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

TENDER NO. BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653

FOR

MOU FOR PRE-BID TIE UP FOR "Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 400 MW Marib-II AND/OR 300 MW Marib-III Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at MARIB GAS POWER STATION - YEMEN"

PART I – TECHNICAL BID

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

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

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2515476 / 2515464 / 2515479
Fax 091-0120-2515464 / 2515467
Email: msd@bhelpsnr.co.in / sca@bhelpsnr.co.in

TENDER NO. BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653

IMPORTANT NOTE

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

THIS TENDER SPECIFICATION ISSUED TO:

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

INDEX

ISO 9001, ISO 14001 and OHSAS 18001 certified company
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Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
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TENDER NOTICE

Sealed tenders are invited from the contractors fulfilling qualifying requirements for "Entering into a MOU for Pre-Bid Tie-up for Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 400 MW Marib-II AND/OR 300 MW Marib-III Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at MARIB GAS POWER STATION – YEMEN

TENDER NO. BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653

1.0 **The tenderers who wish to participate should have, during preceding seven (7) years period (reckoned as on the date of bid opening) :-**

1.1 "Executed similar nature of work, covered in this tender, for atleast one gas turbine of rating V 94.2 'OR' equivalent 'OR' higher rating in Gas turbine station 'OR' alternatively one steam turbine set of 67.5 MW or higher rating and one Gas Turbine Set of Frame 6 'OR' higher rating".

'AND'

1.2 "Similar nature of Electrical and C&I works consisting of Power Transformer of 132 KV/100 MVA 'OR higher rating in Gas/Steam Turbine Units in Power / Industrial Projects".

NOTES: a). In case the tenderer with experience as per QR SL NO. 1.1, do not have experience as per QR at SL NO. 1.2, they are allowed to have "Tie Up Arrangement" for these works as detailed at SL NO. 3.0 indicated below.

b) If the qualifying work is completed in the seven(7) year period specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.

c) The word "executed" means, tenderer should have achieved the progress specified above even if the total contract is not completed/closed.

2.0 **Party should have an average annual turnover of minimum of Indian Rs. 350 Millions (Rupees Three Hundred & Fifty Millions only) 'OR' USD 7.15 Millions 'OR' EUROS 5.0 Millions `OR' YEMEN RIALS 1430 Millions during preceding three years (2006-07, 2007-08 and 2008-09). Bidders shall submit audited balance sheets and profit & loss account in support of this.**

In case audited balance sheet and profit & loss account for last year ending on 31-03-2009 is not finalised, bidder shall submit audited balance sheet for last 3

years, ending on 31-03-2008. In such a case, this QR shall be read as "Party should have an average annual turnover of minimum of Indian Rs. 350 Millions (Rupees Three Hundred & Fifty Millions only) 'OR' USD 7.15 Millions 'OR' EUROS 5.0 Millions `OR' YEMEN RIALS 1430 Millions during preceding three years (2005-06, 2006-07 and 2007-08). Bidders shall submit audited balance sheets and profit & loss account in support of this"

3.0 Tie- Up Arrangement:

3.1 In case tenderer having experience as per QR SL NO. 1.1 but do not have experience as per QR SL NO. 1.2 , shall be allowed to have tie up arrangements with the parties who are having experience as per QR SL NO. 1.2 given above and shall only be the Lead Partner. The composition of the Tie-up arrangement and role and responsibility of each constituent, including that of lead partner, for execution of work in their respective area must be well defined . The tenderer (Lead Partner) can have only one tie up partner for QR indicated at Sl. No. 1.2. The tenderer shall give an undertaking that the responsibility of execution of entire work shall lie with the Lead Partner and also that in case of dissolution of Tie up, the Lead partner shall be liable for completing the work as per the terms of contract without any additional cost to BHEL or without affecting project schedule. Also, in case of dissolution of Tie up, the Lead partner will immediately arrange necessary alternate tie up with another party meeting the QR requirement of this NIT (Subject to BHEL's approval). In case the same is not arranged, BHEL will be free to get the work done through alternate sources at their (Contractor's) risk & cost. Legal documents of the tie up Agreement, signed by all the partners, shall be submitted as a part of technical bid.

3.2 For the purpose of qualifying requirements as given at SL no 2.0, the financial turnover of all the partners put together shall be considered. However, audited balance sheets of all the partners shall be submitted by the tenderer along with Part –I bid.

4.0 Bidders are required to enter into an Integrity Pact (IP) with BHEL against this tender / contract as per Annexure-V of this NIT by signing and stamping all the pages of IP by authorized representative. Bidder, who do not comply with this requirement shall not be considered against this tender.

NOTES: (i) Bidders are required to meet (i) QR SL No.1.0 for work experience and QR SL NO. 2.0 for Financial Turnover. Bidders shall submit supporting documents for the same.

(ii) Qualifying Requirements for Marib Phase-II and Marib Phase-III are common.

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 on BHEL web page www.bhel.com. Bidder(s) intending to participate may download the tender document from the web site.

(iii) Bidder(s) can obtain 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 25*.09.2009.**

(iv) **Tenders must be submitted to the undersigned in Room No. 104 latest by 25.09.2009 at 15.00 Hrs (IST).**

(v) **Deposit of Earnest Money Deposit (EMD)-- NOT APPLICABLE**

(vi) **CORPORATE GUARANTEE** :- Bidders are required to submit a Corporate Guarantee duly signed by Authorised person in accordance with their Board resolution in case of Limited/Pvt Limited Companies, or Partners in case of Partnership Firms, or owner in case of Proprietary Firms for Indian Rs. 5,00,000/- or US$ 10,000/- in favour of " BHARAT HEAVY ELECTRICALS LTD.," (A Govt. of India Undertaking) having its Registered office at BHEL House, Siri Fort, Asiad, New Delhi – 110049 & through its unit at Power Sector – Northern Region, Noida, Distt. Gautam Budh Nagar, Uttar Pradesh (U.P), India. **A copy of board resolution is to be enclosed with the Corporate Guarantee.** The validity of Corporate Guarantee should initially be at least for a minimum period of six month from the date of opening of tender and which can be further extendable as per the requirement till finalization of tender. Corporate Guarantee shall be returned to all bidders immediately after finalization of tender, signing of MOU and submission of bid bond with the successful bidder.

(vii) 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.

(viii) Bidders shall enter into an Integrity Pact (IP) with BHEL as per format given at Annexure – XII of this NIT. The bidders are required to return this Integrity Pact (IP) alongwith Techno-Commercial bid (Part-I), duly signed and stamped by the authorized signatory who signs the bid. It may be noted that only those bidders who have entered into such an IP with BHEL would be competent to participate against this NIT i.e. entering into this pact is a preliminary qualification for the bidders. The Independent External Monitor against this NIT shall be **Shri D. P . Bagchi, IAS (Retd), Y-165, Regency Park-II, Phase IV, DLF City, Gurgaon-122009**

(ix) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.

(x) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/post.

(xi) Unsolicited rebate/discount shall not be accepted after bid opening.

(xii) Tenders once submitted to BHEL, shall not be returned.

(xiii) Purchase Preference will be given to Indian CPSUs as per Indian Govt. Guidelines.

Sr. DGM/SCP

ISO 9001, ISO 14001 and OHSAS 18001 certified company
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TENDER NOTICE

LAST DATE OF SALE : 25.09.2009
DUE DATE OF SUBMISSION : 25.09.2009 (15 Hrs. IST)

NIT NO. / NAME OF WORK
TENDER NO. BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653
Sealed tenders are invited from the contractors fulfilling qualifying requirements for "Entering into a MOU for Pre-Bid Tie-up for Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 400 MW Marib-II AND/OR 300 MW Marib-III Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at MARIB GAS POWER STATION PHASE - YEMEN

NOTES:

1. Purchase Preference will be given to Indian CPSU as per Indian Govt. Guidelines.
2. The complete tender documents can be downloaded from BHEL Web Site, **www.bhel.com**.
3. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper.

SDGM/SCP

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

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

The Site of Power Plant (Marib II & III) is approximately 230 Km from Sana'a capital town of Yemen and is located in the east of Yemen. Marib is the most famous ancient city in Yemen. The old city of Marib lies in the Sabean plains on the outskirts of the east Yemen desert Mafazet Saihad'. It's strategic position lends itself to its important role in history, as it controlled the ancient incense routs. It was a meeting point for caravans coming from the Qana port on the Arabian Sea coast, crossing the Wadi

Present order is for supply and installation of 400 MW Gas Turbine V 94.2 (4 nos) under Phase-II & 300 MW Gas Turbine V 94.2 (3 nos) under Phase-III on EPC basis.

The site conditions are as follows:-

i) Climate	:Mostly desert; hot and humid along west coast; temperate in western mountains affected by seasonal monsoon; extraordinarily hot, dry, harsh desert in east Terrain narrow coastal plain backed by flat topped hills
ii) Geographical	: 15 00 N, 48 00 E
iii) Natural hazards	: Sandstorms and dust storms in summer
iv)) Ambient Temperature	: Max up to 45 degree C.
v) Altitude	: 1100 m above MSL
vi)Currency	: Yemeni Rial (YER)
vii) Languages	: Arabic

MARIB – PHASE II & III

BRIEF SCOPE & MANDATORY TERMS & CONDITIONS OF

PRE-BID TIE-UP ARRANGEMENT

BHEL has been qualified to bid on EPC basis for 400 MW Marib Phase-II & 300 MW Marib Phase-III Gas Power Project, Marib, Yemen. Accordingly, BHEL is in the process of submitting their bids for the same to Public Electricity Corporation, Yemen (PEC).The most of the supplies for this project have been envisaged from various units of BHEL.

Through this tender enquiry, BHEL is looking for the suitable Pre-Bid Tie up partner for **Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages for 400 MW Marib Phase-II & 300 MW Marib Phase-III Gas turbine Power Station Project at Marib, Yemen**. The detailed scope, specifications and terms & conditions are covered in this NIT.

Mandatory terms and conditions of the pre-bid tie up are given below. In case of conflict with any condition given elsewhere in this NIT, the conditions given hereunder shall prevail on the condition given elsewhere;

1. The successful bidder shall be responsible for execution of its scope of work based on the BHEL engineering approved by the customer including all addendums/ clarifications etc. of this tender Enquiry specification for either Marib Phase-II 'OR' Phase-III 'OR' both the phases – II & III together, which will depend on work awarded to BHEL by Customer (PEC).

2. **BIDDERS SHALL QUOTE FOR MARIB-PHASE-II AND/OR MARIB- PHASE-III IN ATTACHED RATE SCHEDULE. EVALUATION WILL BE DONE SEPARATELY FOR MARIB PHASE-II AND MARIB PHASE-III.**

3. MOU shall be signed with the techo-commercial accepted lowest bidder of each phase in BHEL's prescribed format (Format Attached).

4. **BHEL shall open offers in camera (Technical & Price bid).**

5. The agreed price drawn during MOU may be subject to further proportional reduction for the package under MOU, in the event of any price reduction given by BHEL to its customer together with alteration in terms & conditions during negotiation with customer.

6. MOU shall have provision for variations in quantities against addition/ deletion/ changes in scope of work.

7. Within 30 days of entering into MOU, successful bidder shall have to submit a bid-bond in the form of bank guarantee for 1 % of value agreed in MOU, in order

to ensure successful bidder's continued association & linkage with BHEL till customer finalises order.

8. MOU will be converted to contracts on receipt of firm order from customer without any major deviation/ financial implication keeping in view the spirit of MOU and without again going through tendering procedures. Contract will be signed only with pre-bid tie-up party on receipt of firm order from customer on BHEL which may be either for Phase-II or Phase-III or both as the case may be.

9. In line with the time schedule clause no. 61 & 62 of SCC, it is expected that the work for Marib-Phase-II and Phase-III may start almost parallel. Contractors shall mobilize their resources accordingly. In case, contractor is awarded both the Phases, he has to create all facilities including deployment of T&Ps, IMTEs and Manpower, safety & quality set-up etc. separately for each of the phases in order to achieve the targets as indicated in tender enquiry.

10. Any changes/ modifications, addition/ deletion necessary, which are necessitated because of fault of successful bidder, shall be to their account.

MARIB – PHASE II & III

SECTION- I

GENERAL INSTRUCTIONS TO TENDERERS

1 This tender specification as a whole, furnishing all the details and other documents as required in the following pages, shall be duly signed and sent in a sealed cover (IN DUPLICATE) super-scribing the name of work as given in the tender notice.

2 The tender shall be addressed to : OFFICER INVITING TENDER AS INDICATED IN THE TENDER NOTICE.

3. Tenders submitted by post shall be sent as **"REGISTERED/ SPEED/ COURIER POST"** and shall be posted with due allowance for any postal delay. The tenders received after the due date and time of opening are liable to be rejected. Offers received by Telegram/telex/ Fax/ E-mail/ Internet may be considered as per terms of NIT.

4 Tenders shall be opened at the time and date as specified in the tender notice in the presence of such of those tenderers or their authorised representatives who may be present. -- **NOT APPLICABLE**

5 The tenderers shall closely peruse all the clauses, specifications and drawings indicated in the Tender Documents before quoting. Should the tenderer have any doubt about the meaning of any portion of the Tender Specifications or find discrepancies / omission in the Drawings or the tender documents issued are incomplete or shall require clarification on any of the technical aspect, scope of work etc., he shall atonce contact the authority inviting the tender for clarification before the submission of the tender.

6 Before tendering, the tenderers are advised to inspect the site of work and the environments and be acquainted with the actual working and other prevalent conditions, facilities available, position of material and labour. No claim will be entertained later on grounds of lack of knowledge.

7 Tenderer must fill up all the schedules and furnish all the required information as per the instructions given in various sections of the tender specification. Each and every page of the Tender Specification must be SIGNED, STAMPED AND SUBMITTED ALONG WITH THE OFFER by the Tenderer in token of complete acceptance thereof. The information furnished shall be complete by itself.

8 The tenderer shall quote the rates in English Language and international numerals. These rates shall be entered in figures as well as in words. In case of difference in rates between words and figures THE LESSER OF THE TWO will be treated as valid rate. For the purpose of tender, the metric system of units shall be used.

9 All entries in the tender shall either be typed or be written in ink. Erasure and over writings are not permitted and may render such tenders liable to summary rejection. All cancellations and insertions shall be duly attested by the tenderer.

10 **QUALIFICATIONS OF TENDERERS** : Only tenderers who have previous experience in the work of this nature and description detailed in this tender specification are expected to quote for this work. **Offers from tenderers who do not have proven and established experience in the field are not likely to be considered.**

11 **DATA TO BE ENCLOSED** : Full information shall be given by the tenderer in respect of the following. Non submission of these information may lead to rejection of the offer.

11.1 **FINANCIAL STATUS** : Financial viability as per proforma enclosed at ***ANNEXURE-`A'***

11.2 **INCOME TAX CERTIFICATES** : A Certificate of Income tax clearance from the appropriate authority in the forms prescribed therefor duly indicating annual turnover. These certificates shall be valid for one year from the date of issue or for the period prescribed therein for all tenders submitted during the period.—NOT APPLICABLE

11.3 **PREVIOUS EXPERIENCE** : A statement giving particulars (duly supported by documentary evidence) of the various service rendered in progress for each similar works by the tenderer indicating the particulars and value of each work, the site location, the duration, date of completion etc., strictly as per proforma enclosed at ***ANNEXURE-B.***

11.4 **ORGANISATION CHART** : The organisation pattern that are totally available with him and that will be employed by the tenderer for this work in the form of monthwise and categorywise deployment plan duly indicating the number of Engineers, Supervisors, skilled and unskilled workers etc., as per proforma enclosed at ***ANNEXURE-`C'.***

11.5 An attested copy of the **Power of Attorney**, in case the tender is signed by an individual other than the sole Proprietor, shall also be attached.

11.6 **IN CASE OF AN INDIVIDUAL** : His full name, experience, address and nature of business.

OR

IN CASE OF PARTNERSHIP FIRMS : The names of all the partners with addresses and their experience. A copy of the partnership deed/ instrument of Partnership duly certified by a Notary Public shall be enclosed.

OR

IN CASE OF COMPANIES : Date and place of registration including date of commencement certificate in case of public companies and the nature of business carried or by the Company. Certified copies of memorandum and Articles of Association are also to be furnished. Also indicate names, addresses and experience of the Directors.

11.7 A list of tools and tackles (including cranes, tractor-trailers, winches, Derricks, welding sets etc., wherever applicable) that the tenderer is having and those that will be deployed on this job as per proforma enclosed at ***ANNEXURE-`D'.***

11.8 Analysis of unit rate quoted as per proforma enclosed at ***ANNEXURE-`E'.***

11.9 Declaration sheet as per proforma enclosed at ***ANNEXURE-`F'.***

11.10 In addition to the above, the particulars required elsewhere in tender documents.

11.11 Checklist and schedule of general particulars duly filled in, signed and stamped as per ***ANNEXURE-`G'.***

NOTE : In terms of clauses 11.1 to 11.11 above, all the data required to be enclosed with the tender need to be furnished neatly typed, signed and stamped in the given formats only (in the form of separate sheets) failing which the tender may be considered as incomplete and is liable for rejection. Documentary proofs wherever necessary also need to be enclosed.

12 **EARNEST MONEY DEPOSIT** : Every tender must be accompanied by the prescribed amount of Earnest Money Deposit in any one of the following forms.

NOTE : Bank Guarantee, Cheques, Currency Notes, Money Orders or Postal Orders will not be accepted.

12.1 ***Cash(As permissible under Income Tax Act)*** : The amount should be remitted by the party to the Cashier of Bharat Heavy Electricals Limited and cash receipt issued by him shall be enclosed alongwith the tender.

12.2 Pay Order or Demand Draft in favour of Bharat Heavy Electricals Limited, Noida.

12.3 Tenders received without Earnest Money in full in the manner prescribed above will not be considered.

12.4 The Earnest Money Deposit of the successful tenderer will be retained towards part of Security Deposit.

12.5 In the case of unsuccessful tenderers, the Earnest Money will be refunded normally within fifteen days of acceptance of award of work by the successful tenderer.

12.6 BHEL reserves the right of **forfeiture of Earnest Money deposit** in case the successful tenderer,

(a) After opening of Tender, revokes his tender within the validity period or increases his earlier quoted rates.

(b) Does not commence the work within the period as per LOI/Contract. In case the LOI/Contract is silent in this regard then within 15 days after award of contract.

12.7 EMD shall not carry any interest.

12.8 Tenderers, who so ever desires, may deposit one time Earnest Money Deposit of Rs. 2,00,000/- in cash***(As permissible under Income Tax Act***) /DD/pay order only with the cashier of BHEL. Tenderers who furnish one time EMD as above, will not be required to furnish EMD time and again alongwith their tenders submitted to BHEL/ PSNR. However they will be required to indicate the cash receipt No. and date of one time EMD in all their tenders.

13 **AUTHORISATION AND ATTESTATION** : Tenders shall be signed by persons duly authorised / empowered to do so. Certified copies of such authority and relevant documents shall be submitted alongwith the tenders.

14 **VALIDITY OF OFFER** : *THE OFFER SHALL BE KEPT OPEN FOR ACCEPTANCE FOR A MINIMUM PERIOD OF SIX MONTHS FROM THE DATE OF OPENING OF TENDERS*. In case Bharat Heavy Electricals Limited calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenderers.

15 **EXECUTION OF CONTRACT** :The successful tenderer's responsibility under this contract commences from the date of issue of the Letter of Intent by Bharat Heavy Electricals Limited. The successful tenderer shall be required to execute an agreement in the prescribed form as per ***ANNEXURE-`I'*** with the BHEL within a reasonable time after the acceptance of his tender and in any case before submitting the first bill for payment.

16 **SECURITY DEPOSIT** : Upon acceptance of tender, the successful tenderer must deposit the required amount of security deposit within the time specified in the Letter of Intent for satisfactory completion of work.

16.1 The total amount of Security Deposit shall be as follows :

(a) In case of work costing upto 10 lakhs : 10% of the contract value.

(b) In case of work costing above Rs 10 lakhs and upto Rs 50 lakhs : 1 Lakh + 7.5 % of the amount exceeding Rs. 10 Lakhs.

(c) In case of work costing more than Rs 50 lakhs : 4 Lakhs + 5 % of the amount exceeding Rs. 50 Lakhs.

NOTE: The conversion rate from INR to US $ shall be the exchange rate of State Bank of India as prevailing on the date of technical bid opening

16.2 The Security Deposit will be deposited within 15 days from the date of issue of Letter of Intent but before start of work in any one of the following forms :-

(a) The total Security Deposit as indicated in the Letter of Intent in cash (As permissible under Income Tax Act).

(b) Pay Order, Demand Draft in favour of BHEL.

(c) Deleted

(d) Deleted

(e) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.

(f) Deleted.

(g) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be collected before start of the work and the balance 50% may be recovered from the running bills.

(h) EMD of the successful tenderer shall be converted and adjusted against the security deposit.

16.3 The security deposit shall not carry any interest.

NOTE: Acceptance of Security Deposit against Sl. No. (d) and (f) above will be subject to hypothecation or endorsement on the documents in favour of BHEL. However, BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith.

16.4 Security deposit shall not be refunded to the contractor except in accordance with the terms of the contract.

16.5 The validity of the Bank Guarantee furnished towards Security Deposit under (e) above shall be upto the period of completion of work as stipulated in the Letter of Intent + 2 (TWO) month and the same will be kept valid by proper renewal till the satisfactory completion of the Guarantee Period.

16.6 If the value of the work done at any time exceeds the accepted agreement value, the Security Deposit shall be correspondingly enhanced and the extra Security Deposit shall be immediately deposited by the Contractor or recovered from payments due to him.

16.7 Failure to deposit the Security Deposit within the stipulated time, may lead to forfeiture of Earnest Money Deposit and Cancellation of the award of work.

16.8 If any part of Security Deposit of the Contractor is held in the form of approved securities, it shall be kept transferred in the name of Bharat Heavy Electricals Limited, in such a manner that the same can be realised fully without referring to the Contractor. BHEL shall not be responsible for any depreciation in the value of the Security while in BHEL's custody or for any loss of interest thereon.

16.9 BHEL reserves the right of ***forfeiture of Security Deposit*** in addition to other claims and penalties in the event of the contractor's failure to fulfil any of the contractual obligations or in the event of termination of contract as per terms and conditions of contract. BHEL reserves the right to set off the Security Deposit, against any claims of any other contracts with BHEL.

16.10 **RETURN OF SECURITY DEPOSIT** : If the contractor fully performs and completes the work in all respects to the entire satisfaction of BHEL and presents an absolute "***No Demand Certificate***" in the prescribed form and returns properties belonging to BHEL taken, borrowed or hired by him for carrying out the said works, half the amount of Security Deposit will be released to the contractor after deducting all costs, expenses and other amounts that are to be paid to BHEL under this or other contracts entered into with the Contractor. It may be noted that in no case the Security Deposit shall be refunded / released prior to passing of final bill. Balance half of the amount of Security Deposit will be released only after the Guarantee Period is over.

NOTE : All the BGs are to be submitted as per BHEL/PSNR performa.

17 **No interest** shall be payable by BHEL on Earnest Money Deposit, Security Deposit or on any moneys due to the contractor.

18 **REJECTION OF TENDER AND OTHER CONDITIONS :**

18.1 The acceptance of Tender will rest with BHEL which does not bind itself to accept the lowest tender or any tender and reserves to itself full rights for the following without assigning any reasons whatsoever.

(a) To reject any or all of the tenders.

(b) To split up the work amongst two or more Tenderers.

(c) To award the work in part.

(d) In either of the contingencies stated in (b) and (c) above to modify the time for completion suitably.

18.2 Conditional and un-witnessed tenders, tenders containing absurd or unworkable rates and amounts, tenders which are incomplete or otherwise considered defective and tenders not in accordance with the tender conditions, specifications, etc., are liable to be rejected.

18.3 If a tenderer expires after the submission of his tender or after the acceptance of his tender, BHEL may at its discretion, cancel such tender. If a partner of a firm expires after the submission of the tender or after the acceptance of the tender, BHEL may cancel such tender at its discretion unless the firm retains its character.

18.4 BHEL will not be bound by any Power of Attorney granted by the tenderer or by changes in the composition of the firm made subsequent to the execution of the contract. BHEL may, however, recognise such Power of Attorney and changes after obtaining proper legal advice, the cost of which will be chargeable to the contractor concerned.

18.5 If the tenderer deliberately gives wrong information in his tender, BHEL reserves the right to reject such tender at any stage or to cancel the contract, if awarded and forfeit the Earnest Money/ Security Deposit/ any other moneys due.

18.6 Canvassing in any form in connection with the tender is strictly prohibited and the tenders submitted by the contractor who resorts to canvassing are liable to be rejected.

18.7 Should a tenderer or contractor or in the case of a firm or Company of contractors/ one or more of its Partners/ share holders / Directors have a relation or relations employed in BHEL, the authority inviting tender shall be informed to the fact alongwith the offer, failing this BHEL may, at its sole discretion reject the tender or cancel the contract and forfeit the Earnest Money/ Security Deposit

18.8 The successful tender should not sub-contract the part or complete work detailed in the tender specification without written permission of BHEL. The tenderer is solely responsible to BHEL for the work awarded to him.

18.9 **NO DEVIATIONS** to the tender conditions will normally be accepted. however, if the tenderer insists for certain deviations to the conditions, financial implication thereof shall be loaded to the quoted price for evaluating the tenderer's offer.

MARIB – PHASE II & III

SECTION - II

GENERAL TERMS AND CONDITIONS

19.0 The following terms and expressions shall have the meaning hereby assigned to them except where the context otherwise requires.

19.1 **BHEL** (or B.H.E.Ltd.) shall mean Bharat Heavy Electricals Limited, a Company registered under the Indian Companies Act, 1956, with its Registered Office at BHEL HOUSE, SIRI FORT, NEW DELHI-110049 or its authorised officers or its Engineer or other employees authorised to deal with any matters with which these persons are concerned, on its behalf.

19.2 **`GENERAL MANAGER'** shall mean the Officer in Administrative charge of the contracting Unit of BHEL.

19.3 **`ENGINEER' or `ENGINEER-IN-CHARGE'** shall mean Engineer deputed by BHEL. The terms includes Deputy General Manager, Construction Manager, Resident Manager, Site Engineer, Resident Engineer and Assistant Site Engineer of BHEL at the site as well as the officers in charge at Head Office.

19.4 **`SITE**' shall mean the place or places at which the plants/ equipment are to be erected and services are to be performed as per the specifications of this Tender.

19.5 **`CLIENTS OF BHEL' or `CUSTOMER'** shall mean the project authorities to whom BHEL is supplying the equipment.

19.6 **`CONTRACTOR'** shall mean the individual, firm or company who enters into contract with BHEL and shall include their executors, administrators, successors and permitted assigns.

19.7 **`CONTRACT' or `CONTRACT DOCUMENT'** shall mean and include the agreement, the work order, the accepted appendices of rates, Schedules of Quantities, if any, General Conditions of Contract, Special Conditions of Contract, Instructions to Tenderers, the drawings, the technical specifications, the special specifications, if any, the tender documents and the Letter of Intent/ Acceptance letter issued by BHEL. Any conditions or terms stipulated by the tenderer in the tender documents or subsequent letters shall not form part of the Contract unless specifically accepted in writing by BHEL in the Letter of Intent and incorporated in the Agreement.

19.8 **`GENERAL CONDITIONS OF CONTRACT'** shall mean the `Instructions to Tenderers' and `General Conditions of Contract' pertaining to the work detailed.

19.9 **`TENDER SPECIFICATIONS'** shall mean the Special Conditions, Technical Specifications, appendices, Site information and drawings pertaining to the work for which the tenderers are required to submit their offer. Individual Specifications Number will be assigned to each tender specifications.

19.10 `**TENDER DOCUMENTS'** shall mean the General Conditions of Contract (19.8) and Tender Specifications (19.9).

19.11 `**LETTER OF INTENT'** shall mean the intimation by a letter / telegram / telex / fax to the tenderer that the tender has been accepted in accordance with provisions contained in the letter. The responsibility of the contractor commences from the date of issue of this letter and all the terms and conditions of contract are applicable from this date.

19.12 `**COMPLETION TIME'** shall mean the period by date specified in the Letter of Intent or date mutually agreed upon for handing over the erected equipment/ plant which are found acceptable by the Engineer being of required standard and conforming to the specifications of the Contract.

19.13 `**PLANT**' shall mean and connote the entire assembly of the plant and equipment covered by the Contract.

19.14 `**EQUIPMENT**' shall mean all equipment, machineries, materials, structurals, electricals and other components of the plant covered by the Contract.

19.15 `**TESTS'** shall mean and include such test or tests to be carried out by the contractor as are prescribed in the Contract or considered necessary by BHEL in order to ascertain the quality, workmanship, performance and efficiency of the contracted work or part there of.

19.16 `**APPROVED', `DIRECTED' or `INSTRUCTED'** shall mean approved, directed or instructed by BHEL.

19.17 `**WORK' or `CONTRACT WORK'** shall mean and include supply of all categories of labour, specified consumables, tools and tackles required for complete and satisfactory site transportation, handling, stacking, storing, erecting, testing and commissioning of the equipment to the entire satisfaction of BHEL.

19.18 `**SINGULAR' and `PLURAL'** etc. Words carrying singular number shall also include plural and vice versa where the context so requires. Words importing masculine gender shall be taken to include the feminine gender and words importing persons shall include any Company or Association or Body of Individuals, whether incorporated or not.

19.19 `**HEADINGS**' The headings in these General Conditions are solely for the purpose of facilitating reference and shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or the contract.

19.20 `**MONTH'** shall mean calendar month.

19.21 `**WRITING'** shall include any manuscript, type written or printed statement under the signature or seal as the case may be.

20 **LAW GOVERNING THE CONTRACT AND COURT JURISDICTION:** The Contract shall be governed by the Law for the time being in force in the Republic of India. The Civil Court at Delhi/ New Delhi, having ordinary Original Civil Jurisdiction shall alone have exclusive jurisdiction in regard to all claims in respect of this Contract.

21 **ISSUE OF NOTICE** The Contractor shall furnish to the Engineer, the name, designation and address of his authorised agent and all complaints, notices, communications and references shall be deemed to have been duly given to the Contractor, if delivered to the Contractor or his authorised agent or left at or posted to the address either of the contractor or his authorised agent and shall be deemed to have been so given in the case of posting on the day on which they would have reached such address in the ordinary course of post or at which they were so delivered or left.

22 **USE OF LAND** No land belonging to BHEL or its customer under temporary possession of BHEL shall be occupied by the Contractor without the written permission of BHEL.

23 **COMMENCEMENT AND COMPLETION OF WORK**

23.1 The contractor shall commence the work within the time indicated in the Letter of Intent and shall proceed with the same with due expedition without delay.

23.2 If the successful tenderer fails to commence the work within the stipulated time, BHEL, at its sole discretion, will have the right to cancel the contract. His Earnest Money and/ or Security Deposit will stand forfeited without any further reference to him without prejudice to any and all of BHEL's other rights and remedies in this regard.

23.3 All the works shall be carried out under the direction and to the satisfaction of BHEL.

23.4 The transported equipment, erected /constructed plant or work performed under the Contract, as the case may be, shall be taken over when it has been completed in all respects and/or satisfactorily put into operation at site.

24 **MEASUREMENT OF WORK AND MODE OF PAYMENT**

24.1 All payments due to the contractor shall be made by `Account Payee' Cheques.

24.2 For progress/ running bill payments, the contractor shall present detailed measurement sheets in triplicate duly indicating all relevant details based on technical documents and connected drawings for the work done during the month/ period under different categories in line with terms of payment as per Letter of Intent. The basis of arriving at the quantities/ weights shall be the relevant documents and drawings released by BHEL. These measurement sheets shall be prepared jointly with Engineer and signed by both the parties.

24.3 These measurement sheets will be checked by the Engineer and quantities and percentages eligible for payment under different groups shall be decided by him. The abstract of quantities and percentages so arrived at based on the terms of payment shall be entered in the **Measurement Book and signed by both the parties.**

24.4 Based on the above quantities, contractor shall prepare the bills in the prescribed proforma and work out the financial value. These will be entered in the Measurement Book and signed by both the parties. Payment shall be made by BHEL after effecting the recoveries due from the contractor.

24.5 All recoveries due from the contractor for the month / period shall be effected in full from corresponding running bills unless specific approval from Competent authority is obtained to the contrary.

24.6 Measurement shall be restricted to that quantity for which it is required to ascertain the financial liability of BHEL under this contract.

24.7 Measurement shall be taken jointly by persons duly authorised by BHEL and the Contractor.

24.8 The Contractor shall bear the expenditure involved, if any, in making the measurements and testing of materials to be used/ used in the work. The Contractor shall, without extra cost to BHEL, provide all the assistance with appliances and other things necessary for measurement.

24.9 If, at any time due to any reason whatsoever, it becomes necessary to re-measure the work done, in full or in part, the expenses towards such re-measurement shall be borne by the Contractor.

24.10 ***Passing of bills covered by such measurements does not amount to acceptance by BHEL of the completion of the work measured. Any left out work has to be completed by the Contractor, as directed***.

24.11 Final measurement bill shall be prepared in the proforma prescribed for the purpose, based on the certificate issued by the Engineer that the entire work as stipulated in the tender specifications has been completed in all respects to the entire satisfaction of BHEL. The Contractor shall give unqualified `No Claim' and `No Demand' certificates. All the tools and tackles loaned to him should be returned in condition satisfactory to BHEL. The abstract of final quantities and financial values shall also be entered in the Measurement Book and signed by both the parties. The final bill shall be paid within a reasonable time after completion of the work. After the payment of final bill, only the guarantee obligation percentage value shall remain unpaid which shall be released in accordance with clause 32.

25 RIGHTS OF BHEL

BHEL reserves to itself the following rights in respect of this contract without entitling the contractor to any compensation.

25.1 To get the work done through another agency at the risk and cost of the contractor, in the event of poor progress or the contractor's inability to progress the work for completion as stipulated in the contract, poor quality of work, persistent disregard of instructions of BHEL, assignment, transfer, subletting of the contracted work without written permission of BHEL, non-fulfillment of any contractual obligations etc. and to claim / recover compensation for such losses from the contractor including BHEL's supervision charges and overheads from Security Deposit/ other dues.

25.2 To withdraw any portion of work and / or to restrict / alter quantum of work as indicated in the contract during the progress of work and get it done through another agency and/ or by the departmental labour to suit BHEL's commitments to its customer

or in case BHEL decides to advance the completion due to other emergent reasons/ BHEL's obligation to its customer.

25.3 To terminate the contract after due notice and forfeit the Security Deposit and recover the loss sustained in getting the balance work done through other agencies in addition to liquidated damages in the event of :

(a) Contractor's continued poor progress.

(b) Withdrawal from or abandonment of the work before completion of the work.

(c) Corrupt act of the contractor.

(d) Insolvency of the contractor.

(e) Persistent disregard of the instructions of BHEL.

(f) Assignment, transfer, subletting of the contract work without BHEL's written permission.

(g) Non-fulfillment of any contractual obligations.

25.4 To recover any moneys due from the Contractor from out of any moneys due to the Contractor under this or any other Contract or from the Security Deposit.

25.5 To claim compensation for losses sustained including BHEL's supervision charges and overheads in case of termination of contract and to levy liquidated damages for delay in completion of work, at the rate of 1/2% of the contract value per week of delay or part thereof subject to a ceiling **of 10% of the contract value.**

25.6 To determine the Contract or to restrict the quantum of work and pay for the portion of work done in case BHEL's contract with its customer is terminated for any reason.

25.7 To effect recoveries from any amounts due to the contractor under this or any other contract or in any other form the moneys which BHEL is forced to pay to anybody due to contractor's failure to fulfil any of his obligations.

25.8 To restrict or increase the quantity and nature of work to suit site requirements, since the tender specification is based on preliminary documents and quantities furnished therein are indicative and approximate and the rates quoted shall not be subject to revision.

25.9 To deploy BHEL's skilled and semiskilled workmen in case of emergency / poor progress/ deficiency in skill on the part of the employees of the contractor and to recover the expenditure on account of the same from the moneys due to the contractor.

25.10 While every endeavor will be made by BHEL to this end, BHEL can not guarantee uninterrupted work due to conditions beyond its control. The Contractor will not be entitled to any compensation/ extra payment on this account.

25.11 In the event of any dispute of technical nature, the decision of BHEL shall be final and binding on the Contractor.

26 RESPONSIBILITIES OF CONTRACTOR IN RESPECT OF LOCAL LAWS, EMPLOYMENT OF WORKERS, ETC.

The following are the responsibilities of the Contractor in respect of observance of local laws, employment of personnel, payment of taxes etc.:

26.1 As far as possible, unskilled workers shall be engaged from the local areas in which the work is being executed.

26.2 The contractor at all times during the continuance of this contract, shall in all his dealings with the local labour for the time being employed on or in connection with the work, have due regard to all local festivals, religious and other customs.

26.3 The Contractor shall comply with all State and Central Laws, Statutory Rules, Regulations, etc., such as The payment of wages Act, The Minimum Wages Act, The workmen's Compensation Act, The Employer's Liability Act, The industrial Disputes Act, The Employees' Provident Fund Act, Employees' State Insurance Scheme, the Contract Labour (Regulations and Abolition Act, 1970)and other Acts, Rules and Regulations for labour as may be enacted by the Government during the tenure of the Contract and having force or jurisdiction at site. The contractor shall give to the local Governing Body, Police and other concerned Authorities all such notice as may be required under law.

26.4 The Contractor, in the event of his engaging 20 or more workmen, will obtain independent license under the Contract Labour (Regulations and Abolition Act, 1970) from the concerned authorities based on the certificate (Form-V) issued by the principal employer/ customer.

26.5 The contractor shall pay all taxes, fees, license charges, deposits, duties, tolls, royalty, commissions or other charges which may be leviable on account of any of his operations connected with this contract. In case BHEL is forced to make any such payment, BHEL shall recover the same from the contractor either from moneys due to him or otherwise as deemed fit.

26.6 While BHEL will pay the **inspection fees of the Boiler/ Electrical** Inspectorate, all other arrangements for the periodical visits of Boiler/ Electrical Inspector to site, inspection certificates etc. will have to be made by the contractor at his cost. The contractor will also meet all expenses in connection with his welder's qualification/ requalification tests etc.

26.7 The contractor shall be responsible for the provision of health and sanitary arrangements more particularly described in the Contract Labour (Regulations and Abolition Act, 1970) and safety precautions as may be required for safe and satisfactory execution of the contract.

26.8 The contractor shall be responsible for proper accommodation including adequate medical facilities for the personnel employed by him.

26.9 The contractor shall be responsible for the proper behavior and observance of all regulations by the staff employed by him.

26.10 The contractor shall ensure that no damage is caused to any person / property of other parties working at site. If any such damage is caused, it shall be the responsibility of the contractor to make good the losses and compensate them.

26.11 All the properties/ equipment/ components of BHEL/ its customer loaned with or without deposit, to the contractor shall remain the properties of BHEL/ its customer. The contractor shall use such properties for the purpose of execution of this contract. All such properties/ equipment/ components shall be taken to be in good condition unless notified to the contrary by the contractor within 48 hours. The contractor shall return them in good condition as and when required by BHEL/ its customer. In case of non-return, loss, damage, repairs etc., the cost thereof, as may be fixed by the Engineer, will be recovered from the contractor.

26.12 It shall not be obligatory on the part of BHEL to supply any tools and tackles or materials other than those specifically agreed to be given by BHEL. However, depending upon availability / possibility, BHEL/ its customer's equipment and other materials may be made available to the contractor on payment of hire charges as fixed by them , subject to the conditions laid down by BHEL/ its customer from time to time. Unless paid in advance, such hire and other charges shall be recovered from out of dues to the contractor or security deposit in one installment.

26.13 The contractor shall fully indemnify and keep indemnified BHEL/ its customer against all claims of whatever nature arising during the course of execution of this contract.

26.14 In case the contractor is required to undertake any work outside the scope of this contract, the amount payable shall be as may be mutually agreed upon.

26.15 Any delay in completion of works or non-achievement of periodical targets, due to reasons attributable to the contractor, will have to be compensated by the contractor either by increased manpower and resources or by working extra hours or more than one shift at no extra cost to BHEL.

26.16 The contractor shall execute the work under the conditions usual to such power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate and coordinate with other agencies at project site and proceed in a manner that shall help in the progress of work at site as a whole.

