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TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573
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TENDER SPECIFICATION

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

FOR

“Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 2 X 157 MW Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at EXISTING WESTERN MOUNTAIN GAS TURBINE EXTENSION POWER STATION, RUWAIS, LIBYA”

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

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ISO 9001-2000, ISO 14001
and OHSAS 18001 certified
company
SubContract and Purchase
Deptt.

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

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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

Sl. No.	CONTENTS	PAGE
1.	Tender Notice	04-06
2.	Tender Notice- Newspaper	07
3.	Procedure for submission of tender	08
4.	Project Information	09
5.	General Conditions of contract	10-62
6	Section-III Special Conditions of Contract	63-138
7.	APPENDIX-I -- Payment Break UP	139-141
8.	Annexure – I TENTATIVE SUMMARY LIST OF GAS TURBINE PACKAGES	142-150
9.	Annexure-II , LIST OF T&P and IMTEs being provided by BHEL for use of contractor free of hire charges	151
10.	Annexure-III , LIST OF Tentative T&P and IMTEs to be Provided by Contractor at his own cost .	152-153
11.	Annexure-IV , TENTATIVE LIST OF MAJOR MECHANICAL EQUIPMENTS TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST.	154-155
12.	Annexure-V TENTATIVE LIST OF MAJOR ELECTRICAL TESTING INSTRUMENTS / EQUIPMENT TO BE ARRANGED BY CONTRACTOR AT HIS OWN COST.	156-157
13.	Annexure-VI Terms & conditions of Reverse Auction	158
14.	Annexure-VII , CERTIFICATE OF DECLARATION FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS	159
15.	Annexure-VIII , NON DISCLOSURE AGREEMENT	160
16.	Annexure-IX , FORMAT OF UNDERTAKING	161
17.	RATE/PRICE SCHEDULE	162



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TENDER NOTICE

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the “Erection, Testing, Commissioning and trial operation of total mechanical, electrical & C&I packages of 2 X 157 MW Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at EXISTING WESTERN MOUNTAIN GAS TURBINE EXTENSION POWER STATION, RUWAIS, LIBYA”

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QUALIFYING REQUIREMENTS:

- 1.0 Tenderer who wish to participate should have executed during last seven years;
- 1.1 “Similar works in atleast one Frame-9 or equivalent GTG set or higher rating set, alternatively 60 MW or higher rating STG ”.
- 1.2 “Similar nature electrical and C&I works in 60 MW or higher rating unit in Power Projects/ Industrial Projects”.
- 2.0 The Tenderer should have a minimum average annual turnover of INR 70 Millions (Indian Rupees Seventy Millions Only) on the audited accounts of last three financial years (2005-06, 2006-07 & 2007-08). Bidders shall submit audited balance sheets and profit & loss account in support of this.
- 3.0 Tie Up/Joint Venture Arrangement
 - 3.1 Tenderers having experience as per QR at SL No. 1.1 are allowed to have tie up/ Joint Venture for the work against QRs at SI No. 1.2. The composition of the Tie-up arrangement and role and responsibility of each constituent for execution of work in their respective area must be well defined and the document submitted shall clearly indicate that the tenderer (Partner with experience of QR SL NO. 1.1) is the Lead Partner. The Tenderer shall give an undertaking that the responsibility of execution of entire work shall lie with him and also that in case of

dissolution of Tie up/JV, 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 and they will immediately arrange necessary alternate tie up arrangements with another party meeting the QR requirement of this NIT (Subject to BHEL's approval) and that in case the same is not arranged, BHEL will be free to get the work done through alternate sources at their (Contractor's) risk and cost.

Legal documents of tie up/JV agreement, signed by both the partners, shall be submitted as a part of technical bid. Power of Attorney in favour of Each Signatory for signing the agreement shall also be submitted.

3.2 For the purpose of qualifying requirements as given at SL NO. 2.0 above i.e. Financial Turnover of both the partners shall be considered. However, audited balance sheets of both the partners shall be submitted individually.

NOTES:

- (i) The Tender Documents comprise of following;
 - (a) General Conditions of Contract
 - (b) Special Conditions of Contract, Tender Notice, Project Synopsis etc.
 - (c) Rate Schedule
- (ii) Tender Documents with complete details are hosted in this web page. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit Rs.1000/- (Rupees One thousand only) in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer
- (iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e **upto 20.12.2008** on payment of Rs.1,000/- (non-refundable) either in cash or by crossed demand draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender No. and work.
- (iv) Tenders must be submitted to the undersigned in Room No. 104 latest by 15:00 Hrs. on **20.12.2008**. Technical bids shall be opened at 15.30 Hrs. on **20.12.2008**.
- (v) Earnest Money Deposit (EMD) : Refundable, Non-interest bearing **EMD of Rs 2,00,000/-** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/NOIDA . Those bidders who have already deposited ' One Time 'EMD' of Rs. 2,00,000/- with BHEL, PSNR, NOIDA need not submit EMD with the present tender.
- (vi) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

- (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) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.
- (ix) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/post.
- (x) Bids once received by BHEL, will not be returned.
- (xi) Purchase Preference will be given to CPSUs as per Indian Govt. Guidelines.
- (xii) BHEL reserves the right to go for a Reverse Auction instead of Opening the submitted sealed bid, which will be decided after technical evaluation. As such, the bidders should submit their best prices in the 'Sealed Price Bid'. However, bidders are required to confirm their acceptance of "General terms and conditions" governing RA specifically in their technical bid. The "General terms and conditions" governing RA are given in the SCC of the NIT. Bidders are also required to furnish following details in their techno-commercial bid, for this purpose (RA).**

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

1. Name and Designation of official
2. Postal Address (Complete)
3. Telephone Nos. (Land line & Mobile both)
4. FAX No.
5. E-mail address
6. Name of Place/State/Country, wherefrom he will participate in the RA

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

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TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573



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DOMESTIC NOTICE INVITING TENDER

LAST DATE OF SALE : 20.12.2008
DUE DATE OF SUBMISSION : 20.12.2008 (15:00 Hrs.)
DATE OF OPENING : 20.12.2008 (15:30 Hrs.)

