one point each for site work and labour colony. Contractor shall arrange further distribution of water.

**NOTE:**

- **THOUGH BHEL IS GETTING THE CONSTRUCTION POWER AND WATER ON FREE OF CHARGE BASIS FROM THE CUSTOMER. , THE CONTRACTOR SHALL ENSURE THAT THERE IS NO WASTAGE. THE CONTRACTOR MAY HAVE TO INSTAL A METER FOR THIS PURPOSE . PERIODICAL AUDITS WILL BE HELD TO ENSURE THAT THESE RESOURCES ARE BEING OPTIMALLY USED.**
- **IN CASE ANY WASTAGE IS OBSERVED BHEL RESERVES THE RIGHT TO RECOVER ANY CHARGES / PENALTIY AS DEEMED FIT TO BE DECIDED BY BHEL ENGINEER**

**Contractor will have to provide insulated cables for power distribution and jointing ( if any ) will have to be done with proper jointing kits .**

- 56.5 Provision of distribution lines of both electrical power and water from the central points 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.

- 56.6 Following points should be strictly adhered to by the contractor while drawing construction power supply from Distribution Board.

- (a) All electrical installations should be as per Indian Electricity rules.
- (b) All distribution Boards installed by the contractor should be constructed with fire proof materials viz. steel frames, bakelite sheets etc.
- (c) Connection for single phase should be taken from phase and neutral. No where the connection should be taken with earth as neutral.
- (d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

- (e) Contractor have to make their own earthing arrangement for their equipment / DB earthing. Earthing connection have to be done with copper conductor and copper / brass clamps with BHEL's prior permission.
  - (f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
  - (g) Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
  - (h) Contractor should ensure that all the CBs / TPNs / Fuses / MCCB / ELCB cables etc. should be of adequate rating/ capacity.
  - (i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected / proposed loads. Contractor will submit a report on all electrical connected load by the 7<sup>th</sup> of every month.
  - (j) ELCB will be tested once in a week or as deemed fit by BHEL Engineer by actually simulating the earth leakage for all installations and the same shall be recorded by BHEL Engineer in the log book to be maintained by the contractor.
  - (k) 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.
  - (l) Adequate lighting facilities such as flood lights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.
- 56.7 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, same will be got done by the Engineer and expanses incurred shall be recovered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.
- 56.8 The contractor under this contract shall also provide free of cost services of
- Material management software package / other packages computer operators for total 17 man months,
  - Office assistants and stock ledgers posters for a total 34 man months
  - Attendants in store & office for a total 51 man months.

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

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

## 57.0 TIME SCHEDULE

- 57.1 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, the actual date of start of work, to fix up zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&P by the contractor.
- 57.2 Entire work as detailed in the tender specifications shall be completed within **17 months** from the date of start of erection (Zero date) to achieve various milestones are as under:

<b>MILESTONES FOR UNIT-1</b>	<b>MONTHS</b>
• ZERO DATE	START OF WORK AS PER BHEL
• BOILER LIGHT UP READINESS	3 <sup>rd</sup> MONTH
• SYNCHRONISATION READINESS OF UNIT – 1	6 <sup>th</sup> MONTH
• TRIAL OPERATION READINESS OF UNIT – 1	9 <sup>th</sup> MONTH

**Milestones for Unit-2 , 3 shall follow with a lag of 3 , 6 months months .**

### Note:

- **Depending upon front and material availability above milestones may be required to prepone by one month. Contractor is required to mobilise additional resources to meet above requirement within their quoted lumpsum price.**
  - Contractor has to mobilise all required resources including manpower to achieve above schedule for which no compensation will be payable. However in case of contractor discharges his contractual responsibility even before schedule contract period, he will be allowed to wind up his set up without any financial implications on either side
- 57.3 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.

## 58.0 OVER RUN

- 58.1 In case due to reasons not attributable to the contractor, the work gets delayed and scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of first **3 (Three) months** after the contractual completion date. In case the scheduled completion time gets extended beyond **3 (Three) months** as stated above, the contractor shall be considered for payment of fixed over run charges **@ Rs. 75,000/- (Rupees Seventy five thousands only) per month** on receipt of advance notice intending to claim over run & 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) The targets fixed during the over run period are achieved by contractor.

58.2 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.