26.17 The contractor will be directly responsible for payment of wages to his workmen. A pay-roll sheet giving details of all payments made to the workmen duly signed by the contractor's representative should be furnished to BHEL, if called for.

26.18 In case of any class of work for which there is no specification laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer.

26.19 No levy, payment or charges made or imposed shall be impeached by reason of any clerical error or by reason of any mistake in the amount levied, demanded or charged.

26.20 ***No idle labour charges will be admissible in the event of any stoppage of work resulting in the contractor's workmen being rendered idle due to any reason at any time*.**

26.21 The contractor shall take all reasonable care to protect the materials and the work till such time the plant / equipment has been taken over by BHEL / its customer.

26.22 Contractor shall not stop work or abandon the site for whatsoever reason or dispute, excepting for force majeure conditions. All problems / disputes shall be separately discussed and settled without effecting the progress of work. Stoppage or abandonment of work, other than under force majeure conditions, shall be treated as breach of work of contract and dealt with accordingly.

26.23 The contractor shall keep the area of work clean and shall remove the debris etc. while executing day-to-day work. Upon completion of work, the contractor shall remove from the vicinity of work, all scrap, packing materials, rubbish, unused and other materials and deposit them in places specified by the Engineer. The contractor will also demolish all the hutments, sheds, offices, etc. constructed and used by him and shall clean the debris. In the event of his failure to do so, the same will be arranged to be done by the Engineer and the expenses recovered from the contractor.

26.24 The contractor shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work and timely execution shall be the essence of this contract. The contractor shall be responsible to ensure that the quality, assembly and workmanship conform to the dimensions and clearance given in the drawings and/ or as per the instructions of the Engineer.

26.25 The contractor shall furnish fortnightly labour deployment report indicating the classification and number of workmen engaged, date wise and category wise. Besides, the contractor shall also furnish progress reports on work at regular intervals as required by the Engineer.

27 RESPONSIBILITIES OF CONTRACTOR IN RESPECT OF SAFETY OF MEN, EQUIPMENT, MATERIAL AND ENVIRONMENT.

27.1 All safety rules and codes applied by BHEL and its customer at site shall be observed by the contractor and his workmen without exception. The contractor shall be responsible for the safety of the equipment / material and work to be performed by him and shall maintain all lights, fencing guards, signs etc. or other protections necessary for the purpose. Contractor shall also take such additional precautions as may be indicated from time to time by the Engineer, with a view to prevent pilferage, accidents, fire hazards etc. Suitable number of clerical staff, watch and ward, store keepers to take care of equipment, materials, construction tools and tackles shall be posted at site by the contractor till the completion of the work under this contract. The contractor shall arrange for such safety devices as are necessary for this type of work and carry out the requisite site tests of handling equipment, lifting tools, tackles etc. as per usual standards and practices.

27.2 The contractor shall provide to it's work force and ensure the use of the following personal protective equipment as found necessary and as directed by the authorized BHEL officials.

(a) Safety Helmets conforming to IS-2925
(b) Safety Belts conforming to IS-3521
(c) Safety shoes conforming to IS-1989
(d) Eye & Face Protection devices conforming to IS-8520 and IS-8940
(e) Hand & body protection devices conforming to IS-2573, IS-6994, IS-8807 & IS-8519.

27.3 All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, safety nets, ladders, equipment etc. used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorized BHEL official who shall have the right to ban the use of any item.

27.4 All electrical equipment, connections and wiring for construction power, it's distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carry out all types of electrical works. All electrical appliances including portable electric tools used by contractor shall have safe plugging system to source of power and be appropriately earthed.

27.5 The contractor shall not use any hand lamp energised by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

27.6 Where it becomes necessary to provide and / or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provision and/or storage in accordance with the rules and regulations laid down in the relevant Government Acts, such as Petroleum Act, Explosives Act, petroleum and Carbides of Calcium Manual of the Chief Controller of Explosives, Government of India etc. Prior approval of the authorised BHEL official at the site shall also be taken by the contractor in all such matters.

27.7 The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working, when natural daylight may not be adequate for clear visibility.

27.8 In case of a fatal or disabling injury / accident to any person at construction sites due to lapses by the contractor, the victim and / or his / her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and / or his / her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

27.9 In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover the cost of such damages from the payments due to the contractor after holding an appropriate enquiry.

27.10 In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from the payments due to the contractor, after notifying the contractor suitably and giving him opportunity to present his case.

27.11 If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given reasonable opportunity to do so and / or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorized BHEL official, BHEL shall have the right to take the corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

27.12 The contractor shall submit report of all accidents, fires, property damage and dangerous occurrences to the authorized BHEL official immediately after such occurrence, but in any case not later than 12 hours of the occurrence. Such reports shall be furnished in the manner prescribed by BHEL. In addition, periodic reports on safety shall also be submitted by contractor to the authorized BHEL official from time to time as prescribed.

27.13 During the course of construction, alteration or repairs scrap lumbers with protruding nails, sharp edges etc., and all other debris including combustible scrap shall be kept cleared from working areas, passage ways and stairs in and around site.

27.14 Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck or permitted to strike each other violently. When cylinders are transported by powered vehicles, they shall be secured in a vertical position.

27.15 The contractor shall be responsible for the safe storage of his radioactive sources.

27.16 All the contractor's supervisory personnel and sufficient number of workers shall be trained for fire fighting and shall be assigned specific fire protection duties. Enough number of such trained personnel must be available during the tenure of the contract.

27.17 Contractor shall provide enough fire protecting equipment of the types and numbers at his office, stores, erection site, other temporary structures, labour colony area etc. Access to such fire protection equipment shall be easy and kept open at all times. Compliance of the above requirement under fire protection shall in no way relieve the contractor of any of his responsibility and liabilities to fire accident occurring. In the event fire safety measures are not to BHEL's satisfaction, BHEL shall have option to provide the same and recover the cost plus incidentals from contractor's bills and / or impose penalty as deemed fit by the Engineer.

27.18 Before commencing the work, the contractor shall appoint /nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

27.19 If safety record of the contractor in execution of the awarded job is to the satisfaction of Safety Department of BHEL, issue of an appropriate certificate to recognize the safety performance of the contractor may be considered by BHEL after completion of the job.

28.0 CONSEQUENCES OF CANCELLATION

28.1 Whenever BHEL exercises its authority to terminate the contract / withdraw a portion of work under clause 25, the work may be got completed by any other means at the contractor's risk and cost provided that in the event of the cost of completion (as certified by the Engineer which shall be final and binding on the contractor) being less than the contract value, the advantage shall accrue to BHEL. If the cost of completion exceeds the moneys due to the contractor under the contract, the contractor shall either pay the excess amount demanded by BHEL or the same shall be recovered from the contractor. This will be in addition to the forfeiture of Security Deposit and recovery of liquidated damages as per relevant clauses.

28.2 In case BHEL completes the work under the provisions of this clause, the cost of such completion to be taken into account for determining the excess cost to be charged to the contractor shall consist of cost of materials purchased and / or labour provided by BHEL with an addition of such percentage to cover supervision and establishment charges as may be decided by BHEL.

29.0 INSURANCE

29.1 BHEL / its customer shall arrange for insuring the materials / property of BHEL / its customer covering the risks during transit, storage, erection and commissioning.

29.2 It shall be the sole responsibility of the contractor to insure his workmen against risks of accidents and injury while at work as required by the relevant Rules and to pay compensation, if any, to them as per Workmen's Compensation Act. The contractor shall also insure his staff against accidents. The work will be carried out in a protected area and all the Rules and Regulations of BHEL / its client in the Project Area which are in force from time to time will be followed by the contractor.

29.3 If due to negligence and/or non-observance of safety and other precautions, any accident / injury occurs to any other persons/ public, the contractor shall pay necessary compensation and other expenses, if so decided by the appropriate authority.

29.4 The contractor will take necessary precautions and due care to protect the material, while in his custody from any damage/ loss till the same is taken over by BHEL or customer. For lodging / processing of insurance claim the tractor will submit necessary documents. BHEL will reserve the right to recover the loss from the contractor, in case the damage / loss is due to carelessness / negligence on the part of the contractor. In case of any theft of material under contractor's custody , matter shall be reported to police by the contractor immediately and copy of FIR and subsequently police investigation report shall be submitted to BHEL for taking up with insurance.

29.5 If due to negligence/ carelessness on the part of the contractor, any material/ equipment gets damaged, the contractor shall submit necessary documents for lodging insurance

claims as required by BHEL Engineer. BHEL shall however reserves the right to recover deductible franchise and also unsettled portion of insurance claim amount from the contractor.

29.6 If due to negligence/ carelessness on the part of the contractor, any surrounding properties also gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserves the right to recover deductible franchise and to unsettled portion of insurance claim amount from the contractor.

29.7 The contractor may note that BHEL T&Ps / IMTEs are not insured. The Contractor will take necessary precautions and due care to protect the same while in his custody from any damage/ loss till the same is handed over back to BHEL. In case the damage / loss is due to carelessness/ negligence on the part of the contractor, the Contractor is liable to get them repair/ replaced immediately and in case of his failure to do so within a reasonable time , BHEL will reserve the right to recover the loss from the contractor.

30.0 STRIKES AND LOCKOUTS

30.1 The contractor will be solely responsible for all disputes and other issues connected with his workmen. In the event of contractor's workmen resorting to strike or the contractor resorting to lockout and if the strike or lockout so declared is not settled within a period of one month, BHEL shall have the right to get the erection work executed by employing its own men or through other agencies or both. The cost incurred by BHEL in this regard shall be recovered from the contractor.

30.2 For any purpose whatsoever, the employees of the contractor shall not be deemed to be in the employment of BHEL

31.0 FORCE MAJEURE

31.1 The following shall amount to force majeure conditions. Acts of God, Act of any Government, War, Sabotage, Riots, Civil Commotion, Police Action, Revolution, Flood, Fire, Cyclone, Earthquake and Epidemic and other similar causes over which the contractor has no control.

31.2 If the contractor suffers delay in the due execution of the contract, due to delays caused by force majeure conditions, as defined above, the agreed time for completion of the work covered by this contract shall be extended by a period of time equal to the period of delay, provided that on the occurrence of any such contingency, the contractor immediately reports to BHEL in writing the causes for the delay but the Contractor shall not be eligible for any compensation on this account.

32.0 **GUARANTEE** Even though the work will be carried out under the supervision of the Engineer, the contractor will be responsible for the quality of the workmanship and shall guarantee the work done for a period of 24 months from the date of completion of work as certified by the Engineer, and shall rectify, free of cost to BHEL, all defects arising out of faulty erection during the guarantee period starting from the date of completion of rectification. In the event of the contractor failing to repair the defective works within the time specified by the Engineer, BHEL may proceed to undertake the repairs of such defective works at the contractor's risk and cost,

without prejudice to any other rights and recover the same from out of any moneys payable to the contractor or by other legal means.

33.0 **ARBITRATION** : All disputes between the parties to the contract arising out of or in relation to the contract, other than those for which the decision of the Engineer or any other person is by the contract expressed to be final and conclusive, shall after written notice by either party to the contract to the other party, be referred to sole arbitration of the General Manager or his nominee. The arbitration shall be conducted in accordance with the provisions of the Arbitration and Reconciliation Act, 1996. The parties to the contract understand and agree that it will be no objection that the General Manager or the person nominated as Arbitrator had earlier in his official capacity to deal directly or indirectly with the matters to which the contract relates or that in the course of his official duties had expressed views on all or any of the matters in dispute or difference. The award of the Arbitrator shall be final and binding on the parties to this contract. In the event of the Arbitrator dying, neglecting or refusing to act or resigning or being unable to act for any reason or his award being set aside by the Court for any reason, it shall be lawful for the General Manager or his successor, as the case may be, either to act himself as the Arbitrator or to appoint another Arbitrator in place of the outgoing Arbitrator in the manner aforesaid. The Arbitrator may, from time to time, with the consent of both the parties to the contract, enlarge the time for making the award. Work under the contract shall be continued during the arbitration proceedings. The venue of the arbitration shall be the place from which the contract is issued or such other place as the Arbitrator at his discretion may determine.

---x---x---

ANNEXURE-A

FINANCIAL VIABILITY

1. Owner's capital in the business (incase of Partnership, please mention percentage shares and amounts).

2. Quantum of business done during last three financial years. i) Rs.

   ii) Rs.

   iii) Rs.

3. Value of fixed Assets of the business in last three years.
   i) Rs.

   ii) Rs.

   iii) Rs.

4. Guarantee limits (if any) enjoyed by the firm.

5. Over draft limits (if any enjoyed by the firm.

6. Please enclose audited profit and loss account and balance sheet for last 3 years (indicate no. of sheets).

7. Certificate from Scheduled Bank to prove Contractor's financial capacity to undertake the work duly indicating the financial limits the tenderer enjoys.

(Signature of tenderer)
With Stamp

NOTE:

All the above documents should be duly certified by auditors/ Bank as may be applicable.

ANNEXURE – B

Article I. ANALYSIS OF SIMILAR JOBS EXECUTED / IN PROGRESS

S.No.	Agency By whom Awarded	Location of project	Capacity & unit nos.	Scope of work and tonnage	Date of award	Contract value
1	2	3	4	5	6	7

%age work completed and due date for completion	Date of completion if job is already over	No. of skilled/ unskilled workers deployed at peak	No. of Engrs. & Super-visors deployed at peak	Details of major T&P like cranes, Tractor Trailors, Winches, welding M/cs supplied		Consumables by whom
				By Con-Tractor	By other Agency	
8	9	10	11	12	13	14

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE – C

Section 1.01 MONTHWISE MANPOWER DEPLOYMENT PLAN

S.No.	Catetory	No. of Person available on roll of the Orga-nasation	Month (Indicate No. of persons to be deployed in each month)						
			Ist	2nd	3rd	4th	5th	6th	and so on
1.									
2.									
3.									
	Total								

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE – D

Article II. (A) STATUS OF TOOLS & PLANTS

S.No.	Name of Equipment	Quantity owned	Registration no. wherever Applicable	Documents enclosed for proof of Ownership	Present Location	Quantity proposed to be deployed for this job

Section 2.01 (B) MONTHWISE T&P DEPLOYMENT PLAN

S.No.	Description of T & P	Month (Indicate No. to be deployed in each month)							
		Ist	2nd	3rd	4th	5th	6th	7th	8th and so on

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE - E

ANALYSIS OF UNIT RATE QUOTED

S.NO.	DESCRIPTION	PERCENTAGE OF THE UNIT RATE QUOTED	REMARKS
1.	Salary & wages for staff & workers		
2.	Consumables		
	(a) Gases		
	(b) Welding Electrodes		
	(c) P.O.L.		
	(d) Others		
3.	Depreciation & maintenance for T&P		
4.	Depreciation & Maintenance for other items		
5.	Establishment and Administration expenses of site		
6.	Overheads		
7.	Profit		

(SIGNATURE OF TENDERER)
WITH STAMP

ANNEXURE - F

DECLARATION SHEET

I, ----------hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.---------- are true and complete to the best of my knowledge. I have gone through the specification, conditions and stipulations in detail and agree to comply with the requirements and intent of specification.

I, further certify that I am the duly authorised representative of the under mentioned tenderer and a valid power of attorney to this effect is also enclosed.

Tenderer's Name & Address

Authorised representative's signature with name and address.

ANNEXURE - `G'

CHECKLIST AND SCHEDULE OF GENERAL PARTICULARS

NOTE : Tenderers are requested to fill in the following details and no column should be left blank

1. Name and address of the tenderer

2. Telegraphic/ telex address

3. Phone No. (Office)/ Fax No.

4. Name & designation of the official of the tenderer to whom all the references shall be made.

5. Tenderer's proposal No. & date

6. Whether EMD submitted (By cash/Pay order / bank draft) by.....

7. Validity of offer/ rates quoted for six months from the date of opening of tender Yes/No

8. Financial Status as per Clause 11.1 (in the format as per Annexure-A) Yes/No

9. Income tax Clearance certificate as per Clause 11.2 Yes/No

10. Details of experience as per clause 11.3 (in the format as per Annexure-B) Yes/No

11. Monthwise & Categorywise manpower deployment plan as per Clause 11.4 (in the format as perAnnexure-C) Yes/No

12. Attested copy of power of attorney as per clause 11.5 Yes/No

13. Details about type of the firm as per clause 11.6 Yes/No

14. Status of T&P and monthwise deployment plan as per clause11.7 (in the format as per Annexure-D) Yes/No

15. Analysis of unit rate quoted as per Clause 11.8 (in the format as per Annexure-E) Yes/No

16. Declaration sheet as per clause 11. 09
(in the format as per Annexure-F) Yes/No

Date _____ (SIGNATURE OF TENDERER)
WITH STAMP

WITNESS
(SIGNATURES WITH FULL PARTICULARS)

1.

2.

ANNEXURE – H

BANK GUARANTEE FOR SECURITY DEPOSIT

B.G. NO. Date

This deed of Guarantee made this ---------- day of ----------two thousand by ---------- (Bank) hereinafter called the "The Guarantor" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) in favour of M/s Bharat Heavy Electrical Limited (A Govt. of India Undertaking) a company incorporated under the Companies Act, 1956, having its registered office at BHEL House, Siri Fort, Asiad, New Delhi – 110049 through its unit at Power Sector – Northern Region, Noida, Distt. Gautam Budh Nagar, (UP) hereinafter called "The Company" (which expression shall unless repugnant to the context or meaning thereof by deemed to include its successors and assigns)

WHEREAS ----------(hereinafter referred to as the Contractor) have entered into a contract arising out of Letter of Intent no.---------- dt.----------(hereinafter referred to as "the contract") for the construction of ---------- with the company.

AND WHEREAS the contract inter-alia provides that the contractor shall furnish to the company a sum of Rs.---------- (Rupees----------) towards security deposit for due and faithful performance of the contract in the form and manner specified therein.

AND WHEREAS the contractor has approached the Guarantor and in consideration of the arrangement arrived at between the contractor and the Guarantor, the Guarantor has agreed to give the Guarantee as hereinafter mentioned in favour of the company.

The Guarantor do hereby guarantee to the company the due and faithful performance, observance or discharge of the Contract by the contractor and further unconditionally and irrevocably undertake to pay to the Company without demur and merely on a demand, to the extent of Rs.----------(Rupees----------) against any claim by the company on them for any loss, damage, costs, charges and expenses caused to or suffered by the company by reasons of the contractor making any default in the performance, observance or discharge of the terms, conditions, stipulations or undertakings or any of them as contained in the contract.

The decision of the company whether any default has occurred or has been committed by the contractor in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them as contained in the contract and / or as to the extent of loss, damage, costs, charges and expenses caused to or suffered by the company by reason of the contractor making any default in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them shall be conclusive and binding on the Guarantor irrespective of the fact whether the contractor admits or denies the default or questions the correctness of any demand made by the company in any Court, Tribunal or Arbitration proceedings or before any other Authority.

The company shall have the fullest liberty without affecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the contract or extend time of performance by the contractor or to postpone for any time and from

time to time any of the powers exercisable by it against the contractor and either enforce or forebear from enforcing any of the terms and conditions governing the contract or securities available to the company and the Guarantor shall not be released from its liability under these presents by any exercise by the company of the liberty with reference to the matters aforesaid or by reasons of time being given to the contractor or any other forbearance, act or commission on the part of the company or any indulgence by the company to the contractor or any other matter or thing whatsoever which under the law relating to sureties would, but for this provision have the effect of so releasing the Guarantor from its liability under this guarantee.

The Guarantor further agrees that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the contract and its claim satisfied or discharged and till the company certifies that the terms and conditions of the contract have been fully and properly carried out by the contractor and accordingly discharges this Guarantee, subject however, that the company shall have no claim under this Guarantee after ---------- i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time, as the case may be) unless a notice of the claim under this Guarantee has been served on the Guarantor before the expiry of the said period in which case the same shall be enforceable against the Guarantor not withstanding the fact that the same is enforced after the expiry of the said period.

The Guarantor undertakes not to revoke this Guarantee during the period it is in force except with the previous consent of the Company in writing and agrees that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the contractor or the Guarantor shall not discharge the Guarantor's liability hereunder.

It shall not be necessary for the company to proceed against the contractor before proceeding against the Guarantor and the Guarantee herein contained shall be enforceable against them notwithstanding any security which the Company may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealized.

Notwithstanding anything contained herein before, our liability under the Guarantee is restricted to Rs.---------- (Rupees----------). Our guarantee shall remain inforce until ----------, i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time) unless a claim or demand under this guarantee is made against us on or before ---------- we shall be discharged from our liabilities under this Guarantee thereafter.

Any claim or dispute arising under the terms of this documents shall only be enforced or settled in the courts of at New Delhi / Delhi only.

The Guarantor hereby declares that it has power to execute this guarantee and the executant has full powers to do so on behalf of the Guarantor.

IN WITNESS whereof the ---------- (Bank) has hereunto set and subscribed its hand the day, month and year first, above written.

Signed for and on behalf of the Bank

(Signatory No.----------)

WITNESSES

1. Name & Address
2. Name & Address

Notes :

1. The above BG shall be executed on the non-judicial stamp papers of adequate value procured in the name of the bank in the state where the bank is located.

2. The above BG is required to be sent by the executing bank directly to BHEL at the address where tender is submitted / accepted under seal cover.

ANNEXURE - I

AGREEMENT

Agreement No. and Date _____
Name of the Work
_____
Name of the Contractor with
full address _____
_____
Value of work awarded _____

Letter of Intent No. and Date _____

Scheduled Commencement Date _____
Scheduled Completion Date _____

THIS AGREEMENT MADE THIS _____DAY OF_____2000 between BHARAT HEAVY ELECTRICALS LIMITED (A Government of India Enterprise) a Company incorporated under the Companies Act, 1956, having its Registered Office at BHEL House, Siri Fort New Delhi- 110049 (herein after called BHEL) of the ONE PART.

AND

M/S _____
_____ (hereinafter called the `Contractor') of the SECOND PART.

WHEREAS M/s ----------state that they have acquired and possess extensive experience in the field of ----------

And Whereas in response to an Invitation to Tender No. ---------- issued by BHEL for execution of ---------- the contractor submitted their offer No.----------dated ----------And whereas BHEL has accepted the offer of the Contractor on terms and conditions specified in the Letter of Intent No.---------- dated ----------read with the references cited therein.

THIS AGREEMENT WITNESSES AND it is hereby agreed by and between the parties as follows:

1. That the contractor shall execute the work of ----------and more particularly described in Tender Specification No ----------including Drawings and Specifications (hereinafter called the said works) in accordance with and subject to terms and conditions contained in these presents, instructions to Tenderers, General Conditions of Contract, Special Conditions, Annexures, Letter of Intent dated ----------and such other instructions, Drawings, Specifications given to him from time to time by BHEL.

2. The Contractor is required to furnish to BHEL Security deposit in the form of cash/ approved securities/ Bank Guarantee valid upto ---------- for a sum of Rs.---------- towards satisfactory performance and completion of the Contract.

3. The Contractor has furnished a Bank Guarantee bearing no.----------dated ---------- for a sum of Rs.----------executed by ---------- in favour of BHEL towards Security Deposit valid upto ---------

OR

The Contractor has furnished to BHEL an initial Security Deposit of Rs.----------in the form of cash / approved Securities/ B.G No.---------- dated ---------- for Rs.---------- executed by ---------- in favour of BHEL valid upto ---------- and has agreed for recovery of the balance security deposit by BHEL @ 10% of the value of work done from each running bill till the entire Security Deposit is recovered.

OR

The contractor has furnished to BHEL an initial Security Deposit of Rs.-----(Rs.---------- vide Bank draft No.----------dated ----------and by adjusting EMD of Rs.----------submitted vide Bank draft No.---------- dt.---------) and has agreed for recovery of balance Security Deposit by BHEL @ 10% of the value of work done from each running bill till the entire security deposit is recovered.

4. The Contractor hereby agrees to extend the validity of the Bank Guarantee for such further period or periods as may be required by BHEL and if the Contractor fails to obtain such extension(s) from the Bank, the Contractor, shall pay forthwith or accept recovery of Rs.---------- from the bills in one installment and the contractor further agrees that failure to extend the validity of the Bank Guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum of Rs.----------.

OR

In case the contractor furnishes the bank guarantee at a later date the contractor hereby agrees to extend the validity of bank guarantee for such further period or periods as may be required by BHEL and if the contractor fails to obtain such extension(s) from the bank, the contractor shall pay forthwith or accept recovery of the amount of bank guarantee given in lieu of security deposit from the bills in one installment and the contractor further agrees that failure to extend the validity of bank guarantee or failure to pay the aforesaid amount in the manner specified above shall constitute breach of contract. In addition to above, BHEL shall be entitled to take such action as deemed fit and proper for recovering the said sum.

5. That in consideration of the payments to be made to the Contractor by BHEL in accordance with this Agreement the Contractor hereby covenants and undertakes with BHEL that they shall execute, construct, complete the works in conformity, in all respects, with the terms and conditions specified in this Agreement and the documents governing the same.

6. That the Contractor shall be deemed to have carefully examined this Agreement and the documents governing the same and also to have satisfied himself as to the nature and character of the Works to be executed by him.

7. That the Contractor shall carry out and complete the execution of the said works to the entire satisfaction of the Engineer or such other officer authorised by BHEL, within the agreed time schedule, the time of completion being the essence of the Contract.

8. That BHEL shall, after proper scrutiny of the bills submitted by the Contractor, pay to him during the progress of the said works such sum as determined by BHEL in accordance with this Agreement.

9. That this Agreement shall be deemed to have come into force from -------- the date on which the letter of intent has been issued to the Contractor.

10. That whenever under this contract or otherwise, any sum of money shall be recoverable from or payable by the Contractor, the same may be deducted in the manner as set out in the General Conditions of Contract or other conditions governing this Agreement.

11. That all charges on account of Octroi, Terminal and other taxes including sales tax or other duties on material obtained for execution of the said works shall be borne and paid by the Contractor.

12. That BHEL shall be entitled to deduct from the Contractor's running bills or otherwise Income Tax under Section 194 (C) of the Income Tax Act, 1961.

13. That BHEL shall be further entitled to recover from the running bills of the Contractor or otherwise such sum as may be determined by BHEL from time to time in respect of consumables supplied by BHEL, hire charges for tools and plants issued (Where applicable) and any other dues owed by the Contractor.

14. That it is hereby agreed by and between the parties that non- exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents and the liability of the Contractor with respect to compensation payable to BHEL or Contractor's obligations shall remain unaffected.

15. It is clearly understood by and between the parties that in the event of any conflict between the Letter of Intent and other documents governing this Agreement, the provisions in the Letter of Intent shall prevail.

16. The following documents

1. Invitation to Tender No---------- and the documents specified therein.
2. Contractor's Offer No---------- dated----------.
3. _____
4. _____
5. _____
6. Letter of Intent No_____ dated_____.
7. _____

shall also form part of and govern this Agreement.

IN WITNESS HEREOF, the parties hereto have respectively set their signatures in the presence of

WITNESS

1.

2.

(CONTRACTOR)
(to be signed by a person holding
a valid Power of Attorney)

WITNESS

1.

2.

(For and on behalf of BHEL)

LIST OF MEMBER BANKS

1. State Bank of India
2. ABN AMRO Bank N.V.
3. Bank of Baroda
4. Canara Bank
5. CITI Bank N.A.
6. Corporation Bank
7. Deutsche Bank AG
8. HDFC Bank Ltd.
9. The Hongkong and Shanghai Banking Corporation Ltd.
10. ICICI Bank Ltd.
11. IDBI Ltd.
12. Punjab National Bank
13. Standard Chartered Bank
14. State Bank of Travancore
15. State Bank of Hyderabad
16. Syndicate Bank
17. Indian Bank
18. Oriental Bank of Commerce
19. Kotak Mahindra Bank Ltd.

MARIB – PHASE II & III

SECTION – I (a)

SPECIFICATION

FOR

HEALTH, SAFETY AND ENVIRONMENT (HSE)

1.0 SCOPE

This specification establishes the Health, Safety and Environment (HSE) management requirement to be complied with by the Contractors during construction.

Requirements stipulated in this specification shall supplement the requirements of HSE Management given in relevant Act (s) /legislations, General Condition Contract (GCC). Special Conditions of Contract (SCC) and job specification where different documents stipulates different requirements, the most stringent be adopted.

2.0 REFERENCES

This document should be read in conjunction with following :

- General Conditions of Contract (GCC)
- Special Conditions of Contract (SCC)
- Scope of work
- Relevant IS Codes (refer Annexure-I)
- Reporting Formats (refer Annexure-II)

a. REQUIREMENTS OF HEALTH, SAFETY & ENVIRONMENT (HSE) MANAGEMENT SYSTEM TO BE COMPLIED BY CONTRACTORS.

b. MANAGEMENT RESPONSIBILITY

3.1.1 The Contractor to comply with HSE requirement at Construction sites as enclosed to cover commitment of their organization to ensure health, safety and environment aspects in their line of operations.

3.1.2 The HSE management system shall cover the HSE requirements including but not limited to what is specified under Para 1.0 and para 2.0 above.

3.1.3 Contractor shall be fully responsible for planning and implementing HSE requirements. Contractor as a minimum requirement shall designate/deploy the following to co-ordinate the above :

No. of workers deployed upto 250 - Designate one safety Supervisor

Above 250 & upto 500	- Deploy one qualified and Experienced safety engineer/ officer
Above 500 (for every 500 or less)	- One additional safety engineer/ officer, as above.

Contractor shall indemnify & hold harmless Owner/BHEL & their representatives free from any and all liabilities arising out of non-fulfillment of HSE requirement.

3.1.4 The Contractor shall ensure that the Health, Safety and Environment (HSE) requirements are clearly understood & faithfully implemented at all levels at site.

3.1.5 BHEL shall promote and develop consciousness for Health, Safety and Environment among all personnel working for the Contractor. Regular awareness programmes and work site meetings shall be arranged on HSE activities to cover hazards involved in various operations during construction.

3.1.6 The Contractor shall arrange suitable first aid measures such as First Aid Box, trained personnel to give First Aid and install fire protection measures such as adequate number of steel buckets with sand and water to the satisfaction of BHEL/Owner.

3.1.7 Non-Conformance on HSE by Contractor (including his Sub-contractors) as brought out during review / audit by BHEL/Owner representative shall be resolved forthwith by Contractor. Compliance report shall be provided to BHEL.

3.1.8 The Contractor shall ensure participation of his Resident Engineer / Site-In-Charge in the Safety Committee / HSE Committees meetings arranged by BHEL / Owner. The compliance of any observations shall be arranged urgently. He shall assist BHEL / Owner to achieve the targets set by them on HSE during the project implementation.

3.1.9 The Contractor shall adhere consistently to all provisions of HSE requirements. In case of non-compliance or continuous failure in implementation of any of HSE provisions, BHEL / Owner may impose stoppage of work without any Cost & Time implication to BHEL / Owner and / or impose a suitable penalty for non-compliance with a notice of suitable period, upto a commulative limit of 1.0% (one percent) of Contract value. This penalty shall be in addition to all other penalties specified else where in the contract. The decision of imposing stoppage of work, its extent & minority penalty shall rest with BHEL / Owner & binding on the Contractor.

3.1.10 All fatal accidents and other personnel accidents shall be investigated by a team of Contractor's senior personnel for root cause & recommended corrective and preventive actions. Findings shall be documented and suitable actions taken to avoid recurrences shall be communicated to BHEL / Owner. BHEL / Owner shall have the liberty to independently investigate such occurrences and Contractor shall extend all necessary help and co-operation in this regard.

3.2 HOUSE KEEPING

3.2.1 Contractor shall ensure that a high degree of house keeping is maintained and shall ensure interalia; the following :

a) All surplus earth and debris are removed / disposed off from the working areas to identified locations (s).

b) Unused/Surplus Cables, Steel items and steel scrap lying scattered at different places within the working areas are removed to identified locations (s).

c) All wooden scrap, empty wooden cable drums and other combustible packing materials, shall be removed from work place to identified location(s).

d) Roads shall be kept clear and materials like : pipes, steel, sand boulders, concrete, chips and brick etc., shall not be allowed on the roads to obstruct free movement of men & machineries.

e) Fabricated steel structurals, pipes & piping materials shall be stacked properly for erection.

f) Water logging on roads shall not be allowed.

g) No parking of trucks/trolleys, cranes and trailers etc., shall be allowed on roads which may obstruct the traffic movement.

h) Utmost care shall be taken to ensure over all cleanliness and proper upkeep of the working areas.

i) Trucks carrying sand, earth and pulverized materials etc., shall be covered while moving within the plant area.

In case of non-compliance of any of above, BHEL shall have the liberty to get it done from some other agency at this risk and cost.

3.3 HEALTH, SAFETY AND ENVIRONMENT

3.3.1 The Contractor shall provide safe means of access to any working place including provisions of suitable and sufficient scaffolding at various stages during all operations of the work for the safety of his workmen, and BHEL / Owner. Contractor shall ensure deployment of appropriate equipment and appliances for adequate safety and health of the workmen and protection of surrounding areas.

3.3.2 The contractor shall ensure that all their staff and workers wear Safety Helmet and Safety shoes. Contractor shall also ensure use of safety belt, protective goggles, gloves etc., by the personnel as per job requirements. All these gadgets shall conform to relevant IS specifications or equivalent.

3.3.3 The Contractor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health for driving of vehicles, handling and erection of material and equipments. All lifting equipments shall be tested certified for its capacity before use. Adequate and suitable lighting at every work place and approach there to, shall be provided by the Contractor before starting the actual operations at night. It is mandatory for contractor to get his workmen medically examined / checked for fitness of work assigned once a year and furnish the certificate to that effect from RMP / Govt. Hospital.

3.3.4 Hazardous and / or toxic materials such as solvent, coating or thinners shall be stored in appropriate containers.

3.3.5 All hazardous materials shall be labeled with the name of the materials, the hazards associated with its use and necessary precautions to be taken.

3.3.6 Contractor shall ensure that during the performance of the work, all hazards of the health of personnel, have been identified, assessed and eliminated.

3.3.7 Chemical spills shall be contained and cleaned up immediately to prevent further contamination.

3.3.8 All personnel exposed to physical agents such as ionizing or non-ionizing radiation, ultraviolet rays or similar other physical agents shall be provided with adequate shielding or protection commensurate with the type of exposure involved.

3.3.9 Where contact or exposure of hazardous materials could exceed limits or could otherwise have harmful effects, appropriate personnel protective equipment such as gloves, goggles, aprons, chemicals resistant clothing and respirator shall be used.

3.3.10 All persons deployed at site shall be knowledgeable of and comply with the environmental laws, rules & regulations relating to the hazardous materials substances and wastes. Contractor shall not dump, release or otherwise discharge or dispose off any such materials without the express authorization of BHEL / Owner.

4.0 DURING JOB EXECUTION

4.1 Implement Health, Safety and Environment requirements including but not limited to as brought out under para 3.0. Contractor shall ensure to :

- arrange workmen compensation insurance, registration under ESI Act, third party liability insurance etc., as applicable.
- arrange all HSE permits before start of activities (as applicable) like hot work, confined space, work at heights, storage of chemical / explosive materials and its use and implement all precautions mentioned therein.
- Submit timely the completed checklist on HSE activities, Monthly HSE report, accident reports, investigation reports etc., as per BHEL / Owner requirements. Compliance of instructions on HSE shall be done by Contractor and informed urgently to BHEL / Owner.
- Ensure the Resident Engineer / Site-Incharge of the Contractor shall attend all the Safety Committee / HSE meetings arranged by BHEL/Owner. In case of his absence from site that a second senior most person shall be nominated by him in advance and communicated to BHEL/Owner.
- Display at site office and work locations caution boards, list of hospitals, emergency services available.

- Display posters, banners made available by BHEL for safe working to promote safety consciousness.
- Assist in HSE audits by BHEL / Owner and submit compliance report.
- Generate and submit HSE records / report as per HSE plan.
- Appraise BHEL / Owner on HSE activities at site.

ANNEXURE - I

RELEVENT IS – CODES FOR PERSONAL PROTECTION

IS: 2925-1984	Industrial Safety Helmets
IS: 4770-1968	Rubber gloves for electrical purposes
IS: 6994, 1973 (Part-I)	Industrial Safety Gloves (Leather & Cotton Gloves)
IS: 1989-1986 (Part I & III)	Leather safety boots and shoes
IS: 3738-1975	Rubber knee boots
IS: 5557-1969	Industrial and Safety rubber knee boots
IS: 6519-1971	Code of practice for selections, care and repair of Safety footwear
IS: 11226-1985	Leather Safety footwear having direct moulding sole
IS: 5983-1978	Eye protectors
IS: 9167-1979	Ear protectors
IS: 3521-1983	Industrial Safety belts and harness

ANNEXURE – II

1.0 HEALTH, SAFETY & ENVIRONMENT (HSE) PLAN

PROJECT: ---------- CONTRACTOR :----------

DATE :---------- OWNER :----------

(To be prepared by each construction Agency)

ACTIVITY DESCRIP-TION	PROCEDURE/ W.I/ GUIDELIES	CODE OF CONFOR-MANCE	PERFORMING FUNCTIONS			AUDIT FUNCTION/ CUSTOMER REVIEW AUDIT REQUIREMENT
			PERFOR-MER	CHECK-ER	APPRO-VER	

PREPARED BY REVIEWED BY APPROVED BY
(RESIDENT ENGINEER)

2.0 MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (1/6)

PROJECT:---------- CONTRACTOR:----------

DATE :---------- OWNER:----------

INSPECTION BY:----------

Note: Write 'NA' wherever the item is not applicable.