NIT NO. / NAME OF WORK

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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NOTES

1. Purchase Preference will be given to CPSU as per Indian Govt. Guidelines.
2. Please visit our website at www.bhel.com for details of NIT including Qualifying Requirements.

DGM/SCP

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
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PROCEDURE FOR SUBMISSION OF SEALED TENDERS:

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

TECHNICAL BID (COVER-I)

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

PRICE BID (COVER-II)

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

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

PROJECT INFORMATION

The site of power plant is approximately 240 KM from Tripoli and located adjacent to Main highway going to Nalut.

The site conditions are as follows :-

1. Ambient Temperature : 1 deg. To 48 deg. C
2. Altitude : 248.5 m above MSL
3. Wind velocity (Max.) : 100 Km/ Hr, Stack – 150 Km/Hr
4. R. Humidity : 60 %

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.
- 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 at once 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.

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

- 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 thereof 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.
- 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 month wise and category wise 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

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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 , 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 Rs. 10 lakhs (: 10% of the contract value.
- (b). In case of work costing above Rs 10 lakhs and upto Rs 50 lakhs : Rs. 1 Lakh + 7.5 % of the amount exceeding Rs. 10 Lakhs.
- (c). In case of work costing more than Rs 50 lakhs : Rs. 4 Lakhs + 5 % of the amount exceeding Rs. 50 Lakhs.
- 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 :-

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

- (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) Local cheques of scheduled banks, subject to realization.
- d) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc.
(Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).
- 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) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act . The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.
- 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 + 1 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 realized 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 fulfill 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.

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, Site 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, structural, electrical 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 thereof.
- 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 fulfill 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.

- a. Contractor to appraise himself of latest Libyan Laws before quoting including Libyan Administrative Contract Regulations. GCC of owner GECOL / Libyan Govt. is also enclosed for general compliance.
- b. The contractor shall indemnify and hold harmless BHEL against any damages, claims, that BHEL is liable to pay , and suits, legal proceedings that may have to be defended by BHEL, on account of breach of any local law by the contractor .

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,

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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 its 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/ International standard
 - (b) Safety Belts conforming to IS-3521/ International standard
 - (c) Safety shoes conforming to IS-1989/ International standard
 - (d) Eye & Face Protection devices conforming to IS-8520 and IS-8940/ International standard
 - (e) Hand & body protection devices conforming to IS-2573, IS-6994, IS-8807 & IS-8519. / International standards
- 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, its 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 energized 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.

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

- 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 lumbars 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

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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 contractor 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 Strikes and Lockouts are banned in Libya. Contractor shall be solely responsible and bear all consequences resulting from such act by his personnel.
- 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, War, Riots, Civil Commotion, 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

The Contractor shall guarantee the soundness of works under the contract and their proper execution and operability in achieving the full relevant purpose for a period of 12 months from the date of provisional take-over by the Owner M/s GECOL. If any defect, default or deficiency transpires therein, the Contractor shall remedy or start the same within one week from being notified thereof, otherwise, BHEL may carry out the same at the risk & cost of Contractor with BHEL overheads without any prejudice to the rights of the BHEL to compensation. Additionally contractor shall maintain, at site, a group of one supervisor and two technicians during the guarantee period within the lump sum contract price.

33.0 ARBITRATION :

The contract shall be governed by and interpreted in accordance with the Laws of India. Any dispute or claim arising out of or in connection with the contract shall be settled in accordance with the provisions of the Arbitration and Conciliation Act, 1996, of India and the rules made there under. Unless the parties mutually agree on a sole Arbitrator, the arbitration shall be by a Tribunal consisting of three Arbitrators. Each party will appoint one Arbitrator, and the two arbitrators so appointed by the parties, shall appoint the third arbitrator. The venue of the arbitration shall be New Delhi. The arbitration shall be conducted in English. The award to be given by the arbitration shall be a speaking award.”

--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.

ANALYSIS OF SIMILAR JOBS EXECUTED / IN PROGRESS

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

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

(SIGNATURE OF TENDERER)
WITH STAMP

MONTHWISE MANPOWER DEPLOYMENT PLAN

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

(SIGNATURE OF TENDERER)
WITH STAMP

(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
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(B) MONTHWISE T& P DEPLOYMENT PLAN

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

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.

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. Month wise & Category wise manpower deployment plan as per Clause 11.4 (in the format as per Annexure-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 month wise deployment plan as per clause 11.7 (in the format as per Annexure-D) Yes/No
15. Analysis of unit rate quoted as per Clause 11.8

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

(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.

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 - 201301, (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 notwithstanding 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 in force 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 Name . _____

)

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.

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.

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.----- dated-----) 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. The contract shall be governed by and interpreted in accordance with the Laws of India. Any dispute or claim arising out of or in connection with the contract shall be settled in accordance with the provisions of the Arbitration and Conciliation Act, 1996, of India and the rules made there under. Unless the parties mutually agree on a sole Arbitrator, the arbitration shall be by a Tribunal consisting of three Arbitrators. Each party will appoint one Arbitrator, and the two arbitrators so appointed by the parties, shall

appoint the third arbitrator. The venue of the arbitration shall be New Delhi. The arbitration shall be conducted in English. The award to be given by the arbitration shall be a speaking award.”

16. 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.