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

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

I. 90 % of contract value payable on fulfillment of following conditions:

**(A) For Equipment / items such as Panels, Cable Trays, cable, JB, impulse pipe, tubing etc. where no calibration is required**

- (i) 50% of item rate shall be payable on erection / installation
- (ii) 20% of item rate on final alignment, welding , clamping, termination etc.
- (iii) 15% of item rate on testing, pre-commissioning , charging etc.
- (iv) 5% of item rate on pending point clearance

**(B) For equipment/items where calibration and testing is required.**

- (i) 25% of item rate on calibration and testing
- (ii) 30% of item rate on erection, installation, alignment and termination wherever involved.
- (iii) 15% of item rate on individual device loop checking/hydro test/ charging of installation and panels.
- (iv) 15% of item rate on system loop checks, pre-commissioning checks by simulation/ field calibration or with actual system operation.
- (v) 5% of item rate on pending points clearance.

**NOTE:-Further percentage break up for payments against above, if required, will be mutually discussed and finalised at site.**

**II Milestone payments--5% of awarded Contract value (CV)**

- (i) 1 x 0.35 % of CV on readiness for Boiler LightUp for 1<sup>st</sup> Unit.
- (ii) 2 x 0.33 % of CV on readiness for Boiler LightUp for other two Units.
- (iii) 3 x 0.33 % of CV on Synchronisation of Unit
- (iv) 3 x 0.75 % of CV on completion of Coal firing Of Unit
- (v) 3 x 0.25 % of CV on Full Loading of Unit

NOTE: If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site incharge, at his discretion, after recording reasons for exercising such option, can split and release payment upto 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone / commissioning activities.

**III** 2.5% of contract value will be payable on handing over of the unit to BHEL's Customer or 3 months after contractor has discharged his responsibilities as stipulated in this contract, whichever is earlier. However unit shall be deemed to have been handed over by the contractor on completion of trial operation of STG.

**IV** The balance 2.5% of contract value shall be payable on completion of all pending work, rework wherever required, area cleaning and reconciliation of materials fulfilment of contractual obligations and on submission and passing of Final bill.

**NOTE:** Above payment at III & IV shall be released after adjustment of the contract value based on actual work carried out.

**Annexure-I****LIST OF T&Ps AND IMTES BEING PROVIDED BY BHEL FREE OF HIRE CHARGES  
ON SHARING BASIS**

SL No.	EQUIPMENT	QTY	Remarks
<b>A: T &amp; Ps</b>			
1.	Crane- 14 / 18 T		1 No.
2.	EOT crane (125 T) in TG hall		2 No

**.NOTES:** 1. In addition to above any special tools and tackles , if supplied by the manufacturer will also be provided to the contractor free of hire charges as and when made available.

2. Other terms and conditions regarding above items shall be as per tender clause 37. (Tools and Plants / IMTEs)

**Annexure-II****INDICATIVE LIST OF T & P TO BE ARRANGED BY THE CONTRACTOR AT HIS OWN COST**

1. Hydra 14 MT	-----	1 No
2. Hydraulic Jacks suitable for handling of Power Transformers		- Adequate Nos
3. 10,000 litre Oil Tank	-----	1 No.
4. Hi- Vacuum Oil Filter Machine suitable for Transformers		- 1 No.
5. High Vacuum Pump suitable Transformers	-----	1 No.
6. Pull Lifts & Ratchet hoist	-----	Adequate Nos.
7. 5 / 10 T Chain Pulley blocks	-----	1 Set
8. Welding Transformers / Welding generators	-----	8 Nos.
9. Gas cutting set	-----	Adequate Nos.
10. Grinders	-----	Adequate Nos.
11. Hydraulic Pipe Bending machine	-----	3 Nos
12. Pedestal mounted Drill Machine ( upto 36 mm )	-----	1 No.
13. Hammer / Pistol Drill Machine	-----	Adequate nos .
14. Portable Compressor for Maxi termination	-----	1 Nos
15. Hydraulic Pump ( upto 250kg/cm <sup>2</sup> )	-----	1 No.
16. Hand crimping tools	-----	Adequate Nos.
17. Blower	-----	1 No
18. Vacuum Cleaner	-----	1 No

**NOTES:**

- The above list specifies only major T&Ps (may not be complete to be deployed by the contractor). All additional / other tools and plants in good and safe working conditions which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rates..
- Other terms and conditions regarding above items please also refer clause 37 (T&P/IMTEs).