ITEM	YES	NO	REMARKS	ACTION
HOUSING KEETING				
Waste containers provided and used				
Sanitary facilities adequate and clean				
Passageways and Walkways Clear				
General neatness of working areas				
Others				
PERSONNEL PROTECTIVE EQUIPMENT Goggles: Shelds				
Face protection				
Hearing protection				
Safety Shoes provided				
Hand protection				
Safety Belts				
Others				
EXCAVATIONS / OPENINGS				
Openings properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				

MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (Contd.. 2/6)

ITEM	YES	NO	REMARKS	ACTION
WELDING, CUTTING				
Gas cylinders chained upright				
Cables and hoses not obstructing				
Screens or shields used				
Flammable materials protected				
Fire extinguisher (s) accessible				
Other				
SCAFFOLDING				
Fully decked platforms				
Guard and intermediate rails in place				
Toe boards in place				
Adequate shoring				
Adequate access				
Other				
LADDERS				
Extension side rails 1 m above				
Top of landing				
Properly secured				
Angle + 70 from horizontal				
Other				

MONTHLY HSE CHECKLIST CUM COMPLANCE REPORT (Contd.3/6)

ITEM	YES	NO	REMARKS	ACTION
Article III. HOIST. CRANES AND DERRICKS				
Condition of cables and sheaves OK				
Condition of slings, chains, hooks & eyes O.K.				
Inspection and maintenance logs maintained				
Outriggers used				
Signs/barricades provided				
Signals observed and understood				
Qualified operators				
Other				
Article IV. MACHINERY, TOOLS AND EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
Article V. VECHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				

MONTHLY HSE CHECKLIST CUM COMPLANCE REPORT (Contd.4/6)

ITEM	YES	NO	REMARKS	ACTION
TEMPORARY FACILITIES				
Emergency instructions posted				
Fire extinguishers provided				
Fire-aid equipment available				
Secured against storm damage				
General neatness				
In accordance with electrical requirements				
Other				
FIRE PREVENTION				
Personnel instructed				
Fire extinguishers checked				
No smoking in Prohibited areas				
Hydrants Clear				
Other				
ELECTRICAL				
Proper wiring				
ELCB’s provided				
Ground fault circuit interrupters				
Protection against damage				
Prevention of tripping hazards				
Other				

MONTHLY HSE CHECKLIST CUM COMPLANCE REPORT (Contd.5/6)

ITEM	YES	NO	REMARKS	ACTION
HANDLING AND STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguishers nearby				
Other				
WORKING AT HEIGHT				
Erection plan				
Safety belts and lanyards; chute lines				
Other				
Article VI. ENVIRONMENT				
Chemical and other Effluents properly disposed				
Cleaning liquid of pipes disposed off properly				
Water used for hydrotesting disposed off as Per agreed procedure				
Lubricant Waste/Engine Oil properly disposed				
Waste from Canteen, offices, sanitation etc,. Disposed properly				
Disposal of surplus earth, stripping materials, Oily rags and combustible materials done Properly				

MONTHLY HSE CHECKLIST CUM COMPLIANCE REPORT (Contd.6/6)

ITEM	YES	NO	REMARKS	ACTION
Green belt protection				
Hygienic conditions at labour camps O.K?				
Availability of First Aid facilities				
Proper sanitation at site, office and Labour camps				
Arrangement of medical facilities				
Measures for dealing with illness				
Availability of Potable drinking water For workmen & staff				

Signature of Resident Engineer with Seal

3.0 ACCIDENT CUM FIRE REPORT

(To be submitted by contractor after every accident within 24 hours of accident)

Report :_____

Name of Site:_____ Date:_____

CONTRACTOR_____

NAME OF THE INJURED_____

FATHER'S NAME_____

SUB-CONTRACTOR M/S_____

DATE & TIME OF ACCIDENT_____

LOCATION_____

BRIEF DESCRIPTION OF ACCIDENT

CAUSE OF ACCIDENT

NATURE OF INJURY/DAMAGE

MEDICAL AID PROVIDED/ACTIONS TAKEN

INTIMATION TO LOCAL AUTHORITIES

DATE:

SIGNATURE OF CONTRACTOR
WITH SEAL

TO: SITE-IN-CHARGE/BHEL 1 COPY

4.0 SUPPLEMENTARY ACCIDENT & INVESTIGATION REPORT

Project:_____Supplementary to Report No._____
(Copy enclosed)
Site:_____ Date:_____

CONTRACTOR_____

NAME OF THE INJURED_____
FATHER'S NAME_____
SUB-CONTRACTOR M/S_____
DATE & TIME OF ACCIDENT_____
LOCATION_____

BRIEF DESCRIPTION & CAUSE OF ACCIDENT

NATURE OF INJURY/DAMAGE

COMMENTS FROM MEDICAL PRCTICETIONER, WHO ATTENDED THE VICTIM / INJURED

SUGGESTED IMPROVEMENT IN THE WORKING CONDITION, IF ANY

LOSS OF MANHOURS AND IMPACT ON SITE WORKS

ANY OTHER COMMENT BY SAFETY OFFICER

DATE: SIGNATURE OF CONTRACTOR WITH SEAL

TO: SITE-IN-CHARGE/BHEL 1 COPY

5.0 MONTHLY HEALTH, SAFETY & ENVIRONMENT (HSE) REPORT

(To be submitted by each Contractor)

Actual work start Date:_____For the month of _____

Project:_____Report No._____

Name of the Contractor:_____Status as on:_____

Name of Work:_____Name of safety officer_____

ITEM	THIS MONTH	CUMMULATIVE
Total Strength (Staff + Workmen)		
Number of HSE meetings organized at site		
Number of HSE awareness programmes Attended at site		
Whether workmen compensation policy taken Y/N		
Whether workmen compensation policy is valid Y/N		
Whether workmen registered under ESI Act Y/N		
Number of Fatal Accidents		
Number of Loss Time Accidents (Other than Fatal		
Other accidents (Non Loss Time)		
Total No. of Accidents		
Total man-hours worked		
Man-hour loss due to fire and accidents		
Compensation cases raised with Insurance		
Compensation cases resolved and paid to workmen		

Remarks

_____

Date

Safety Officer/Resident Engineer
(Signature & Name)

To: SITE-IN-CHARGE,BHEL 1 COPY

MARIB – PHASE II & III

SPECIAL CONDITIONS OF CONTRACT

SECTION-III PART `A'

INDEX

MARIB – PHASE II & III

SPECIAL CONDITIONS OF CONTRACT

SECTION-III PART`A`

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 and lump sum 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 labor, supervisors, Engineers, watch and ward as required, tools & tackles, calibrated inspection, measuring and test equipment as specified and otherwise required for the work and consumables 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 and rectification.

(f) Preservation / Re-conservation of all components during storage / erection till handing over.

34.5 **BHEL-Power Sector (NR) is ISO 9001-2008, ISO 14001-1996 and OHSAS 18001-1999 certified company. Quality of work, to customer's satisfaction and**

system requirements are 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.

35.0 PRELIMINARY WORKS

35.1 The contractor shall, as a first field activity check the turbines, generators and other equipments & also all auxiliaries foundations for the correctness of the same as per the drawings and satisfy himself in all aspects, such as location of foundations, consolidation of foundations, absence of voids, levels, correctness of bolt holes, pockets levels and centre lines etc All measurements should be recorded and submitted to Engineer for approval before erection

35.2 Before starting erection job, contractor shall ensure that GTG area is sufficiently enclosed against ingress of dust and water, and all debris have been cleared off from the floor to a designated area as per instruction of Engineer. The contractor shall arrange to get the working area and surroundings cleaned daily to ensure a dust free atmosphere for working.

35.3 Contractor shall first cover all openings on operating floor and put temporary hand railings on all sides of the floor to avoid any accident to the personnel working.

35.4 The contractor shall provide his tool stores for special tools and instruments at a convenient location near to the place of working in GTG hall.

35.5 Contractor shall set up longitudinal and transverse axes and two or more level bench marks accurately on GTG floor which shall be certified by Engineer. The certified GTG Center lines and datum level shall be the reference for GTG and all auxiliaries erection and alignment work.

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

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

35.8 All the works shall be performed to the lines, grades and elevations indicated on the drawings. The contractor shall be responsible to locate and layout the works. The horizontal and vertical control points established by the Engineer shall be used as datum for the works under this contract. Any work done without being properly located may be removed and dismantled by the Engineer at the contractor's expenses, if the contractor refuses to do it.

36.0 CIVIL WORKS, FOUNDATIONS AND GROUTING

36.1 Foundation for all equipment and necessary civil works shall be provided by 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.

36.2 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided it is allowed by BHEL Engineer. The embedded sub sole plates shall be corrected and checked with Prussian blue to get the required level and contact with frames.

36.3 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

36.4 The contractor shall arrange for grouting of foundation bolt holes of structure / equipment with special grout including complete encasing of equipment bases as specified in the drawings / specification or as advised by Engineer after preparing foundation top surface for grouting . Rotating auxiliaries foundation bolts / bases to be grouted only by Pedi grout M10 or equivalent as specified by BHEL. Static equipment foundation bolt and base to be grouted by Portland cement. All the arrangement required for grouting including supply of sand, pea gravel and any other material required for grouting, shuttering, nails, wires etc., shall be arranged by the contractor at his cost except special grout material which will be provided by BHEL free of cost.

36.5 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.

36.6 All the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer.

36.7 The contractor shall prepare the required test pieces / cubes to ensure the strength of the grout and get the same tested in laboratory at his cost as directed by BHEL before grouting with special grouts. Test cubes shall also be taken during grouting for testing in the laboratory and shall be tested at his cost.

36.8 After the grouting, the foundations are to be cured by contractor to the satisfaction of Engineer. The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.

37.0 CONSUMABLES

37.1 The contractor shall provide within finally accepted price and rates, all consumables like gaskets for temporary work, gland packing , all welding electrodes (including alloy steel and stainless steel), TIG filler wires, MIG welding process and MIG filler wires , all inert / welding gases, soldering material, dye penetrates , radiography films other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, Parmali wood, petrol, CTC / other cleaning agents, wooden sleepers, steel required for temporary works such as supports , packing , H&S, shims etc. hardware items, sealing compound required for completion of work except those which are specifically supplied by manufacturing unit.

37.2 All the shims & gaskets which go finally as part of equipment shall be supplied by BHEL free of cost.

37.3 It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.

37.4 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 / MIG filler 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.

37.5 BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants / special consumables if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained.

37.6 Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost.

37.7 In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first subsequent bill at market value plus the departmental charges of BHEL from time to time (30% at present). Postponement of such recovery is normally not permitted. he decision of Engineer in this regard shall be final and binding on the Contractor.

37.8 All lubricant and chemicals required for system cleaning , pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL/BHEL's client. All services including labor 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.

37.9 Transportation of oil drums, from stores, filling of oil and filling of oil for flushing, first filling of oil and subsequent changeover or topping / making up till the unit is fully commissioned and handed over to customer is included in scope of this contract. The contractor shall have to return all the empty drums to BHEL/BHEL's client store at no extra cost. Any loss / damage to above drums shall be to contractor's account.

37.10 Special consumables that are required for final box up like anti-seize compounds, jointing compound and sealing compound shall be provided by BHEL However the contractor shall use them to the satisfaction of BHEL Engineer.

38.0 TOOLS AND PLANTS / IMTE's

38.1 No T&Ps and IMTEs (Inspection, Measuring & Testing Equipment), shall be provided by BHEL to Contractor except special tools , T&Ps and IMTEs as indicated in Annexure.

38.2 All 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 for phase – II & III separately . 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.

38.3 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.

38.4 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.

38.5 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.

38.6 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.

38.7 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.

38.8 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.

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

39.0 SUPERVISORY STAFF AND WORKMEN

39.1 The contractor shall deploy all the skilled workmen like Mill Wright fitters, welders, gas cutters, 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 insist on removal of any employee workman of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.

39.2 The supervisory staff including qualified Engineers deployed by the contractor shall ensure proper out-turn of work and discipline on the part of the labor 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 labor and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

39.3 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.

39.4 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.

39.5 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.

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

39.7 During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every mile stones are to be advanced or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, 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.

39.8 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.

39.9 **The month wise manpower deployment plan to be submitted as per format (at Annexure - C to General Conditions of Contract) is only to assess the capability as well as understanding of the contractor to execute the work**. It shall be the contractor's responsibility to deploy the required manpower, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account. Separate persons shall be identified at site for quality control and safety by the contractor.

40.0 MATERIAL HANDLING AND STORAGE

40.1 All the equipment 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 and transported to 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 drawing / lifting material from BHEL/customer stores, contractor shall ensure that the balance / other materials are stacked back immediately.

40.2 While BHEL will endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed, it shall be contractor's 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 program.

40.3 The contractor shall take delivery of components, equipment / consumables from storage area after getting approval of BHEL Engineer on standard indent forms.

40.4 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.

40.5 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.

40.6 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 recovered from the contractor.

40.7 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.

40.8 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 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. As per General Conditions of contract under provisions of clause No 29, BHEL will reserve the right to recover the cost of repair / replacement ,if any, to bring back the equipment in original order, in case the equipment/ material is lost / damaged while in the custody of the contractor. BHEL's decision in this regard shall be final and binding on the contractor.

40.9 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.

40.10 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.

40.11 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.

40.12 The contractor shall be responsible for making suitable indoor storage facilities to store all equipment (drawn by the contractor from BHEL / customer stores) which require indoor storage till the time of their installation. The Engineer will direct the contractor in this regard, which item in his opinion will require indoor storage, and the contractor shall comply with Engineer's decision

40.13 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.

40.14 The contractor shall hand over all parts / materials remaining extra over the normal requirement with proper identification tags to the concerned BHEL / customer stores or at a place in project area as directed by BHEL Engineer.

40.15 Power Transformer tanks shall be unloaded near foundations by other agency (with in a distance of 100 M). The contractor may be required to place these on foundation by dragging , jacking, rigging or lifting by crane on the foundation .

40.16 While Transformer main tanks will be delivered near the foundation, 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 such accessories, transformer oil drums etc. are to be made by the contractor .

40.17 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. Silica gel will be arranged by contractor at his cost. However the N_2 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.

41.0 PRESERVATION OF COMPONENTS

41.1 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 blocked up at least six inches (6") off 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.

d) Insulation materials shall be stored indoors or otherwise protected against getting wet.

41.2 It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled and erected by him till such time of final painting. It shall be contractor's responsibility to arrange for required paints(Primer), thinners, labor, 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.

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

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

42.0 CLEANING OF EQUIPMENT

42.1 The contractor shall thoroughly clean all components before installation. The components , whose surfaces are coated with protective coating before dispatch to site , are to be

thoroughly cleaned by suitable mechanical / chemical means as per approved procedure / as per advise of BHEL Engineer. All arrangement for the same shall be made be the contractor within quoted rates / price.

42.2 Contractor shall ensure that Gas Turbine and GTG Assemblies , rotors , pedestals, glands, diaphragms, packing, rings etc. shall be cleaned with kerosene and carbon tetra chloride before assembly and erection of the equipment. For cleaning purposes only soft cotton cloth shall be used. Contractor shall never use cotton waste for cleaning any GTG equipment. Generator and other electrical equipment before erection shall be cleaned with dry air / vacuum cleaner.

42.3 The contractor shall ensure that during the cleaning process of pipes etc. the procedure adopted shall be such as to consume minimum amount of DM water.

42.4 The contractor shall clean inside of all pipes and fittings from dirt, sand and loose scales, mechanically and by air blowing before being erected. All pipe lines be thoroughly cleaned by diaphragm bursting and flushed. A system for recordings of all such operations shall be developed and maintained in a manner acceptable to Engineer and to ensure that no obstructions are left inside the tubes and pipes .

43.0 ERECTION

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

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

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

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

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

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

43.7 All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to as perfect and as accurately as practicable. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

43.8 All the motors and equipment shall be suitably doweled after alignment of shafts with tapered machined dowels as per the direction of the Engineer. Dowel pins required for the same shall be arranged by the contractor at his own cost. However the materials for dowel pins shall be issued by BHEL free of cost.

43.9 The contractor shall fabricate pipes, special bends, etc. threading and welding as required, install lube oil systems and carry out the chemical cleaning of fabricated piping. The contractor shall also service the lube oil system, carry out the hydraulic test of oil coolers, etc.

43.10 The bearings shall be blue matched at site and checked for bearing clearances. Scraping of bearing housing, if required to any extent shall be carried out by the contractor. No extra claim for blue matching of any two surfaces upto 1mm initial gap will be entertained. The contractor shall also check air gap and adjustment of stator / rotor to magnetic center shall be carried out as part of erection.

43.11 The contractor shall carry out Kerosene oil test / Dye penetration test of all the bearing housings of turbine and generator. The Kerosene oil / DPT kit for the test shall also be arranged by the contractor at his own cost.

43.12 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, before they are installed and energised. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

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

43.14 Pipes may be supplied un-fabricated in running lengths without beveling. It shall be responsibility of contractor to carry out fabrication by cutting to size, bevel / prepare edges, fabricate support pads, drill holes for drain, vent and other stub, welds, carryout NDT & SR as per site requirement and as directed by BHEL.

43.15 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 of seamless pipes and Mitre bends upto 80 mm Nb and ERW pipe upto 50 Nb wherever not supplied by Manufacturer / additionally required will have to be fabricated at site at no extra cost to BHEL.

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

43.17 It is possible that few flanges may not be matching. The contractor shall be required to cut and reweld the same as and when required at no extra cost.

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

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

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

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

43.22 The contractor shall be responsible for the application of cold pull of pipings wherever required and shall follow the cold pull procedure as prescribed by the Engineer.

43.23 The adjustment of all hangers & supports erected both cold and hot conditions for maintaining the proper slopes towards the drain points and application of cold pull in the piping wherever required is also included in the scope of the contractor.

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

43.25 Spring suspensions / constant load hangers have to be preassembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrestors / lockers etc., have to be carried out as and when required.

43.26 All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated by the contractor without any extra cost to BHEL. The raw materials required for fabricating such supports shall be

supplied by BHEL free of cost. All the T&P and consumables shall be provided by the contractor with in his quoted price.

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

43.28 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used, the tools and the equipment deployed shall be subject to the approval of Engineer. All the torque wrenches shall be set at the start of each days work and at least once during the day. The bolting work shall be carried out by the competent technicians.

43.29 It is the responsibility of the contractor to ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches and other written instructions of the Engineer, the contractor shall inspect the hangers associated with the piping systems as follows:

(a) After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and in all respect ready for start up.

(b) Piping in the hot position with the unit operating at the maximum load.

(c) Piping in the cold position during the first complete shut down.

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

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

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

43.33 The contractor shall dismantle the valves & actuator for overhauling, servicing and lubrication wherever required as advised by the Engineer. The contractor shall also lap

or grind the valve seat for ensuring the satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost.

43.34 Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermowells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on GTG, auxiliaries and pipe lines covered within the scope of this specification, will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The welding of all the above items will be contractor's responsibility even if the :

a) Product groups under which these items are released, are not covered in the scope of this tender.

b) Items are supplied by any agency other than BHEL.

43.35 Erection of CO_2 system complete in all respects, including CO_2 racks, cylinders stands , connecting piping, valves, distribution headers , main control panels, canopy etc shall be in the scope of contractor. Taking delivery from BHEL store, handling of cylinders, commissioning, replacing and returning empty cylinders to BHEL / its client stores, shall be the responsibility of the contractor. Cutting of GI / Copper pipes to size, preparation of threads to match the fittings is to be carried out by the contractor within the finally accepted rate.

43.36 Additional platforms and ladders of permanent nature incidental to the job or rectification / modification in the existing ones for approaching different equipment / valves as per site requirement, which may not be indicated in drawings, shall be fabricated and installed by the contractor without any extra cost. The materials required will be supplied by BHEL free of cost. All the T&P and consumables shall be provided by the contractor .

43.37 The contractor shall submit neatly drafted as build drawings to BHEL Engineer after execution of respective works.

43.38 All cabling work including laying of cable trays for oil centrifuge machine, generator drier is in the scope of subject work.

43.39 Wherever cables are to be laid under the scope of subject work the same shall be laid in cable trays, dressed , properly glanded , terminated and tagged at no extra cost to BHEL

43.40 Erection of impulse line upto and including first battery of root valves for all the equipment is in the scope of the contractor.

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

43.42 Certain skid mounted instruments like pressure gauge, pressure transmitters, temperature gauges, flow switches, flow indicators, etc., may be received in assembled condition as

integral part of equipment. Contractor shall be responsible of safe receipt and installation of these instruments supplied mounted on skids / equipment. The calibration of these instruments will be in contractor's scope of work

44.0 WELDING HEAT TREATMENT, RADIOGRAPHY & NON-DESTRUCTIVE TESTING

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

44.2 Welding of equipment, pipings shall be done by certified high pressure welders who posses valid certificate as per provision of ASME. The H.P. welder who possesses necessary certificate shall appear well in advance before the expiry of the validity of his certificate for re-qualification test as per relevant provision of ASME and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired shall have to be terminated forthwith.

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

44.4 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.

44.5 Faulty welds caused by the poor workmanship shall be cut and re-welded by the contractor at his own expenses. The procedure for the repair of defective welds shall be approved by the Engineer prior to any repair being made.

44.6 The contractor shall carry out the root run welding of all butt welds, HP or LP as per WPS. The contractor shall have to carry out full TIG welding of butt weld joints of tubes/ pipes of lesser thickness if required. During the root runs of stainless steel joints , the contractor shall before and during welding have to purge the pipes with inert gas. All arrangements required for the above shall be the responsibility of the contractor at no additional cost.

44.7 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

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

44.9 Only **BHEL approved electrodes and filler wire** will be used. All electrodes shall be baked and dried in the electric electrode drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate will have co-relation with the lot No. / batch No given on electrode packets. No electrodes will be allowed to be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved/ accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. Periodical calibration for the same shall also be arranged by the contractor within the finally accepted rates.

44.10 All site butt weld seams subject to vacuum conditions shall be rediographed. Before the weld seams are subjected to radiography test, the seams shall be properly ground and cleaned.

44.11 All butt / fillet welds shall be subject to dye penetration test as per the instructions of the engineer at no additional cost.

44.12 The contractor shall adopt the “stitch welding” while carrying out the assembly of condenser. Final welding shall be carried out by “step back seam method” to ensure minimum deformation of the welded parts.

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

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

44.15 All welds shall be painted with anticorrosive red oxide paint. Necessary consumables and scaffolding etc. excluding paints shall be provided by contractor at his own cost. Paints shall be provided by BHEL free of cost.

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

44.17 Contractor shall arrange all necessary heating equipment with automatic recording devices. Also the contractor shall have to arrange for labor, heating elements, thermocouples, etc. insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieving operations. Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL. The contractor has to provide thermochalks, temperature recorders, thermocouple attachment units, graphs, sheets, etc. for checking within the finally accepted rates. All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. approved/accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost. The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder after setting up the weld joints for heat treatment operation prior to the starting.

44.18 The contractor shall also be equipped for carrying out other NDT like LPI / MPI /UT/ Hardness test etc. as required as per welding schedule/ drawings within the finally accepted price / rates.

44.19 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR or ISO as specified by BHEL.

44.20 Low speed high contrast, fine grain films (D-7 or equivalent) in 10 cm. width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.

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

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

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

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

44.25 For multiple exposure on pipes, an overlap of about 25 mm of film should be provided.

44.26 Radiography personnel with sufficient experience and certified by M/s BARC as Radiographer for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed . These personnel should also be registered with DRP/ BARC for film badge service

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

44.28 The contractor shall have a dark room fully equipped with radiography equipment, film(un-exposed), chemicals and any other dark room accessories. There should be adequate number of radiography personnel with sufficient experience and certified by Authorised agency as Radiographer for conducting radiographic tests in accordance with safety rules laid down in relevant codes. The proof of having sufficient film/ chemicals to complete the entire work should be shown to BHEL.

44.29 Contractor shall note that 100% radiography will be done at the initial stages on all the piping welding joints. Subsequently radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of BHEL welding schedule. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL.

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

44.31 Since radio-isotopes are being used, all precautions and safety rules as prescribed by BHEL/ Customer shall be strictly followed. Any Certificate/ formalities to be completed as per Yemen Law, if required, shall be provided/arranged by contractor before taking up the work.

44.32 Radiography of joints shall be so planned after welding that the same is done without delay to assess the performance of HP welders. If the performance of welder is unsatisfactory, he shall be replaced immediately.

44.33 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if the defect persists after first repair, as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.

44.34 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including labor, supervisors/ Engineer required for the work as per directions of BHEL.

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

44.36 The contractor shall prepare complete field welding execution schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site in consultation with BHEL Engineer. Such schedules shall be strictly adhered to by the contractor.

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

45.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities on GTG set such as chemical cleaning of piping system, water washing, oil flushing of oil system etc. as instructed by BHEL using contractors own consumables, labor and scaffoldings etc. However all the chemicals required for carrying out these activities will be supplied by BHEL free of cost. All required tests (Mechanical and electrical) indicated by BHEL and its client for successful commissioning are included in the scope of these specification. Specialised test equipment, if any, shall be provided by BHEL free of hire charges. However contractor has to take proper care of the equipment issued to him.

45.2. All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. All the repairs (Shop welded or site welded) arising out of the failure during testing shall be done by the contractor.

45.3 The scope of pre-commissioning activities cover installation of all necessary temporary piping, supports , valves, blanking, pumps, tanks etc. and other accessories with access platforms valves, pressure gauges, instruments, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, chemical cleaning, steam blowing or for any other tests as the case may be and will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents.

45.4 All items required for conducting hydraulic test, chemical cleaning of pipe lines etc., will be supplied by BHEL free of cost. However servicing, erection, welding and dismantling and returning of the same to stores is the responsibility of the contractor. The quoted lump sum price shall cover all above activities. No separate payment for erection and dismantling of the required equipment and piping.

45.5 It shall be the responsibility of the contractor to preserve the cleaned surface as per BHEL's requirement.

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

45.7 It shall be specifically noted that the above employees of the contractor may have to work round the clock as per advise of BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.

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

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

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

46.11 The contractor shall fill the tanks with water upto the specified level as many times as called for by the Engineer for checking & conducting settling test at no additional cost to BHEL.

46.12 Incase 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.

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

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

46.0 FINISH PAINTING

46.1 All equipment within the scope of these specifications shall be received duly painted. However during storage, handling and erection the same may get peeled off / damaged / deteriorate. All such surfaces are to be thoroughly cleaned by buffing / sand blasting and painted with suitable approved primer and intermediate paint. Finally all equipments shall be given a full finish paint coat of approved final colour. Besides above two coats of approved primer paint and at least two or more coats of approved intermediate and finish paints to get the desired dry film thickness of minimum 250 microns is to be applied on unpainted surfaces as identified by BHEL on equipment, piping , structures fabricated and erected at site. The gas cut stubs would require being ground and rounded before painting. ductings and enclosures shall require inside painting also. All tools and other consumables including scaffolding materials required for painting shall be arranged and provided by contractor within the quoted rates**. Epoxy Polymide Poly Eurethene Paints shall be supplied by BHEL free of cost.** The contractor shall provide legend on equipment in size specified by Engineer. Letter writing shall be done in Arabic / English or in both languages as per site requirement which will be indicated by BHEL. The minimum thickness of painting as specified has to be checked by Alchometer duly calibrated / suitable means as per advice of BHEL Engineer.

46.2 All tools including Airless Spray Guns , Air Compressors and consumables including scaffolding materials required for painting shall be arranged by contractor at no extra cost to BHEL **including paints which will be arranged by contractor** . Painting should be as per colour scheme and quality approved / specified by Engineer.

46.3 The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Arabic / English or in both languages.

46.4 The painters have to under go test and only qualified painters will be allowed to work.

47.0 PROGRESS REPORTING

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

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

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

47.4 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 program and the slippages do not accumulate and effect the overall program.

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

48.0 DRAWING AND DOCUMENTS

48.1 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.

48.2 Necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan which shall be returned to BHEL at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.

48.3 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 drgs. / data / documents and removal of obsolete ones from work place and returning to BHEL.

48.4 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.

48.5 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.

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

49.0 TAXES & DUTIES

49.1 **The price quoted shall be inclusive of all taxes/duties including custom duty, as applicable.** The contractor shall be responsible for payment of all taxes, duties, fees, levies etc. as per prevalent laws at Yemen and compliance to all local regulations. **Custom duties according to Yemeni laws, applicable for / on import of materials for construction of Plant, including consumables, will be to the account of contractor (**

present rate is 5%) and will be included in the quoted rates . However all construction equipment required by contractor or its sub-contractors to perform the works pursuant to the contract shall be exempted from duties or impositions imposed under the laws of the republic of Yemen provided that such items are either consumed in performance, re-exported or transferred to owner at the conclusion of the contract.

49.2 Taxes as required to be deducted at source as per Local Yemen Laws / Indian Law (applicable in case of only those contractors having their office in India), if any, at prevailing rates shall be deducted on gross invoice value from the running bills unless Exemption Certificate from appropriate Tax Authority is furnished.

50.0 EXTRA WORK:

50.1 BHEL may consider for payment of extra works on manhour basis @ USD 3 (US Dollars Three only) per man hour 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.

50.2 The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals. Services as and when required in existing units shall also be covered in the above extra work rate excluding those included elsewhere.

50.3 The extra works, if any, shall be carried out by a separate gang which can be identified for certification of man-hours. 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 man-hours which are certified by the BHEL Engineer-in-charge, will be considered for payment. The decision of BHEL in this regard shall be final and binding on the contractor.

51.0 PRICE VARIATION & OVER RUN

The finally accepted rates for scope of work as defined in this tender shall remain FIRM throughout the contract period including extended period, if any. NO PRICE VARIATION / COMPENSATION / OVER RUN on account of any increase whatsoever, will be payable during the entire period of execution including extended period, if any.

52.0 RATE SCHEDULE

52.1 **The bidders are required to quote their rate inclusive of all taxes / duties applicable for this work in US Dollars (USD).**

52.2 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 lumpsum price.

52.3 The tenderer shall quote the 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.

53.0 INSTRUCTIONS TO TENDERER

53.1 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)

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

53.3 **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.**

53.4 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.

SPECIAL CONDITIONS OF CONTRACT

SECTION- III - PART-B

MARIB PHASE-II

INDEX

54.0 LAYOUT AND OVERVIEW OF PLANT

1. Introduction:

Proposed plant (Marib Stage – II) is located 230 KM north east of Sana'a . Nearest Town is Marib , 60 km away. It is open cycle power plant having a generating capacity of 4x V94.2. Plant occupies a total area of 240 M X 116 M (approx.)

2. Existing facilities:

The Main Plant is located at East of existing 3 x V94.2 Gas Turbines of Marib Stage –I which has its own 400 kV Substation . Power of the proposed plant will be transmitted a new Switchyard , which will be located south of the Power Plant and in line with the existing switchyard.. Generator Transformers are located adjacent to thhe GT Building in the Power Plant Area .

3. GT Building:

This building is located on the north of switchyard (Transformer yard in between). Four numbers V 94.2 GT Machines are housed in the building. For housing four GTs, its operation, handling & maintenance etc, a 142.5 M long building is proposed . Exhaust gas of GT is led to the atmosphere through stack, which is located on western side of GT building. Fin Fan coolers are located near exhaust stack.

4. Fuel Oil Facilities:

Fuel Oil Facilities for Stage II will be located in the existing Marib Stage –I Fuel Oil Area and will add to the existing facilities .. 1 nos additional Fuel Oil Tank will be provided and the system will be suitably modified to merge with the existing system .The Fuel Unloading and Forwarding system required to send the fuel oil to Stage-II will be installed next to the new Tank . . The Fuel Oil Piping to Marib Stage –II will run on a pipe rack .

5. Water System:

All water systems e.g. Fire water, Raw water its treatment plant is located in between F.O. system and GT area.

6. Fire Water System:

Two numbers over ground steel tanks are provided for storing Fire water. Pumps are placed in a building which is located adjacent to F.W. Tanks. The pressurized fire hydrant system consists of a pipe network and adequate number of hydrants positioned around each areas/buildings at strategic locations. Hydrant mains will be laid underground.

7. Plant Water Facility:

Plant water is sourced from underground. Adequate number of bore well pumps will be provided at strategic locations of the plant depending on availability of underground water. Raw water will be pumped to 2 nos over ground steel tank located near fire water tanks in the same island . Raw water pump house is located adjacent to tank. This is water is pumped to respective water treatment plants for treatment and deliver to the user points.

DM water is sent to GTG & compressors and DG set. Drinking water is supplied to the various plant & non plant buildings for human use. Water treatment plants e.g. D.M. Plant, softening plant, R.O. plant is located in one island.

8. Ventilation system :

G.T. Building

Twelve number Cabinet type centrifugal fans (suitable for outdoor duty) are envisaged for pressurized ventilation system of this building. Each unit will be located on top of the GT / TG Building . Supply Air will be discharged at different locations of building through the use of duct. Hot air from GT hall is exhausted by means of roof extractor units.

Aux. Buildings

All other non A/C buildings, MCC rooms will be have either fresh air ventilation system or Mechanical exhaust ventilation as applicable.

9. Common Control Room Building:-

This two storyed building is located at east of GT building . Switch gear room and 220V Battery is located on ground floor., Control room/UPS battery room and AHU is located at First floor. Switch gear room and control room is air conditioned.

10. Effluent Treatment Plant:

This plant is located on the other side of road of F.O. area. Two areas are identified for oil spilage.

1) Transformer yard
2) Fuel oil area
3) GT Hall

Collection Pits of adequate capacity is provided in the strategic location to collect oily waste. Oily waste is taken to the ETP for treatment and separated water is to led to Guard pond located at north of ETP.

11. Piping Network:-

One main pipe rack is planned from F.O. pump house / Gas terminal Point of Marib Stage –I to Station in Stage – II and from here to GT building and further along the length of GT building . This pipe rack will have 7M (apprx.)clearance from ground to allow free movement of Traffic along the road. Fuel oil piping form pump house to GT building is routed through this pipe rack. Gas pipe line is laid on sleepers up to pipe rack and then routed through this pipe rack up to GT building . Also depending on requirement , cables run through this rack . All other misc pipe network (except fire hydrant mains) is laid through sleepers.

12. Roads/Drainage:-

Proper road network is provided in the plant so as to ensure smooth transportation during erection as well as plant operation. From main road to various building/facilities suitable approach road is provided. Main entry to the plant provided from N to S through the administrative area and Transformer yard. This main road is connected with the highway. A separate road is provided for independent access to the switch yard parallel to the main road. This will facilitate movement to existing switch yard while erection of proposed GTs are in progress. Main parking area for 2 buses and 30 cars is provided near main gate outside plant boundary. Storm water drains is planned so as to drain the raw water towards north of boundary and finally led to a earthen rain water pond located just out side plant boundary limit Approximately 12M wide band is planned along boundary for greenery & plantation.

MARIB PHASE-II

SECTION –III (B-I)

SCOPE OF WORK

BHEL is bidding for the work of Design, Manufacture, supply, installation, erection & commissioning of 4 X 100 MW Gas Turbine Station including Main Gas Turbine Unit , Gas Turbine Auxiliaries , Balance of Plant , Inter Connecting Piping , Electrical and C+I Auxillaries at **MARIB 400 MW GA TURBINE POWER STATION PROJECT PHASE – II . To carry out the Electro - Mechanical works of this contract BHEL intends to enter into a Pre-Bid Tie up with a reputed and experienced Contractor , who will be awarded in case BHEL is awarded the Project Works by Customer .**

The scope of work under this tender for Electro Mechanical Works consists of

- taking delivery of the Plant Material from the project storage yard / stores / sheds to erection site (approximately 2 Km),
- Their preservation, safe keeping, watch and ward.
- Checking, dressing, chipping and leveling of foundations.
- Pre-assembly, erection, alignment of various equipment, machining
- Welding, heat treatment, radiography and other non-destructive tests wherever required
- Hydraulic testing, air leak test, and other pre commissioning tests,
- Insulation and finish painting etc.,
- Chemical cleaning, alkali flushing.
- Pre-Commissioning operations required for above operations and other commissioning activities including post commissioning operations , P G Testing stabilization of the unit.
- Unit trial operation, resolving any deficiencies observed and handing over of units at **MARIB 400 MW GA TURBINE POWER STATION PROJECT PHASE – II**

55.0 MECHANICAL PACKAGE

Major equipment to be installed, tested and commissioned under this specification is given below. However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.

A. MAIN TURBINE :

The Main Gas Turbine consists of the following skids , the detailed dimensions and weights **of which are indicated in Annexure –1**

a) Main Gas Turbine Thermal Block
b) Combustion Chambers (Left and Right)
c) Oil Tank with Pumps sets
d) Hydraulic Unit
e) Fuel Oil Injection Skid
f) Fuel Gas skid
g) Leak Oil tank
h) Piping Skids – Left , Right and Front
i) Interconnecting Piping
j) Platforms and Gratings for Main Turbine
k) Exhaust gas diffuser
l) Intermediate shaft
m) Fuel Oil and gas Piping
n) Lub Oil piping and valves
o) Miscellaneous Supports , Guides , Support Blocks

B. POWER CONTROL CENTRE:

The PCC consists of 3 nos containers weighing appx 35 MT each and having overall dimensions of 12 m x 3.5 m x 4.5 m each . The 3 containers will have to be placed over the PCC pit and joined together to form one unit . Electrical works are covered in the Electrical Package .

C. INLET AIR FILTER:

The Inlet Air Filter is located above the GT Hall and consists essentially of the following main items.

i.) **Filter House**:

The Intake Filter consists of multiple modules arranged one above the other. Each module consists of multiple rows of filters arranged one above the other. The air intake system is fitted with weather covers to protect against the entry of moisture and fitted with coalescer pad (moisture separators) which also serves as bird screen.

Filtration system is self-cleaning type (pulsejet cleaning) and cleaning sequence shall be fully automatic. Compressed air for pulsejet cleaning is taken from compressor for pulse jet cleaning system.

ii. Silencer and Intake Bend

The silencer casing is fixed to the filter compartment. The intake bend with transition to the vertical intake duct is flanged to the silencer casing. Intake bend and intake duct shall be provided with suitable sound insulation to meet the project specific sound requirements.

iii. Isolating Device for Intake Duct

One isolating device (shut off flap) is provided in the upper part of the vertical air intake duct for the whole cross section of the duct. This isolating device prevents ventilation and therefore the entry of moisture into the compressor inlet during plant shutdown and ensures the effectiveness of dry air purging. The isolating device shall be equipped with a motorised actuator, control contacts and position indicators such that remote monitoring is possible.

iv. Vertical Intake Duct

The vertical intake duct is designed in several sections for reasons related to transport and assembly. The upper portion of the vertical intake duct shall be connected to the intake bend with fabric expansion joint. The connection itself shall be covered on the inside of the duct exposed to the flow. The connection "intake bend-expansion joint- intake duct" and the duct sections are connected by bolted flanged connections outside which shall be sealed appropriately. The entire intake duct is sound proofed.

To prevent the formation of condensation on the compressor and turbine during plant outages, an air dryer is provided at the compressor inlet. Piping and nozzles of compressor blade cleaning system are permanently installed in the air intake duct.

v. Compressor Inlet

It comprises of outer cone and inner cone.

vi. <u>Compressed Air System</u>

Air intake system of each gas turbine is envisaged with pulse jet cleaning system for which air of required quality is derived through compressed air system. Each Gas Turbine consists of independent compressed air system which comprises of following equipment:

(a) Compressor with accessories e.g. air filters, silencer, drier, oil & oil separating tank etc.
(b) Air receiver
(c) Electricals and C & I equipment
(d) Field cabling within system equipment

(e) Air receiver will be installed on the roof of GT hall near filter house and all other equipment will be installed inside GT hall beside Air Intake Duct.

D. EXHAUST GAS SYSTEM

The gas turbine exhaust system serves to discharge the gas turbine exhaust gases to the environment through an exhaust stack.

The exhaust system consists of four major sections. These sections are the diffuser, lower stack section, upper stack section with silencer and the support frame.

(i) Diffuser

The diffuser is made of welded construction with internal insulation. The internal insulation design consists of ceramic wool, covered by overlapping stainless steel sheets. Thermal expansion between turbine and diffuser shall be accommodated by means of a metallic expansion joint installed between the turbine outlet and the diffuser inlet.

(ii) Lower Stack Section

The lower stack section consists of a rectangular, self-supporting casing, provided with internal insulation and with a cold outer shell of carbon steel. As insulation material ceramic wool shall be applied, cladded with overlapping stainless steel sheets. The lower stack section shall be mechanically disconnected from the other stack parts; connection is made by means of fabric expansion joints.

(iii) Upper Stack Section

Above the lower stack section, the upper stack section is provided, consisting of silencer housing and stack pipe. The connection between the lower and the upper stack section is made by an expansion joint. The transition from the lower stack section to the stack pipe is realized by an expander, on which the silencer housing is located. A reducer tapering towards the stack outlet pipe or a cylindrical part depending upon noise requirement level to be maintained is installed on top of the silencer housing.

Silencer casing and stack pipe are internally insulated with cold outer shell of carbon steel. The internal insulation material is ceramic wool covered with a floating stainless steel liner (single style) on the flue gas side. The silencer shall be self-supporting. The sound attenuation splitters are of absorption type with mineral wool as noise abetting material.

The stack height shall be 30m. The stack is equipped with aviation hazard lighting.

(iv) Support frame

The support frame is a steel structure carrying the loads of the upper stack section. The upper stack section shall be suspended in the support frame. Maintenance platforms are arranged to enable access both to the silencer and the upper section of the stack pipe. The platform on top of the support frame and at the stack outlet shall be circumferential.

E. AIR BLAST OIL COOLER

Air Blast cooler consists of one or more heat exchanger elements and Fan boxes. The finned heat exchanger is the principal element on the re-cooling unit It consists of ribbed package with tubes and is arranged in a steel frame. The collectors serve as the inlet and outlet, and ensure the optimum distribution of the medium.

The various components are described as below:

i. **Tube bundle**: The tube bundle can be further divided into the following components:

ii. **Finned Tubes**: The finned tubes used in heat exchanger are either L, G type finned or plate finned tubes.

iii. **Header/Oil box**: It is fabricated construction and provides smooth passage to process fluid through the tubes. The construction is done in such a manner that it can be cleaned as and when necessary.

iv. **Bundle frame:** It is a fabricated construction made up of mild steel angles (sections) and sheets to contain tubes. In addition , it provides the complete bundle sufficient rigidity to enable it to be lifted and transported without damage.

v. **Fan Drive arrangement**: Drive assembly consists of Axial Flow fans and AC induction Motor. The fans are statically and dynamically balanced in order to minimize vibration.

vi. **Structure:** The structure consists of column, beams, drive assembly, truss, brackets and bracing's etc. The structure members supports the tube bundle and drive unit. Normally all the structural members and sealing plates are bolted to each other to facilitate dismantling of the complete structure.

vii. **Control Panel:** This is an essential component to take care of controlling the operation of the Air Blast Cooler. This also houses the different type of switching elements and cabling

F. GAS DETECTION SYSTEM

Description

Gas detection system designed for the detection of flammable gases/vapours like High Speed Diesel oil and / or leakage of methane etc. in the vicinity of gas turbine and its balance of plants. The gas detection system will ensure a high degree of safety with respect to detection of actual leak providing warning/alarm and trip signals.