17. 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)

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)

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

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 Supervisor - Designate one safety

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 cumulative 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

- 4.1.1 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 - In charge 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

RELEVANT IS – CODES FOR PERSONAL PROTECTION

IS: 2925-1984 /International Standard	Industrial Safety Helmets
IS: 4770-1968/International Standard purposes	Rubber gloves for electrical purposes
IS: 6994, 1973 (Part-I) /International (Leather & Cotton	Standard Industrial Safety Gloves
	Gloves)
IS: 1989-1986 (Part I & III) /International shoes	Standard Leather safety boots and shoes
IS: 3738-1975/International Standard	Rubber knee boots
IS: 5557-1969/International Standard boots	Industrial and Safety rubber knee boots
IS: 6519-1971/International Standard care and repair	Code of practice for selections, of Safety footwear
IS: 11226-1985/International Standard	Leather Safety footwear having direct moulding sole
IS: 5983-1978/International Standard	Eye protectors
IS: 9167-1979/International Standard	Ear protectors
IS: 3521-1983/International Standard	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	PROCEDURE/	CODE	OF
PERFORMING FUNCTIONS	AUDIT		
DESCRIPTION W.I/ GUIDELIES	CONFOR-		
FUNCTION	MANCE	PERFOR-	CHECK- APPRO-
CUSTOMER		MER	ER VER
REVIEW AUDIT			
REQUIREMENT			

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: Shields

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 COMPLIANCE REPORT (Contd.3/6)

ITEM	YES	NO	REMARKS	ACTION
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				
MACHINERY, TOOLS AND EQUIPMENT				
Proper instruction				
Safety devices				
Proper cords				
Inspection and maintenance				
Other				
VECHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Other				

MONTHLY HSE CHECKLIST CUM COMPLIANCE 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

ENVIRONMENT

Chemical and other Effluents properly disposed

Cleaning liquid of pipes disposed off properly

Water used for hydro testing 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:
CONTRACTOR

SIGNATURE OF
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 PRACTITIONER, 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

To: SITE-IN-CHARGE, BHEL

Safety Officer/Resident Engineer
 (Signature & Name)
 1 COPY

SPECIAL CONDITIONS OF CONTRACT

SECTION-III PART `A`

INDEX

Clause	Description
34.	General
35.	Preliminary work
36.	Civil works, foundation and grouting
37.	Consumables
38.	Tools & Plants / IMTE's
39.	Supervisory Staff & Workmen
40.	Material handling and storage
41.	Preservation of components
42.	Cleaning of equipment
43.	Erection
44.	Welding HT, RG & NDT
45.	Testing, Pre - Commg., Commg. & Post - Commg.
46.	Finish Painting
47.	Progress reporting
48.	Drawings & documents
49.	Income tax & sales tax
50.	Extra work
51.	Price escalation
52.	Rate schedule
53.	Instructions to tenderers

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 9001-2000, 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. The 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. 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.
- 39.10 For the Statutory Requirement of employment to local skilled and unskilled personnel refer to the Special Conditions of Contract.**

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 N₂ gas if required will be provided by BHEL free of cost & filling etc. will be arranged by the contractor with in the accepted rates for transformer erection & commissioning.

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 by 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 value, 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 CO₂ system complete in all respects, including CO₂ 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 possess 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 radiographed. 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 Libyan 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 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.
- 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 Polyimide Polyurethane 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 **except paints which will be supplied by BHEL free of cost** . 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.

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

- 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 **INCOME TAX**, as applicable shall be deducted at source at prevailing rates from the gross value of bills as per tax law, rules and notification issued from time to time by Central Govt. of India
- 49.2 **TAXES, LEVIES, CHARGES etc.** :- All payments to Contractor in Libya will be made after deduction of necessary levies, charges, taxes, etc., as required under Libyan Laws.
- 49.3 **CUSTOM DUTY:** - BHEL / OWNER shall incur customs duties and any other fees and charges due under the Customs law and Regulations issued with respect to the importation of goods or their entry (Plant Material) as related to the execution of this CONTRACT.

50.0 EXTRA WORK:

- 50.1 BHEL may consider for payment of extra works on manhour basis @ Rs.200 (Rupees two hundred 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

The contract price shall not be subject to any variation on any account during the entire period / extended period of the contract. No escalation / price variation claim will be accepted.

52.0 RATE SCHEDULE

- 52.1 The bidders are required to quote their rate inclusive of all taxes / duties applicable for this work.
- 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-familiarisation of site conditions. Once the tenderer has quoted for the work, it is implied that he has ascertained various site condition and NO CLAIM whatsoever will be entertained by BHEL on any such account.**
- 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.
- 53.5 Tenderers who wish to visit Libya to collect any information in respect of this tender, may send the details of personnel along with copies of their passport in the soft form to facilitate arrangement of Visas. The details should be sent within 7 – 10 days of issue of NIT.

SPECIAL CONDITIONS OF CONTRACT

SECTION – III, PART-B

INDEX

54	Scope of Work – Section - III
55	Scope – Mechanical Package (B-I)
56	Scope – Electrical & C&I Package (B-II)
57	Erection
58	Testing, Pre-commissioning Commissioning & Post Commissioning
59	Special Conditions of Contract for LIBYA
60	Facilities to be provided by BHEL / Contractor
61	Time Schedule
62	Over run
63	Terms of payment
64	Liquidated Damages
65	Security Deposits
66	Others

SECTION – III B

54.0 SCOPE OF WORK

BHEL has been awarded the work of Design, Manufacture, supply, installation, erection & commissioning of 2 X 157 MW Gas Turbine Station including Main Gas Turbine Unit , Gas Turbine Auxiliaries , Balance of Plant , Inter Connecting Piping , Electrical and C+I Auxiliaries at EXISTING WESTERN MOUNTAIN GAS TURBINE EXTENSION POWER STATION , RUWAIS, LIBYA. In continuation of existing four operational Gas turbines supplied and erected by BHEL.