**Annexure-III**

Indicative list of IMTEs to be arranged by the **CONTRACTOR** for **ELECTRICAL RELATED WORK.**

Sl. No.	EQUIPMENT	QTY
1.	500 V / 1000V, (Hand operated ) megger -----	1 No.
2.	2.5 and 5 KV (Mains operated megger) -----	1 No.
3.	Digital Multimeters with current probe-----	4 Nos
4.	2. Analog Multimeters -----	2 Nos
5.	Tong Testers ( various ranges )including mA Range -----	2 Sets
6.	Decade resistance Box -----	1 no
7.	Intercom Sets for cable Checking -----	Adequate Nos
8.	Transformer Oil Testing Kit (Motor operated) 0-100 KV-----	1 Set
9.	PPM Measuring Kit -----	1 No
10.	Primary Injection Kit -----	1 Set
11.	Secondary Injection Kit -----	1 Set
12.	Single / three phase variac -----	1 Each

## Notes:

1. The above list of testing instruments / equipment required for testing / commissioning is only for guidance to contractor and not complete. Any other / additional testing instruments / equipment required for timely and satisfactory completion of job will also be arranged by contractor at his own cost.
2. Contractor must re-ascertain /recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration / deployment of IMTE's.
3. Other terms and conditions regarding above items shall be as per clause no 37 (Tools & plants / IMTEs)

**Annexure-IV**

Indicative list of **IMTE** to be arranged by the **CONTRACTOR** for **C&I** work

S.NO.	DESCRIPTION	RANGE	ACCURACY	QTY
1.	Dead Weight Tester	0-600Kg/cm <sup>2</sup>	LC-0.5Kg/cm <sup>2</sup>	1 Set
2.	Comparison test set (With Sub-standard Press. Gauge)	0-1 Kg/cm <sup>2</sup>	$\pm 0.25\%$ Lc-0.2Kg/cm <sup>2</sup> !	1 Set
		0-4 k g/cm <sup>2</sup>	-----do----- !	
		0-6 Kg/cm <sup>2</sup>	-----do----- !	
		0-10kg/cm <sup>2</sup>	-----do----- !	
		0-25Kg/cm <sup>2</sup>	+0.25%Lc-0.25 Kg/cm <sup>2</sup> !	
		0-60Kg/cm <sup>2</sup>	$1\pm 0.25\%$ Lc-1.0 Kg/cm <sup>2</sup> !	
		0-250Kg/cm <sup>2</sup>	$\pm 0.25\%$ Lc-0.20 Kg/cm <sup>2</sup> !	
		0- 400Kg/cm <sup>2</sup>	$\pm 0.25\%$ Lc-0.20 Kg/cm <sup>2</sup> !	
3.	Variable DC regulated (Electronic voltage source with digital indication).	0-30V DC	0.2%	1 No
4.	Oil bath with thermostat, Stirrer and sub-standard Glass Thermometers in Multiple ranges	0-300 Degree Cel.		1 set.
5.	Glass U tube mercury mano-meter with standard steel Scale having leveling arrangement.	0-760 mm		As per requirement
6.	Glass U tube mercury mano-meter with standard steel Scale having leveling arrangement.	0-1000 mm		As per requirement
7.	Inclined tube manometer	0-1000 mm		As per requirement
8.	mA/mV source with Digital display.	0-200 mA/200mV		01 No.
9.	Rehostat	100 Ohm , 10 A		03 Nos.
10.	Precision Digital Multimeter	4-1/2 Digits		06 No.
11.	Digital multimeters	3-1/2 Digits		06 Nos

**Notes:**

- The above list of testing instruments/equipment required for testing / commissioning is only for guidance to contractor and not complete. Any other / additional testing instruments / equipment required for timely and satisfactory completion of job will also be arranged by contractor at his own cost.

1. Contractor must re-ascertain /recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration / deployment of IMTE's.
2. Other terms and conditions regarding above items shall be as per clause no. 37 (tools & plants / testing & measuring instruments

**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 Tenderer with stamp)

Date:

**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.....

ANNEXURE-VI

**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.

## ANNEXURE - VII

**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	

**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.: Erection, testing, commissioning, trial operation and handing over of  
all C&I equipments for 3x 500 MW units at APCPL Jhajjar ,  
HARYANA.**

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited [APCPL Jhajjar 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)