Configuration

Gas Detection System consists of measuring heads with infrared sensors installed in the various locations of the gas turbine and fuel oil and gas area. It consists of one number Control panel which is placed in Central Control Room and the total system is connected by cables .. There will be two portable gas detectors for personal protection and accurate locating of leak points.

Installation per gas turbine:

- Detectors inside ventilation duct of left combustion chamber hood (3nos each) 11/12/13/14 UMB
- Detectors inside ventilation duct of right combustion chamber hood (3 nos. each) 11/12/13/14 UMB
- Detectors on fuel oil skid (2 nos each) 11/12/13/14 UMB
- Fuel gas final gas final filter (2 nos each) 11/12/13/14UEN

Installation in common system:

- Fuel oil forwarding skid (5 nos)10UEL
- Fuel gas treatment plant (3 nos)10UEN

G. CO_2 Fire Fighting System for GT (Comb. Chamber)

i. Function

Use of combustible liquids and gases such as HSD and Natural gas as the fuel in the gas turbine power plant under consideration necessitates the provision of fire detection, alarm and CO_2 triggering to prevent and fight fires actively. Fixed CO_2 fire-fighting system is used for the left and right combustion chambers of the gas turbine where fuel piping carrying HSD and Natural gas terminate.

These piping terminate on the top of the combustion chamber. Besides the piping, there are one terminal block and wiring for ignition transformers also on the combustion chamber dome.

ii. Detection System

Space within each combustion chamber is continuously monitored by 4 heat detectors/combustion chamber. These detectors are cross-zoned. These detectors detect fire and give alarm and trigger release of CO_2 as described below .

iii. Manual Overrides

Manual initiation of CO_2 gas release is possible from the fire alarm panel, combustion chambers and from cylinder locations. Manual interruption of CO_2 gas is possible from the combustion chambers and from the panel for each of the area to avoid dumping of gas due to false alarm if any.

iv. Fire Alarm Panel and System Interface

Fire Alarm/Control Panel per GT has the facility to process the input signals and to control all the input data received from initiating and indicating devices.

Panel is provided with batteries and online battery chargers. Battery shall be capable of 12 hours of back up supply in case of power supply failure.

v. Extinguishing System

The extinguishing system used is a solenoid operated, high pressure, Total Flooding type as per NFPA 12 .One main battery consisting of Two CO2 cylinders is provided for both combustion chambers. Another battery of 100 % standby filled reserve cylinders is also provided near the main battery. Each cylinder is continuously weighed by the weighing device and in case any cylinder is empty, the audio/ visual indication for the same is available at the panel.

vi. Fire Detection in PCC

Smoke detectors (ceiling mounted) are installed inside the PCC for detection of fire and alarm. Types of smoke detectors envisaged are as ionization type(9 no.) and optical type (7 no.).

H. IGNITION GAS SYSTEM

Function

The main fuel of the gas turbine (fuel oil or fuel gas) is ignited during the start up of gas turbine by means of ignition flame. For this every burner is equipped with an ignition gas burner.

Main Components

During start with fuel oil only the cylinder gas is used as ignition gas.

The cylinders are arranged in the cylinder room provided in the GT building. These cylinders are filled with commercial grade ignition gas (Propane Gas). This cylinder bank serves as a common cylinder gas facility for 2 turbines. The ignition gas cylinders can be isolated with the help of valves . The system consists of Gas Heaters , weighing machines , Pressure Regulators , Piping and Valves

I. GAS TURBINE INSULATION

Gas Turbine is thermally and accoustically insulated with Rockwool mattress. The mattress is directly applied on casing except for exhaust gas diffusor where pillows are made which are put on casing. Insulation mattresses are covered with 1mm GI Sheet. The inside of GI sheet is coated with 3-4 mm of noise dampening material. GI sheet and insulation are properly secured to Turbine using support structure

J. MAIN GENERATOR

The Main Gas Turbine Generator is Air Cooled. The rotor is loose supplied and has to be threaded at site after installation of Bearing Shells .The excitation system consists of Brush

Gear assembly . The system consists of the following equipments consists of the following equipments,**The detailed dimensions and weights of which are indicated in Annexure –1**

i.) Generator stator
ii.) Generator Rotor
iii.) Bearing Shells
iv.) End Shields
v.) Brush Gear assembly
vi.) Generator Platforms
vii.) Off Base Enclosure and Acoustic Insulation
viii.) Air Ducting
ix.) Generator Air Filter

K. FUEL OIL SYSTEM

Fuel oil is received at power plant through road tankers. Fuel oil is unloaded from road tankers and stored in above ground storage tanks. Fuel oil from storage tanks is to be pumped to fuel oil injection skid at requisite pressure and quantity.

The component of the fuel oil system are mostly skid based and are described in the following section and the **details are furnished in annexure -1**

i. Tank Farm Management

Fuel oil is stored in of above ground storage tanks. The capacity of each tank is 10,000 cu.m. The Tanks will have to be fabricated at site from factory fabricated sheets . Tanks are fixed roof with floating suction arrangement .Two 10000m^3 capacity tank already exist at site. One 10000m^3 tank is to be fabricated.

ii. Fuel Oil Forwarding Skid

This consists of 2 skids containing In the unloading station, forwarding centrifugal pumps are provided in 2 skids . There are two numbers of pump skids comprising of inlet strainer, valves, instruments etc. Each skid is provided with double basket strainer capacity of 2 x 100% and mesh size 200 microns at the suction side for pump protection

iii. Discharge Filter Station

This skid consists of Duplex filter , Accumulator ,Valves and piping and instrumentation

iv. Drain Oil Station

This skid consists of Drain Oil Tank , drain oil pumps , suction strainer , valves piping and instrumentation

v. Interconnecting piping including supports

Refer to Annexure-1 for approximate quantities of Piping envisaged under this system . This consists of Piping within the system and also piping to GT Area .

vi. Electrical system for Fuel Oil System

The Electrical System consists of the Fuel Oil MCC and Control panel . In addition ,the cable tray and cabling system hooks up the field instrumentation and field devices to the Control system .

vii. **Fuel oil transfer skid and Fuel Oil Centrifuge**

Fuel oil transfer skid 2x110m3/hr and Fuel oil centrifuges 5x50m3/hr transfer dirty oil after cleaning to new fuel oil tank of 10000m3 capacity.

L. FUEL GAS SYSTEM

This consists of 12 nos Gas Skids interconnected by Piping :

i. Pressure reduction and metering station
ii. Station inlet and Knock out drum layout (Skid 1 & 2)
iii. Filter Separator and turbine meter line (Skid 3 & 4)
iv. Water bath heaters -3 nos. (Skids 5,6,7)
v. Pressure reduction lines layout Skid 8
vi. Filter, metering 4 nos. Skids 9,10, 11 & 12
vii. Condensate tank 5000 litres (1 no.) Condensate tanks 1000 litres (2 nos.)
viii. One no.Gas Chromatograph and One no. Control Panel and associated cabling .
ix. Piping CS size 12" (800 meters), 20" (200 meters), 14" (50 m), 10" (100 m) and SS 10" (140m)

M. GAS ANALYSING SYSTEM

i) Description

The system is design to cover the requirement of exhaust gas analysis system which is used for on line monitoring of SOX , Nox,CO,CO2 & O2 in the diffuser of Gas Turbine . The analyzer is rugged in construction , reliable and simple to operate. The Gas Analyzing system is dedicated to each Turbine

ii) Configuration

Analyzing system shall be Hot Extractive type with sample handling system using sampling probe , sample gas pumps, cooler, condensate drain facility, flow control unit and auto calibration facility. For hot extraction type analyzer type system with sampling accessories & analyzer instrument shall be housed in panel . The sample gas probe shall have a filter element and filter heater hall be mounted near probe . The system has the auto probe cleaning and auto calibration facility. The auto cleaning of the probe will be done through compressed air.

N. FIRE FIGHTING SYSTEM :

The Fire |Fighting System consists of the following :

a) Fire Fighting Pump House :

The main equipments in the Fire Fighting Pump House are :

i. 6.6 kV Motor Driven Fire Pump - 2 nos
ii. Diesel Engine Driven Fire Pump – 2 nos

iii. Electric Motor Driven Jockey Pump – 2 nos

iv. Hydro Pnuematic System consisting of Air Compressors and Tank

v. Interconnecting Piping

vi. Associated Electrical and Instrumentation for the above including Control Panels , Battery and Chargers , cables , Process Connections etc

b) Fire Water Tanks

2 nos 1000 m3 , Over ground Fire Water Tanks are envisaged . Tanks have to be fabricated at site from the shop fabricated ,rolled and painted steel sheets

c) Fire Fighting Piping

Most of the piping for the Fire Fighting System is envisaged to be overground except in places where the piping crosses roads or other such obstacles .While the total piping is of the order of 400 MT , the various piping systems are :

i. Fire Water Main
ii. Medium Velocity Spray for Cable Vaults
iii. Auto High Velocity Spray for Oil Filled Transformers , Lub Oil tanks etc

The detection system and other items eg deluge valves , control panels required to complete the system are included . Hose Boxes and hoses are to be installed at various locations .

d) Inert gas System

The Main control room and the local control rooms associated with each gas turbine will be protected by inert gas based fire extinguishing system as per NFPA 2001. The system will operate automatically during outbreak of fire

The design, manufacture and installation of such fire protection system shall be in accordance with the relevant NFPA standards and complete system components/ equipment shall be listed by UL/FM/VdS.

Inert gas system shall be provided with 100% standby reserve supply of containers filled with the agent and duly connected to the piping manifold.

e) Foam System

The Foam System is envisaged for the Fuel Oil Tanks and the Unloading Area and consists of 1 nos each of Electric Foam Pump and Diesel Foam Pump , Foam Storage Tank , Foam Piping from Foam Tank to the Fuel Oil Area and Instrumentation , Foam Makers , Foam Balance pressure Ratio Controller Assy etc

f) Fire Detection and Annunciation System

The Fire Detection System consists of Fire Detectors of the following types : Beamic / Ionic / PhotoElectric / Heat , including Response Indicators , Junction Boxes , MCP (Manual call Points) etc . MICC Cables are envisaged for most of the system .. In addition LHS cables are envisaged for the Cable trays in the plant .Fire Alarm Panels with Battery

BackUps are envisaged in the CCR , FWPH , Fire station and the Foam Pump House , with central control in the CCR

a) Portable & Mobile Fire Extinguishers

All buildings, plants/plant areas and appropriate special rooms, ducts, channels etc. are to be protected.
Hand-operated fire extinguishers have to be installed on every floor of all electrical buildings and plants, wall-mounted, permanently installed and spaced at 15m all round.

In addition, all the above-mentioned buildings shall be provided with a mobile fire extinguisher (CO_2), located at a central spot, on every floor and with 2 (two) fire-fighting carts where the length of the floor exceeds 30 m. In the event of a more extensive outbreak of fire, it must be possible to concentrate the discharge as required for an optimal effect. The mobile fire extinguishing equipment shall be in the form of a handcart equipped with twin cylinders as a minimum requirement.

O. AIR CONDITIONING SYSTEM

The Air Conditioning System consists of the following Areas :

a) **Central Control Room + Switchgear Room** :

This consists of 4 no.s 45 TR Air Cooled Chilling Units with 4 nos matching Air Handling Units , Ducting from AHU to the CCR and Switchgear Room areas , Strip Heaters , Pan Humidifier , Field instruments , Control Panel , Fresh Air Arrangement for AHU etc .

b) **Other Areas** :

This consists of about 8 nos 3 phase 7.5 / 5.0 / 3.0 TR (appx) Ductable/ Split AC Units ,Ducting wherever required , Strip Heaters , Fresh Air Arrangement etc . In addition , 5 nos , 3 phase , 5.0 TR Floor Mounted Non Ductable AC Units and 50 nos 1.5 / 3.0 TR Single Phase Non Ductable AC Units are to be installed .

c) **Ducting** :

The ducting will be supplied in finished Galvanised Steel Sheets (L- Form) which will have to be assembled at site complete with hangers ,supports The total quantity of 18G / 20G / 22G / 24 G sheets of appx 2100 SQ MTR . In addition about 300 SQ MTR will be supplied in sheets , to be fabricated at site for site changes .

Thermal Insulation of supply and return air duct with finish is to be applied for 2100 SQ MTR . Acoustic Insulation for the first 5 mtr from the AHU is to be applied . Fixing of Grills , Dampers etc are included in the scope .

P. VENTILLATION PACKAGE :

The Ventilation Package consists of the following :

Air washer Units : 12 nos cabinet type Centrifugal Fan, with Motor , of capacity 100000cnh each , dry panel filters ,

Ducting : The ducting will be supplied in finished Galvanised Steel Sheets (L- Form) which will have to be assembled at site complete with hangers ,supports The total quantity of 18G / 20G / 22G / 24 G sheets of appx 5500 SQ MTR . In addition about 800 SQ MTR will be supplied in sheets , to be fabricated at site for site changes . Thermal Insulation of supply and return air duct with finish is to be applied for 1000 SQ MTR

Roof Extractor Fans : 16 nos Axial Flow Roof Extractor units with hood , disconnection switch and all accessories with each of capacity 40,000 CMH.

Axial Fan Supply Air : The following types of axial flow fans is envisaged :

i. 4 sets of 50,000 to 1,20,000 CMH Axial flow Supply fans with Drive motor , Air Intake Louvres , Dry Filter panels , filter fixing frame and supporting structure , vibration isolaters etc

ii. 15 nos 6000 m3/hr Supply Air fans with Pre-Filter and Fine Filter complete with casing , TEFC Squirrel Cage Induction Motor and mounting Frame ,MS Rain Protection Cowl , Bird Screen and other accessories .

iii. 15 nos 4000 to 10000 m3/hr Supply Air fans with Pre-Filter and Fine Filter complete with casing , Flame proof Motor and mounting Frame ,MS Rain Protection Cowl , Bird Screen and other accessories .

iv. 30 nos 7500 m3/hr Supply Air fans with Pre-Filter and Fine Filter complete with casing , TEFC Squirrel Cage Induction Motor and mounting Frame ,MS Rain Protection Cowl , Bird Screen and other accessories .

v. 36 nos 2000 m3/hr Propeller Fans .

Fire and Gravity Dampers : 15 SQ MTR of these dampers is envisaged .

Q. COMPRESSED AIR SYSTEM :

The Compressed Air System consists of 4 nos , 240CMH Air Cooled Package air Compressors (skid mounted) ,2 nos Air Drying Plant matching Compressor Capacity, 4 nos Air Receivers of 6 m^3 capacity each and associated Piping along with drains , traps and vents

R. WATER SYSTEM :

The Water System consists skid mounted equipments and in addition to the 3 no Raw Water Pumps which supply the raw water from the tank to the water treatment plant, **the following 4 groups are envisaged** :

RO System:

The system comprises of the following skids :Dual Media with Filter, RO Module , Permeate Storage Tank , RO Cleaning System .

Drinking Water System :

Sodium Chloride (NaOCl) Dozing System

DM Water System:

Mixed Bed Exchanger and Blower , Acid Storage tanks and Pumps ,Alkali Storage tanks and Pumps , Regen/ Measuring Tank and ejectors ,Nuetralisation tanks and Pumps .

The Interconnecting Piping consists of Rubber lined / SS piping of 50 to 200 NB sizes .

The total weight of system is 50 MT .

S. MISCELLANEOUS TANKS :

Other than the tanks of the Fuel Oil System , the following Tanks are envisaged :

a) Raw Water tank – 2 no, 1600 m^3 , appx 13 m dia, 13 m height; 65 tonnes each

b) Potable Water Tank – 1 no. ; 125 m^3

c) Non Potable water Tank – 1 no. ; 125 m^3

d) DM Water tank – 1 no; 250 m^3; appx 7 m dia; 7.5 m height; 19 tonnes

e) Permeate tank – 1 no; 55 m^3; appx 5 m dia ; 3 m height

The tanks will be fabricated at site from shop fabricated and primer painted rolled sheets 8-16 mm thick .

U. EFFLUENT TREATMENT SYSTEM :

The effluent treatment system consists of Collection of waste water and effluents from Fuel Oil System , Workshop , Compressor Washing in GT Building , Fire water from Transformers , in a common collection tank . The Water is pumped from each of these areas by the pumps installed under this system . After separation of the Oil / Sludge and the water in the API and TPI , the sludge is sent to the sludge pit , the oil for filling in drums for manual disposition and the water to the Clean Water Pit / Evaporation Pond for disposal . System consists of Pumps , Strainers , Stirrers , Level Switches , Control Panels etc

The total piping envisaged under this package is appx 2.0 km of 50 NB pipes and the pipes are mostly over ground except at road crossings .

U. LP PIPING :

The following Piping is envisaged under the LP piping System :

a) CS Piping for Raw Water and Soft Water System :

The total piping under this group is appx 65 MT inclusive of bends and fittings and will have to be welded at site

b) **GI Piping for Drinking Water and Air System**:

The total piping under this group is appx 22 MT and all pipes below 50 NB are screwed connections . Above 50 NB , flange connections will be supplied which are to be bolted . Some site modifications may have to be carried out by welding .

c) SS piping for DM Water System:

The total piping under this group is appx 5 MT inclusive of bends and fittings and will have to be welded at site .

Most of the piping is over ground and .All hangers , supports and piping accessories will be supplied

V. CRANES :

The following Cranes sent in knocked down condition are to be assembled and erected :

a) 60/12.5/7.5 MT EOT Crane - 1 no.

This is a 10.7 M Span Double Girder Crane to be installed in the GT Hall , with DSL Length of 142.5 m . While the total weight of th crane is appx 35 MT , the Gantry rail is 25 MT and the DSL weighs about 2 MT

b) 32 T Crab Crane - 1 no.

The trolley weight of this crane is 10T , the span is 3.6 m and total travel is 11.35 m

c) 7 T Single Girder crane in GT Hall over GT OIL Tank - 1 no.

d) 5 T EOT Crane in Fire water Pump House - 1 no.

e) 2.5 T Electric Hoist in GT Hall for Generator End Shield - 4 nos.

f) 2 T EOT Crane in Compressor House -1 no.

g) 2 T HOT Crane in Fuel Oil Pump House - 1 no.

W. Sewage Treatment Plant:

The sewage treatment plant consists of Packaged Treatment Plant. The system consists of Skid mounted equipments and pits with level switches and pumps which will pump the sewage to skid mounted system.

The major packages of this System are : Air Flow Package , raw Sewage transfer Pumps ,Air Blowers , Dozing Skid , Collection Pit , Sludge Storage tanks , Clean Water pumps etc

MARIB PHASE-II

SECTION –III (B-II)

56.0 ELECTRICAL PACKAGE

56.0 SCOPE OF WORK

56.1 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 ELECTRICAL and C&I equipment and items indicated in the rate schedule (including optional items also) covered within the scope of these specifications for **MARIB 400 MW GAS TURBINE POWER STATION PROJECT PHASE – II**

56.2 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 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.

56.3 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 / PEC.

56.4 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 including dry out / centrifuging of transformers 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.

POWER TRANSFORMERS :

4 nos Generator Transformer of 120 MVA , 420/15.75 kV , Star Delta , ONAF with On Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 133 MT and the quantity of oil

for the first fill is appx 50000 L . The weight of the accessories is appx 30 MT . The appx tank dimensions is 8300 x 4000 x 3900 mm and the overall dimensions is 14000 x 9500 x 9600 mm .

4 nos Unit Auxillary Transformer of 6.3 MVA , 15.75 kV / 6.9 kV , Delta Star, ONAN / ONAF with OFF Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 14 MT and the quantity of oil for the first fill is appx 3000 L . The weight of the accessories is appx 6 MT . The appx tank dimensions is 3900 x 3200 x 3200. and the overall dimensions is 3900 x 3200 x 3200mm

Isolated Phase Busduct :

4 nos 15.75 kV , 7600 A , Al Conductor , Al Alloy Enclosure Busduct . The Busduct connects Gen Transformer to the Generator and has Tap Off for 1 nos UAT , LAVT and NG Cubicle . In the Nuetral Side , the Star Formation is is made to form the star point and the Generator is earthed thru the NG Transformer . The average per phase route length of the Main Run , UAT Tap Off , LAVT is 75 m , 25 m , 1.5 m respectively . The conductor section in the Main Run 450 mm Dia , 15 mm thick and that of Tap Off is 114.3 OD , 8.56 mm thk . The duct diameters for Main and TapOff is 1000 mm , 8.00 thk and 680 mm , 4.78 mm thk . The total number of welded joints (butt and flexible) on the Main Run and Tap Off are 45 nos and 20 nos respectively .The appx weights of the supporting structure is 20 MT . In addition the there is 1 set of 3 nos LAVT having dimensions 2850 mm x 800 mm x 2250 mm and having weight of 1.5 MT each . Total nos of CTs envisaged is 40 nos and nos of VTs is 9 . 1 nos NG Cubicle consisting of 1 nos NGT and 1 nos NGR and having a total weight of 1.8 MT is envisaged .Air Pressurisation Unit having a total weight of 1.0 MT is envisaged .Seal Off Bushing and Rubber bellows are also provided in the busduct .

Also to be erected in each busduct is Generator Circuit Breaker 24 kV , 10000 A SF6 filled , Hydraulically operated weighing appx 5.5 MT .

6.6 kV SWITCHGEAR :

The 6.6 kV Station Switchgear consists of the following systems:

a) Station 6.6 kV Switchgear System consists of One board consisting of 32 panels (Breakers) The Switchgear is Spring Operated Metal Clad Vacuum Interrupters with Protection and Metering CTs , PTs , Relays and Meters . The weight of each Panel (including trolley) is appx 1.5 MT and panels will be shipped in sections of 2-3 panels . In addition , 1 no each FEB and BEB and 2 nos spare trucks will be supplied.

b) 3 nos Panels will be installed as extention in the Existing Switchgear in Marib -1. Beside installation of panel ,the job also includes completion of interface wiring with the existing system.

LT SWITCHGEAR

Sl No	Name	WEIGHT (KG)	Overall Dimension (mm)
1	STATION PCC-1	10800	10950 x 1754 x 2550
2	EMERGENCY PCC	9700	10300 x 1754 x 2550

3	HVAC MCC-	10500	12500 x 1444 x 2550
4	MISC MCC	3000	5260 x 1000 x 2550
5	WATER TREATMENT MCC	4000	6450 x 1000 x 2550
6	FUEL OIL MCC	7000	7700x1000x2550
7	22O V DCDB	2700	6860 x 644 x 2550

NGR :

4 nos Nuetral Grounding Resistance are supplied for the UAT and Station Transformer . The NGR are structure mounted with structure having dimension 950 x 650 x 2000 mm and weight of appx 250 kg . The size of the NGR is 1818 x 685 x 1210 and weighs appx 400 kg . The NGR will be supplied in knocked down condition and is to be assembled at site .

LT SERVICE TRANSFORMERS :

4 nos Unit Auxillary Transformer of 2.0 MVA & 4 nos of 1.6 MVA, 6.9 kV/ 0.4 kV, Delta Star, ONAN with OFF Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 5.90 MT and the quantity of oil for the first fill is appx 1500 L . The weight of the accessories is appx 2.50 MT . The appx tank dimensions is 2500 x 1750 x 2500 mm

LT SEGREGATED PHASE BUSDUCT :

8 nos 400 V , Al conductor , Al Alloy Enclosure Busduct connecting Service Transformers and the LT Switchgear . The bus duct is supplied in sections and is to be installed at site with loose supplied components Viz. structure, bus duct section, JBs, seal off bushings, split covers, , earthing strip, Jointing of various sections supplied shall be done by bolting as specified. The installation includes wiring / cabling of space heaters is to be done at site .

Busduct Rated 3200 A – 8 sets

LOCAL PUSH BUTTON STATIONS AND STARTERS :

120 nos LPBs and 55 nos Local starters are envisaged

DC SYSTEM :

The DC System consists of 2 sets of 220 V Battery Chargers and 220 V Lead Acid batteries .
2 nos Float cum Boost Battery Charger size is 2500 x 1000 x 2550 mm and there are 2 nos Fuse Boxes (1000 x 1000 mm) also supplied.
Each Battery Bank consists of 110 cells of 645 AH and each Bank dimension is 2 x (6440 x 600 mm) .

UPS SYSTEM :

The UPS System consists of 2 sets of 220 V UPS and 220 V Lead Acid batteries .
The UPS size is 10000 x 800 x 2550 mm . Each Battery Bank consists of 190 cells of 750 AH and each Bank dimension is 2 x (10000 x 431 mm) .

CONTROL AND RELAY PANELS :

The Dimensions of the Relay and Control Panels is as under :

Sl No	Name	No of Panels	Dimensions (EACH PANEL) (mm)			Weight (each) (kg)
			Length	Depth	Height	Weight
1	DCS Panels	7	750	750	2300	400
2	E C B	1	3000	1000	2345	1000
3	Transducer panel	1	1500	800	2415	1000
4	Annunciation panel	1	2000	800	2415	800
5	BTS Panel	1	1500	1000	2355	800
6	Main Control Desk	8	1000	1500	1000	400

POWER CONTROL CENTRE :

Each Gas Turbine Unit has a Power Control Centre which houses the total Electrical and Instrumentation Equipments for the Gas Turbine and Auxillaries . The PCC is supplied in 3 sections , which will be erected and assembled mechanically by the mechanical group. The Panels are supplied installed in the PCC and consists of the following systems :

i. 6.6 kV Switchgear
ii. 6.6 kV/ 400- 650 V Dry Type Transformers
iii. 400 V Switchgear
iv. 220 V DCDB
v. 220 V Battery and Chargers
vi. 240V DC-DC Converters
vii. SFC and SEE Panels
viii. Gen , GT , UAT Protection and Metering Panels and VT Panels
ix. Turbine Control Panels
x. Network and SOE Panels
xi. Operator and Engineering Stations
xii. Air Conditioners and Lighting System

INSTRUMENTATION:

Most of the instruments required for the Gas Turbine System will come fixed on the skids .Calibration of these instruments and commissioning is envisaged in the scope of work .The approximate number of instruments covered per Gas Turbine is indicated . In addition some instruments are to be calibrated ,erected and commissioned , including completion of process connections .

ITEM	Calibration, Commg	Erection,Calibration , Commg
Differential / Pressure Gauges	25	35
Differential / Temperature Gauges	25	35
Differential / Pressure Switches	25	40
Differential / Temperature Switches		15
Differential / Pressure Transmitters	35	35
Limit Switches	25	25
RTDs		15
Thermocouples		20
Vibration Sensors		20
Speed Probes		6
Flame Detectors		4
Position Transmitters	10	
Junction Boxes		15

The wiring for the installed instruments to the Junction Boxes also have to be done . In addition , certain mechanical equipments will be installed on the skids at site for which the wiring connections will have to be completed .

The Instrumentation scope for the other Mechanical Packages are covered in their respective Packages .

COMMUNICATION SYSTEM:

The Communication System consists of the following systems:

a) 500 line **Telephone Exchange** and the communication network over the entire plant with about 200 telephones to be installed Other than the Telephone Exchange (appx size 750 x 750 x 2300 mm) and a 48 V , 80 VA VRLA Battery and Charger system, the system consists of the cable network and the other equipments eg Junction Boxes , handsets etc.

b) **PA System :** The system consists of 3 nos operater console , cabinet for recorder ,amplifier etc and appx 20 loudspeakers in the field . The cabinet size is 750 x 750 x 1500 mm

c) **Master Clock System :** The system consists of the Main Clock Panel along with about 20 clocks to me mounted in the plant area . GPS antenna is also envisaged .

UNDER GROUND AND OVER GROUND EARTHING :

The Overground and Underground Earthing is by Stranded Bare Conductor . The total quantity of Bare Conductor of various sizes being supplied is appx 35 KM . The conductors are to be joined bt Thermowelding , for which sufficient kits will be supplied .

For underground earthing , while the major civil works will be carried out by a different agency , minor civil works will have to be carried out by the contractor . Further , appx 220 Copper Clad Steel Earthing electrodes are to be installed . T**he installation of the Electrode , all electrical connections and the civil works are to be done by the Contractor.**

STATION LIGHTING :

The Station Lighting System provided lighting for the entire Power Station – both indoors and outdoors . The System broadly consists of the following sub-systems :

Lighting Distribution Boards (AC + DC)	-	11 nos
Lighting Panels (AC + DC)	--	86 nos
Lighting Fixtures (AC + DC)	--	2600 nos
Receptacles	--	425 nos
Street Lighting Poles	--	225 nos
Emergency Lighting Units	--	60 nos
Ceiling Fans	--	10 nos
Switch Board for Local Control	--	140 nos
GI Conduit	--	45 KM
Wires (1 core)	--	95 KM
Earthing Wire	--	50 KM
Structural steel	--	25 MT

STATION CABLING :

The Cabling System consists of Cable Tray Installation , Cable Laying and Cable Termination . The brief description of the systems is as under :

CABLE TRAYS:

The cable Tray system consists of Boltable Cable Support system . The total quantity of Single and Double Channel is 10275 m and 300 m respectively . Fixing of the Base Plates to the concrete is by Anchor Bolts (M10) and to steel structures by Clamps and Fittings .

The total quantity of trays envisaged is 27 kms and is of Ladder Type . Also included are various bends , reducers and Tees .

CABLE LAYING :

The total length of Cables envisaged for the Plant is as under :

For Main Plant

6.6 kV Cable -- 8 KM

LT Power Cables -- 112 KM

LT Control Cables -- 95 KM

Signal cables -- 8 KM

For Gas Turbine Systems:

LT Power Cables -- 43 KM

Signal cables -- 175 KM

Cabling work includes cable laying and termination . All cable accessories except wire ferrules and cable tags will be supplied . No of HT Terminations is approx. 170 nos.

FIRE SEALING SYSTEM:

Fire Sealing System will be applied to close all cable openings . The system will be Mortar type or Foaming Type . The approx. area to be covered is 400 sq mtr.

LIGHTNING PROTECTION SYSTEM

This system is applicable for the GT Hall Building , and associated plants , other buildings and structures . Total No of Masts is 40 nos

It consists of a system comprising of horizontal and vertical air terminations provided on the topmost surface of each building / structure required to be protected .

Minimum size of vertical air termination (Tinned Copper rod) is of dia 16 mm and that of horizontal air terminations / down conductor (Tinned Copper Strip) of size 25 X 3.0 mm .

Materials and sizes of system components approximately are :

i. Pipe Mast For Transformer Yard : GI Pipe Nb 139.7, 8.22 m high
ii. Vertical Air Termination : Copper rod Dia 16 MM , , 1000 mm long
iii. Horizontal Air Connection : Tinned Copper Strip 25 X 3 mm
iv. Down Conductor : Tinned Copper strip 25X 3 mm
v. Test Link ; Tinned Copper Strip 150 X 25 x 3 mm
vi. Electrode in Ground : Copper clad steel rod 14 mm dia , 3000 mm long

Layout , number/ details of vertical air terminations , horizontal air terminations and down conductors shall be in accordance with the building dimensions / profile , stipulations of BS : 6651and approved lightning protection system lay out drawings .

56.5 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.

56.6 The customer PEC 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.

56.7 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.

57.0 ERECTION

57.1 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.

57.2 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.

57.3 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) HT TRANSFORMERS

Scope of work includes checking and preparation foundation, shifting of Tank to 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 and back charging of transformers.

Painting of Transformer as approved by BHEL Engineer .

(B) ISOLATED PHASE BUSDUCT :

Foundation checking and carrying out minor modifications wherever required , erection of Structure , Busduct , LAVT , NG Cubicle etc , alignment of total busduct and readiness for welding , Welding of Bus , Ducts and shunts , by MIG /TIG and NDT and X-ray tests . Fixing of Rubber Bellows , SOB , Wall Frame assembly , Flexible and Rigid Bus Connections , CTs , VTs , NGT and NGR . Erection of earth Conductors, HAB equipment and carrying out Water and Air Tightness Tests **.** Cabling of CTs upto Marshalling Box after MB erection , testing of CTs and wiring and other tests , Hipot of Main Busduct .

Painting of Busduct as approved by BHEL Engineer .

(C) SEGREGATED PHASE BUSDUCT:

Foundation checking and carrying out minor modification wherever required, erection of structures, Busduct sections, and other loose items as per relevant drawings / documents, alignments and jointing by bolting of total Busduct , fixing of Rubber Bellows, seal Off Bushings, wall frame assembly, Flexible & rigid Bus connections, erection of earth conductors,, cabling upto JB /

Marshalling Box , contact resistance checks on bus duct, Hi-pot of Busduct, earthing of system with main earth conductor / riser.

Painting of Busduct with paint as approved by BHEL Engineer .

(D) 6.6 KV SWITCH GEAR

Erection of Panels after foundation checking and carrying out minor modification wherever required, Jointing of panels, inter panel wiring, busbar & earthbar connections, mounting of loose supplied items, testing of complete panels, BEB, FEB and spare trucks, HV test of main and Control bus, testing & commissioning of breakers after scheme checking including testing / calibration of all instruments and relays.

For the extension panels , interface with thebexisting panels is also to be completed in addition to the above works

(E) LT SERVICE TRANSFORMERS :

Scope of work 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 and back charging of transformers.

Painting of Transformer as approved by BHEL Engineer .

(F) DC BATTERY CHARGERS / UPS

Erection of Panels after foundations checking / fabrication of base frames or stools (wherever applicable) and carrying out minor modification wherever required; Joining of panels, inter-panel wiring, busbar & earthbar connections, mounting of loose supplied items, Testing of complete board & including testing / calibration of all instruments and schemes; Dummy load test of Chargers including arranging of dummy load and temporary power supply etc.

(G) DC BATTERY

Erection of battery after assembly of battery stands, inter-connection of batteries and first charging; Capacity testing using dummy load and subsequent recharging (in case of failure of capacity test, the charging Discharging cycle is to be repeated) Dummy load test of chargers includes arrangement of dummy load and temporary connection in absence of regular power supply.

(H) PANELS – POWER , CONTROL & RELAY (LTMCCs , STRP / GCPs ,ECB 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. 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..

Touch-Up Painting as approved by BHEL Engineer .

(N) CABLING:

a) Fixing of Cable Tray Support Structure to concrete foundations / brick walls by anchor bolts or to steel structure by suitable clamps , including fabrication / fixing of any other structure required to install the support structure .

b) Fixing of cable trays and tray bends and accessories to the tray supporting structure including modification of the trays to suit the local tray route conditions is to be carried out .

c) Laying, dressing & clamping of the cables in the cable trays / angles / conduit pipes as per the cable schedule and as instructed by the BHEL Engineer . Nylon / PVC ties / Tre Foil Clamps required for dressing / clamping shall be provided to the Contractor .

d) The cable tags , as approved by the BHEL Engineer , are to be provided by the contractor (at both ends and at regular intervals as advised by BHEL Engineer) at his cost . Similarly Wire ferrules of approved category is to be provided by the Contractor at his cost .

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

f) Gland plate hole drilling is to be carried out by the contractor at no extra cost

g) Cable Termination shall be carried out by the contractor as per approved drawings / as per instructions of the Engineer . Lugs , Glangs , cable termination kits will be supplied by BHEL . **Wire ferrules of approved category is to be provided by the Contractor at his cost .** All required crimping tools and other tools will be provided by the Contractor

STATION LIGHTING :

Erection of lighting boards ,panels, light poles, fittings and other suitable fixtures required for light fittings, conduiting, cabling and wiring as per drawing, testing of wiring and circuit checking, energizing of system forms part of erection job. All conduits, lighting fittings / panels and accessories required for lighting work shall be supplied by BHEL .

Fabrication / erection of required supporting structures and control-gear of respective fitting , all civil work for lighting poles including supply of cement , all civil works for buried cables etc is included in the scope of the Contractor

Conduiting required for light fittings shall also include fixing of conduit accessories like bends, tees, 3 / 4 way JBs etc. and the laying of PVC wires in respective conduit as per circuits shown in drawing.

INSTRUMENTATION

A. GUAGES AND SWITCHES :

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 / gauge boards , the scope includes erection of gauge board / rack, dismantling from skids / racks / gauge board, 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.

Some instruments may need repeated calibration / replacement. The same will be carried out by the contractor 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.

B. 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.

(D) 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

(E) IMPULSE LINE (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 / swoze 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.

(F) JUNCTION BOX, PUSH BUTTONS ETC

Includes fabrication / fixing / painting of stands for junction boxes / push buttons / frame mounted panels etc

(G) 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 used to make the joint water proof.

(H) COMPUTERS / PLC BASED EQUIPMENTS

All computer related items / equipment like 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. 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.

(I) SAMPLE HANDLING SYSTEM / ANALYZER SYSTEM

Includes installation of main analyzer panel, analyzer, probes, sensors and other accessories like sample gas cylinders, mechanical / electrical interconnections (including SS Tubing & Electrical heat Tracing, wherever required) between various components, energizing, testing & commissioning

57.4 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.

57.5 Conduits shall be thoroughly cleaned before pulling in the cable.

57.6 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.

57.7 In case of Transformers if any leakage / sweating is observed from field assembled / shop assembled gasket joints, valves, welded joints the same shall be attended by the contractor including draining of oil, refilling of oil & centrifuging if required at no extra cost to BHEL till handing over period. Sealing compound and any other consumable, if needed, shall be arranged by the contractor with in the quoted rates.

57.8 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.

57.9 **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.**

57.10 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.

57.11 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 the contractor . The adhesive etc. shall also be arranged by contractor at his cost.

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

58.1 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.

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

58.3 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 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 couse of dy out, moisture content tests as and hen 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 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.

II. HT / LT SWITCHGEAR PANELS:

(a) IR test of power and control circuits & High voltage test of Bus bar.

(b) Checking of protections and interlocks of all related schemes.

(c) Calibration of all indicating & metering instruments, relays, timers etc.

(d) Checking of operation of all relays and other protective devices e.g. thermal overload relays, single phasing preventers etc.

(e) Carrying out of suitable modifications as per system requirement.

(f) Operation of all illumination, space heating circuits etc.

III. BUSDUCTS

(a) Insulation and earth resistance checks.

(b) High voltage test on Bus bars after drawing out VTs and disconnecting lightning arresters surge capacitors and other connected equipment e.g. generator , generator transformer etc.

(c) Measurement of contact resistance of joints, bus bar loop resistance etc.

(d) Testing of CTs, VTs, NGC including primary and secondary injection tests.

(e) Making all arrangements for testing of the Generator , Gen Trf and UAT

(f) Testing pre-commissioning & trial run of hot air blowing unit.

IV. BATTERY AND BATTERY CHARGER / UPS

(a) Checking of battery charger panel.

(b) Calibration of all indicating and measuring instruments.

(c) Dummy load test of battery charger.

(d) Charging of battery and recharging after carrying out battery discharge test/ capability test of battery using dummy load.

(e) In the absence of regular power supply to battery chargers arrangements are to made for battery charging from temporary construction power supply points.

(V) CONTROL & PROTECTION PANELS

(a) Checking of complete wiring and insulation resistance.

(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) Carrying out primary injection, secondary injection, stability checks etc.

58.4 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.

58.5 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.

58.6 During commissioning activities and for carrying out various tests, special instruments etc , have to be temporarily erected and commissioned to suit the commissioning activities. Contractor will provide the necessary 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.

58.7 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, 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.

58.8 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.

58.9 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.

58.10 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/redo the work without any extra claim.

58.11 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.

59.0 SPECIAL CONDITIONS OF CONTRACT

59.1 It shall be the responsibility of the Contractor to pay salaries and other benefits to its employees/persons engaged by it as per the agreement with those employees/ persons, and in keeping with the local laws.

59.2 The employees of the contractor or persons employed by it as aforesaid shall work under the control and direction of the contractor and shall, under no circumstances, be considered employees of BHEL.

59.3.Transport Facilities for contractor’s site personnel.

The contractor shall be responsible for providing adequate transport to and from the site for his own and his contractor’s personnel which may be brought in daily from their living quarters of housing areas.

59.4. Temporary offices and sanitary/accommodations etc.

1) The contractor shall at his own cost, provide temporary accommodation for his site personnel, including sanitary facilities as and where necessary, canteen facilities etc. Limited open (space accommodation for contractor's office and stores for tools would be provided by BHEL at site.

2) The sanitary facilities shall be kept in clean and orderly conditions to the approval of BHEL and public health authorities of Yemen.