The scope of work under this tender consists of

- Taking delivery of the Plant Material from the project storage yard / stores / sheds to erection site
- 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, completion of all jobs required for PAC & FAC and stabilization of the unit.

Unit trial operation, resolving any deficiencies observed and handing over of units at **WESTERN MOUNTAIN GAS TURBINE EXTENSION POWER STATION, RUWAIS, LIBYA**

Note: The Contractor under this contract shall also provide services of five skilled workers for exclusive use of BHEL for the entire contract period including grace period within the quoted rates.

55.0 SECTION –III (B-I)

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 and any work related to interconnection , setting and adjustment/modification with existing units for which no compensation will be payable and contractor shall complete the entire work as detailed in tender specifications within finally accepted rates / prices.

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) with Hoods
- 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 and Auxiliaries.
- 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

REPAIR/REPLACEMENT OF EXISTING GT-3 EXHAUST STACK SILENCERS

POWER CONTROL CENTRE:

The PCC consists of 3 nos. containers weighing approx 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 .

INLET AIR FILTER:

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

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.

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.

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.

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.

Compressor Inlet

It comprises of outer cone and inner cone.

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:

- Compressor with accessories e.g. air filters, silencer, drier, oil & oil separating tank etc.
- Air receiver
- Electricals and C & I equipment
- Field cabling within system equipment
- 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.

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.

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.

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, clad 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.

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.

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.

REPAIR/REPLACEMENT OF SILENCERS OF GT – 3 OF EXISTING

PLANT

– In addition to above works , silencers of existing GT – 3 are required to be repaired/replaced and reinstalled within the lump sum contract price. All required material for rectification shall be provided by BHEL.

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:

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

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

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.

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.

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.

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.

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

FIN FAN COOLER

A Fin-Fan 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:

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

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

Header/Water 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.

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.

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.

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.

Control Panel: This is an essential component to take care of controlling the operation of Fin –Fan Cooler. This also houses the different type of switching elements and cabling

VAPOUR EVACUATION SYSTEM

Functional Description

This system has been envisaged for evacuation of Cumbustor hoods, provided for the upper part of the gas turbine combustion chambers, inside the gas turbine building. It also serves the purpose of removal of waste heat from the cumbustor hood.

Supply of the components to meet this functional requirements and these are broadly given below.

Air Handing Unit.

Dampers

Cables, cable accessories (tray, support, gland etc).

Control system

System description

To ensure a negative pressure, the enclosures are exhausted by fan (one in operation and one as stand-by). The hoods are supplied with air taken from the gas turbine house are supplied with outside air. The air flows into the hood through an opening and a supply air duct leaves the hood through a flexible compensator and damper. One end of flexible compensator is clamped with end of combustor hood. The exhaust dampers are opened with electric actuator. The connection of the hood between the exhaust damper and the exhaust air duct shall be joined by means of flexible connections.

The 2 x 100 % fans are of heavy duty centrifugal type are to be installed above the Pipe rack behind the GT Hall . In the suction side a hand actuated damper is installed for maintenance & repair and a self acting non-return damper to ensure automatic switch – over.

The system shall be operated continuously and for long term shut down, the system will be switched off manually from the local control panel.

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 vapour evacuation duct of left combustion chamber hood (3 Nos. each) 15/16 UMB
- Detectors inside vapour evacuation duct of right combustion chamber hood (3 Nos. each) 15/16 UMB
- Detectors on fuel oil skid (2 Nos. each) 15/16 UMB
- Fuel gas - final gas final filter (2 Nos. each) 15/16 UMB

CO₂ Fire Fighting System for GT (Comb. Chamber)

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 CO₂ triggering to prevent and fight fires actively. Fixed CO₂ 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. Top of the combustion chambers is totally enclosed in an octagonal metal sheet enclosure. This enclosure is being continuously ventilated by Vapor Evacuation System. Inside the PCC (Power Control Center, only fire detection system is used).

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 CO₂ as follows:

Manual Overrides

Manual initiation of CO₂ gas release is possible from the fire alarm panel, combustion chambers and from cylinder locations. Manual interruption of CO₂ 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.

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.

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.

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.).

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 both the 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 .

GAS TURBINE INSULATION

Gas Turbine is thermally and acoustically 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

MAIN GENERATOR

The Main Gas Turbine Generator is Air Cooled having Coolers which carry DM Water . 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

- a) Generator Stator
- b) Generator Rotor
- c) Cooler Housing Assembly
- d) Bearing Shells
- e) End Shields
- f) Brush Gear assembly
- g) Expansion Tank

GENERATOR COOLING WATER SYSTEM

The Generator cooling water system consists of Cooling water Pumps which circulate the DM Water from the Generator to the Fin Fan Coolers . The system also consists of a DM Makeup System which has pumping units and an Expansion tank . The system also has a Dozing System . The system is fully automatic and has field instruments to complete the automation.

FUEL OIL SYSTEM

Extension of the following existing system with one no. additional fuel forwarding skid with associated piping , valves , electrical systems e.g. cabling , cable trays etc. and C & I system etc. including cutting , welding , tap off.

Additional fuel forwarding pump skid will comprise one number forwarding pump with motor and other accessories like valves, instruments etc. Piping of the skid will be terminated at terminal flange connection. Cables will be terminated in skid junction box. Suction and discharge piping of the skid will be connected to piping network within fuel oil pump house. Wiring between MCC Panel and field instrument / Motor will be done at site.