59.5. The erection work shall be carried out during normal working hours. No overtime, Friday or night work shall be carried out without the permission of BHEL except when work is unavoidable and absolutely necessary for the saving of life of property, or for the safety of the work or to overcome slippages in targets. The provisions of this paragraph shall not be applicable in the case of any work which is customarily carried out by rotating or double shifts.

59.6 Arbitration:

" Efforts shall be made to settle any dispute or differences arising under or out of or in connection with or relating to this contract (except as to any matter, the decision of which is especially provided for therein) through discussion between the parties, failing which either party may refer the matter to arbitration as provided clause 33.0 of the General Conditions of Contract. "

59.7 CLEANING UP AND ENVIRONMENTAL PROTECTION

59.7.1 Contractor shall at all times, keep its work areas at the Site in a neat, clean and safe condition. Waste material shall be removed by Contractor from work areas on a continuous basis. Upon completion of any portion of the work, Contractor shall promptly remove all of its Construction Equipment, any Plant temporary structures and surplus materials not be used at or near the same location during later stages of work. Upon completion of the work, Contractor shall at its expense, satisfactorily dispose of all buildings, rubbish, unused materials and other equipment and materials belonging to it or used in the performance of the work, including return of any unused salvageable materials supplied by BHEL / Owner for incorporation into the work to Owner's warehouse or storage area on Site. Contractor shall leave the premises in a neat, clean and safe condition. In the event of Contractor's failure to comply with the foregoing the same may be accomplished by BHEL/ Owner at Contractor's expense.

59.7.2 Contractor's operations should be so performed as to prevent accidental spillage of contaminants, debris or other pollutants and waste into streams or underground water sources. Such pollutants include, but are not restricted to sanitary waste aggregate processing tailings, concrete curing water, oil or petroleum products, mineral salts and thermal pollution. Dewatering operations should be conducted in a manner to prevent muddy water from being discharged into streams. Setting ponds or other approved means should be used. Turbidity increases in the streams must be avoided and methods of reducing turbidity increases must be adopted. Waste water from aggregate processing, concrete batching, must not enter streams without using settling ponds, gravel filters or other processes so as not be harmful to fish.

59.7.3 Abatement of air pollution should be observed by Contractor by use of devices to control, prevent and minimize emissions to the atmosphere. Dust from Contractor operations, as far as practicable should be minimized. Exhaust gases due to poor engine adjustments must be avoided and engines not operated until corrective adjustments are made. Dust control by sprinkling or other methods must be adopted to avoid and reduce the dust nuisance. Burning of waste materials, brush or trees shall only be done when atmosphere

conditions are favourable, as determined by BHEL / Owner. Clean-up to prevent accumulation of waste materials and rubbish should be enforced. Disposal of waste materials by burial should not contaminate ground water supplies. Excessive noise levels should be controlled.

59.8 ENVIRONMENTAL PROTECTION

59.8.1 Applicable Standards

The project must conform to the local standards of the Republic of Yemen. The following standards and / or regulations are to be applied.

59.8.2 Environmental Quality Standards

The discharge of pollution in water and air as well as noise levels shall meet with the stipulations of Local Pollution Control Board as well as other Acts of the Government. It is a pre-condition that irrespective of what is stated in Statutory regulations or any other act or norms, the tender stipulated environmental qualities standards are the minimum requirements and shall be fulfill in toto.

59.8.3 Fundamental Requirements of Environmental Protection for Power Plants

59.8.3.1 General Principals

To protect the environment, Power Plant construction should comply with state regulations, carry out composition and review system for Environmental Impact Assessment (EIA) report

59.8.3.2 Water Pollution Prevention and Control

The plant construction should be designed to economize on water use and to set up a water management system featuring equilibrium between water feed and water discharge

Waste water such as oily waste generated in construction of phase –II plant shall be collected in local area sump pits for disposal to off-site by means of portable pumps or vaccum trucking

59.9 HEALTH, SAFETY & ENVIORNMENT (HSE)

Contractor shall execute the work and conduct its operations at the Site in compliance with all applicable laws, regulations and standards, including those governing safety and the Safety Programme submitted by Contractor and approved by BHEL / Owner. Contractor shall direct its personnel to take all precautions necessary to protect against and prevent injury to personnel and damage to property. Contractor shall continuously inspect the work and supervise its personnel to determine and enforce compliance with the above provisions. Contractor shall cooperate with other contractors and subcontractors and shall respond promptly to the direction of BHEL / Owner for the purpose of implementing the Safety Program.

Contractor shall submit a written Safety Program with details appropriate to the work to be performed for BHEL / Owner's review. Such review shall not relieve Contractor of its responsibility for safety, nor shall it be construed as limiting in any manner the Contractor's

obligation to undertake any action that may be necessary or required to establish and maintain safe working condtions at the Site.

Contractor shall designate a qualified Safety Representative. Such Safety Representative shall attend all project monthly safety meetings and participate fully in all acativities outlined in Contractor's Safety Program.

Contractor shall maintain reports of all accidents and injuries and shall furnish BHEL / Owner a monthly summary of injuries and man-hours lost due to injuries. Contractor shall report immediately any accidents occurring at the Site or enroute to or from the Site.

Contractor shall hold regularly scheduled meetings to instruct its personnel on safety practices and the requirements of its Safety Program. Contractor shall furnish safety equipment and enforce the use of such equipment by its personnel.

Besides provision with regard to SAFETY under Clause 27 of GCC, Contractor shall note that Explosives shall not be used on the work by contractor except with permission in writing of the ENGINEER and in manner and to the extent to which he has prescribed. Where explosives are used, the same shall be stored in a special magazine to be provided by and at the cost of the contractor who shall be liable for all damages, losses and injury to any person or property and shall be responsible for complying with all statutory obligations in these respect. **Further, the contractor is required to provide proper Safety Net System wherever the hazard of fall from height is present as per instructions of BHEL Engineer at site. The safety net shall be duly tested and shall be of International standards and the nets shall be located as per site requirement to arrest or to reduce the consequences of a possible fall of persons working at different heights.**
Besides provision with regard to SAFETY under Clause 27 of GCC, the contractor will be responsible for Health, Safety & Environment management at site for the construction activities to be carried out by them in accordance with requirements **given under section I(a) of GCC of this document**. The contractor shall continuously take special care to ensure the safety and prevention of human and equipment accidents and maintain good sanitary conditions in and around the site. All the construction work and plant operation must be carried out in the safest possible manner. The Engineer reserves the right to stop any process which, in the Engineer's opinion, is being performed dangerously. In this case the contractor must immediately adhere the requisite safety precautions and any delays attributed to the work stoppage on this account shall not affect the agreed contractual finishing dates

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

Contractor shall arrange for following provisions of HSE

1. Contractor has to maintain contact with local hospital having scanning & other modern medical facilities required during emergency including ambulance.

2. Contractor has to ensure pre employment medical check for all staff & workers.

3. **The Contractor shall provide and maintain proper sanitary facilities including Toilets/Urinals and drinking water at site for the use of workers and ensure that workers make use of them for maintaining cleanliness and health environment.**

4. Contractor has to 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, following
   - Male nurse (in shifts)
   - Oxygen set up
   - Breathing apparatus
   - Eye wash facility
   - Stretcher
   - Trauma blanket
   - Medicines.

The Contractor shall arrange and maintain ambulance at site for entire contract period for subject work. This emergency facility set up including ambulance, male nurse etc. will be shared by BHEL and its other contractors working at same project at no extra cost to BHEL and its sub-contractors.

In case, under unavoidable circumstances , if the ambulance is not available, the contractor will have to arrange for the same as under clause 41.9.3.1 mentioned above.

Additional safety requirement of BHEL's Customer, if any, shall be provided by the Contractor without any extra cost. Non adherence of safety requirements will attract penalty, which shall be as follows;

a) Penalty equivalent to USD 15 for the first violation.

b) Penalty equivalent to USD 30 for the subsequent violations.

c) For serious lapses, as decided by BHEL, even fines upto USD 500 at a time can be imposed.

The Contractor shall be fully responsible for accidents caused due to him or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries.

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.

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

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

59.10 QUALITY

General

As a means of assuring that the quality characteristics of each phase of the work fulfills the requirements of the project, the contractor / principle sub contractor shall be an entity which has a documented Quality Management System. The Quality Management shall be capable of providing the required Quality planning. Quality control, Quality assurance for all phases of the work covering, storage, erection, construction and testing for all equipment, materials and services. The BHEL / Owner (as an audit client) reserves the right to audit all such elements in all phases of work for its effectiveness/conformity directly or thro' an authorized representative. However, such audits will be limited and may be determined prior to the order by the BHEL / Owner. The audit right in no way relieves the Contractor from performing the necessary application of his own system requirements.

Quality Management System

Contractor Quality Management System shall meet the requirements of ISO 9001. Contractor /–shall demonstrate compliance with this requirement by submitting a copy of their Quality Manual.

59.11 COMPLIANCE TO REGULATIONS AND BYELAWS

59.12 Permits

Contractor shall procure and pay for all permits, registrations , licenses required for performance of the Contract Works and shall furnish any bonds security or deposits required to permit performance of its Works hereunder.

59.13 The contractor shall observe the provisions of effective legislation in Yemen especially with respect to labour, wages and social security legislation and insurance on works, goods, transport means archeology, custom, taxes(including income tax), training etc. and shall bear any expenses required including permits & licenses necessary for starting work.

59.14. All traveling expenses including air fares etc., within India, airfare from India to Yemen and back shall be borne by the Contractor for all his employees. The contractor shall also bear airfare and other expenses for those employees sent

back to India on account of misconduct, disobedience, improper behaviour, sickness and unsatisfactory work or any other reason whatsoever.

59.15 Contractor shall arrange at his cost the passports (As applicable) for all his staff and labour duly incorporating the endorsement for Yemen. They shall arrange visa, attestation of certificates, required for travel arrangements, work permit, Resident visa and other documents and comply with other formalities. All the expenses will be borne by the Contractor. Necessary help by BHEL will be provided for this.

59.16. The delay in obtaining the passports and other travel documents or compliance with the various formalities for the deputation of the contractor's persons shall not absolve the contractor from the obligation under the contract including completion of the work strictly in accordance with time schedule. Save as otherwise / expressly provided for herein the persons so deputed by the contractor shall not be entitled for any claim or retrenchment benefit from BHEL directly or indirectly.

59.17 Injury to Third parties

a) The contractor shall indemnify BHEL in respect of all damages or injury occurring, before all the works have been taken over, to any person or to any property (other than property forming part of the works) and against all actions, suits, claims, demands, costs, charges and expenses arising in connection therewith which shall be occasioned by the negligence of the contractor or his sub-contractor, or by defective design (other than a design made, furnished by BHEL), materials or workmanship pertaining to contractor. If while the contractor is on the site for purpose of making good a defect there shall occur any losses of or damage or injury to the works or to any other property or to any person, the contractor's liability in respect thereof shall be the same as if the said losses, damage of injury has occurred before any part of the works had been taken over.

b) The contractor shall have to pay necessary compensation and other expenses, as required under the law, regulation and local orders at Yemen, in event of accident / injury occurs to contractor's employee or any other person / public / property. The contractor shall arrange local insurance policies at Yemen in regard to his workmen and 3rd party liabilities as may be required under the laws also.

59.18 Whenever the contractor has knowledge that any actual or potential, labour dispute, whether between him or his sub-contractor's personnel, is delaying or threatens to delay the timely performance of works, he shall immediately give notice thereof to the BHEL's representative at site and will take all necessary remedial measures in consultation with BHEL.

59.19. The Contractor shall execute the works in strict accordance with the contract and to the satisfaction of BHEL's Engineers. The Contractor shall take instructions

only from BHEL's Engineer or his Authorized Representative. In case of any class of work for which there is no specification laid down in the Contract, the works shall be carried out in accordance with the instructions and requirement of Engineer. In events of difference of opinion, the decision of Engineer will be final and binding.

59.20 Correspondence

The official language for all correspondence exchanged between BHEL and the contractor shall be English. Also contractor to deploy personnel good in written and spoken Arabic to take care of the local requirements.

59.21. Organizing for erection works

As soon as practicable after award of the contract, the contractor shall establish at site an office with such qualified personnel as may be needed to direct and supervise Erection works and also having following abilities and experiences :

a) He must have the ability to control schedule, to manage engineering and the counter measure for safety etc.
b) He must be able to manage his engineers, supervisors and labour to get the desired output.
c) He must be able to speak English.

59.22 The contractor shall supply necessary numbers of qualified welders to execute erection works.

59.23. If welders do not have necessary qualifications, the contractor shall execute the qualification tests for his welders in accordance with ASME, at his own cost to be witnessed and approved by BHEL.

59.24. Subletting:

In order to meet certain local statutory regulations, contractor may have to employ a few local hands and sublet a part of the works which does not call for specialized skills.

The Contractor shall not, however, sublet, assign or transfer part or whole of the Contract without previous consent in writing of the Employer

59.25. The contractor shall perform any other services although not specified but nevertheless required for the completion of the work.

59.26. The contractor shall be responsible for the safe storage of his radioactive sources.

59.27. Other Miscellaneous conditions:-

- The contractor shall not claim any compensation of the scope of work, due to change in design which curtails the quantum.

- In case of any class of the work for which there is no such specification as laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer'.

- Should any error or ambiguity be discovered in the specification or information, the contractor shall forthwith bring the same to the notice of the `Engineer' as soon as located. BHEL's interpretation in such cases shall be final and binding on the contractor.

- No change to the conditions in tender will be accepted. If the tenderer stipulates changes in the tender conditions, then accordingly there will be financial loading with respect to these conditions while evaluating the tenderer's offer. BHEL's decision in this regard shall be final and binding on the bidder.

- No idle labour charges will be admissible in the event of any stoppage caused in the work resulting contractor's labour being rendered idle due to any cause at any time.

- It is possible that some repair/rectification/modification may be needed on the equipment to be erected/constructed/work to be performed under this specification, for reasons not attributable to the contractor. All such repair/rectification/modifications work which can be done with the available facilities at site shall be carried out by the contractor on extra man-hour rate. .

- The Contractor and its employees shall not be involved in any manner in any political activity.

The tender is also subject to General Conditions of Yemen Government

60.0 FACILITIES TO BE PROVIDED BY BHEL/CONTRACTOR

60.1 CONTRACTOR – FURNISHED UTILITIES AND FACILITIES

60.1.1 Contractor shall at its expense, arrange for develop and maintain utilities and facilities at the site to execute the work under the contract, including but not limited to the following:

a) Illumination: Contractor shall provide light sufficient to safety perform work at night or when daylight is inadequate or obscured, including illumination of the access to the place of work.
b) First Aid Facilities: Contractor shall provide first aid facilities for the treatment of its employees who may be injured or become ill while engaged in the performance of work under the Contract. Contractor will make available such First Aid facilities to

other contractors and Owner's employees on a "when available basis" and subject to reasonable charges for service rendered.

c) Temporary Field Offices: Contractor shall provide off site field offices and change facilities for its employees.
d) Fire Prevention / Protection : Contractor shall provide a fire prevention/protection program including fire protection equipment to mitigate the possibility of fires. Contractor's recommended fire prevention/protection program shall be subject to Owner's review.
e) Potable Water: Contractor shall provide potable water for use by its employees.
f) Construction Service Water and Fire Water: Contractor shall provide water for use during construction of the Plant, including fire protection by local arrangement / installation of required Bore wells at his own cost.
g) Toilet facilities: Contractor shall provide adequate toilet facilities for all Contractor personnel.
h) Trash disposal at an off-side location: Contractor shall provide its own trash disposal site at an off-site location as approved by the Engineer
i) Security for Site and off-site facilities: Contractor shall provide all the necessary security measures for all its on-site and off-site facilities.
j) Identification badges: Contractor shall provide proper identification budges for all its personnel, including visitors.

60.1.2 BHEL shall provide limited open space, for office , storage shed & labour colony . It is the responsibility of the contractor to construct sheds, provide all utilities and dismantle and clear the site after completion of work or as and when required , as a part of his scope of work.

60.1.3 Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport , electricity(thru DG sets), water(bore wells), medical facilities etc. as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

60.1.4 **Construction power, for construction purposes as well as office , stores use will be arranged by contractors by DG sets including further distribution at his own cost for the entire duration of the contract .** The contractor should have adequate spare capacity in DG Sets to take care of breakdowns . The Contractor shall submit the proposal / scheme for the same for approval of Engineer . All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply. Required calibrated energy meter for measurement of power consumed has to be arranged / installed by Contractor at his cost.

60.1.5 Provision of distribution lines of power from the central points to the required place with proper distribution boards observing the safety rules laid down by the 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. The contractor shall adjust his working shift / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

60.1.6 Adequate lighting facilities such as flood lamps, 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.

60.1.7 No claim for damages will be entertained by the Company on account of interruptions of water supply or limitation of quantity of water as aforesaid or on account of the water so taken being not fit for construction purposes or on any other account in connection with such water supply.

60.1.8 Contractor shall arrange for construction water within the quoted rates by making adequate borewells. Contractor has to satisfy himself that the water brought by him is fit for construction / consumption and to submit the test report from reputed laboratory and adequately treat such water at his cost when it is not found fit for the said purposes.

60.1.9 The Contractor shall make arrangements for storage of sufficient quantity of water required for work.

60.1.10 The Contractor shall during the progress of the work, provide, erect and maintain at his own expenses all necessary temporary workshops, stores, consumables, offices, etc. required for the proper and efficient execution of the work. The planning, setting and erection of these buildings shall have the approval of the Engineer and the Contractor shall at all times keep them tidy and in a clean and sanitary condition to the entire satisfaction of the Engineer.

60.1.11 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled 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. .

61.0 TIME SCHEDULE

61.1 As stated earlier, this tender is for selecting Pre-Bid Partner for this work and an MOU will be drawn with the selected Party by BHEL. However, the work will be awarded to the selected party, in case BHEL gets the job from its customer M/s PEC, Yemen. **As such, the work is expected to start tentatively after 12 months from the bid submission to M/s PEC, Yemen by BHEL**. 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. The bidders should consider above fact while quoting their price.

61.2 **Entire work as detailed in the tender specifications shall be completed within 20 months from the date of start of erection (Zero date) to achieve various milestones are as under:**

MILESTONES	MONTHS
• **START OF ERECTION**	**ZERO DATE**
• **ST-1 CHARGING**	**5 th MONTH**
• **SYNCHRONISATION OF UNIT – 1**	**8 th MONTH**
• **TRIAL OPERATION + HO OF UNIT – 1**	**9 th MONTH**
• **SYNCHRONISATION OF UNIT – 2**	**10 th MONTH**

- **TRIAL OPERATION + HO OF UNIT - 2 — 11 th MONTH**
- **SYNCHRONISATION OF UNIT – 3 — 14 th MONTH**
- **TRIAL OPERATION + HO OF UNIT – 3 — 15 th MONTH**
- **SYNCHRONISATION OF UNIT – 4 — 17 th MONTH**
- **TRIAL OPERATION + HO OF UNIT - 4 — 18 th MONTH**

Note:

- 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

61.3 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.

62.0 TERMS OF PAYMENT

62.1 **The prices for all the items of the BOQ shall be quoted in US Dollars. The payment shall be made as per tender terms on receipt of payments from customer**. The terms of payment applicable on each item of price schedule shall be as under :-

(A) <u>ADVANCE PAYMENT</u>

(a) **"**5% of the contract value shall be paid as interest bearing advance against submission of a Bank Guarantee for an amount equal to 1.20 times of advance valid for 15 months initially and thereafter extension for a period upto which the advance is fully adjusted. The interest chargeable shall be Prime Lending Rate of State Bank of India plus 2%."

The BG should be issued preferably through any of the Member Banks listed in the GCC. The BG may also be accepted from a Foreign Bank at the sole discretion of BHEL, provided the BG is duly endorsed by any of the BHEL's Member Bank listed in the GCC 'OR' any Nationalized Bank in India.

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

(b) The advance paid shall be recovered from the contractor's monthly running bills to an extent of 10% of each bill alongwith applicable interest amount till it is fully recovered. The BG amount shall be allowed to be reduced every six months by an amount equal to the amount adjusted against running bills.

(c) The BG against advance shall be returned after full adjustment of the entire amount of advance along with interest .

(B) Progressive Payments

(a) 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.

(b) 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. The BHEL shall pay to the Contractor in the following manner upon condition that the Contractor shall comply with, perform and observe several covenants/conditions/obligations under the Contract .

(c) The Contractor shall be paid monthly running bill to a maximum of 90% of the value of the work actually executed on site provided the work has been executed to the satisfaction of the Engineer. BHEL Site Manager, at his discretion can split this 90 % payment, to facilitate site operations. The Engineer may after a measured bill allow & certify payment to the contractor on the basis of abstract measurement bill submitted by the contractor. Contractor will also submit the soft copy containing abstract & measurement sheets of the bill which will be returned to him after correction for further resubmission of bill. From this amount recovery such as advances, security deposit taxes etc. would be made. The certificate of the Engineer regarding such approval and passing of sums so payable shall be final and conclusive against the contractor.

(d) 4 x 1.25 % of the contract value shall be paid against issue of provisional takeover certificate by BHEL's Customer(M/s PEC).

(e) 2.5% of the contract value shall be paid on completion of all pending works, rework wherever required, site clearing and reconciliation of materials.

(f) Balance 2.5% of the contract value shall be paid within one month of submission and passing of final bill and against final take over certificate by BHEL's Customer(M/s PEC).

NOTE: Above payment at (f) & (g) shall be released after working out the contract value based on actual work carried out.

(C) Currency of Payment and Exchange Rate

(i) Payment in US $

50 % of the passed bill amount will be paid in US$ subject to Reserve Bank of India (RBI) / Yemen Govt guidelines.

(ii) Local Currency Payment

Balance 50% of the passed bill amount will be paid in local currency (i.e. Yemen Rials).

The conversion rate from US $ to Yemen Rials shall be the selling rate of Central Bank of Yemen as prevailing on the last working day of the month for which bill has been raised.

(D) Any certificate relating to the work done may be modified by any subsequent interim certificates or by the final certificates and no certificate of the Engineer supporting an earlier advance payment shall of itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract.

NOTE:-

1. The breakup at the appendix-I to this section is only to facilitate progressive payments and deemed to cover all equipments in the scope of the tender. The total work shall be as detailed under scope of work and Appendix `F' etc.

2. Prorata payments shall be made once a month in proportion to the work carried out by the contractor during the preceding month/months.

3. All levies, charges, taxes payable in India and Yemen will be borne by the Contractor or his Employees as applicable.

63.0 LIQUIDATED DAMAGES (LD)

For delay in completion of work attributable to the contractor, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the total contract value.

64.0 SECURITY DEPOSIT

64.1 The contractor shall submit Security Deposit (SD) in US $ within 15 days from the date of issue of LOI as per clause no. 16.0 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 in the GCC. The BG may also be accepted from a Foreign Bank at the sole discretion of BHEL, provided the BG is duly endorsed by any of the BHEL's Member Bank listed in the GCC 'OR' any Nationalized Bank in India.

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

65.0 OTHERS

65.1 The tenderer shall specifically confirm that he has inspected the site of work and acquired full knowledge and information about the site conditions, wage structure,

Industrial climate, total work involved and will not raise claim of any nature due to lack of knowledge of site condition. He will also confirm that local taxation laws at the site have been clearly understood by him.

65.2 Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification requirements/ evaluation of 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.

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

65.4 Settlement of disputes shall be according to the Rules of reconciliation and arbitration under Indian Arbitration Act 1996 and according to Indian Laws in India at Delhi as per GCC of BHEL.

65.5 CHANGES IN LEGISLATION

If after the date of bid opening and during Contract execution, there may be any legislative changes in the Republic of Yemen (law, decree or by-laws) which cause additional or reduced cost to the Contractor in the execution of the work, such additional or reduced cost, if fully justified and approved by BHEL / Owner, shall be paid for or reimbursed, as the case may be, by or to the BHEL / Owner.

65.6 LAW APPLICABLE

The Contract shall be governed by and construed in accordance with the laws of the Republic of Yemen

65.7 RECOGNIZED FESTIVALS AND CUSTOMS

Contractor shall have due regard for all recognized festivals and religious or other customs in dealing with its workmen and others in the Republic of Yemen.

65.8 Insurance

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

65.8.1 BHEL / its customer shall arrange for insuring the materials of BHEL / its customer covering the risks during transit, storage, erection and commissioning.

65.8.2 If due to negligence/ carelessness on the part of the contractor, any material/ equipment

gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserve the right to recover deductible franchise and also unsettled portion of insurance claim amount from the contractor.

65.8.3 If due to negligence/ carelessness on the part of the contractor, any surrounding properties also gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserves the right to recover deductible franchise and to unsettled portion of insurance claim amount from the contractor.

65.8.4 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.

65.8.5 The Contractor shall provide insurance cover to all persons employed/engaged by him throughout the period of Contract, including the extended period, if any, under prevailing local law

66.0 PEFORMANCE GUARANTEE:- The contractor shall Guarantee the soundness of works under the contract and their proper execution and operability and achieving the relevant purpose fully for a period of 24 months as from taking over of last unit by the owner M/s PEC. If any defect, default or deficiency transpires therein, the contractor shall remedy or complete same within one week from being notified thereof, otherwise BHEL may carry out same at expense and responsibility of the contractor and may deduct the expense incurred including 30% overheads in this respect from the deposit with BHEL, without prejudice to the right of the BHEL to compensation.

APPENDIX-I

PAYMENT BREAKUP (MARIB PH-II)

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:

SL NO	PACKAGE	AREA	ACTIVITY	No of Units	Unit	APPX QTY	Package %	Total %	Group Total %
1	**Gas Turbine**			**4**			**3.5%**		**14.00%**
			Placement of Gas Turbine		PKG		1.25%	5.0%	
			Placement of Skids		PKG		0.75%	3.0%	
			Placement of Ducts + CC		PKG		0.75%	3.0%	
			Alignment of Gas Turbine		PKG		0.75%	3.0%	
2	**Gas Turbine Generator**			**4**			**3.0%**		**12.00%**
			Placement of GTG		PKG		0.8%	3.20%	
			Rotor Insertion		PKG		0.6%	2.4%	
			Cooling Air System		PKG		1.0%	4.0%	
			Alignment of GTG		PKG		0.6%	2.4%	
3	**Gas Turbine Auxillaries**			**4**			**3.75%**		**15.00%**
		Inlet Air Filter		4			1.5%	6.00%	
			Filter Housing		PKG				
			Filter System		PKG				
		Exhaust Stack		4			1.5%	6.00%	
			Shell Erection		PKG				
			Insulation		PKG				
		Air Blast Cooler		4	PKG		0.20%	0.80%	
		Fin Fan Cooler		0	PKG		0.00%	0%	
		Gas Detection System		4	PKG		0.20%	0.8%	
		Fire Fighting System		4	PKG		0.15%	0.6%	
		Cooling Water System		0	PKG		0.00%	0%	
		Gas Turbine Insulation		4	PKG		0.20%	0.80%	
4	**Station Mechanical Package**								**24.00%**

		Fire Fighting System	1	PKG		4.00%	4.00%	
		Air Conditioning and Ventillation	1	PKG		2.00%	2.00%	
		Fuel Oil Tanks	1	NOS		2.00%	2.00%	
		Fuel Oil system	1	PKG		2.50%	2.50%	
		Fuel Gas System	1	LOT		2.50%	2.50%	
		Water System	1	NO		1.50%	1.50%	
		Water Tanks	1	NO		2.00%	2.00%	
		Sewage Treatment Plant	1	LOT		1.75%	1.75%	
		EOT and Under Slung Cranes	1	PKG		1.75%	1.75%	
		LP Piping	1	PKG		3.00%	3.00%	
		Water Treatment Plant	1	PKG		1.00%	1.00%	
5	**Electrical + C&I Package**							**30.00%**
		Generator Transformer	4	NOS		1.5%	6.00%	
		Unit Auxillary Transformer	4	NOS		0.5%	2.0%	
		Isolated Phase busduct	4	NOS		1.50%	6.00%	
		Station 6.6 kV Switchgear	1	NO		1.00%	1.00%	
		PCC + Gas Turbine Electricals+I&C	4	PKG		1.50%	6.00%	
		LT Auxillary Transformers	20	NOS		0.10%	2.0%	
		Station LT Switchgear	6	NOS	6	0.20%	1.20%	
		Station Battery Charger	1	NO		0.20%	0.20%	
		Station UPS	1	NO		0.20%	0.20%	
		Station Cabling	4	UNITS		0.75%	3.00%	
		Master Clock	1	PKG		0.04%	0.04%	
		Station Lighting	1	PKG		1.50%	1.50%	
		Over Ground Earthing	1	LOT		0.06%	0.06%	
		Electrical Control Board	1	NO		0.10%	0.10%	
		Fire Sealing System	1	LOT		0.70%	0.70%	
6	**MILE STONES**							**5.00%**

		Initial Man Power Deployment				1.0%	1.0%	
		Charging of 6.6 kV Stn Switchgear				1.00%	1.00%	
		Synchronisation Unit # 1				0.75%	0.75%	
		Synchronisation Unit # 2				0.75%	0.75%	
		Synchronisation Unit # 3				0.75%	0.75%	
		Synchronisation Unit # 4				0.75%	0.75%	

NOTES: (1) 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.

(2) Mile stone payment of " Initial Manpower Deployment" shall be payable on deployment of 50 workers within one month of Mobilization Notice from BHEL.

Annexure -I

TENTATIVE SUMMARY LIST OF MAJOR GAS TURBINE PACKAGES (PER SET) FOR 4xV94.2 GTGs FOR MARIB STAGE - II GTPP, YEMEN

S.No	Description	No off	Dimension LxBxH (m x m x m)	Gross wt. (kg)	Net wt. (kg)	Remarks
1.	Thermal Block Gas Turbine	1	10.340x 4.080x 3.930	197397.00	189300.00	
2.	Combustion Chamber (Right)	1	7.650x 3.800x 4.500	30000.00	23608.00	
3.	Combustion Chamber (Left)	1	7.650x 3.800x 4.500	30000.00	23608.00	
4.	Oil tank with pump sets, instrumentation, rack	1	6.900x 2.800x 3.830	14690.00	11500.00	
5.	Hydraulic unit	1	1.860x 1.600x 2.390	1450.00	970.00	
6.	Fuel Oil Injection Skid	1	6.000x 2.000x 3.650	9000.00	7000.00	
7.	Leak Oil tank	1	2.100x 1.850x 1.500	2350.00	1720.00	
8.	Piping Skids – right skid	1	10.350x 1.550x 2.300	6000.00	3000.00	
9.	Piping Skids – left skid	1	10.120x 1.520x 2.620	7000.00	4000.00	
10.	Piping Skids - front rack	1	2.500x 1.200x 2.550	1466.00	1130.00	
11.	Grating for Combustion Chamber	1	2.000x .900x 0.800	700.00	500.00	
12.	Platform around turbine	1	3.600x 1.800x 1.500	2171.00	1700.00	
13.	Platform (around Combustion Chamber)	1	4.360x 2.300x 1.380	3100.00	2500.00	

14.	Anchoring lube oil tank	1	0.600x 0.600 x 0.500	183.00	163.00	
15.	Lube oil piping (Generator)	1	6.100x 0.500x 0.400	430.00	150.00	
16.	Turbine Support & Centre Guide, Block	1	2.310x 0.820x 0.750	927.00	752.00	
17.	Drains oil pipes	1	0.500x 0.400x 0.300	100.00	31.00	
18.	Blow off system pipes	1	2.050x 0.300x 0.300	150.00	65.00	
19.	Drying device	1	1.200x 0.920x 1.500	187.00	67.00	
20.	Exhaust Gas Diffuser	1	6.100x 4.740x 4.770	10062.00	6162.00	
21.	Intermediate shaft	1	5.000x 1.080x 1.100	6910.00	5685.00	
22.	Actuator of adjustment fixture for stator blade	1	1.040x 1.000x 1.000	468.00	365.25	
23.	Compressor Support Block	1	1.920x 1.131 x 0.950	880.00	432.00	
24.	Turbine support center guide, block	1	1.700x 1.350x 0.400	616.95	472.95	
25.	Nuts and bolts for intermediate shaft	1	0.580x 0.480x 0.350	103.00	98.00	
26.	Combustion chambers piping & valves	1	4.000 x 3.000 x 2.400	1683.00	783.00	
27.	Thermal and Noise Insulation for unit 1	1	6.000 x 2.300 x 2.000	4000.00	2000.00	

28.	Site mounting material unit 1	1	5.500 x 2.500 x 1.200	1545.00	1185.00	
29.	Cover, oil guard ring (compressor side)	1	1.280 x 1.080 x 0.750	414.00	305.00	
30.	Fuel Gas Skid	1	2.700 x 2.250 x 2.800	2760.00	1930.00	
31.	Site Mounting material	1	0.350 x 0.200 x 0.200	1.500	0.500	
32.	Actuator combustion air	1	1.900x 1.800x 0.660	700.00	530.00	
33.	Blow off system pipe	1	7.350x 2.050x 1.020	2910.00	1870.00	
34.	Blow off system valves	1	1.600x 1.500x 1.430	1245.00	800.00	
35.	Combustion Chamber support	1	1.250x 0.850x 0.400	300.00	130.00	
36.	Electrical device for combustion chamber	1	2.050x 0.300x 0.300	250.00	190.00	
37.	Electrical items for front and rear bearings	1	0.680x 0.480x 0.420	52.00	40.00	
38.	Cables	1	1.200x 0.300x 0.350	55.00	40.00	
39.	Cable conduit dual fuel operation	1	1.080x 0.980x 0.550	160.00	70.00	
40.	Equipment for Temperature. measurement	1	6.130x 0.330x 0.350	150.00	90.00	
41.	Compressor support block	1	0.800x 0.600x 0.350	412.00	332.00	
42.	Bolts, nuts, screws,rod,plat	1	0.700x 0.400x 0.250	205.00	115.00	

	e,clamp					
43.	Connecting Rod	1	3.000x 0.220x 0.220	69.00	49.41	
44.	Lube oil pipes	1	3.000x 1.400x 1.000	891.00	541.00	
45.	Ignition Gas Pipe and vent pipes	1	6.300x 0.400 x 0.400	431.00	311.00	
46.	Oil cooler and counter flanges, throttle valve	1	4.500 x 1.700 x 1.700	800.00	450.00	
47.	Oil pipe – cooler and temperature control valve	1	7.000 x 2.000 x 1.500	2600.00	2000.00	

TENTATIVE SUMMARY LIST OF GENERATOR PACKAGES (PER SET) FOR 4xV94.2GTGs FOR GTPP, MARIB –II, YEMEN

SL. NO.	**ITEM**	**LENGTH** (MM)	**BREADTH** (MM)	**HEIGHT** (MM)	**NET** WEIGHT KG	**GROSS** WEIGHT KG
01	GENERATOR PACKAGE (ASSEMBLY)	10500	5500	4800	236600	246000
02	GENERATOR AIR INLET DUCTING	7000	5000	5000	5000	5600
03	GENERATOR AIR OUTLET DUCTING	5000	5000	3000	3000	3500
04	ACCESSORIES, FOUNDN. ITEMS etc.	3000	2500	2500	15000	16000
05	TERMINAL BUSHINGS	3000	2500	1500	4000	4800
06	ENCLOSURE	11000	6500	5300	10000	11000
07	WALKWAYS	6000	3000	3000	4000	4500
08	AIR FILTER UNIT	6000	5000	5000	9000	10000
09	FILTER UNIT STRUCTURALS	6000	3000	2000	3000	3700
10	DUCTING STRUCTURALS	8000	3000	3000	4000	4500
11	CO2 FIRE PROTECTION EQUIPMENT	3000	2500	2500	3000	4000

TENTATIVE SUMMARY LIST OF BLACK BOX PACKAGES (PER SET) FOR 4xV94.2 GTGs FOR GTPP,Marib-II, YEMEN

S.no	Description of package	Gross weight (MT)	Wt. of indigenous components (MT)	Wt. of the imported components (MT)	Remarks
1	Air Intake System	250.00			per GT
3	Co2 fire fighting system	2.00	1.50	0.50	per GT
4	Lube Oil Purifier	6.00	6.00		
5	Fuel Gas Supply System	250.00		250.00	
6	Special tools and tackles for GT maintenance	3.000	-	3.000	Non ODC Total 15 boxes
7	Ignition gas heating system	3.000	3.000	-	Turnkey package
8	Fuel Oil Supply System (imported)	1200.00		1200.00	
9	Exhaust Gas System	400.00			per GT
10	Scaffolding for rotor maintenance	5.00	5.00		

TENTATIVE BILL OF QUANTITY FOR FUEL OIL SYSTEM YEMEN (Marib-II)

1. Fuel Oil Storage tanks 10,000 cu.m. (one nos.)

Details of each 10,000 cu.m. tank - Material to be despatched in pre-fabricated condition. - Plates / structure to be despatched with (1) coat of the shop primer inorganic ethyl zinc silicate	
Diameter	30 m
Shell height	15 m
Empty weight	350 MT
Material grade	Plate ASTM A 36
• Material to be despatched in pre-fabricated condition. • Plates / structure to be despatched with (1) coat of the shop primer inorganic ethyl zinc silicate	

2. Fuel Oil Unloading and Forwarding System

Skids for the System - appx dimensions	
Description	
Fuel Oil Transfer Pump Skid	
Fuel Oil Centrifuges	
Fuel Oil Forwarding Pump Skids	
Duplex filter at pump disharge	
Drain Oil Tank with transfer skid	
Pressure sustaining station	
1 set piping connecting Tank and skids	
1 set piping for forward and return of fuel oil from tanks to Gas Turbine	
MCC panel	

3. Fuel Oil Piping : Appx Lenghts

Pipe, 50 NB Sch. 80	SA 106 Gr.B	Mtrs	130
Pipe, 80 NB Sch. 80	SA 106 Gr.B	Mtrs	60
Pipe, 100 NB Sch. 80	SA 106 Gr.B	Mtrs	114
Pipe, 125 NB Sch. 40	SA 106 Gr.B	Mtrs	12
Pipe, 150 NB Sch. 40	SA 106 Gr.B	Mtrs	296
Pipe, 250 NB Sch. 30	SA 106 Gr.B	Mtrs	1700
Pipe, 300 NB Sch. 30	SA 106 Gr.B	Mtrs	2
Pipe, 350 NB Sch. 30	SA 106 Gr.B	Mtrs	450

1. CARBON STEEL SEAMLESS PIPES

Carbon steel seamless pipes material as per ASTM A 106 Gr. B, plain ends, dimensions to ANSI B 36.10 , Sch 40,

S NO	Nominal sizes of pipe in mm	Quantity for fuel , lube piping (metres)	Quantity for water , air piping(metres)	Total Quantity (In metres)
1.	15	6	-	6
2.	25	42	-	42
3.	32	6	-	6
4.	40	-	102	102
5.	50	816	-	816
6.	80	24	-	24
7.	100	6	-	6
8.	125	108	-	108
9.	150	-	6	6
10.	200	-	120	120

2. CARBON STEEL SEAMLESS TUBES

Carbon steel seamless tubes as per DIN 2391 / C, Material St – 35, NBK

S NO	OD OF TUBE ,X THICKNESS IN MM	Quantity (In metres)
1.	10 X 1.5 THK	18
2.	12 X 1.5 THK	60
3.	15 X 2 THK	6
4.	22 X 2 THK	36

3. STAINLESS STEEL SEAMLESS PIPES

Stainless steel seamless pipes material as per ASTM A 312 Gr. TP 304, plain ends, dimensions to ANSI B 36.19 M, Sch 10S .

S NO	Outside diameter of pipe in mm	Quantity (In metres)
1.	33.4	18
2.	42.2	6
3.	48.3	12

ANNEXURE-II

LIST OF T&P and IMTEs being provided by BHEL for use of contractor free of hire charges (MARIB-II) .

S.NO.	EQUIPMENT	CAPACITY	QTY
T&P			
1.	EOT Crane (in T.G. hall)	60 MT	1 Nos.
2.	Miscellaneous Cranes in Various Buildings	2.5 / 5 / 7.5/ 10 T	
3.	Maxi Termi Gun		1 No.
4.	Relay Testing Kit		1 set
5.	Special Tools for Gas Turbine		1 set

Notes:

1. Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.