The component of the EXISTING FUEL OIL SYSTEM are mostly skid based and are described in the following section

Fuel Oil Forwarding Skid

This consists of 2 skids containing in the unloading station, 5 x 75 m³/hr 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

1 Discharge Filter Station

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

2 Drain Oil Station

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

3 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 .

4 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 .

FUEL GAS SYSTEM

Extension of the existing system with tap off by providing Tee Connection after Existing Water Bath Heaters discharge header, piping , valves , electrical and C & I system etc. including cutting , welding , tap off.

This consists of following additional Gas Skids interconnected by Piping :

1. Gas Pressure reducing Station (3 X 50 %)
2. GT Gas Flow metering for each GT
3. Final Gas Filter Separator and motorized isolation & vent valve for each GT
4. Common drain Collecting System Capacity 1 Cu. M. (1 no.)
5. Nitrogen Let Down Skid - One no.

6. Replacement of Existing 16' size Turbine Type Flow Meter with 20" size Turbine Type Flow Meter with required modification in inlet & Outlet pipe
7. BOM as below for gas field piping

Description	Quantity required
Tap off / Tee Connection (reducing Tee ANSI B 16.9) Size 16"-16"-12" ; Standard ASTM A 234WPB	1 no.
Pipe 300 NB Sch 30 (12"/ ANSI 300) ASTM A 106 Gr B	15 meter
Elbows 12"; 90 ° long radius ANSI B 16.9 Standard ASTM A 234 WPB / ANSI 300	4 nos.
Pipe 350 NB Sch 30 (14"/ ANSI 300) ASTM A 106 Gr B / 355.6 x 9.53 mm	300 meter
Elbows 14"; 90 ° long radius ANSI B 16.9 Standard ASTM A 234 WPB / ANSI 300	16 nos.
Reducing Tee Size 14"-14"-10" Standard ASTM A 234WPB/ ANSI 300	1 no.
Eccentric Reducer 14"-10" Standard ASTM A 234WPB/ ANSI 300	1 no
Pipe 250 NB Sch 30 (10"/ ANSI 300) ASTM A 106 Gr B / 273.1 x 7.8 mm	60 meter
Elbows 10"; 90 ° long radius ANSI B 16.9 Standard ASTM W 234 WPB / ANSI 300	5 nos.
Elbows 10"; 45 ° long radius ANSI B 16.9 Standard ASTM W 234 WPB / ANSI 300	4 nos.
Stainless Steel Piping, fittings as below (after final filter to GT inlet)	
Pipe 10" Sch 30; ASTM A 316	70 m
Elbows 10"; 90 ° long radius ANSI B 16.9 Standard ASTM A 403 WP316	8 nos.
Elbows 10"; 45 ° long radius ANSI B 16.9 Standard ASTM A 403 WP 316	2 nos.
10"-6" Concentric Reducer ANSI B 16.9 Standard ASTM A 403 WP 316	2 nos.
Flange 6" Sch 30 ASTM A 182 Gr F 316L	2 nos.
Vent and drain piping/ fittings/ flanges	<ul style="list-style-type: none"> ▪ All vent connection at least 3 m above working platform ▪ Drain piping from final filter to drain tank 1000 litres
Other field piping accessories	
U clamps to support the piping on concrete pedestals / C Channel	70 nos. for 350 NB 20 nos. for 250 NB 4 nos. for 300 NB
Weldolet 1" ASME B 16-25 Sch 80 ASTM A 234 WPB	7 nos.
Ball valve 1" NPT 3000 lbs with thread female	7 nos.

Flange 1" ANSI 300 RF Sch 80 ASTM A 105	7 nos.
Flange 1" ANSI 300 RF Sch 80 ASTM A 105 – Threaded 1" NPT	7 nos.

8. Pre-fabricated pipe spool will be provided for skid piping i.e. pressure reducing skid, flow meter skids and final filter skids. Interconnection pre-fabricated piping within skids will be dispatched separately for transportation purpose and will be assembled at site.
9. Electrical wiring between field instruments and respective control panel will be done.

GAS ANALYSING SYSTEM

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

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 analyser 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.

FIRE FIGHTING SYSTEM :

Extension of the following existing system with additional piping , valves , electrical and C & I system etc. including cutting , welding , tap off including modification /repair/ replacement / rerouting of underground / over ground piping of existing fire fighting system. and servicing of pumps, motors & Diesel engines of existing system. Wrapping and coating of underground piping is also included in the scope of contractor. **The total piping is of the order of 70 MT**

The Existing 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 Pneumatic 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.

c) Fire Fighting System Piping

Most of the piping for the Fire Fighting System is over ground except in places where the piping crosses roads or other such obstacles , the various piping systems are :

- i. Fire Water Main
- ii. Medium Velocity Spray for Fuel Oil tanks , Gas Conditioning Skid , Air Blast Coolers
- iii. Auto High Velocity Spray for Station and Generator Transformers , UAT , Cable Vault s etc
- iv. Auto Medium Velocity Spray, Gas Turbine Auxiliaries e.g. LO Tank , FO Injection Skid etc

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

d) Foam System

The Foam System is envisaged for the Fuel Oil Tanks and the Unloading Area and consists of 1 no. 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 Assembly etc

e) **Fire Detection and Alarm System**

The Fire Detection System consists of Fire Detectors of the following types : Beamic / Ionic / Photo Electric / 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 Back ups are envisaged in the CCR , FWPH , Fire station and the Foam Pump House , with central control in the CCR .

AIR CONDITIONING SYSTEM

Air conditioning of Electrical building with installation of 6 Nos. package type air conditioners of 3 TR capacity each with associated tubing, cabling , electrical , C & I panels etc.