2. Other terms and conditions regarding above items shall be as per clause no. 38 (T&P/IMTEs)

3. All Cranes indicated above will be first installed by the contractor and then will be used for erection purposes . The contractor has to depute skilled and experienced operators for operating the cranes .

4. Since these cranes and other T&Ps are to be handed over to the customer , any defects and damages attributable to wrong operation / negligence during the operation period will be booked to the contractor .

ANNEXURE-III

LIST OF Tentative T&P and IMTEs to be Provided by Contractor at his own cost (MARIB-II) .

S.NO.	EQUIPMENT	CAPACITY	QTY
T&P			
1.	Crane	120 / 150 T	As per requirement
2.	Crane	40 / 50 T	As per requirement
3.	Crane	15/18 T	As per requirement
4.	Crane - Hydra	8 / 10 T	As per requirement
5.	Trailer with pulling unit	10 MT	As per requirement
6.	Trailer with pulling unit	20 MT	As per requirement
7.	Trailer with pulling unit	40 MT	As per requirement
8.	Trailer with pulling unit FOR ROTOR INSERTION	50 / 60 MT	As per requirement
9.	Welding Generators, Transformers, Rectifiers And Tig/Mig Welding Machine , Submerged Arc Welding Machines		Adequate numbers.
10.	Hydraulic Jacks (Low Height , 200 mm)	25/50/100T	Adequate numbers.
11.	Gas Cutting Sets		Adequate numbers.
12.	Hydraulic Jacks Gang Operated (Low Height)	25/50/100T	Adequate numbers.
13.	Screw Jacks	5/10/25/50T	Adequate numbers.
14.	Hydraulic Pipe Bending Machine		1 number.
15.	Torque Tension Meter/ Wrench Upto 2750 Nm Range		1 set
16.	Chain Pulley Blocks	5 /10/ 20T	Adequate numbers.
17.	Pull Lifts	3.6 / 6 / 10 T	Adequate numbers.
18.	Tools for Reaming and Honing		1 set
19.	Pulley Blocks	2,3 sheaves	2 nos each
20.	Portable Air Compressor (140 / 210 CFM)		1 no
21.	Special Tools for Oil Tanks		set

22.	Automatic Plate Cutting Machine		1 no
23.	Airless Paint Gun		2 nos
24.	Special Tools for Gas Turbine Insulation		set
25.	Sheet Grooving Machine		2 nos
26.	Hammer drill Machines	Upto 40 mm bits	Adequate numbers.
27.	Drill machines , Grinders		Adequate numbers.
28.	Hand Tool Sets		Adequate numbers
29.	6000 LPH Hi- Vacuum Oil Filter Machine suitable for HT Transformers		1 no
30.	High Vacuum Pump suitable for HT Transformers		1 no
31.	10,000 litre Oil Tank		1 no
32.	Hydraulic crimping tool		2 no
33.	Hand crimping tools		Adequate numbers
34.	Electrical Tool Box		Adequate numbers
35.	Drum Winch		1 no
36.	Star Delta Motor Starter with Main Switch	50 kW	3nos
37.	Air Compressor for Maxi Gun		1 no
38.	Brazing Kit		set
39.	Electrical Connectors of various sizes		Adequate numbers.

NOTES:

1. The above list of T&Ps required for erection/testing / commissioning is only for guidance to contractor and not complete. Any other / additional T&Ps 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.
3. Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).

ANNEXURE-IV

TENTATIVE LIST OF MAJOR MECHANICAL EQUIPMENTS TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST (MARIB-II).				
SL. No.	**DESCRIPTION**	**RANGE**	**ACCURACY**	**QTY**
1.	Dumpy level	0 to 350 mm	LC-0.01	1 No.
2.	Surface plate	Up to 1.0 Sq. Mtr	Grade 1,2,3	1 No
3.	Straight Edge	Up to 1.2 Mtr long	Grade 1,2,3	2 No.
4.	Master pressure gauge	0 – 6 , 20 , 250 Kg/cm2	0.02 / 0.1 / .5 kg	1 No. each
5.	Inside Micrometer	50-1250 mm		2 nos
6.	Outside Micrometer	0-25, 0-150 , 150-300 , 400-500 mm		2 no, 1 no each for the rest
7.	Dial Gauge with magnetic stand	0-10 , 0-50 mm	LC 0.01	10 nos , 2 no s
8.	3 Point Inside Micrometer	0 – 80 mm	LC 0.005 mm	1 no
9.	Vernier Caliper	Upto 600 mm	LC 0.02 mm	1 no
10.	Slip Gauges Set (121 piece set)	Upto 0.01 mm		1 no
11.	Micro Level Water Pots with Depth Micrometer 0.1 mm Accuracy and 6 pots with 6 mm tube 50 m long		LC 0.01 mm / M	1 no
12.	Master level (square)		LC 0.02 mm / M	2 nos
13.	Feeler Gauges	6” ,12”		4 ,2 sets respectively
14.	Hand held Vibration Meters			As per reqmt.
15.	Non Contact type	0-5000 rpm		1 no

	Tachometer			
16.	Non Contact type Thermometer			1 no
17.	Compact Roller Assy	10 / 50 MT		4 nos
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.			
3.	Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).			

ANNEXURE-V

TENTATIVE LIST OF MAJOR ELECTRICAL TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST(MARIB-II).				
SL. No.	**DESCRIPTION**	**RANGE**	**ACCURACY**	**QTY**
1.	Motorised Megger 2.5 / 5 kV			2 nos
2.	500 V / 1000V, (Hand operated) megger			2 nos
3.	Transformer Oil Testing Kit (Motor operated)	0-100 KV		1 no
4.	Digital Multimeters			10 nos.
5.	Primary Injection Kit			1 no
6.	Secondary Injection Kit			1 no
7.	Relay Testing Kit			1 set
8.	Tong Testers	Range Wise		As per requirement
9.	HV Test Kit	0-50 kV		1 no
10.	Micro ohm meter with 100Amps DC Source			1 no
11.	Motor checker , TTR			1 no each
12.	KELVIN DOUBLE BRIDGE			1 no
13.	PPM Measuring Kit			1 no
14.	Analog Multimeters			3 no
15.	Single / three phase variac			2 no each
16.	Decade Box / Rheostat	Range Wise		As per requirement
17.	Phase Sequence Indicator			3 nos
18.	Dead Weight Tester	0-600Kg/cm2	LC-0.5Kg/cm2	2 nos
19.	Comparison test set	0-4 k g/cm2 0-6 Kg/cm2 0-10kg/cm2 0-25Kg/cm2 0-60Kg/cm2	+0.25%Lc-0.25 Kg/cm2	1 set

		0-250 Kg/cm2		
20.	Variable DC regulated supply	0-30V DC	0.2%	1 no
21.	Oil bath with thermostat Stirrer and sub-standard Glass Thermometers in Multiple ranges	0-300 Degree Cel.		2 nos
22.	Glass U tube mercury mano-meter with standard steel Scale having leveling arrangement	0-760 mm		2 nos
23.	mA/mV source with Digital display	0-200 mA/200mV		2 nos

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.
3	Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).

SPECIAL CONDITIONS OF CONTRACT

PART-B

MARIB-PHASE-III

INDEX

54.0 LAYOUT AND OVERVIEW OF PLANT

1. **Introduction:**
Proposed plant (Marib Stage – III) is located 230 KM north east of Sana'a . Nearest Town is Marib , 60 km away. It is open cycle power plant having a generating capacity of 3 x V94.2. Plant occupies a total area of 200 M X 116 M (approx.)

2. **Existing facilities**:
The Main Plant is located at East of existing 3 x V94.2 Gas Turbines of Marib Stage –I and the envisaged Marib-II extension , which has its own 400 kV Substation . Power of the proposed plant will be transmitted a new Switchyard , which will be located south of the Power Plant and in line with the existing switchyard.. Generator Transformers are located adjacent to the GT Building in the Power Plant Area .

3. **GT Building:**
This building is located on the north of switchyard (Transformer yard in between). Three numbers V 94.2 GT Machines are housed in the building. For housing four GTs, its operation, handling & maintenance etc, a 105 M long building is proposed . Exhaust gas of GT is led to the atmosphere through stack, which is located on western side of GT building. Fin Fan coolers are located near exhaust stack.

4. **Fuel Oil Facilities:**
Fuel Oil Facilities for Stage III will be located in the existing Marib Stage –I Fuel Oil Area and will add to the existing facilities and the system will be suitably modified to merge with the existing system .The Fuel Forwarding system required to send the fuel oil to Stage-II will be installed . . The Fuel Oil Piping to Marib Stage –III will run on a pipe rack .

5. Water System:
All water systems e.g. Fire water, Raw water its treatment plant is located next to the GT area.

6. Fire Water System:
Two numbers over ground steel tanks are provided for storing Fire water. Pumps are placed in a building which is located adjacent to F.W. Tanks. The pressurized fire hydrant system consists of a pipe network and adequate number of hydrants positioned around each areas/buildings at strategic locations. Hydrant mains will be laid underground.

7. **Plant Water Facility**:
Plant water is sourced from underground. Adequate number of bore well pumps will be provided at strategic locations of the plant depending on availability of underground water. Raw water will be pumped to 2 nos over ground steel tank located near fire water tanks in the same island . Raw water pump house is located adjacent to tank. This is water is pumped to respective water treatment plants for treatment and deliver to the user points.

DM water is sent to GTG & compressors and DG set. Drinking water is supplied to the various plant & non plant buildings for human use. Water treatment plants e.g. D.M. Plant, softening plant, R.O. plant is located in one island.

8. **Ventilation system** :

G.T. Building

Nine number Cabinet type centrifugal fans (suitable for outdoor duty) are envisaged for pressurized ventilation system of this building. Each unit will be located on top of the GT / TG Building . Supply Air will be discharged at different locations of building through the use of duct. Hot air from GT hall is exhausted by means of roof extractor units.

Aux. Buildings

All other non A/C buildings, MCC rooms will be have either fresh air ventilation system or Mechanical exhaust ventilation as applicable.

9. Common Control Room Building:-

This two storyed building is located at east of GT building . Switch gear room and 220V Battery is located on ground floor., Control room/UPS battery room and AHU is located at First floor. Switch gear room and control room is air conditioned. Suitable extension will be provided for Marib- III

10. Effluent Treatment Plant:

This plant is located on the other side of road of F.O. area. Two areas are identified for oil spillage.

1) Transformer yard
2) Fuel oil area
3) GT Hall

Collection Pits of adequate capacity is provided in the strategic location to collect oily waste. Oily waste is taken to the ETP for treatment and separated water is to led to Guard pond located at north of ETP.

11. Piping Network:-

One main pipe rack extension is planned from F.O. pump house / Gas terminal Point of Marib Stage –I to Station in Stage – II and from here to GT building and further along the length of GT building . This pipe rack will have 7M (apprx.)clearance from ground to allow free movement of Traffic along the road. Fuel oil piping form pump house to GT building is routed through this pipe rack. Gas pipe line is laid on sleepers up to pipe rack and then routed through this pipe rack up to GT building . Also depending on requirement , cables run through this rack . All other misc pipe network (except fire hydrant mains) is laid through sleepers.

12. Roads/Drainage:-

Proper road network is provided in the plant so as to ensure smooth transportation during erection as well as plant operation. From main road to various building/facilities suitable approach road is provided. Main entry to the plant provided from N to S through the administrative area and Transformer yard. This main road is connected with the highway. A separate road is provided for independent access to the switch yard parallel to the main road. This will facilitate movement to existing switch yard while erection of proposed GTs are in progress. Main parking area for 2 buses and 30 cars is provided near main gate outside plant boundary. Storm water drains is planned so as to drain the raw water towards north of boundary and finally led to a earthen rain water pond located just out side plant boundary limit Approximately 12M wide band is planned along boundary for greenery & plantation.

MARIB-PHASE-III

SECTION –III B

SECTION –III (B-I)

55.0 SCOPE OF WORK

BHEL is bidding for the work of Design, Manufacture, supply, installation, erection & commissioning of 3 X 100 MW Gas Turbine Station including Main Gas Turbine Unit , Gas Turbine Auxiliaries , Balance of Plant , Inter Connecting Piping , Electrical and C+I Auxillaries at **MARIB 300 MW GA TURBINE POWER STATION PROJECT PHASE – III . To carry out the Electro - Mechanical works of this contract BHEL intends to enter into a Pre-Bid Tie up with a reputed and experienced Contractor in case BHEL is awarded the Project Works .**

The scope of work under this tender for Electro Mechanical Works consists of

- taking delivery of the Plant Material from the project storage yard / stores / sheds to erection site (approximately 2 Km),
- Their preservation, safe keeping, watch and ward.
- Checking, dressing, chipping and leveling of foundations.
- Pre-assembly, erection, alignment of various equipment, machining
- Welding, heat treatment, radiography and other non-destructive tests wherever required
- Hydraulic testing, air leak test, and other pre commissioning tests,
- Insulation and finish painting etc.,
- Chemical cleaning, alkali flushing.
- Pre-Commissioning operations required for above operations and other commissioning activities including post commissioning operations , P G Testing stabilization of the unit.

- Unit trial operation, resolving any deficiencies observed and handing over of units at **MARIB 300 MW GA TURBINE POWER STATION PROJECT PHASE – III**

55.0 MECHANICAL PACKAGE

Major equipment to be installed, tested and commissioned under this specification is given below. However, changes in design may occur as is usual in any such large scale work for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.

A. MAIN TURBINE :

The Main Gas Turbine consists of the following skids , the detailed dimensions and weights **of which are indicated in Annexure –1**

a) Main Gas Turbine Thermal Block
b) Combustion Chambers (Left and Right)
c) Oil Tank with Pumps sets
d) Hydraulic Unit
e) Fuel Oil Injection Skid
f) Fuel Gas skid
g) Leak Oil tank
h) Piping Skids – Left , Right and Front
i) Interconnecting Piping
j) Platforms and Gratings for Main Turbine
k) Exhaust gas diffuser
l) Intermediate shaft
m) Fuel Oil and gas Piping
n) Lub Oil piping and valves
o) Miscellaneous Supports , Guides , Support Blocks

B. POWER CONTROL CENTRE:

The PCC consists of 3 nos containers weighing appx 35 MT each and having overall dimensions of 12 m x 3.5 m x 4.5 m each . The 3 containers will have to be placed over the PCC pit and joined together to form one unit . Electrical works are covered in the Electrical Package .

C. INLET AIR FILTER:

The Inlet Air Filter is located above the GT Hall and consists essentially of the following main items.

i.) **Filter House**:

The Intake Filter consists of multiple modules arranged one above the other. Each module consists of multiple rows of filters arranged one above the other. The air intake system is fitted with weather covers to protect against the entry of moisture and fitted with coalescer pad (moisture separators) which also serves as bird screen.

Filtration system is self-cleaning type (pulsejet cleaning) and cleaning sequence shall be fully automatic. Compressed air for pulsejet cleaning is taken from compressor for pulse jet cleaning system.

ii. Silencer and Intake Bend

The silencer casing is fixed to the filter compartment. The intake bend with transition to the vertical intake duct is flanged to the silencer casing. Intake bend and intake duct shall be provided with suitable sound insulation to meet the project specific sound requirements.

iii. Isolating Device for Intake Duct

One isolating device (shut off flap) is provided in the upper part of the vertical air intake duct for the whole cross section of the duct. This isolating device prevents ventilation and therefore the entry of moisture into the compressor inlet during plant shutdown and ensures the effectiveness of dry air purging. The isolating device shall be equipped with a motorised actuator, control contacts and position indicators such that remote monitoring is possible.

iv. Vertical Intake Duct

The vertical intake duct is designed in several sections for reasons related to transport and assembly. The upper portion of the vertical intake duct shall be connected to the intake bend with fabric expansion joint. The connection itself shall be covered on the inside of the duct exposed to the flow. The connection "intake bend-expansion joint-intake duct" and the duct sections are connected by bolted flanged connections outside which shall be sealed appropriately. The entire intake duct is sound proofed.

To prevent the formation of condensation on the compressor and turbine during plant outages, an air dryer is provided at the compressor inlet. Piping and nozzles of compressor blade cleaning system are permanently installed in the air intake duct.

v. Compressor Inlet

It comprises of outer cone and inner cone.

vi. Compressed Air System

Air intake system of each gas turbine is envisaged with pulse jet cleaning system for which air of required quality is derived through compressed air system. Each Gas Turbine consists of independent compressed air system which comprises of following equipment:

(a) Compressor with accessories e.g. air filters, silencer, drier, oil & oil separating tank etc.

(b) Air receiver

(c) Electricals and C & I equipment

(d) Field cabling within system equipment

(e) Air receiver will be installed on the roof of GT hall near filter house and all other equipment will be installed inside GT hall beside Air Intake Duct.

D. EXHAUST GAS SYSTEM

The gas turbine exhaust system serves to discharge the gas turbine exhaust gases to the environment through an exhaust stack.

The exhaust system consists of four major sections. These sections are the diffuser, lower stack section, upper stack section with silencer and the support frame.

(i) Diffuser

The diffuser is made of welded construction with internal insulation. The internal insulation design consists of ceramic wool, covered by overlapping stainless steel sheets. Thermal expansion between turbine and diffuser shall be accommodated by means of a metallic expansion joint installed between the turbine outlet and the diffuser inlet.

(ii) Lower Stack Section

The lower stack section consists of a rectangular, self-supporting casing, provided with internal insulation and with a cold outer shell of carbon steel. As insulation material ceramic wool shall be applied, cladded with overlapping stainless steel sheets. The lower stack section shall be mechanically disconnected from the other stack parts; connection is made by means of fabric expansion joints.

(iii) Upper Stack Section

Above the lower stack section, the upper stack section is provided, consisting of silencer housing and stack pipe. The connection between the lower and the upper stack section is made by an expansion joint. The transition from the lower stack section to the stack pipe is realized by an expander, on which the silencer housing is located. A reducer tapering towards the stack outlet pipe or a cylindrical part depending upon noise requirement level to be maintained is installed on top of the silencer housing.

Silencer casing and stack pipe are internally insulated with cold outer shell of carbon steel. The internal insulation material is ceramic wool covered with a floating stainless steel liner (single style) on the flue gas side. The silencer shall be self-

supporting. The sound attenuation splitters are of absorption type with mineral wool as noise abetting material.

The stack height shall be 30m. The stack is equipped with aviation hazard lighting.

(iv) **Support frame**

The support frame is a steel structure carrying the loads of the upper stack section. The upper stack section shall be suspended in the support frame. Maintenance platforms are arranged to enable access both to the silencer and the upper section of the stack pipe. The platform on top of the support frame and at the stack outlet shall be circumferential.

E. AIR BLAST OIL COOLER

Air Blast cooler consists of one or more heat exchanger elements and Fan boxes. The finned heat exchanger is the principal element on the re-cooling unit It consists of ribbed package with tubes and is arranged in a steel frame. The collectors serve as the inlet and outlet, and ensure the optimum distribution of the medium.

The various components are described as below:

i. **Tube bundle**: The tube bundle can be further divided into the following components:

ii. **Finned Tubes**: The finned tubes used in heat exchanger are either L, G type finned or plate finned tubes.

iii. **Header/Oil box**: It is fabricated construction and provides smooth passage to process fluid through the tubes. The construction is done in such a manner that it can be cleaned as and when necessary.

iv. **Bundle frame:** It is a fabricated construction made up of mild steel angles (sections) and sheets to contain tubes. In addition , it provides the complete bundle sufficient rigidity to enable it to be lifted and transported without damage.

v. **Fan Drive arrangement**: Drive assembly consists of Axial Flow fans and AC induction Motor. The fans are statically and dynamically balanced in order to minimize vibration.

vi. **Structure:** The structure consists of column, beams, drive assembly, truss, brackets and bracing's etc. The structure members supports the tube bundle and drive unit. Normally all the structural members and sealing plates are bolted to each other to facilitate dismantling of the complete structure.

vii. Control Panel: This is an essential component to take care of controlling the operation of the Air Blast Cooler. This also houses the different type of switching elements and cabling

F. GAS DETECTION SYSTEM

Description

Gas detection system designed for the detection of flammable gases/vapours like High Speed Diesel oil and / or leakage of methane etc. in the vicinity of gas turbine and its balance of plants. The gas detection system will ensure a high degree of safety with respect to detection of actual leak providing warning/alarm and trip signals.

Configuration

Gas Detection System consists of measuring heads with infrared sensors installed in the various locations of the gas turbine and fuel oil and gas area. It consists of one number Control panel which is placed in Central Control Room and the total system is connected by cables .. There will be two portable gas detectors for personal protection and accurate locating of leak points.

Installation per gas turbine:

- Detectors inside ventilation duct of left combustion chamber hood (3nos each) 15/16/17 UMB
- Detectors inside ventilation duct of right combustion chamber hood (3 nos. each) 15/16/17 UMB
- Detectors on fuel oil skid (2 nos each) 15/16/17 UMB
- Fuel gas final gas final filter (2 nos each) 15/16/17 14UEN

Installation in common system:

- Fuel oil forwarding skid (5 nos) 10UEL
- Fuel gas treatment plant (3 nos) 10UEN

G. CO_2 Fire Fighting System for GT (Comb. Chamber)

i. Function

Use of combustible liquids and gases such as HSD and Natural gas as the fuel in the gas turbine power plant under consideration necessitates the provision of fire detection, alarm and CO_2 triggering to prevent and fight fires actively. Fixed CO_2 fire-fighting system is used for the left and right combustion chambers of the gas turbine where fuel piping carrying HSD and Natural gas terminate.

These piping terminate on the top of the combustion chamber. Besides the piping, there are one terminal block and wiring for ignition transformers also on the combustion chamber dome.

ii. Detection System

Space within each combustion chamber is continuously monitored by 4 heat detectors/combustion chamber. These detectors are cross-zoned. These detectors detect fire and give alarm and trigger release of CO_2 as described below .

iii. Manual Overrides

Manual initiation of CO_2 gas release is possible from the fire alarm panel, combustion chambers and from cylinder locations. Manual interruption of CO_2 gas is possible from the combustion chambers and from the panel for each of the area to avoid dumping of gas due to false alarm if any.

iv. Fire Alarm Panel and System Interface

Fire Alarm/Control Panel per GT has the facility to process the input signals and to control all the input data received from initiating and indicating devices.

Panel is provided with batteries and online battery chargers. Battery shall be capable of 12 hours of back up supply in case of power supply failure.

v. Extinguishing System

The extinguishing system used is a solenoid operated, high pressure, Total Flooding type as per NFPA 12 .One main battery consisting of Two CO2 cylinders is provided for both combustion chambers. Another battery of 100 % standby filled reserve cylinders is also provided near the main battery. Each cylinder is continuously weighed by the weighing device and in case any cylinder is empty, the audio/ visual indication for the same is available at the panel.

vi. Fire Detection in PCC

Smoke detectors (ceiling mounted) are installed inside the PCC for detection of fire and alarm. Types of smoke detectors envisaged are as ionization type(9 no.) and optical type (7 no.).

H. IGNITION GAS SYSTEM

Function

The main fuel of the gas turbine (fuel oil or fuel gas) is ignited during the start up of gas turbine by means of ignition flame. For this every burner is equipped with an ignition gas burner.

Main Components

During start with fuel oil only the cylinder gas is used as ignition gas.

The cylinders are arranged in the cylinder room provided in the GT building. These cylinders are filled with commercial grade ignition gas (Propane Gas). This cylinder bank serves as a common cylinder gas facility for 2 turbines. The ignition gas cylinders can be isolated with the help of valves . The system consists of Gas Heaters , weighing machines , Pressure Regulators , Piping and Valves

I. GAS TURBINE INSULATION

Gas Turbine is thermally and accoustically insulated with Rockwool mattress. The mattress is directly applied on casing except for exhaust gas diffusor where pillows are made which are put on casing. Insulation mattresses are covered with 1mm GI Sheet. The inside of GI sheet is coated with 3-4 mm of noise dampening material. GI sheet and insulation are properly secured to Turbine using support structure

J. MAIN GENERATOR

The Main Gas Turbine Generator is Air Cooled. The rotor is loose supplied and has to be threaded at site after installation of Bearing Shells .The excitation system consists of Brush Gear assembly . The system consists of the following equipments consists of the following equipments , **the detailed dimensions and weights of which are indicated in Annexure –1**

i.) Generator stator
ii.) Generator Rotor
iii.) Bearing Shells
iv.) End Shields
v.) Brush Gear assembly
vi.) Generator Platforms
vii.) Off Base Enclosure and Acoustic Insulation
viii.) Air Ducting
ix.) Generator Air Filter

L. FUEL OIL SYSTEM

Fuel oil is received at power plant through road tankers. Fuel oil is unloaded from road tankers and stored in above ground storage tanks. Fuel oil from storage tanks is to be pumped to fuel oil injection skid at requisite pressure and quantity.

The component of the fuel oil system are mostly skid based and are described in the following section and the **details are furnished in annexure -1**

i. Fuel Oil Forwarding Skid

This consists of 2 skids containing In the unloading station, forwarding centrifugal pumps are provided in 2 skids . There are two numbers of pump skids comprising of inlet strainer, valves, instruments etc. Each skid is provided with double basket strainer capacity of 2 x 100% and mesh size 200 microns at the suction side for pump protection

ii. Discharge Filter Station

This skid consists of Duplex filter , Accumulator ,Valves and piping and instrumentation

iii. Drain Oil Station

This skid consists of Drain Oil Tank , drain oil pumps , suction strainer , valves piping and instrumentation

iv. Interconnecting piping including supports

Refer to Annexure-1 for approximate quantities of Piping envisaged under this system . This consists of Piping within the system and also piping to GT Area .

v. Electrical system for Fuel Oil System

The Electrical System consists of the Fuel Oil MCC and Control panel . In addition ,the cable tray and cabling system hooks up the field instrumentation and field devices to the Control system .

vi. **Fuel oil transfer skid and Fuel Oil Centrifuge**

Fuel oil transfer skid 2x110m3/hr and Fuel oil centrifuges 5x50m3/hr transfer dirty oil after cleaning to new fuel oil tank of 10000m3 capacity.

M. FUEL GAS SYSTEM

This consists of 12 nos Gas Skids interconnected by Piping :

i. Pressure reduction and metering station
ii. Station inlet and Knock out drum layout (Skid 1 & 2)
iii. Filter Separator and turbine meter line (Skid 3 & 4)
iv. Water bath heaters -3 nos. (Skids 5,6,7)
v. Pressure reduction lines layout Skid 8
vi. Filter, metering 4 nos. Skids 9,10, 11 & 12
vii. Condensate tank 5000 litres (1 no.) Condensate tanks 1000 litres (2 nos.)
viii. One no.Gas Chromatograph and One no. Control Panel and associated cabling .
ix. Piping CS size 12" (1600 meters), 20" (200 meters), 14" (50 m), 10" (100 m) and SS 10" (140m)

O. GAS ANALYSING SYSTEM

i) Description

The system is design to cover the requirement of exhaust gas analysis system which is used for on line monitoring of SOX , Nox,CO,CO2 & O2 in the diffuser

of Gas Turbine . The analyzer is rugged in construction , reliable and simple to operate. The Gas Analyzing system is dedicated to each Turbine

ii) Configuration

Analyzing system shall be Hot Extractive type with sample handling system using sampling probe , sample gas pumps, cooler, condensate drain facility, flow control unit and auto calibration facility. For hot extraction type analyzer type system with sampling accessories & analyzer instrument shall be housed in panel . The sample gas probe shall have a filter element and filter heater hall be mounted near probe . The system has the auto probe cleaning and auto calibration facility. The auto cleaning of the probe will be done through compressed air.

P. PLANT FIRE FIGHTING SYSTEM :

The Fire |Fighting System consists of the following :

a) Fire Fighting Pump House :

The main equipments in the Fire Fighting Pump House are :

i. 6.6 kV Motor Driven Fire Pump - 2 nos
ii. Diesel Engine Driven Fire Pump – 2 nos
iii. Electric Motor Driven Jockey Pump – 2 nos
iv. Hydro Pnuematic System consisting of Air Compressors and Tank
v. Interconnecting Piping
vi. Associated Electrical and Instrumentation for the above including Control Panels , Battery and Chargers , cables , Process Connections etc

b) Fire Water Tanks

2 nos 1000 m3 , Over ground Fire Water Tanks are envisaged . Tanks have to be fabricated at site from the shop fabricated ,rolled and painted steel sheets

c) Fire Fighting Piping

Most of the piping for the Fire Fighting System is envisaged to be overground except in places where the piping crosses roads or other such obstacles .While the total piping is of the order of 400 MT , the various piping systems are :

i. Fire Water Main
ii. Medium Velocity Spray for Cable Vaults
iii. Auto High Velocity Spray for Oil Filled Transformers , Lub Oil tanks etc

The detection system and other items eg deluge valves , control panels required to complete the system are included . Hose Boxes and hoses are to be installed at various locations .

d) Inert gas System

The Main control room and the local control rooms associated with each gas turbine will be protected by inert gas based fire extinguishing system as per NFPA 2001. The system will operate automatically during outbreak of fire

The design, manufacture and installation of such fire protection system shall be in accordance with the relevant NFPA standards and complete system components/equipment shall be listed by UL/FM/VdS.

Inert gas system shall be provided with 100% standby reserve supply of containers filled with the agent and duly connected to the piping manifold.

e) Fire Detection and Annunciation System

The Fire Detection System consists of Fire Detectors of the following types : Beamic / Ionic / PhotoElectric / Heat , including Response Indicators , Junction Boxes , MCP (Manual call Points) etc . MICC Cables are envisaged for most of the system .. In addition LHS cables are envisaged for the Cable trays in the plant .Fire Alarm Panels with Battery BackUps are envisaged in the CCR , FWPH , Fire station and the Foam Pump House , with central control in the CCR

f) Portable & Mobile Fire Extinguishers

All buildings, plants/plant areas and appropriate special rooms, ducts, channels etc. are to be protected.
Hand-operated fire extinguishers have to be installed on every floor of all electrical buildings and plants, wall-mounted, permanently installed and spaced at 15m all round.

In addition, all the above-mentioned buildings shall be provided with a mobile fire extinguisher (CO_2), located at a central spot, on every floor and with 2 (two) fire-fighting carts where the length of the floor exceeds 30 m. In the event of a more extensive outbreak of fire, it must be possible to concentrate the discharge as required for an optimal effect. The mobile fire extinguishing equipment shall be in the form of a handcart equipped with twin cylinders as a minimum requirement.

P. AIR CONDITIONING SYSTEM

The Air Conditioning System consists of the following Areas :

a) **Central Control Room + Switchgear Room** :

This consists of 2 no.s 45 TR Air Cooled Chilling Units with 2 nos matching Air Handling Units , Ducting from AHU to the CCR and Switchgear Room areas , Strip Heaters , Pan Humidifier , Field instruments , Control Panel , Fresh Air Arrangement for AHU etc .

b) **Other Areas** :

This consists of about 8 nos 3 phase 7.5 / 5.0 / 3.0 TR (appx) Ductable/ Split AC Units ,Ducting wherever required , Strip Heaters , Fresh Air Arrangement etc . In addition , 5 nos , 3 phase , 5.0 TR Floor Mounted Non Ductable AC Units and 50 nos 1.5 / 3.0 TR Single Phase Non Ductable AC Units are to be installed .

c) **Ducting** :

The ducting will be supplied in finished Galvanised Steel Sheets (L- Form) which will have to be assembled at site complete with hangers ,supports The total quantity of 18G / 20G / 22G / 24 G sheets of appx 1000 SQ MTR . In addition about 150 SQ MTR will be supplied in sheets , to be fabricated at site for site changes .
Thermal Insulation of supply and return air duct with finish is to be applied for 1000 SQ MTR . Acoustic Insulation for the first 5 mtr from the AHU is to be applied . Fixing of Grills , Dampers etc are included in the scope .

Q. VENTILLATION PACKAGE :

The Ventilation Package consists of the following :

Air washer Units : 9 nos cabinet type Centrifugal Fan, with Motor , of capacity 100000cnh each , dry panel filters ,

Ducting : The ducting will be supplied in finished Galvanised Steel Sheets (L- Form) which will have to be assembled at site complete with hangers ,supports The total quantity of 18G / 20G / 22G / 24 G sheets of appx 4000 SQ MTR . In addition about 500 SQ MTR will be supplied in sheets , to be fabricated at site for site changes . Thermal Insulation of supply and return air duct with finish is to be applied for 2000 SQ MTR

Roof Extractor Fans : 12 nos Axial Flow Roof Extractor units with hood , disconnection switch and all accessories with each of capacity 40,000 CMH.

Axial Fan Supply Air : The following types of axial flow fans is envisaged :

i. 4 sets of 50,000 to 1,20,000 CMH Axial flow Supply fans with Drive motor , Air Intake Louvres , Dry Filter panels , filter fixing frame and supporting structure , vibration isolaters etc

ii. 10 nos 6000 m3/hr Supply Air fans with Pre-Filter and Fine Filter complete with casing , TEFC Squirrel Cage Induction Motor and mounting Frame ,MS Rain Protection Cowl , Bird Screen and other accessories .

iii. 10 nos 4000 to 10000 m3/hr Supply Air fans with Pre-Filter and Fine Filter complete with casing , Flame proof Motor and mounting Frame ,MS Rain Protection Cowl , Bird Screen and other accessories .

iv. 20 nos 7500 m3/hr Supply Air fans with Pre-Filter and Fine Filter complete with casing , TEFC Squirrel Cage Induction Motor and mounting Frame ,MS Rain Protection Cowl , Bird Screen and other accessories .

v. 24 nos 2000 m3/hr Propeller Fans .

Fire and Gravity Dampers : 15 SQ MTR of these dampers is envisaged .

R. COMPRESSED AIR SYSTEM :

The Compressed Air System consists of 4 nos , 240CMH Air Cooled Package air Compressors (skid mounted) ,2 nos Air Drying Plant matching Compressor Capacity, 4 nos Air Receivers of 6 m^3 capacity each and associated Piping along with drains , traps and vents

S. WATER SYSTEM :

The Water System consists skid mounted equipments and in addition to the 3 no Raw Water Pumps which supply the raw water from the tank to the water treatment plant, **the following 4 groups are envisaged** :

RO System:

The system comprises of the following skids :Dual Media with Filter, RO Module , Permeate Storage Tank , RO Cleaning System .

Drinking Water System :

Sodium Chloride (NaCl) Dozing System

DM Water System:

Mixed Bed Exchanger and Blower , Acid Storage tanks and Pumps ,Alkali Storage tanks and Pumps , Regen/ Measuring Tank and ejectors ,Nuetralisation tanks and Pumps .

The Interconnecting Piping consists of Rubber lined / SS piping of 50 to 200 NB sizes . **The total weight of system is 50 MT .**

T. MISCELLANEOUS TANKS :

Other than the tanks of the Fuel Oil System , the following Tanks are envisaged :

a) Raw Water tank – 2 no, 1600 m^3 , appx 13 m dia, 13 m height; 65 tonnes each

b) Potable Water Tank – 1 no. ; 125 m^3

c) Non Potable water Tank – 1 no. ; 125 m^3

d) DM Water tank – 1 no; 250 m^3; appx 7 m dia; 7.5 m height; 19 tonnes

e) Permeate tank – 1 no; 55 m^3; appx 5 m dia ; 3 m height

The tanks will be fabricated at site from shop fabricated and primer painted rolled sheets 8-16 mm thick .

U. EFFLUENT TREATMENT SYSTEM :

The effluent treatment system consists of Collection of waste water and effluents from Fuel Oil System , Workshop , Compressor Washing in GT Building , Fire water from Transformers , in a common collection tank . The Water is pumped from each of these areas by the pumps installed under this system . After separation of the Oil / Sludge and the water in the API and TPI , the sludge is sent to the sludge pit , the oil for filling in drums for manual disposition and the water to the Clean Water Pit / Evaporation Pond for disposal . System consists of Pumps , Strainers , Stirrers , Level Switches , Control Panels etc

The total piping envisaged under this package is appx 2.0 km of 50 NB pipes and the pipes are mostly over ground except at road crossings .

V. LP PIPING :

The following Piping is envisaged under the LP piping System :

a) CS Piping for Raw Water and Soft Water System :

The total piping under this group is appx 65 MT inclusive of bends and fittings and will have to be welded at site

b) **GI Piping for Drinking Water and Air System**:

The total piping under this group is appx 22 MT and all pipes below 50 NB are screwed connections . Above 50 NB , flange connections will be supplied which are to be bolted . Some site modifications may have to be carried out by welding .

c) SS piping for DM Water System:

The total piping under this group is appx 5 MT inclusive of bends and fittings and will have to be welded at site .

Most of the piping is over ground and .All hangers , supports and piping accessories will be supplied

W. CRANES :

The following Cranes sent in knocked down condition are to be assembled and erected :

a) 60/12.5/7.5 MT EOT Crane - 1 no.

This is a 10.7 M Span Double Girder Crane to be installed in the GT Hall , with DSL Length of 142.5 m . While the total weight of th crane is appx 35 MT , the Gantry rail is 25 MT and the DSL weighs about 2 MT

b) 32 T Crab Crane - 1 no.

The trolley weight of this crane is 10T , the span is 3.6 m and total travel is 11.35 m

c) 7 T Single Girder crane in GT Hall over GT OIL Tank - 1 no.

d) 5 T EOT Crane in Fire water Pump House - 1 no.

e) 2.5 T Electric Hoist in GT Hall for Generator End Shield - 4 nos.

f) 2 T EOT Crane in Compressor House -1 no.

g) 2 T HOT Crane in Fuel Oil Pump House - 1 no.

X. Sewage Treatment Plant:

The sewage treatment plant consists of Packaged Treatment Plant. The system consists of Skid mounted equipments and pits with level switches and pumps which will pump the sewage to skid mounted system.

The major packages of this System are : Air Flow Package , raw Sewage transfer Pumps ,Air Blowers , Dozing Skid , Collection Pit , Sludge Storage tanks , Clean Water pumps etc

MARIB-PHASE-III

SECTION –III (B-II)

56.0 ELECTRICAL PACKAGE

56.0 SCOPE OF WORK

56.1 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 ELECTRICAL and C&I equipment and items indicated in the rate schedule (including optional items also) covered within the scope of these specifications for **MARIB 300 MW GAS TURBINE POWER STATION PROJECT PHASE – III**

56.2 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 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.

56.3 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 / PEC.

56.4 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 including dry out / centrifuging of transformers 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.

POWER TRANSFORMERS :

3 nos Generator Transformer of 120 MVA , 420/15.75 kV , Star Delta , ONAF with On Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 133 MT and the quantity of oil for

the first fill is appx 50000 L . The weight of the accessories is appx 30 MT . The appx tank dimensions is 8300 x 4000 x 3900 mm and the overall dimensions is 14000 x 9500 x 9600 mm .

3 nos Unit Auxillary Transformer of 6.3 MVA , 15.75 kV / 6.9 kV , Delta Star, ONAN / ONAF with OFF Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 14 MT and the quantity of oil for the first fill is appx 3000 L . The weight of the accessories is appx 6 MT . The appx tank dimensions is 3900 x 3200 x 3200. and the overall dimensions is 3900 x 3200 x 3200mm

Isolated Phase Busduct :

3 nos 15.75 kV , 7600 A , Al Conductor , Al Alloy Enclosure Busduct . The Busduct connects Gen Transformer to the Generator and has Tap Off for 1 nos UAT , LAVT and NG Cubicle . In the Nuetral Side , the Star Formation is is made to form the star point and the Generator is earthed thru the NG Transformer . The average per phase route length of the Main Run , UAT Tap Off , LAVT is 75 m , 25 m , 1.5 m respectively . The conductor section in the Main Run 450 mm Dia , 15 mm thick and that of Tap Off is 114.3 OD , 8.56 mm thk . The duct diameters for Main and TapOff is 1000 mm , 8.00 thk and 680 mm , 4.78 mm thk . The total number of welded joints (butt and flexible) on the Main Run and Tap Off are 45 nos and 20 nos respectively .The appx weights of the supporting structure is 20 MT . In addition the there is 1 set of 3 nos LAVT having dimensions 2850 mm x 800 mm x 2250 mm and having weight of 1.5 MT each . Total nos of CTs envisaged is 40 nos and nos of VTs is 9 . 1 nos NG Cubicle consisting of 1 nos NGT and 1 nos NGR and having a total weight of 1.8 MT is envisaged .Air Pressurisation Unit having a total weight of 1.0 MT is envisaged .Seal Off Bushing and Rubber bellows are also provided in the busduct .
Also to be erected in each busduct is Generator Circuit Breaker 24 kV , 10000 A SF6 filled , Hydraulically operated weighing appx 5.5 MT .