VENTILATION PACKAGE :

The Ventilation Package consists of the following :

Air washer Units : 2 nos. Sheet Metal Air Washer Units comprising of Centrifugal Fan , with Motor , Pumps with motor , dry panel filters , air washer internals , piping , instruments , Control Panel etc

Ducting : The ducting will be supplied in finished Galvanised Steel Sheets (L-Form) which will have to be assembled/diamond prepared/reinforced from inside at site complete with hangers , supports The total quantity of 18G / 20G / 22G / 24 G sheets of approx 3000 M2 . In addition about 400 M2 will be supplied in sheets , to be fabricated at site for site changes . Thermal Insulation and sheeting (including of supply and return air duct with finish is to be applied for 600 M2.

Roof Extractor Fans : 8 nos. Axial Flow Roof Extractor units with hood , disconnection switch and all accessories .

Modification/repair work in the existing ventilation duct, insulation, sheeting etc in Existing Units air washers 3, 4 for as required for extension units : Approx. 100 M2..

Removal and rerouting of cables, trays of air washer 3, 4 as required for extension units.

COMPRESSED AIR SYSTEM :

Extension of the following existing system with additional piping , valves , electrical and C & I system etc. including cutting , welding , tap off for removal , rerouting of existing piping .

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

The Existing Compressed Air System consists of 3 nos. , 240CMH Air Cooled Package air Compressors (skid mounted) , 3 nos. Air Receivers and associated Piping along with drains , traps and vents .

WATER SYSTEM :

Extension of the existing system with following additional skid pumps , piping , valves, replacement of acid tank, electrical and C & I system etc. including cutting , welding , tap off for removal , rerouting of existing piping .

RO System:

One no. new R O Module will be provided

Softening System :

No new skid envisaged.

Drinking Water System :

No new skid envisaged.

DM Water System:

New Mixed Bed Exchanger and Blower , Regen / Measuring Tank and ejectors .

The Interconnecting Piping consists of Rubber lined / SS piping of 50 to 200 NB sizes . The total weight of system is Approx. 5 MT .

EFFLUENT TREATMENT SYSTEM :

Extension of the following existing system from Unit-5 and 6 transformers, GT Hall through provision of pumps, piping etc

The existing 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 3 nos. Pumps , valves , Strainers , Stirrers , Level Switches , Control Panels etc

The extension piping envisaged under this package is approx 0.75 km of 40 NB pipes and the pipes are mostly over ground except at road crossings .

LP PIPING :

The following Piping is envisaged under the LP piping System :

- a) CS/GI Piping for Soft Water System :
- The total piping under this group is approx. 5 MT inclusive of bends and fittings and shall have to be threaded and welded at site.
- b) GI Piping for Drinking Water and Air System:
- o The total piping under this group is approx 3 MT and shall have to be welded at Site
- c) SS piping for DM Water System:
- o The total piping under this group is approx 2 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.

CRANES :

- a) Extension of rails and DSL Length of approx. 70 m for existing 10.7 M Span Double Girder Crane already installed in the GT Hall. . DSL weighs about 2 MT
- b) Extension of already existing 1 no. 6.5 T crane in GT Hall for GT lub. oil pump handling by 78 M of PVC Shrouded Down Shop Lead Arrangement.
- c) 4.5 T Under Slung Crane of 2.6 m span in GT Hall for Generator Coolers - 2 Nos.

EMERGENCY DG SET – 1 NO

The 1 MVA EDG mainly consists of the following:

a) EDG Skid

The main Diesel Engine and the alternator are mounted on the Common Base Frame along with the Flexible Coupling. The Exhaust Gas Silencer and intermediate ducts connects the Engine Exhaust to the Chimney . The charge air Ducting is also included .

b) DG Auxiliaries

The DG Auxiliaries for the starting System consists of electric Batteries and charger.

- c) The Fuel Oil system consists of Fuel Unit , HSD Transfer Pump Unit , HSD Day Tank etc .

The Water system consists of Maintenance day tank , Radiator and miscellaneous pumps .

d) Exhaust

The Exhaust duct consists of assembly of silencer shells ,supporting structure and platforms and is to be welded / bolted at site . Insulation and cladding on the Exhaust duct is to be applied

e) Piping

The Piping consists of Carbon Steel and stainless steel piping of various sizes varying from 15 to 200 NB but mostly as 50 NB along with fittings and accessories . All pipes below 50 NB are to be TIG welded and for higher size pipes , root has to be TIG welded . Fuel oil and lub oil lines shall be cleaned by acid pickling before being put in use .

f) Electrical System

The electrical system consists of the 12 V Battery and Charger , Main PCC , DG Control Panel , AC and Power DB. Cabling consists of erection of cable trays 300 meters and laying of HT , LT power , control and signal cabling among the various auxiliaries . LPB , Junction Boxes and other miscellaneous items are also to be installed

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573
SECTION –III (B-II)

56. 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 leveling 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 **2 X 157 MW units at Western Mountain Gas turbine Extension Power Plant , Libya**

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 / GECOL.

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 values 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.

EHV SYSTEM :

The EHV System comprises of 400 kV , 220 kV and 66 kV cables , Porcelain Insulators for Isolating Cable termination , Lightning Arrestors and GI steel Structures for Installation of the Equipments for connecting the Generator Transformer and Station Transformer to the Switchyard.

POWER TRANSFORMERS :

2 Nos. Generator Transformer of 148 MVA , 440/15.75 kV , Star Delta , OFAF with On Load Tap Changer . The shipping weight of the Nitrogen filled Tank is about 115 MT and the quantity of oil for the first fill is approx 52000 L . The weight of the accessories is approx 30 MT . The approx tank dimensions is 7100 x 3750 x 3800 mm and the overall dimensions is 13800 x 7700 x 9200 mm .

2 nos. Unit Auxiliary Transformer of 6300 KVA , 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 approx 3000 L . The weight of the accessories is approx 6 MT . The approx tank dimensions is 3900 x 3200 x 3200. and the overall dimensions is 3900 x 3200 x 3200mm

Isolated Phase Bus duct :

2 nos. 15.75 kV , 8000 A , Al Conductor , Al Alloy Enclosure Bus duct . The Bus duct connects Gen Transformer to the Generator and has Tap Off for 1 no. UAT , LAVT and NG Cubicle . In the Neutral Side , the Star Formation 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 65 m , 25 m , 1.5 m respectively . The conductor section in the Main Run is Box Channel 254 mm A/F , 13.81 mm thick and that of Tap Off is 114.3 OD , 8.56 mm thick . The duct diameters for Main and Tap Off is 876 mm , 6.35 mm thick and 680 mm , 4.78 mm thick. The total number of welded joints (butt and flexible) on the Main Run and Tap Off are 45 nos. and 20 nos. respectively .The approx weights of the supporting structure is 20 MT . In addition there is 1 set of 2 nos. LAVT having dimensions 1850 mm x 800 mm x 1550 mm and having weight of 1.5 MT each . Total nos. of CTs envisaged is 40 nos. and nos. of VTs is 3 . 1 no. NG Cubicle consisting of 1 no. NGT and 1 no. 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 bus duct .

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

6.6 kV SWITCHGEAR :

6.6 kV Switchgear System consists of One board consisting of 5 panels (Breakers) (4 New + 1 Spare)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 approx 1.5 MT and panels will be shipped in sections of 2-3 panels

LT SWITCHGEAR

S. No	Item	Quantity No.	Approx. Weight (KG)	Approx. Overall Dimension (mm)
1	STATION PCC-3	1	10800	10500 x 1754 x 2550
2	EMERGENCY PCC	1	9700	6000 x 1754 x 2550
3	HVAC MCC-	1	10500	8000 x 1500 x 2550
4	MISC MCC	1	3000	5260 x 1000 x 2550
5	220 V STATION DCDB	1	2700	1600 x 644 x 2550

NGR :

2 nos. Neutral 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 approx 250 kg . The size of the NGR is 1818 x 685 x 1210 and weighs approx 400 kg . The NGR will be supplied in knocked down condition and is to be assembled at site .

LT SERVICE TRANSFORMERS :

2 nos. Unit Auxiliary Transformer of 2000 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 approx 1500 L . The weight of the accessories is approx 2.50 MT . The approx tank dimensions are 2500 x 1750 x 2500 mm

LT SEGREGATED PHASE BUSDUCT :

400 V , Al conductor , Al Alloy Enclosure Bus duct 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, JB's, 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 .

Bus duct Rated 3200 A – 2 sets

LOCAL PUSH BUTTON STATIONS AND STARTERS :

50 nos. LPBs and 30 nos. Local starters are envisaged

UPS SYSTEM :

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

The UPS System consists of 2 X 20 KVA UPS with bypass equipment and 1 no. of ACDB (with 20 feeders) and cables between UPS and Battery / ACDB. sets of 220 V UPS and 220 V Lead Acid batteries .

2 X Plante Type Battery , with 2.5 hours back –up , for above UPS system. .

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	E C B	1	3000	1000	2345	1000
2	Transducer panel	1	1500	800	2415	1000
3	Annunciation panel	1	2000	800	2415	800
	Tariff Metering Panel	1	2295	810	800	250

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 Auxiliaries . The PCC is supplied in 3 sections , which will be erected and assembled mechanically by the mechanical contractor .. The Panels are supplied installed in the PCC and consists of the following systems :

6.6 kV Switchgear

6.6 kV/ 400 V Dry Type Transformers

400 V Switchgear

220 V DCDB

220 V Battery and Chargers

240V DC-DC Converters

SFC and SEE Panels

Gen , GT , UAT Protection and Metering Panels

Turbine Control Panels

Time synchronization with existing PCC and extension PCC ; installation of two nos. GPS antenna including network cabling between existing four units PCC and extension two units PCC.

Control wiring between existing PCC (1st unit PCC) with extension PCC (5th unit) to be done for balance of plant common system i.e. fuel oil system and fuel gas system.

Automatic Grid Control interface with the switch yard.

Installation of turbine flow computer and its panel in PCC pertaining to fuel gas 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	15	25
Differential / Temperature Gauges	15	25
Differential / Pressure Switches	15	25
Differential / Temperature Switches		10
Differential / Pressure Transmitters	20	25
Limit Switches	15	15
RTDs		10
Thermocouples		15
Vibration Sensors		10
Speed Probes		5
Flame Detectors		4
Position Transmitters	10	
Junction Boxes		10

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:

Extension of following existing Communication System consisting of the following systems:

- a) 25 Nos. Telephone instruments along with associated cable for hook up to spare subscriber lines in EXISTING 500 line **Telephone Exchange**
- b) **PA System** : Extension of existing system by providing approx 6 nos. loud speakers which consists of 3 nos operator console , cabinet for recorder ,amplifier etc and approx. 20 loudspeakers in the field . The cabinet size is 750 x 750 x 1500 mm

- c) **CCTV System** : 8 nos. cameras are to be installed in the plant along with the power supplies and to be hooked up with cabling to Existing System Cabinet
- d) **Master Clock System** : Slave clocks 6 Nos. **with interconnection** cables between slave clocks and Power supply cables (Approx. 500 M) for slave clocks.