6.6 kV SWITCHGEAR :

The 6.6 kV Station Switchgear consists of the following systems:

a) Station 6.6 kV Switchgear System consists of One board consisting of 7 panels (Breakers) The Switchgear is Spring Operated Metal Clad Vacuum Interrupters with Protection and Metering CTs , PTs , Relays and Meters . The weight of each Panel (including trolley) is appx 1.5 MT and panels will be shipped in sections of 2-3 panels . In addition , 1 no each FEB and BEB and 2 nos spare trucks will be supplied.
b) 3 nos Panels will be installed as extention in the Switchgear in Marib -II. Beside installation of panel ,the job also includes completion of interface wiring with the existing system.

LT SWITCHGEAR

Sl No	Name	WEIGHT (KG)	Overall Dimension (mm)
1	STATION PCC-1	10800	10950 x 1754 x 2550
2	EMERGENCY PCC EXTENSION	9700	10300 x 1754 x 2550

3	HVAC MCC-	10500	12500 x 1444 x 2550
4	MISC MCC	3000	5260 x 1000 x 2550
5	WATER TREATMENT MCC	4000	6450 x 1000 x 2550
6	FUEL OIL MCC	7000	7700x1000x2550
7	22O V DCDB EXTENSION	2700	6860 x 644 x 2550

NGR :

3 nos Nuetral Grounding Resistance are supplied for the UAT. The NGR are structure mounted with structure having dimension 950 x 650 x 2000 mm and weight of appx 250 kg . The size of the NGR is 1818 x 685 x 1210 and weighs appx 400 kg . The NGR will be supplied in knocked down condition and is to be assembled at site .

LT SERVICE TRANSFORMERS :

4 nos of 1.6 MVA, 6.9 kV/ 0.4 kV, Delta Star, ONAN with OFF Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 5.90 MT and the quantity of oil for the first fill is appx 1500 L . The weight of the accessories is appx 2.50 MT . The appx tank dimensions is 2500 x 1750 x 2500 mm

9 nos 6.6 kV/ 400- 650 V Dry Type Transformers in housing are to be installed for the Gas Turbine auxiliaries

LT SEGREGATED PHASE BUSDUCT :

4 nos 400 V , Al conductor , Al Alloy Enclosure Busduct connecting Service Transformers and the LT Switchgear . The bus duct is supplied in sections and is to be installed at site with loose supplied components Viz. structure, bus duct section, JBs, seal off bushings, split covers, , earthing strip, Jointing of various sections supplied shall be done by bolting as specified. The installation includes wiring / cabling of space heaters is to be done at site .

Busduct Rated 3200 A – 4 sets

LOCAL PUSH BUTTON STATIONS AND STARTERS :

90 nos LPBs and 40 nos Local starters are envisaged

DC SYSTEM :

The DC System consists of 2 sets of 220 V Battery Chargers and 220 V Lead Acid batteries .
2 nos Float cum Boost Battery Charger size is 2500 x 1000 x 2550 mm and there are 2 nos Fuse Boxes (1000 x 1000 mm) also supplied.
Each Battery Bank consists of 110 cells of 645 AH and each Bank dimension is 2 x (6440 x 600 mm) .

UPS SYSTEM :

The UPS System consists of 2 sets of 220 V UPS and 220 V Lead Acid batteries .
The UPS size is 10000 x 800 x 2550 mm . Each Battery Bank consists of 190 cells of 750 AH and each Bank dimension is 2 x (10000 x 431 mm) .

CONTROL AND RELAY PANELS :

The Dimensions of the Relay and Control Panels is as under :

Sl No	Name	No of Panels	Dimensions (EACH PANEL) (mm)			Weight (each) (kg)
			Length	Depth	Height	Weight
1	DCS Panels	4	750	750	2300	400
2	E C B	1	3000	1000	2345	1000
3	Transducer panel	1	1500	800	2415	1000
4	Annunciation panel	1	2000	800	2415	800
5	BTS Panel	1	1500	1000	2355	800
6	Main Control Desk	5	1000	1500	1000	400

POWER CONTROL CENTRE :

Each Gas Turbine Unit has a Power Control Centre which houses the total Electrical and Instrumentation Equipments for the Gas Turbine and Auxillaries . The PCC is supplied in 3 sections , which will be erected and assembled mechanically by the mechanical group. The Panels are supplied installed in the PCC and consists of the following systems :

i. 6.6 kV Switchgear
ii. 400 V Switchgear
iii. 220 V DCDB
iv. 220 V Battery and Chargers
v. 240V DC-DC Converters
vi. SFC and SEE Panels
vii. Gen , GT , UAT Protection and Metering Panels and VT Panels
viii. Turbine Control Panels
ix. Network and SOE Panels
x. Operator and Engineering Stations
xi. Air Conditioners and Lighting System

INSTRUMENTATION:

Most of the instruments required for the Gas Turbine System will come fixed on the skids .Calibration of these instruments and commissioning is envisaged in the scope of work .The approximate number of instruments covered **per Gas Turbine** is indicated . In addition some instruments are to be calibrated ,erected and commissioned , including completion of process connections .

ITEM	Calibration, Commg	Erection,Calibration , Commg
Differential / Pressure Gauges	25	35
Differential / Temperature Gauges	25	35
Differential / Pressure Switches	25	40
Differential / Temperature Switches		15
Differential / Pressure Transmitters	35	35
Limit Switches	25	25
RTDs		15
Thermocouples		20
Vibration Sensors		20
Speed Probes		6
Flame Detectors		4
Position Transmitters	10	
Junction Boxes		15

The wiring for the installed instruments to the Junction Boxes also have to be done . In addition , certain mechanical equipments will be installed on the skids at site for which the wiring connections will have to be completed .

The Instrumentation scope for the other Mechanical Packages are covered in their respective Packages .

COMMUNICATION SYSTEM:

The Communication System consists of the following systems:

a) 500 line **Telephone Exchange** and the communication network over the entire plant with about 200 telephones to be installed Other than the Telephone Exchange (appx size 750

x 750 x 2300 mm) and a 48 V , 80 VA VRLA Battery and Charger system, the system consists of the cable network and the other equipments eg Junction Boxes , handsets etc.

b) **PA System :** The system consists of 3 nos operater console , cabinet for recorder ,amplifier etc and appx 20 loudspeakers in the field . The cabinet size is 750 x 750 x 1500 mm

c) **Master Clock System :** The system consists of the Main Clock Panel along with about 20 clocks to me mounted in the plant area . GPS antenna is also envisaged .

UNDER GROUND AND OVER GROUND EARTHING :

The Overground and Underground Earthing is by Stranded Bare Conductor . The total quantity of Bare Conductor of various sizes being supplied is appx 25 KM . The conductors are to be joined bt Thermowelding , for which sufficient kits will be supplied .

For underground earthing , while the major civil works will be carried out by a different agency , minor civil works will have to be carried out by the contractor . Further , appx 150 Copper Clad Steel Earthing electrodes are to be installed . T**he installation of the Electrode , all electrical connections and the civil works are to be done by the Contractor.**

STATION LIGHTING :

The Station Lighting System provided lighting for the entire Power Station – both indoors and outdoors . The System broadly consists of the following sub-systems :

Lighting Distribution Boards (AC + DC)	-	8 nos
Lighting Panels (AC + DC)	--	65 nos
Lighting Fixtures (AC + DC)	--	1800 nos
Receptacles	--	300 nos
Street Lighting Poles	--	175 nos
Emergency Lighting Units	--	45 nos
Ceiling Fans	--	10 nos
Switch Board for Local Control	--	100 nos
GI Conduit	--	35 KM
Wires (1 core)	--	75 KM
Earthing Wire	--	35 KM
Structural steel	--	15 MT

STATION CABLING :

The Cabling System consists of Cable Tray Installation , Cable Laying and Cable Termination . The brief description of the systems is as under :

CABLE TRAYS:

The cable Tray system consists of Boltable Cable Support system . The total quantity of Single and Double Channel is 7500 m and 225 m respectively . Fixing of the Base Plates to the concrete is by Anchor Bolts (M10) and to steel structures by Clamps and Fittings .
The total quantity of trays envisaged is 20 kms and is of Ladder Type . Also included are various bends , reducers and Tees .

CABLE LAYING :

The total length of Cables envisaged for the Plant is as under :

For Main Plant

6.6 kV Cable -- 8 KM

LT Power Cables -- 80 KM

LT Control Cables -- 75 KM

Signal cables -- 6 KM

For Gas Turbine Systems:

LT Power Cables -- 30 KM

Signal cables -- 125 KM

Cabling work includes cable laying and termination . All cable accessories except wire ferrules and cable tags will be supplied . No of HT Terminations is approx. 170 nos.

FIRE SEALING SYSTEM:

Fire Sealing System will be applied to close all cable openings . The system will be Mortar type or Foaming Type . The approx. area to be covered is 300 sq mtr.

LIGHTNING PROTECTION SYSTEM

This system is applicable for the GT Hall Building , and associated plants , other buildings and structures . Total No of Masts is 30 nos
It consists of a system comprising of horizontal and vertical air terminations provided on the topmost surface of each building / structure required to be protected .
Minimum size of vertical air termination (Tinned Copper rod) is of dia 16 mm and that of horizontal air terminations / down conductor (Tinned Copper Strip) of size 25 X 3.0 mm .
Materials and sizes of system components approximately are :

i. Pipe Mast For Transformer Yard : GI Pipe Nb 139.7, 8.22 m high
ii. Vertical Air Termination : Copper rod Dia 16 MM , , 1000 mm long
iii. Horizontal Air Connection : Tinned Copper Strip 25 X 3 mm
iv. Down Conductor : Tinned Copper strip 25X 3 mm
v. Test Link ; Tinned Copper Strip 150 X 25 x 3 mm
vi. Electrode in Ground : Copper clad steel rod 14 mm dia , 3000 mm long

Layout , number/ details of vertical air terminations , horizontal air terminations and down conductors shall be in accordance with the building dimensions / profile , stipulations of BS : 6651and approved lightning protection system lay out drawings .

56.5 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.

56.6 The customer PEC 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.

56.7 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.

57.0 ERECTION

57.1 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.

57.2 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.

57.3 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) HT TRANSFORMERS

Scope of work includes checking and preparation foundation, shifting of Tank to 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 and back charging of transformers.

Painting of Transformer as approved by BHEL Engineer .

(B) ISOLATED PHASE BUSDUCT :

Foundation checking and carrying out minor modifications wherever required , erection of Structure , Busduct , LAVT , NG Cubicle etc , alignment of total busduct and readiness for welding , Welding of Bus , Ducts and shunts , by MIG /TIG and NDT and X-ray tests . Fixing of Rubber Bellows , SOB , Wall Frame assembly , Flexible and Rigid Bus Connections , CTs , VTs , NGT and NGR . Erection of earth Conductors, HAB equipment and carrying out Water and Air Tightness Tests **.** Cabling of CTs upto Marshalling Box after MB erection , testing of CTs and wiring and other tests , Hipot of Main Busduct .

Painting of Busduct as approved by BHEL Engineer .

(C) SEGREGATED PHASE BUSDUCT:

Foundation checking and carrying out minor modification wherever required, erection of structures, Busduct sections, and other loose items as per relevant drawings / documents, alignments and jointing by bolting of total Busduct , fixing of Rubber Bellows, seal Off Bushings, wall frame assembly, Flexible & rigid Bus connections, erection of earth conductors,, cabling upto JB / Marshalling Box , contact resistance checks on bus duct, Hi-pot of Busduct, earthing of system with main earth conductor / riser.

Painting of Busduct with paint as approved by BHEL Engineer .

(E) 6.6 KV SWITCH GEAR

Erection of Panels after foundation checking and carrying out minor modification wherever required, Jointing of panels, inter panel wiring, busbar & earthbar connections, mounting of loose supplied items, testing of complete panels, BEB, FEB and spare trucks, HV test of main and Control bus, testing & commissioning of breakers after scheme checking including testing / calibration of all instruments and relays.

For the extension panels , interface with thebexisting panels is also to be completed in addition to the above works

(E) LT SERVICE TRANSFORMERS :

Scope of work 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 and back charging of transformers.

Painting of Transformer as approved by BHEL Engineer .

(F) DC BATTERY CHARGERS / UPS

Erection of Panels after foundations checking / fabrication of base frames or stools (wherever applicable) and carrying out minor modification wherever required; Joining of panels, inter-panel wiring, busbar & earthbar connections, mounting of loose supplied items, Testing of complete board & including testing / calibration of all instruments and schemes; Dummy load test of Chargers including arranging of dummy load and temporary power supply etc.

(G) DC BATTERY

Erection of battery after assembly of battery stands, inter-connection of batteries and first charging; Capacity testing using dummy load and subsequent recharging (in case of failure of capacity test, the charging Discharging cycle is to be repeated) Dummy load test of chargers includes arrangement of dummy load and temporary connection in absence of regular power supply.

(H) PANELS – POWER , CONTROL & RELAY (LTMCCs , STRP / GCPs ,ECB 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. 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.

Touch-Up Painting as approved by BHEL Engineer .

(I) CABLING:

a) Fixing of Cable Tray Support Structure to concrete foundations / brick walls by anchor bolts or to steel structure by suitable clamps , including fabrication / fixing of any other structure required to install the support structure .

b) Fixing of cable trays and tray bends and accessories to the tray supporting structure including modification of the trays to suit the local tray route conditions is to be carried out .

c) Laying, dressing & clamping of the cables in the cable trays / angles / conduit pipes as per the cable schedule and as instructed by the BHEL Engineer . Nylon / PVC ties / Tre Foil Clamps required for dressing / clamping shall be provided to the Contractor .

d) The cable tags , as approved by the BHEL Engineer , are to be provided by the contractor (at both ends and at regular intervals as advised by BHEL Engineer) at his cost . Similarly Wire ferrules of approved category is to be provided by the Contractor at his cost .

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

f) Gland plate hole drilling is to be carried out by the contractor at no extra cost

g) Cable Termination shall be carried out by the contractor as per approved drawings / as per instructions of the Engineer . Lugs , Glangs , cable termination kits will be supplied by BHEL . **Wire ferrules of approved category is to be provided by the Contractor at his cost .** All required crimping tools and other tools will be provided by the Contractor

J. STATION LIGHTING :

Erection of lighting boards ,panels, light poles, fittings and other suitable fixtures required for light fittings, conduiting, cabling and wiring as per drawing, testing of wiring and circuit checking, energizing of system forms part of erection job. All conduits, lighting fittings / panels and accessories required for lighting work shall be supplied by BHEL .

Fabrication / erection of required supporting structures and control-gear of respective fitting , all civil work for lighting poles including supply of cement , all civil works for buried cables etc is included in the scope of the Contractor

Conduiting required for light fittings shall also include fixing of conduit accessories like bends, tees, 3 / 4 way JBs etc. and the laying of PVC wires in respective conduit as per circuits shown in drawing.

K. INSTRUMENTATION

I. GUAGES AND SWITCHES :

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 / gauge boards , the scope includes erection of gauge board / rack, dismantling from skids / racks / gauge board, 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.

Some instruments may need repeated calibration / replacement. The same will be carried out by the contractor 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.

II. **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.

III. 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

IV. IMPULSE LINE (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 / swoze 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.

V. JUNCTION BOX, PUSH BUTTONS ETC

Includes fabrication / fixing / painting of stands for junction boxes / push buttons / frame mounted panels etc

VI. 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 used to make the joint water proof.

VII. COMPUTERS / PLC BASED EQUIPMENTS

All computer related items / equipment like 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. 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.

VIII. SAMPLE HANDLING SYSTEM / ANALYZER SYSTEM

Includes installation of main analyzer panel, analyzer, probes, sensors and other accessories like sample gas cylinders, mechanical / electrical interconnections (including SS Tubing & Electrical heat Tracing, wherever required) between various components, energizing, testing & commissioning

57.4 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.

57.5 Conduits shall be thoroughly cleaned before pulling in the cable.

57.6 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.

57.7 In case of Transformers if any leakage / sweating is observed from field assembled / shop assembled gasket joints, valves, welded joints the same shall be attended by the contractor including draining of oil, refilling of oil & centrifuging if required at no extra cost to BHEL till handing over period. Sealing compound and any other consumable, if needed, shall be arranged by the contractor with in the quoted rates.

57.8 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.

57.9 **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.**

57.10 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.

57.11 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 the contractor . The adhesive etc. shall also be arranged by contractor at his cost.

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

58.1 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.

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

58.3 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 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 couse of dy out, moisture content tests as and hen 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 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.

II. HT / LT SWITCHGEAR PANELS:

(a) IR test of power and control circuits & High voltage test of Bus bar.

(b) Checking of protections and interlocks of all related schemes.

(c) Calibration of all indicating & metering instruments, relays, timers etc.

(d) Checking of operation of all relays and other protective devices e.g. thermal overload relays, single phasing preventers etc.

(e) Carrying out of suitable modifications as per system requirement.

(f) Operation of all illumination, space heating circuits etc.

III. BUSDUCTS

(a) Insulation and earth resistance checks.

(b) High voltage test on Bus bars after drawing out VTs and disconnecting lightning arresters surge capacitors and other connected equipment e.g. generator , generator transformer etc.

(c) Measurement of contact resistance of joints, bus bar loop resistance etc.

(d) Testing of CTs, VTs, NGC including primary and secondary injection tests.

(e) Making all arrangements for testing of the Generator , Gen Trf and UAT

(f) Testing pre-commissioning & trial run of hot air blowing unit.

IV. BATTERY AND BATTERY CHARGER / UPS

(a) Checking of battery charger panel.

(b) Calibration of all indicating and measuring instruments.

(c) Dummy load test of battery charger.

(d) Charging of battery and recharging after carrying out battery discharge test/ capability test of battery using dummy load.

(e) In the absence of regular power supply to battery chargers arrangements are to made for battery charging from temporary construction power supply points.

(V) CONTROL & PROTECTION PANELS

(a) Checking of complete wiring and insulation resistance.

(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) Carrying out primary injection, secondary injection, stability checks etc.

58.4 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.

58.5 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.

58.6 During commissioning activities and for carrying out various tests, special instruments etc , have to be temporarily erected and commissioned to suit the commissioning activities. Contractor will provide the necessary 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.

58.7 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, 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.

58.8 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.

58.9 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.

58.10 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/redo the work without any extra claim.

58.11 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.

59.0 SPECIAL CONDITIONS OF CONTRACT

59.1 It shall be the responsibility of the Contractor to pay salaries and other benefits to its employees/persons engaged by it as per the agreement with those employees/ persons, and in keeping with the local laws.

59.2 The employees of the contractor or persons employed by it as aforesaid shall work under the control and direction of the contractor and shall, under no circumstances, be considered employees of BHEL.

59.3.Transport Facilities for contractor's site personnel.

The contractor shall be responsible for providing adequate transport to and from the site for his own and his contractor's personnel which may be brought in daily from their living quarters of housing areas.

59.4. Temporary offices and sanitary/accommodations etc.

1) The contractor shall at his own cost, provide temporary accommodation for his site personnel, including sanitary facilities as and where necessary, canteen facilities etc. Limited open (space accommodation for contractor's office and stores for tools would be provided by BHEL at site.

2) The sanitary facilities shall be kept in clean and orderly conditions to the approval of BHEL and public health authorities of Yemen.

59.5. The erection work shall be carried out during normal working hours. No overtime, Friday or night work shall be carried out without the permission of BHEL except when work is unavoidable and absolutely necessary for the saving of life of property, or for the safety of the work or to overcome slippages in targets. The provisions of this paragraph shall not be applicable in the case of any work which is customarily carried out by rotating or double shifts.

59.6 Arbitration:

" Efforts shall be made to settle any dispute or differences arising under or out of or in connection with or relating to this contract (except as to any matter, the decision of which is especially provided for therein) through discussion between the parties, failing which either party may refer the matter to arbitration as provided clause 33.0 of the General Conditions of Contract. "

59.7 CLEANING UP AND ENVIRONMENTAL PROTECTION

59.7.1 Contractor shall at all times, keep its work areas at the Site in a neat, clean and safe condition. Waste material shall be removed by Contractor from work areas on a continuous basis. Upon completion of any portion of the work, Contractor shall promptly remove all of its Construction Equipment, any Plant temporary structures and surplus materials not be used at or near the same location during later stages of work. Upon completion of the work, Contractor shall at its expense, satisfactorily dispose of all buildings, rubbish, unused materials and other equipment and materials belonging to it or used in the performance of the work, including return of any unused salvageable materials supplied by BHEL / Owner for incorporation into the work to Owner's warehouse or storage area on Site. Contractor shall leave the premises in a neat, clean and safe condition. In the event of Contractor's failure to comply with the foregoing the same may be accomplished by BHEL/ Owner at Contractor's expense.

59.7.2 Contractor's operations should be so performed as to prevent accidental spillage of contaminants, debris or other pollutants and waste into streams or underground water sources. Such pollutants include, but are not restricted to sanitary waste aggregate processing tailings, concrete curing water, oil or petroleum products, mineral salts and thermal pollution. Dewatering operations should be conducted in a manner to prevent muddy water from being discharged into streams. Setting ponds or other approved means should be used. Turbidity increases in the streams must be avoided and methods of reducing turbidity increases must be adopted. Waste water from aggregate processing, concrete batching, must not enter streams without using settling ponds, gravel filters or other processes so as not be harmful to fish.

59.7.3 Abatement of air pollution should be observed by Contractor by use of devices to control, prevent and minimize emissions to the atmosphere. Dust from Contractor operations, as far as practicable should be minimized. Exhaust gases due to poor engine adjustments must be avoided and engines not operated until corrective adjustments are made. Dust control by sprinkling or other methods must be adopted to avoid and reduce the dust nuisance. Burning of waste materials, brush or trees shall only be done when atmosphere conditions are favourable, as determined by BHEL / Owner. Clean-up to prevent accumulation of waste materials and rubbish should be enforced. Disposal of waste materials by burial should not contaminate ground water supplies. Excessive noise levels should be controlled.

59.8 ENVIRONMENTAL PROTECTION

59.8.1 Applicable Standards

The project must conform to the local standards of the Republic of Yemen. The following standards and / or regulations are to be applied.

59.8.2 Environmental Quality Standards

The discharge of pollution in water and air as well as noise levels shall meet with the stipulations of Local Pollution Control Board as well as other Acts of the Government. It is a pre-condition that irrespective of what is stated in Statutory regulations or any other act or norms, the tender stipulated environmental qualities standards are the minimum requirements and shall be fulfill in toto.

59.8.3 Fundamental Requirements of Environmental Protection for Power Plants

59.8.3.1 General Principals

To protect the environment, Power Plant construction should comply with state regulations, carry out composition and review system for Environmental Impact Assessment (EIA) report

59.8.3.2 Water Pollution Prevention and Control

The plant construction should be designed to economize on water use and to set up a water management system featuring equilibrium between water feed and water discharge

Waste water such as oily waste generated in construction of phase –II plant shall be collected in local area sump pits for disposal to off-site by means of portable pumps or vaccum trucking

59.9 HEALTH, SAFETY & ENVIORNMENT (HSE)

Contractor shall execute the work and conduct its operations at the Site in compliance with all applicable laws, regulations and standards, including those governing safety and the Safety Programme submitted by Contractor and approved by BHEL / Owner. Contractor shall direct its personnel to take all precautions necessary to protect against and prevent injury to personnel and damage to property. Contractor shall continuously inspect the work and supervise its personnel to determine and enforce compliance with the above provisions. Contractor shall cooperate with other contractors and subcontractors and shall respond promptly to the direction of BHEL / Owner for the purpose of implementing the Safety Program.

Contractor shall submit a written Safety Program with details appropriate to the work to be performed for BHEL / Owner's review. Such review shall not relieve Contractor of its responsibility for safety, nor shall it be construed as limiting in any manner the Contractor's obligation to undertake any action that may be necessary or required to establish and maintain safe working condtions at the Site.

Contractor shall designate a qualified Safety Representative. Such Safety Representative shall attend all project monthly safety meetings and participate fully in all acativities outlined in Contractor's Safety Program.

Contractor shall maintain reports of all accidents and injuries and shall furnish BHEL / Owner a monthly summary of injuries and man-hours lost due to injuries. Contractor shall report immediately any accidents occurring at the Site or enroute to or from the Site.

Contractor shall hold regularly scheduled meetings to instruct its personnel on safety practices and the requirements of its Safety Program. Contractor shall furnish safety equipment and enforce the use of such equipment by its personnel.

Besides provision with regard to SAFETY under Clause 27 of GCC, Contractor shall note that Explosives shall not be used on the work by contractor except with permission in writing of the ENGINEER and in manner and to the extent to which he has prescribed.

Where explosives are used, the same shall be stored in a special magazine to be provided by and at the cost of the contractor who shall be liable for all damages, losses and injury to any person or property and shall be responsible for complying with all statutory obligations in these respect. **Further, the contractor is required to provide proper Safety Net System wherever the hazard of fall from height is present as per instructions of BHEL Engineer at site. The safety net shall be duly tested and shall be of International standards and the nets shall be located as per site requirement to arrest or to reduce the consequences of a possible fall of persons working at different heights.**

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

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

Contractor shall arrange for following provisions of HSE

1. Contractor has to maintain contact with local hospital having scanning & other modern medical facilities required during emergency including ambulance.

2. Contractor has to ensure pre employment medical check for all staff & workers.

3. **The Contractor shall provide and maintain proper sanitary facilities including Toilets/Urinals and drinking water at site for the use of workers and ensure that workers make use of them for maintaining cleanliness and health environment.**

4. Contractor has to 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, following
   - Male nurse (in shifts)
   - Oxygen set up
   - Breathing apparatus
   - Eye wash facility
   - Stretcher
   - Trauma blanket
   - Medicines.

The Contractor shall arrange and maintain ambulance at site for entire contract period for subject work. This emergency facility set up including ambulance, male nurse etc. will be shared by BHEL and its other contractors working at same project at no extra cost to BHEL and its sub-contractors.

In case, under unavoidable circumstances , if the ambulance is not available, the contractor will have to arrange for the same as under clause 41.9.3.1 mentioned above.

Additional safety requirement of BHEL's Customer, if any, shall be provided by the Contractor without any extra cost. Non adherence of safety requirements will attract penalty, which shall be as follows;

a) Penalty equivalent to USD 15 for the first violation.

b) Penalty equivalent to USD 30 for the subsequent violations.

c) For serious lapses, as decided by BHEL, even fines upto USD 500 at a time can be imposed.

The Contractor shall be fully responsible for accidents caused due to him or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries.

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.

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

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

59.10 QUALITY

General

As a means of assuring that the quality characteristics of each phase of the work fulfills the requirements of the project, the contractor / principle sub contractor shall be an entity which has a documented Quality Management System. The Quality Management shall be capable of providing the required Quality planning. Quality control, Quality assurance for all phases of the work covering, storage, erection, construction and testing for all equipment, materials and services. The BHEL / Owner (as an audit client) reserves the right to audit all such elements in all phases of work for its effectiveness/conformity directly or thro' an authorized representative. However, such audits will be limited and may be

determined prior to the order by the BHEL / Owner. The audit right in no way relieves the Contractor from performing the necessary application of his own system requirements.

Quality Management System

Contractor Quality Management System shall meet the requirements of ISO 9001. Contractor ~~/~~ shall demonstrate compliance with this requirement by submitting a copy of their Quality Manual.

59.11 COMPLIANCE TO REGULATIONS AND BYELAWS

59.12 Permits

Contractor shall procure and pay for all permits, registrations , licenses required for performance of the Contract Works and shall furnish any bonds security or deposits required to permit performance of its Works hereunder.

59.13 The contractor shall observe the provisions of effective legislation in Yemen especially with respect to labour, wages and social security legislation and insurance on works, goods, transport means archeology, custom, taxes(including income tax), training etc. and shall bear any expenses required including permits & licenses necessary for starting work.

59.14. All traveling expenses including air fares etc., within India, airfare from India to Yemen and back shall be borne by the Contractor for all his employees. The contractor shall also bear airfare and other expenses for those employees sent back to India on account of misconduct, disobedience, improper behavior, sickness and unsatisfactory work or any other reason whatsoever.

59.15 Contractor shall arrange at his cost the passports (As applicable) for all his staff and labour duly incorporating the endorsement for Yemen. They shall arrange visa, attestation of certificates, required for travel arrangements, work permit, Resident visa and other documents and comply with other formalities. All the expenses will be borne by the Contractor. Necessary help by BHEL will be provided for this.

59.16. The delay in obtaining the passports and other travel documents or compliance with the various formalities for the deputation of the contractor's persons shall not absolve the contractor from the obligation under the contract including completion of the work strictly in accordance with time schedule. Save as otherwise / expressly provided for herein the persons so deputed by the contractor shall not be entitled for any claim or retrenchment benefit from BHEL directly or indirectly.

59.17 Injury to Third parties

a) The contractor shall indemnify BHEL in respect of all damages or injury occurring, before all the works have been taken over, to any person or to any property (other than property forming part of the works) and against all actions, suits, claims, demands, costs, charges and expenses arising in connection therewith which shall be occasioned by the negligence of the

contractor or his sub-contractor, or by defective design (other than a design made, furnished by BHEL), materials or workmanship pertaining to contractor. If while the contractor is on the site for purpose of making good a defect there shall occur any losses of or damage or injury to the works or to any other property or to any person, the contractor's liability in respect thereof shall be the same as if the said losses, damage of injury has occurred before any part of the works had been taken over.

b) The contractor shall have to pay necessary compensation and other expenses, as required under the law, regulation and local orders at Yemen, in event of accident / injury occurs to contractor's employee or any other person / public / property. The contractor shall arrange local insurance policies at Yemen in regard to his workmen and 3rd party liabilities as may be required under the laws also.

59.18 Whenever the contractor has knowledge that any actual or potential, labour dispute, whether between him or his sub-contractor's personnel, is delaying or threatens to delay the timely performance of works, he shall immediately give notice thereof to the BHEL's representative at site and will take all necessary remedial measures in consultation with BHEL.

59.19. The Contractor shall execute the works in strict accordance with the contract and to the satisfaction of BHEL's Engineers. The Contractor shall take instructions only from BHEL's Engineer or his Authorized Representative. In case of any class of work for which there is no specification laid down in the Contract, the works shall be carried out in accordance with the instructions and requirement of Engineer. In events of difference of opinion, the decision of Engineer will be final and binding.

59.20 Correspondence

The official language for all correspondence exchanged between BHEL and the contractor shall be English. Also contractor to deploy personnel good in written and spoken Arabic to take care of the local requirements.

59.21. Organizing for erection works

As soon as practicable after award of the contract, the contractor shall establish at site an office with such qualified personnel as may be needed to direct and supervise Erection works and also having following abilities and experiences :

a) He must have the ability to control schedule, to manage engineering and the counter measure for safety etc.
b) He must be able to manage his engineers, supervisors and labour to get the desired output.
c) He must be able to speak English.

59.22 The contractor shall supply necessary numbers of qualified welders to execute erection works.

59.23. If welders do not have necessary qualifications, the contractor shall execute the qualification tests for his welders in accordance with ASME, at his own cost to be witnessed and approved by BHEL.

59.24. Subletting:

In order to meet certain local statutory regulations, contractor may have to employ a few local hands and sublet a part of the works which does not call for specialized skills.

The Contractor shall not, however, sublet, assign or transfer part or whole of the Contract without previous consent in writing of the Employer

59.25. The contractor shall perform any other services although not specified but nevertheless required for the completion of the work.

59.26. The contractor shall be responsible for the safe storage of his radioactive sources.

59.27. Other Miscellaneous conditions:-

- The contractor shall not claim any compensation of the scope of work, due to change in design which curtails the quantum.

- In case of any class of the work for which there is no such specification as laid down in the contract, such work shall be carried out in accordance with the instructions and requirements of the Engineer'.

- Should any error or ambiguity be discovered in the specification or information, the contractor shall forthwith bring the same to the notice of the `Engineer' as soon as located. BHEL's interpretation in such cases shall be final and binding on the contractor.

- No change to the conditions in tender will be accepted. If the tenderer stipulates changes in the tender conditions, then accordingly there will be financial loading with respect to these conditions while evaluating the tenderer's offer. BHEL’s decision in this regard shall be final and binding on the bidder.

- No idle labour charges will be admissible in the event of any stoppage caused in the work resulting contractor's labour being rendered idle due to any cause at any time.

- It is possible that some repair/rectification/modification may be needed on the equipment to be erected/constructed/work to be performed under this

specification, for reasons not attributable to the contractor. All such repair/rectification/modifications work which can be done with the available facilities at site shall be carried out by the contractor on extra man-hour rate. .

- The Contractor and its employees shall not be involved in any manner in any political activity.

The tender is also subject to General Conditions of Yemen Government

60.0 FACILITIES TO BE PROVIDED BY BHEL/CONTRACTOR

60.1 CONTRACTOR – FURNISHED UTILITIES AND FACILITIES

60.1.1 Contractor shall at its expense, arrange for develop and maintain utilities and facilities at the site to execute the work under the contract, including but not limited to the following:

a) Illumination: Contractor shall provide light sufficient to safety perform work at night or when daylight is inadequate or obscured, including illumination of the access to the place of work.
b) First Aid Facilities: Contractor shall provide first aid facilities for the treatment of its employees who may be injured or become ill while engaged in the performance of work under the Contract. Contractor will make available such First Aid facilities to other contractors and Owner's employees on a "when available basis" and subject to reasonable charges for service rendered.
c) Temporary Field Offices: Contractor shall provide off site field offices and change facilities for its employees.
d) Fire Prevention / Protection : Contractor shall provide a fire prevention/protection program including fire protection equipment to mitigate the possibility of fires. Contractor's recommended fire prevention/protection program shall be subject to Owner's review.
e) Potable Water: Contractor shall provide potable water for use by its employees.
f) Construction Service Water and Fire Water: Contractor shall provide water for use during construction of the Plant, including fire protection by local arrangement / installation of required Bore wells at his own cost.
g) Toilet facilities: Contractor shall provide adequate toilet facilities for all Contractor personnel.
h) Trash disposal at an off-side location: Contractor shall provide its own trash disposal site at an off-site location as approved by the Engineer
i) Security for Site and off-site facilities: Contractor shall provide all the necessary security measures for all its on-site and off-site facilities.
j) Identification badges: Contractor shall provide proper identification budges for all its personnel, including visitors.

60.1.2 BHEL shall provide limited open space, for office , storage shed & labour colony . It is the responsibility of the contractor to construct sheds, provide all utilities and dismantle and clear the site after completion of work or as and when required , as a part of his scope of work.

60.1.3 Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport , electricity(thru DG sets), water(bore wells), medical facilities etc. as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.

60.1.4 **Construction power, for construction purposes as well as office , stores use will be arranged by contractors by DG sets including further distribution at his own cost for the entire duration of the contract .** The contractor should have adequate spare capacity in DG Sets to take care of breakdowns . The Contractor shall submit the proposal / scheme for the same for approval of Engineer . All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply. Required calibrated energy meter for measurement of power consumed has to be arranged / installed by Contractor at his cost.

60.1.5 Provision of distribution lines of power from the central points to the required place with proper distribution boards observing the safety rules laid down by the 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. The contractor shall adjust his working shift / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

60.1.6 Adequate lighting facilities such as flood lamps, 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.

60.1.7 No claim for damages will be entertained by the Company on account of interruptions of water supply or limitation of quantity of water as aforesaid or on account of the water so taken being not fit for construction purposes or on any other account in connection with such water supply.

60.1.8 Contractor shall arrange for construction water within the quoted rates by making adequate borewells. Contractor has to satisfy himself that the water brought by him is fit for construction / consumption and to submit the test report from reputed laboratory and adequately treat such water at his cost when it is not found fit for the said purposes.

60.1.9 The Contractor shall make arrangements for storage of sufficient quantity of water required for work.

60.1.10 The Contractor shall during the progress of the work, provide, erect and maintain at his own expenses all necessary temporary workshops, stores, consumables, offices, etc. required for the proper and efficient execution of the work. The planning, setting and erection of these buildings shall have the approval of the Engineer and the Contractor shall at all times keep them tidy and in a clean and sanitary condition to the entire satisfaction of the Engineer.

60.1.11 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled 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. .

61.0 TIME SCHEDULE

61.1 As stated earlier, this tender is for selecting Pre-Bid Partner for this work and an MOU will be drawn with the selected Party by BHEL. However, the work will be awarded to the selected party, in case BHEL gets the job from its customer M/s PEC, Yemen. **As such, the work is expected to start tentatively after 12 months from the bid submission to M/s PEC, Yemen by BHEL**. 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. The bidders should consider above fact while quoting their price.

61.2 **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:**

MILESTONES	MONTHS
• **START OF ERECTION**	**ZERO DATE**
• **6.6 kV CHARGING**	**5 th MONTH**
• **SYNCHRONISATION OF UNIT – 1**	**8 th MONTH**
• **TRIAL OPERATION + HO OF UNIT – 1**	**9 th MONTH**
• **SYNCHRONISATION OF UNIT – 2**	**10 th MONTH**
• **TRIAL OPERATION + HO OF UNIT - 2**	**11 th MONTH**
• **SYNCHRONISATION OF UNIT – 3**	**14 th MONTH**
• **TRIAL OPERATION + HO OF UNIT – 3**	**15 th MONTH**

Note:

- 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

61.3 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.

62.0 TERMS OF PAYMENT

62.1 **The prices for all the items of the BOQ shall be quoted in US Dollars. The payment shall be made as per tender terms on receipt of payments from customer**. The terms of payment applicable on each item of price schedule shall be as under :-

(A) ADVANCE PAYMENT

(a) **"**5% of the contract value shall be paid as interest bearing advance against submission of a Bank Guarantee for an amount equal to 1.20 times of advance valid for 15 months initially and thereafter extension for a period upto which the advance is fully adjusted. The interest chargeable shall be Prime Lending Rate of State Bank of India plus 2%."

The BG should be issued preferably through any of the Member Banks listed in the GCC. The BG may also be accepted from a Foreign Bank at the sole discretion of BHEL, provided the BG is duly endorsed by any of the BHEL's Member Bank listed in the GCC 'OR' any Nationalized Bank in India.

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

(b) The advance paid shall be recovered from the contractor's monthly running bills to an extent of 10% of each bill alongwith applicable interest amount till it is fully recovered. The BG amount shall be allowed to be reduced every six months by an amount equal to the amount adjusted against running bills.

(c) The BG against advance shall be returned after full adjustment of the entire amount of advance along with interest .

(B) Progressive Payments

(a) 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.

(b) 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. The BHEL shall pay to the Contractor in the following manner upon condition that the Contractor shall comply with, perform and observe several covenants/conditions/obligations under the Contract .

(c) The Contractor shall be paid monthly running bill to a maximum of 90% of the value of the work actually executed on site provided the work has been executed to the satisfaction of the Engineer. BHEL Site Manager, at his discretion can split this 90 % payment, to facilitate site operations. The Engineer may after a measured bill allow & certify payment to the contractor on the basis of abstract measurement bill submitted by the contractor. Contractor will also submit the soft copy containing abstract & measurement sheets of the bill which will be returned to him after correction for further resubmission of bill. From this amount recovery such as advances, security deposit taxes etc. would be made. The certificate of the Engineer regarding such approval and passing of sums so payable shall be final and conclusive against the contractor.

(d) 3 x 1.66 % (Total 5%) of the contract value shall be paid against issue of provisional takeover certificate by BHEL's Customer(M/s PEC).

(e) 2.5% of the contract value shall be paid on completion of all pending works, rework wherever required, site clearing and reconciliation of materials.

(f) Balance 2.5% of the contract value shall be paid within one month of submission and passing of final bill and against final take over certificate by BHEL's Customer(M/s PEC).

NOTE: Above payment at (e) & (f) shall be released after working out the contract value based on actual work carried out.

(C) Currency of Payment and Exchange Rate

(i) Payment in US $

50 % of the passed bill amount will be paid in US$ subject to Reserve Bank of India (RBI) / Yemen Govt guidelines.

(ii) Local Currency Payment

Balance 50% of the passed bill amount will be paid in local currency (i.e. Yemen Rials).

The conversion rate from US $ to Yemen Rials shall be the selling rate of Central Bank of Yemen as prevailing on the last working day of the month for which bill has been raised.

(D) Any certificate relating to the work done may be modified by any subsequent interim certificates or by the final certificates and no certificate of the Engineer supporting an earlier advance payment shall of itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract.

NOTE:-

1. The breakup at the appendix-I to this section is only to facilitate progressive payments and deemed to cover all equipments in the scope of the tender. The total work shall be as detailed under scope of work and Appendix `F' etc.

2. Prorata payments shall be made once a month in proportion to the work carried out by the contractor during the preceding month/months.

3. All levies, charges, taxes payable in India and Yemen will be borne by the Contractor or his Employees as applicable.

63.0 LIQUIDATED DAMAGES (LD)

For delay in completion of work attributable to the contractor, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the total contract value.

64.0 SECURITY DEPOSIT

64.1 The contractor shall submit Security Deposit (SD) in US $ within 15 days from the date of issue of LOI as per clause no. 16.0 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 in the GCC. The BG may also be accepted from a Foreign Bank at the sole discretion of BHEL, provided the BG is duly endorsed by any of the BHEL's Member Bank listed in the GCC 'OR' any Nationalized Bank in India.

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

65.0 OTHERS

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

65.2 Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification requirements/ evaluation of 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.

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

65.4 Settlement of disputes shall be according to the Rules of reconciliation and arbitration under Indian Arbitration Act 1996 and according to Indian Laws in India at Delhi as per GCC of BHEL.

65.5 CHANGES IN LEGISLATION

If after the date of bid opening and during Contract execution, there may be any legislative changes in the Republic of Yemen (law, decree or by-laws) which cause additional or reduced cost to the Contractor in the execution of the work, such additional or reduced cost, if fully justified and approved by BHEL / Owner, shall be paid for or reimbursed, as the case may be, by or to the BHEL / Owner.

65.6 LAW APPLICABLE

The Contract shall be governed by and construed in accordance with the laws of the Republic of Yemen

65.7 RECOGNIZED FESTIVALS AND CUSTOMS

Contractor shall have due regard for all recognized festivals and religious or other customs in dealing with its workmen and others in the Republic of Yemen.

65.8 Insurance

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

65.8.1 BHEL / its customer shall arrange for insuring the materials of BHEL / its customer covering the risks during transit, storage, erection and commissioning.

65.8.2 If due to negligence/ carelessness on the part of the contractor, any material/ equipment gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserve the right to recover deductible franchise and also unsettled portion of insurance claim amount from the contractor.

65.8.3 If due to negligence/ carelessness on the part of the contractor, any surrounding properties also gets damaged, the contractor shall submit necessary documents for lodging insurance claims as required by BHEL Engineer. BHEL shall however reserves the right to recover deductible franchise and to unsettled portion of insurance claim amount from the contractor.

65.8.4 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.

65.8.5 The Contractor shall provide insurance cover to all persons employed/engaged by him throughout the period of Contract, including the extended period, if any, under prevailing local law

66.0 PEFORMANCE GUARANTEE:- The contractor shall Guarantee the soundness of works under the contract and their proper execution and operability and achieving the relevant purpose fully for a period of 24 months as from taking over of last unit by the owner M/s PEC. If any defect, default or deficiency transpires therein, the contractor shall remedy or complete same within one week from being notified thereof, otherwise BHEL may carry out same at expense and responsibility of the contractor and may deduct the expense incurred including 30% overheads in this respect from the deposit with BHEL, without prejudice to the right of the BHEL to compensation.

APPENDIX-I

PAYMENT BREAKUP (MARIB PH-III)

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:

SL NO	PACKAGE	AREA	ACTIVITY	No of Units	Unit	APPX QTY	Package %	Total %	Group Total %
1	**Gas Turbine**			**3**			**5.00%**		**15.00%**
			Placement of Gas Turbine		PKG		2.00%	6.00%	
			Placement of Skids		PKG		1.00%	3.00%	
			Placement of Ducts + CC		PKG		1.00%	3.00%	
			Alignment of Gas Turbine		PKG		1.00%	3.00%	
2	**Gas Turbine Generator**			**3**			**4.0%**		**12.00%**
			Placement of GTG		PKG		1.00%	3.00%	
			Rotor Insertion		PKG		1.00%	3.00%	
			Cooling Air System		PKG		1.00%	3.00%	
			Alignment of GTG		PKG		1.00%	3.00%	
3	**Gas Turbine Auxillaries**			**3**			**6.0**		**18.00%**
		Inlet Air Filter		3			2.0%	6.00%	
			Filter Housing		PKG				
			Filter System		PKG				
		Exhaust Stack		3			2.0%	6.00%	
			Shell Erection		PKG				
			Insulation		PKG				
		Air Blast Cooler		3	PKG		0.50%	1.50%	
		Gas Detection System		3	PKG		0.50%	1.50%	
		Fire Fighting System		3	PKG		0.50%	1.50%	
		Gas Turbine Insulation		3	PKG		0.50%	1.50%	
4	**Station Mechanical Package**								**21.00%**
		Fire Fighting System		1	PKG		4.00%	4.00%	

		Air Conditioning and Ventillation	1	PKG		1.50%	1.50%	
		Fuel Oil system	1	PKG		2.50%	2.50%	
		Fuel Gas System	1	LOT		2.50%	2.50%	
		Water System	1	NO		1.50%	1.50%	
		Water Tanks	1	NO		1.50%	1.50%	
		Sewage Treatment Plant	1	LOT		1.75%	1.75%	
		EOT and Under Slung Cranes	1	PKG		1.75%	1.75%	
		LP Piping	1	PKG		3.00%	3.00%	
		Water Treatment Plant	1	PKG		1.00%	1.00%	
5	**Electrical + C&I Package**							**30.00%**
		Generator Transformer	3	NOS		2.25%	6.75%	
		Unit Auxillary Transformer	3	NOS		0.45%	1.35%	
		Isolated Phase busduct	3	NOS		2.00%	6.00%	
		Station 6.6 KV Switchgear	1	No.		0.50%	0.50%	
		PCC + Gas Turbine Electricals+I&C	3	PKG		2.50%	7.50%	
		LT Auxillary Transformers	13	NOS		0.10%	1.30%	
		Station LT Switchgear	6	NOS	6	0.10%	0.60%	
		Station Battery Charger	1	No.		0.20%	0.20%	
		Station UPS	1	No.		0.20%	0.20%	
		Station Cabling	3	UNITS		1.00%	3.00%	
		Master Clock	1	PKG		0.04%	0.04%	
		Station Lighting	1	PKG		1.50%	1.50%	
		Over Ground Earthing	1	LOT		0.06%	0.06%	
		Electrical Control Board	1	NO		0.10%	0.10%	
		Fire Sealing System	1	LOT		0.90%	0.90%	
6	**MILE STONES**							**4.00%**
		Initial Manpower Deployment				1.00%	1.00%	
		Synchronisation Unit # 1				1.00%	1.00%	
		Synchronisation Unit # 2				1.00%	1.00%	
		Synchronisation Unit # 3				1.00%	1.00%	

NOTES: (1) 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.

(2) Mile stone payment of " Initial Manpower Deployment" shall be payable on deployment of 50 workers within one month of Mobilization Notice from BHEL.

Annexure -I

TENTATIVE SUMMARY LIST OF MAJOR GAS TURBINE PACKAGES (PER SET) FOR 3xV94.2 GTGs FOR MARIB STAGE - III GTPP, YEMEN

S.No	Description	No off	Dimension LxBxH (m x m x m)	Gross wt. (kg)	Net wt. (kg)	Remarks
1.	Thermal Block Gas Turbine	1	10.340x 4.080x 3.930	197397.00	189300.00	
2.	Combustion Chamber (Right)	1	7.650x 3.800x 4.500	30000.00	23608.00	
3.	Combustion Chamber (Left)	1	7.650x 3.800x 4.500	30000.00	23608.00	
4.	Oil tank with pump sets, instrumentation, rack	1	6.900x 2.800x 3.830	14690.00	11500.00	
5.	Hydraulic unit	1	1.860x 1.600x 2.390	1450.00	970.00	
6.	Fuel Oil Injection Skid	1	6.000x 2.000x 3.650	9000.00	7000.00	
7.	Leak Oil tank	1	2.100x 1.850x 1.500	2350.00	1720.00	
8.	Piping Skids – right skid	1	10.350x 1.550x 2.300	6000.00	3000.00	
9.	Piping Skids – left skid	1	10.120x 1.520x 2.620	7000.00	4000.00	
10.	Piping Skids - front rack	1	2.500x 1.200x 2.550	1466.00	1130.00	
11.	Grating for Combustion Chamber	1	2.000x .900x 0.800	700.00	500.00	
12.	Platform around turbine	1	3.600x 1.800x 1.500	2171.00	1700.00	

13.	Platform (around Combustion Chamber)	1	4.360x 2.300x 1.380	3100.00	2500.00	
14.	Anchoring lube oil tank	1	0.600x 0.600 x 0.500	183.00	163.00	
15.	Lube oil piping (Generator)	1	6.100x 0.500x 0.400	430.00	150.00	
16.	Turbine Support & Centre Guide, Block	1	2.310x 0.820x 0.750	927.00	752.00	
17.	Drains oil pipes	1	0.500x 0.400x 0.300	100.00	31.00	
18.	Blow off system pipes	1	2.050x 0.300x 0.300	150.00	65.00	
19.	Drying device	1	1.200x 0.920x 1.500	187.00	67.00	
20.	Exhaust Gas Diffuser	1	6.100x 4.740x 4.770	10062.00	6162.00	
21.	Intermediate shaft	1	5.000x 1.080x 1.100	6910.00	5685.00	
22.	Actuator of adjustment fixture for stator blade	1	1.040x 1.000x 1.000	468.00	365.25	
23.	Compressor Support Block	1	1.920x 1.131 x 0.950	880.00	432.00	
24.	Turbine support center guide, block	1	1.700x 1.350x 0.400	616.95	472.95	
25.	Nuts and bolts for intermediate shaft	1	0.580x 0.480x 0.350	103.00	98.00	
26.	Combustion chambers piping & valves	1	4.000 x 3.000 x 2.400	1683.00	783.00	

27.	Thermal and Noise Insulation for unit 1	1	6.000 x 2.300 x 2.000	4000.00	2000.00	
28.	Site mounting material unit 1	1	5.500 x 2.500 x 1.200	1545.00	1185.00	
29.	Cover, oil guard ring (compressor side)	1	1.280 x 1.080 x 0.750	414.00	305.00	
30.	Fuel Gas Skid	1	2.700 x 2.250 x 2.800	2760.00	1930.00	
31.	Site Mounting material	1	0.350 x 0.200 x 0.200	1.500	0.500	
32.	Actuator combustion air	1	1.900x 1.800x 0.660	700.00	530.00	
33.	Blow off system pipe	1	7.350x 2.050x 1.020	2910.00	1870.00	
34.	Blow off system valves	1	1.600x 1.500x 1.430	1245.00	800.00	
35.	Combustion Chamber support	1	1.250x 0.850x 0.400	300.00	130.00	
36.	Electrical device for combustion chamber	1	2.050x 0.300x 0.300	250.00	190.00	
37.	Electrical items for front and rear bearings	1	0.680x 0.480x 0.420	52.00	40.00	
38.	Cables	1	1.200x 0.300x 0.350	55.00	40.00	
39.	Cable conduit dual fuel operation	1	1.080x 0.980x 0.550	160.00	70.00	
40.	Equipment for Temperature. measurement	1	6.130x 0.330x 0.350	150.00	90.00	

41.	Compressor support block	1	0.800x 0.600x 0.350	412.00	332.00	
42.	Bolts, nuts, screws,rod,plate,clamp	1	0.700x 0.400x 0.250	205.00	115.00	
43.	Connecting Rod	1	3.000x 0.220x 0.220	69.00	49.41	
44.	Lube oil pipes	1	3.000x 1.400x 1.000	891.00	541.00	
45.	Ignition Gas Pipe and vent pipes	1	6.300x 0.400 x 0.400	431.00	311.00	
46.	Oil cooler and counter flanges, throttle valve	1	4.500 x 1.700 x 1.700	800.00	450.00	
47.	Oil pipe – cooler and temperature control valve	1	7.000 x 2.000 x 1.500	2600.00	2000.00	

TENTATIVE SUMMARY LIST OF GENERATOR PACKAGES (PER SET) FOR 3xV94.2 GTGs FOR MARIB STAGE - III GTPP, YEMEN

SL. NO.	**ITEM**	**LENGTH** (MM)	**BREADTH** (MM)	**HEIGHT** (MM)	**NET** WEIGHT KG	**GROSS** WEIGHT KG
01	GENERATOR PACKAGE (ASSEMBLY)	10500	5500	4800	236600	246000
02	GENERATOR AIR INLET DUCTING	7000	5000	5000	5000	5600
03	GENERATOR AIR OUTLET DUCTING	5000	5000	3000	3000	3500
04	ACCESSORIES, FOUNDN. ITEMS etc.	3000	2500	2500	15000	16000
05	TERMINAL BUSHINGS	3000	2500	1500	4000	4800
06	ENCLOSURE	11000	6500	5300	10000	11000
07	WALKWAYS	6000	3000	3000	4000	4500
08	AIR FILTER UNIT	6000	5000	5000	9000	10000
09	FILTER UNIT STRUCTURALS	6000	3000	2000	3000	3700
10	DUCTING STRUCTURALS	8000	3000	3000	4000	4500
11	CO2 FIRE PROTECTION EQUIPMENT	3000	2500	2500	3000	4000

TENTATIVE SUMMARY LIST OF BLACK BOX PACKAGES (PER SET) FOR 3xV94.2 GTGs FOR MARIB STAGE - III GTPP, YEMEN

S.no	Description of package	Gross weight (MT)	Wt. of indigenous components (MT)	Wt. of the imported components (MT)	Remarks
1	Air Intake System	250.00			per GT
3	Co2 fire fighting system	2.00	1.50	0.50	per GT
4	Lube Oil Purifier	6.00	6.00		
5	Fuel Gas Supply System	250.00		250.00	
6	Special tools and tackles for GT maintenance	3.000	-	3.000	Non ODC Total 15 boxes
7	Ignition gas heating system	3.000	3.000	-	Turnkey package
8	Fuel Oil Supply System (imported)	1200.00		1200.00	
9	Exhaust Gas System	400.00			per GT
10	Scaffolding for rotor maintenance	5.00	5.00		

TENTATIVE BILL OF QUANTITY FOR FUEL OIL SYSTEM
Marib ST-III, YEMEN

1. Fuel Oil Forwarding System

Skids for the System - appx dimensions	
Description	
Fuel Oil Transfer Pump Skid	
Fuel Oil Centrifuges	
Fuel Oil Forwarding Pump Skids	
Duplex filter at pump disharge	
Drain Oil Tank with transfer skid	
Pressure sustaining station	
1 set piping connecting Tank and skids	
MCC panel	

2. Fuel Oil Piping : Appx Lenghts

Pipe, 50 NB Sch. 80	SA 106 Gr.B	Mtrs	130
Pipe, 80 NB Sch. 80	SA 106 Gr.B	Mtrs	60
Pipe, 100 NB Sch. 80	SA 106 Gr.B	Mtrs	114
Pipe, 125 NB Sch. 40	SA 106 Gr.B	Mtrs	12
Pipe, 150 NB Sch. 40	SA 106 Gr.B	Mtrs	296
Pipe, 250 NB Sch. 30	SA 106 Gr.B	Mtrs	3400
Pipe, 300 NB Sch. 30	SA 106 Gr.B	Mtrs	2
Pipe, 350 NB Sch. 30	SA 106 Gr.B	Mtrs	450

1. PLANT PIPING SYSTEM		
S NO	Type of Piping	Total Quantity (MT)
1.	Over Ground Carbon steel Piping including Fittings	300
2.	Under Ground Carbon steel Piping including Fittings	30
3.	SS Piping including fittings	7.5
4.	Hangers , Supports and Supporting Structure	60

ANNEXURE-II

LIST OF T&P and IMTEs being provided by BHEL for use of contractor free of hire charges (MARIB ST-III) .			
S.NO.	**EQUIPMENT**	**CAPACITY**	**QTY**
T&P			
1.	EOT Crane (in T.G. hall)	60 MT	1 Nos.
2.	Miscellaneous Cranes in Various Buildings	2.5 / 5 / 7.5/ 10 T	
3.	Maxi Termi Gun		1 No.
4.	Relay Testing Kit		1 set
5.	Special Tools for Gas Turbine		1 set

Notes:

1. Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.

2. Other terms and conditions regarding above items shall be as per clause no. 38 (T&P/IMTEs)

3. All Cranes indicated above will be first installed by the contractor and then will be used for erection purposes . The contractor has to depute skilled and experienced operators for operating the cranes .

4. Since these cranes and other T&Ps are to be handed over to the customer , any defects and damages attributable to wrong operation / negligence during the operation period will be booked to the contractor .

ANNEXURE-III

LIST OF Tentative T&P and IMTEs to be Provided by Contractor at his own cost
(MARIB ST-III).

S.NO.	EQUIPMENT	CAPACITY	QTY
T&P			
1.	Crane	120 / 150 T	As per requirement
2.	Crane	40 / 50 T	As per requirement
3.	Crane	15/18 T	As per requirement
4.	Crane - Hydra	8 / 10 T	As per requirement
5.	Trailer with pulling unit	10 MT	As per requirement
6.	Trailer with pulling unit	20 MT	As per requirement
7.	Trailer with pulling unit	40 MT	As per requirement
8.	Trailer with pulling unit FOR ROTOR INSERTION	50 / 60 MT	As per requirement
9.	Welding Generators, Transformers, Rectifiers And Tig/Mig Welding Machine , Submerged Arc Welding Machines		Adequate numbers.
10.	Hydraulic Jacks (Low Height , 200 mm)	25/50/100T	Adequate numbers.
11.	Gas Cutting Sets		Adequate numbers.
12.	Hydraulic Jacks Gang Operated (Low Height)	25/50/100T	Adequate numbers.
13.	Screw Jacks	5/10/25/50T	Adequate numbers.
14.	Hydraulic Pipe Bending Machine		1 number.
15.	Torque Tension Meter/ Wrench Upto 2750 Nm Range		1 set
16.	Chain Pulley Blocks	5 /10/ 20T	Adequate numbers.
17.	Pull Lifts	3.6 / 6 / 10 T	Adequate numbers.
18.	Tools for Reaming and Honing		1 set
19.	Pulley Blocks	2,3 sheaves	2 nos each
20.	Portable Air Compressor (140 / 210 CFM)		1 no

21.	Special Tools for Oil Tanks		set
22.	Automatic Plate Cutting Machine		1 no
23.	Airless Paint Gun		2 nos
24.	Special Tools for Gas Turbine Insulation		set
25.	Sheet Grooving Machine		2 nos
26.	Hammer drill Machines	Upto 40 mm bits	Adequate numbers.
27.	Drill machines , Grinders		Adequate numbers.
28.	Hand Tool Sets		Adequate numbers
29.	6000 LPH Hi- Vacuum Oil Filter Machine suitable for HT Transformers		1 no
30.	High Vacuum Pump suitable for HT Transformers		1 no
31.	10,000 litre Oil Tank		1 no
32.	Hydraulic crimping tool		2 no
33.	Hand crimping tools		Adequate numbers
34.	Electrical Tool Box		Adequate numbers
35.	Drum Winch		1 no
36.	Star Delta Motor Starter with Main Switch	50 kW	3nos
37.	Air Compressor for Maxi Gun		1 no
38.	Brazing Kit		set
39.	Electrical Connectors of various sizes		Adequate numbers.

NOTES:

1. The above list of T&Ps required for erection/testing / commissioning is only for guidance to contractor and not complete. Any other / additional T&Ps 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.
3. Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).

ANNEXURE-IV

TENTATIVE LIST OF MAJOR MECHANICAL EQUIPMENTS TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST (MARIB ST-III).				
SL. No.	**DESCRIPTION**	**RANGE**	**ACCURACY**	**QTY**
1.	Dumpy level	0 to 350 mm	LC-0.01	1 No.
2.	Surface plate	Up to 1.0 Sq. Mtr	Grade 1,2,3	1 No
3.	Straight Edge	Up to 1.2 Mtr long	Grade 1,2,3	2 No.
4.	Master pressure gauge	0 – 6 , 20 , 250 Kg/cm2	0.02 / 0.1 / .5 kg	1 No. each
5.	Inside Micrometer	50-1250 mm		2 nos
6.	Outside Micrometer	0-25, 0-150 , 150-300 , 400-500 mm		2 no, 1 no each for the rest
7.	Dial Gauge with magnetic stand	0-10 , 0-50 mm	LC 0.01	10 nos , 2 no s
8.	3 Point Inside Micrometer	0 – 80 mm	LC 0.005 mm	1 no
9.	Vernier Caliper	Upto 600 mm	LC 0.02 mm	1 no
10.	Slip Gauges Set (121 piece set)	Upto 0.01 mm		1 no
11.	Micro Level Water Pots with Depth Micrometer 0.1 mm Accuracy and 6 pots with 6 mm tube 50 m long		LC 0.01 mm / M	1 no
12.	Master level (square)		LC 0.02 mm / M	2 nos
13.	Feeler Gauges	6” ,12”		4 ,2 sets respectively
14.	Hand held Vibration Meters			As per reqmt.
15.	Non Contact type	0-5000 rpm		1 no

	Tachometer			
16.	Non Contact type Thermometer			1 no
17.	Compact Roller Assy	10 / 50 MT		4 nos
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.			
3.	Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).			

ANNEXURE-V

TENTATIVE LIST OF MAJOR ELECTRICAL TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST (MARIB ST-III).				
SL. No.	**DESCRIPTION**	**RANGE**	**ACCURACY**	**QTY**
1.	Motorised Megger 2.5 / 5 kV			2 nos
2.	500 V / 1000V, (Hand operated) megger			2 nos
3.	Transformer Oil Testing Kit (Motor operated)	0-100 KV		1 no
4.	Digital Multimeters			10 nos.
5.	Primary Injection Kit			1 no
6.	Secondary Injection Kit			1 no
7.	Relay Testing Kit			1 set
8.	Tong Testers	Range Wise		As per requirement
9.	HV Test Kit	0-50 kV		1 no
10.	Micro ohm meter with 100Amps DC Source			1 no
11.	Motor checker , TTR			1 no each
12.	KELVIN DOUBLE BRIDGE			1 no
13.	PPM Measuring Kit			1 no
14.	Analog Multimeters			3 no
15.	Single / three phase variac			2 no each
16.	Decade Box / Rheostat	Range Wise		As per requirement
17.	Phase Sequence Indicator			3 nos
18.	Dead Weight Tester	0-600Kg/cm2	LC-0.5Kg/cm2	2 nos
19.	Comparison test set	0-4 k g/cm2 0-6 Kg/cm2 0-10kg/cm2 0-25Kg/cm2 0-60Kg/cm2	+0.25%Lc-0.25 Kg/cm2	1 set

		0-250 Kg/cm2		
20.	Variable DC regulated supply	0-30V DC	0.2%	1 no
21.	Oil bath with thermostat Stirrer and sub-standard Glass Thermometers in Multiple ranges	0-300 Degree Cel.		2 nos
22.	Glass U tube mercury mano-meter with standard steel Scale having leveling arrangement	0-760 mm		2 nos
23.	mA/mV source with Digital display	0-200 mA/200mV		2 nos

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.
3	Other terms and conditions regarding above items shall be as per clause no. 38 (tools & plants / testing & measuring instruments).

MARIB – PHASE II & III

ANNEXURE-VI

BANK GUARANTEE FOR PAYMENT OF ADVANCE

B.G. No. Date

This deed of Guarantee made this _____day of_____two thousand_____by_____(Bank) hereinafter called the "The Guarantor" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) in favour of M/S Bharat Heavy Electricals Limited a Company incorporated under the Companies Act, 1956, having its registered office at BHEL House, Siri Fort, New Delhi - 110049 through its unit at Power Sector-Northern Region, Noida, Distt. Gautam Budh Nagar, (U.P.) India, hereinafter called "The Company" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns).

WHEREAS M/s. _____(hereinafter referred to as the Contractor) have entered into a Contract arising out of Letter of Intent no._____dtd_____(hereinafter referred to as "the Contract") for the --< Name of_work >-- with the Company.

AND WHEREAS the Contract inter-alia provides that the Company will pay to the Contractor interest bearing advance of Rs._____ (Rupees_____ only) on certain terms and conditions specified in the Contract subject to the Contractor furnishing a Bank Guarantee for Rs._____ (Rupees_____ only) in favour of the Company.

AND WHEREAS the Company has agreed to accept a Bank Guarantee from a Bank to cover the said advance.

AND WHEREAS the Contractor has approached the Guarantor and in consideration of the arrangement arrived at between the Contractor and the Guarantor, the Guarantor has agreed to give the Guarantee as hereinafter mentioned in favour of the Company.

NOW THIS DEED WITNESSES AS FOLLOWS:-

(1) In consideration of the Company having agreed to advance a sum of Rs._____ (Rupees_____ only) to the Contractor , the Guarantor do hereby guarantee the due recovery by the Company of the said advance with interest thereon as provided according to the terms and conditions of the Contract. If the said Contractor fails to utilise the said advance for the purpose of the Contract and /or the said advance together with interest as aforesaid is not fully recovered by the Company the Guarantor do hereby unconditionally and irrevocably undertake to pay to the Company without demur and merely on a demand, to the extent of the said sum of Rs._____ (Rupees_____ only) any claim made by the Company on them for the loss or damage caused to or suffered by the Company by reasons of the Company not being able to recover in full the advance with interest as aforesaid.

(2) The decision of the Company whether the Contractor has failed to utilise the said advance or any part thereof for the purpose of the Contract and / or as to the extent of loss or damage caused to or suffered by the Company by reason of the Company not being able to recover in full the said sum of Rs._____ with interest if any shall be final and binding on the Guarantor, irrespective of the fact whether the Contractor admits or denies the default or questions the correctness of any demand made by the Company in any Court Tribunal or Arbitration proceedings or before any other Authority.

(3) The Company shall have the fullest liberty without affecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the Contract or extend time of performance by the Contractor or to postpone for any time and from time to time any of the

powers exercisable by it against the Contractor and either enforce or forebear from enforcing any of the terms and conditions governing the Contract or securities available to the Company and the Guarantor shall not be released from its liability under these presents by any exercise by the Company of the liberty with reference to the matters aforesaid or by reasons of time being given to the Contractor or any other forbearance, act or commission on the part of the Company or any indulgence by the Company to the Contractor or of any other matter or thing whatsoever which under the law relating to sureties would, but for this provision have the effect of so releasing the Guarantor from its liability under this guarantee.

(4) The Guarantor further agrees that the Guarantee herein contained shall remain in full force and effect during the period till the Company discharges this Guarantee, subject to however, that the Company shall have no claim under this Guarantee after_____ i.e. (the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time, as the case may be) unless a notice of the claim under this Guarantee has been served on the Guarantor before the expiry of the said period in which case the same shall be enforceable against the Guarantor not withstanding the fact that the same is enforced after the expiry of the said period.

(5) The Guarantor undertakes not to revoke this Guarantee during the period it is in force except with the previous consent of the Company in writing and agrees that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the Contractor or the Guarantor shall not discharge the Guarantor's liability hereunder.

(6) It shall not be necessary for the Company to proceed against the Contractor before proceeding against the Guarantor and the Guarantee herein contained shall be enforceable against them notwithstanding any security which the Company may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Guarantor hereunder be outstanding or unrealised.

(7) Notwithstanding anything contained herein before, our liability under the Guarantee is restricted to Rs._____(Rupees_____). Our guarantee shall remain inforce until _____, i.e. the present date of validity of Bank Guarantee unless the date of validity of this Bank Guarantee is further extended from time to time. Unless a claim or demand under this guarantee is made against us on or before---------, we shall be discharged from our liabilities under this Guarantee thereafter.

(8) Any claim or dispute arising under the terms of this documents shall only be enforced or settled in the courts at New Delhi/ Delhi only.

(9) The Guarantor hereby declares that it has power to execute this Guarantee under its Memorandum and Articles of Association and the executant has full powers to do so on its behalf under the Power of Attorney dated_____ (To be incorporated by the Bank) granted to him by the proper authorities of the Guarantor.

IN WITNESS whereof the _____(Bank) has hereunto set and subscribed its hand the day, month and year first, above written.

Signed for and on behalf of the Bank

WITNESSES

1. Name & Address

2.Name & Address

Notes:

1. The above BG shall be executed on the non-judicial stamp papers of adequate value procured in the name of the Bank in the state where the Bank is located.

2.The above BG is required to be sent by the executing bank directly to BHEL at the address where tender is submitted /accepted under sealed cover.

MARIB – PHASE II & III

ANNEXURE-VII

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:

MARIB – PHASE II & III

ANNEXURE-VIII

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……..

MARIB – PHASE II & III

ANNEXURE - IX

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 and trial operation of total mechanical, electrical & C&I packages of 400 MW Marib-II & 300 MW Marib-III Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at MARIB GAS POWER STATION PHASE-II & III - YEMEN**

TENDER NO. BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited MARIB GAS TURBINE POWER STATION PROJECT Phase-II & III, YEMEN 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 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)

ANNEXURE-X

MARIB – PHASE II & III

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into on this -------day of ---------- at New Delhi.

BETWEEN

BHARAT HEAVY ELECTRICALS LIMITED, a Government of India Undertaking incorporated under the Companies Act, 1956, having its registered office at BHEL House, Siri Fort, New Delhi unless repugnant or contrary to the context, be deemed to include its successors and permitted assigns) of one Part:

AND

M/s XX XX, an existing Company under the Companies Act,1956, having its registered office at ---------- ----------(hereinafter referred to as ' XX XX" which expression shall, unless repugnant or contrary to the context, be deemed to include its successors and permitted assigns) of the other Part:

Each BHEL and XX XX hereinafter referred to individually as a Party" and collectively as "the Parties".

WHEREAS :

A. Public Electricity Corporation, Republic of Yemen having its registered office at Sana'a, Yemen (hereinafter referred to as "PEC") is planning to set up Marib 400 MW Gas Turbine Power Station Project, Marib Phase-II Project & Marib 300 MW Gas Turbine Power Station Project, Marib Phase-III Project (hereinafter referred to as the "Project") in Marib, Yemen and has invited offers on EPC basis for design, engineering , manufacture, supply, transportation to site, storage, installation, testing and commissioning (including putting the plant into successful operation) of all equipment, material and services required for Gas Power Plant and auxiliaries which, inter alia, includes Balance of Plant (BOP") including all associated civil and structural works, electricals, controls and instrumentation for the Project (hereinafter referred to as the "Proposal").

B. Whereas BHEL has submitted an offer to PEC for the said project including the civil and structural steel works and to perform the contract, if awarded (hereafter referred to as the "Contract").

C. Whereas, XX XX in response to the tender specification No.
BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653

floated by BHEL (hereafter referred to as the "tender") for the "works" to be carried out for the "Project" has submitted their offer (hereafter referred to as the "Offer")

D. Whereas, BHEL after scrutinizing the "offers" submitted by the bidders, has selected XX XX and agrees to award the contract to them for carrying out the "works" in the event of the contract being awarded to BHEL by PEC.

1. PURPOSE OF THE MOU;

BHEL and XX XX desire to enter into this MOU with the purpose of :

(i) Entering into Contract Agreement for **"Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 400 MW Marib-II AND/OR 300 MW Marib-III Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at MARIB GAS POWER STATION PHASE-- YEMEN", which will supersede this MOU WHEN ENTERED INTO.**

(ii) Submitting detailed proposal to PEC IN RESPONSE TO ITS ABOVE REQUEST AND

(iii) Negotiating , signing, performing contract(s) when concluded with PEC for the Works.

2. PRINCIPLES OF AGREEMENT:

2.1 The purpose of this agreement is to specify the rights and obligations of each Party in performing the Works, if the Contract is awarded by PEC to BHEL. The Tender Document and the resulting contract for the Project shall be binding on both the parties

2.2 Nothing contained in this MOU shall constitute or be deemed to constitute a partnership, or joint venture between the Parties hereto and neither of the Parties shall have any authority or power (and shall not represent themselves on having such authority or power) to contract in the name of or to undertake any liability or obligation on behalf of the other Party, same in so far as expressly agreed to and provided in this MOU. There being no sharing or profit or losses, any profit arising to the parties hereto shall be taken credit by the Party causing the profit, any loss shall be borne by the Party causing the loss. The relationship between the parties shall be on an arm's length basis and shall be strictly temporary and nothing contained herein is intended, nor shall it be construed as creating or requiring any other on going or continuing relationship or commitment between the Parties.

2.3 The Parties agree to cooperate in carrying out the Works in the event of the award of the Contract to BHEL by PEC as per their respective scope and as per the terms and conditions stipulated in the "tender" and General/Special and other Conditions forming part of the "tender".

3. SCOPE OF WORK:

The scope of work is **"Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 400 MW Marib-II AND/OR 300 MW Marib-III Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at MARIB GAS POWER STATION PHASE-II & III - YEMEN"** as detailed in tender no. BHEL: NR (SCT): YE-MARIB-PH-II&III: MECH-GTP: 653. M/s XX XX shall arrange, passport, visas, work permit / license, clearance & exemptions from Ministries / Govt. Bodies / Customer, with all expenses / fees etc. for their employees, liaison with Government and other statutory bodies, meeting all statutory & regulatory Codes, Acts, Standards, for successful execution of contract for entire duration of contract. All expenses for all these activities will be borne by the Contractor, M/s XX XX.

4. It is agreed between the parties that they shall make best efforts to secure award of contract for the project execution from PEC. Pooling their resources, experiences, special expertise and capabilities available with them and compile technically and commercially optimum proposal, subject to the terms of this MOU.

XX XX shall provide promptly all relevant technical and commercial information and assistance as required for the purposes of the preparation of the detailed proposal before the due date and for the negotiation of the Tender. XX XX, may attend the meeting required in connection with the Tender and contract either between the parties and / or between the parties and PEC wherever required. Each party's expenses associated with such work shall be borne by the respective parties.

5. PERFORMANCE OF CONTRACT : LIABILITIES OF THE PARTIES

BHEL shall not be liable to the contractor, M/s XX XX for the failure to obtain the Contract or for loss of contract or business opportunity, or for any indirect or consequential loss or damage.

M/s XX XX shall be liable to BHEL for the due performance of its respective Scope of Work in accordance with the tender.

6. CONFIDENTIALITY

Each party undertake to treat as confidential any information which it obtains from the other party in connection with the agreement, to use such information solely for the purpose of the proposal and any resulting contract and to disclose such information only to the extent necessary in connection with this MOU.

7. LIQUIDATED DAMAGES (LDs)

7.1 For delay in completion of work attributable to the contractor M/s XX XX, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the total contract value.

8. Warranty :

The contractor XX XX shall Guarantee the soundness of works under the contract and their proper execution and operability and achieving the relevant purpose fully for a period of 24 months as from taking over of last unit by the owner M/s PEC. If any defect, default or deficiency transpires therein, the contractor shall remedy or complete same within one week from being notified thereof, otherwise BHEL may carry out same at expense and responsibility of the contractor and may deduct the expense incurred including 30% overheads in this respect from the deposit with BHEL, without prejudice to the right of the BHEL to compensation.

9. NOTICE

All notices pursuant to this Agreement shall, except as otherwise provided by made in writing and delivered by hand or sent by prepaid post or on facsimile number as set out below, or such other addresses or facsimile numbers as either Party may from time to time notify to the other in accordance herewith.

If sent to BHEL: BHARAT HEAVY ELECTRICALS LIMITED
Power Sector , Northern Region, Tel: 0120-2515476,

HRDI & PSNR Complex,Fax No., 0120-2515464
Plot No. 25, Sector 16A,
NOIDA – 201301 (UP)

If sent to XX XX :

10. DISPUTE RESOLUTION

a. Any difference or dispute arising from this MOU or from the performance of the scope of work of the parties (the dispute) shall be settled amicably by mutual discussions within 30(thirty) days after either Party has identified such dispute, failing which such dispute shall be referred to the Higher Management of the Parties for resolution within the next 30(thirty) days.

b. If such dispute is not resolved as mentioned herein above. Either Party may, thereafter, notify the other Party in writing that such dispute shall be settled by arbitration pursuant to arbitration proceedings under the Arbitration & Conciliation Act, 1996 , and any amendments thereto as per the Rules under the said Act. The parties to the contract understand and agree that it will have no objection that the General Manager or the person nominated as Arbitrator had earlier in his official capacity to deal directly or indirectly with the matters to which the contract relates or that in the course of his official duties had expressed views on all or any of the matters in dispute or difference. The award of the Arbitrator shall be final and binding on the parties to this contract. In the event of the Arbitrator dying, neglecting or refusing to act or resigning or being unable to act for any reason or his award being set aside by the Court for any reason, it shall be lawful for the General Manager or his successor, as the case may be, either to act himself as the Arbitrator or to appoint another Arbitrator in place of the outgoing Arbitrator in the manner aforesaid. The Arbitrator may, from time to time, with the consent of both the parties to the contract, enlarge the time for making the award. Work under the contract shall be continued during the arbitration proceedings. The venue of the arbitration shall be the place from which the contract is issued or such other place as the Arbitrator at his discretion may determine

c. The place of arbitration shall be Delhi in India, language of arbitration English and the procedural law to be adopted in such arbitration shall be that of India.
The award rendered under arbitration shall be final and binding on the Parties and may be entered in any Court of competent jurisdiction for the its enforcement. The costs of arbitration shall be borne by the Parties as determined by the arbitrator.

11. GOVERNING LANGUAGE & LAW

11.1 The governing language of the Agreement shall be English, Correspondence and technical and commercial documents as well as any other information relating to this Agreement shall be written in the English Language.

11.2 This Agreement and performance of the Scope of Work by the Parties shall be subject to Indian substantive law.

11.3 Jurisdiction: Court of Delhi in India shall be the jurisdiction

12. PRE-BID GUARANTEE

XX XX shall furnish a bid Bank Guarantee equal to 1% of their final quoted value within 30 days of signing of MOU to ensure continued association and linkage with BHEL till the prospective customer finalize their tenders.

13. VARIATION IN PRICING AND ALTERTION IN TERMS & CONDITIONS

The agreed price drawn during MOU may be subject to further proportional reduction for the package under MOU, in the event of any price reduction given by BHEL to its customer together with alteration in terms & conditions during negotiation with customer.

XX XX shall accept variations in quantities against addition/ deletion/ changes in scope of work.

14. Any changes/ modifications, addition/ deletion necessary, which are necessitated because of default of XX XX shall be to the account of the contractor XX XX.

15. TERMS OF AGREEMENT

The present Memorandum of Understanding shall remain in force until superseded by a detailed agreement to be signed after award of work to BHEL by PEC.

Both parties hereby confirm their consent to an approval of the above terms and conditions evidenced by its signatures on this Memorandum.

IN WITNESS WHERE OF THE parties hereto have caused this MOU to be signed by their respective authorized representatives as of the date, month and year herein above written.

For BHARAT HEAVY ELECTRICALS LIMITED For XX XXX

By

Name :

Designation

WITNESS

1.

2.

MARIB – PHASE II & III

Annexure -XI

RATE SCHEDULE

Sl. No	DESCRIPTION OF WORK	Rate in USD (In figures and words)
1	Lumpsum Price in USD for Shifting of Material from Storage Yard / Erection Site, E / T /C , Trial Operation , Handing Over as defined in the Tender Specifications for total Mechanical , Electrical , and C& I Package including Main Gas Turbines , generators , Gas Turbine Auxillaries , Balance of Plant , Piping , etc including all Taxes , Levies charges in Yemen (as well as applicable in India, if any) **of 4 x V94.2 Gas Turbine sets** at Marib **Phase – II** .	
2	Lumpsum Price in USD for Shifting of Material from Storage Yard / Erection Site, E / T /C , Trial Operation , Handing Over as defined in the Tender Specifications for total Mechanical , Electrical , and C& I Package including Main Gas Turbines , generators , Gas Turbine Auxillaries , Balance of Plant , Piping , etc including all Taxes , Levies charges in Yemen (as well as applicable in India, if any) of **3 x V94.2 Gas Turbine sets** at Marib **Phase – III** .	

Notes:

1. **The rate shall be entered in figures as well as in words. In case of difference in rates between words and figures, the lesser of the two will be treated as valid rate.**

2. **Pre-bid tie-up shall be done as stated in clause no. 3 of the " PRE-BID TIE-UP ARRANGEMENT" given in the NIT.**

(Seal and signature of tenderer)