OVER GROUND EARTHING :

The Over ground Earthing is by Stranded Bare Conductor . The total quantity of Bare Conductor of various sizes being supplied is approx 5 KM . The conductors are to be joined by Thermo welding , for which sufficient kits will be supplied .

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)	--	4 nos
50 KVA Transformer for above LDB	--	4 nos.
DC LDB Inverter (5 KVA)	--	1 no.
Lighting Panels (AC + DC)	--	24 nos
Lighting Fixtures (AC + DC)	--	800 nos
Receptacles	--	100 nos
Street Lighting Poles	--	60 nos
Emergency Lighting Units	--	5 nos
Ceiling Fans	--	5 nos
Switch Board for Local Control	--	125 nos
Junction Boxes	--	950 nos.
GI Conduit	--	15 KM
Epoxy Coated conduit	--	2 KM
Wires (1 core)	--	35 KM
Earthing Wire	--	20 KM
Structural steel	--	8 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 2000 m and 200 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 5 kms and is of Ladder Type . Also included are various bends, reducers and Tees. For the EHV System , 3 kms. of Aluminum/GI Trays are envisaged .

CABLE LAYING :

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

For Main Plant

400 kV Cable	--	4.5 KM
6.6 kV Cable	--	4 KM
LT Power Cables	--	25 KM
LT Control Cables	--	35 KM
Signal cables	--	8 KM

For Gas Turbine Systems:

LT Power Cables	--	32 KM
Signal cables	--	42 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. 100 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 150 sq mtr.

LIGHTENING PROTECTION SYSTEM

This system consists of 6 nos. surge arresters and is applicable for the GT Hall Building , and associated plants , other buildings and structures .

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 :

1 Pipe Mast For Transformer Yard	:	GI Pipe	Nb 139.7, 8.22 Mtrs high
2 Vertical Air Termination	:	Copper rod	Dia 16 MM , 1000 Mtrs long
3 Horizontal Air Connection	:	Tinned Copper Strip	25 X 3 mm
4 Down Conductor	:	Tinned Copper strip	25X 3 mm
5 Test Link	:	Tinned Copper Strip	150 X 25 x 3 mm
6 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 : 6651 and 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.

- 56.7 The customer GECOL 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.
- 56.8 Contractor shall plan and transport equipment / components from storage yard sheds to erection site and erect them in such a manner and in a sequence that material accumulation at site should not lead to congestion. Contractor shall plan activities considering plying of his vehicles on ring road also. Materials shall be stacked neatly, preserved and stored in the contractor's shed and work areas in an orderly manner. If required, the contractor shall arrange shifting of surplus material expeditiously failing which the same will be arranged by BHEL at contractor's risk and cost.

57 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, 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 , Bus duct , LAVT , NG Cubicle etc , alignment of total bus duct 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 Bus duct .

Painting of Bus duct as approved by BHEL Engineer .

(C) SEGREGATED PHASE BUSDUCT:

Foundation checking and carrying out minor modification wherever required, erection of structures, Bus duct sections, and other loose items as per relevant drawings / documents, alignments and jointing by bolting of total Bus duct , 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 Bus duct, earthing of system with main earth conductor / riser.

Painting of Bus duct 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, bus bar & earth bar 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.

(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, bus bar & earth bar 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 (LT MCCs , STRP / GCPs ,ECB etc.)

Erection at site / control room including chipping of floor, fabrication and fixing of base channel frame, leveling & 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 /T clamps 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 and ferrule printing m/c 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/modified 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 , Glands , cable termination kits will be supplied by BHEL . **Wire ferrules of approved category and ferrule printing m/c 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 JB's etc. and the laying of PVC wires in respective conduit as per circuits shown in drawing.

(K) INSTRUMENTATION

GAUGES 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 thermo elements like RTDs & Thermocouples includes erection of thermo wells, wherever required, at no extra cost to BHEL.

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, proximator housings / JB required for respective pick up and calibration / commissioning of pick ups will be included in quoted / accepted item rate of respective pickup.

(L) 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

(M) 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.

(N) JUNCTION BOX, PUSH BUTTONS ETC

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

(O) 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.

(P) 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.

(Q) 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 course of dry 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.
- (e) 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.
- (f) 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 be 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 along with BHEL commissioning Engineer and hence

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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, recalibration 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 FOR LIBYA

1. In case of contradiction between general conditions of contract and special condition of contract, the latter shall prevail.
2. The work under this specification shall be carried out by the Contractor under the umbrella of BHEL /BHEL partner.
3. The Contractor shall arrange Man Power for this work on work visa and the work visa shall be arranged through BHEL's Partner. BHEL's Partner shall make statutory salary payment (applicable as per statutory regulation of Libyan laws) to total of 4375 man months (estimated) of Contractors Workers (Indian as well as Local). This includes 3125 man months from India. The statutory salary payment shall be made by BHEL's Partner to the contractor's manpower @ 250 Libyan Dinars per man month which is inclusive of all taxes, insurance, and other statutory levies. However, 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 after taking into account the statutory salary payment made by BHEL's Partner. It may be noted that statutory salary payment to contractor's manpower shall be limited to 4375 man months as per above details.

At times deployment of workers shall have to be arranged by the contractor on Airport/ Business visa, which shall be within the quoted rates and no extra payment shall be applicable on this account.

4. All personnel engaged for execution of the contract, from India or Libya or any other place, shall be considered as Contractor's employees for the purpose of the meaning of 'Contractor's employees' used anywhere in the tender.
5. 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 or BHEL's Partner, although they will be part of BHEL's umbrella.
6. For the purpose of local laws of LIBYA only, the rules for employees of contractor will be same as applicable to BHEL employees at Libya Project. By this it does not purport that facilities extended to or payment made to the employees directly inducted by BHEL shall become applicable to contractor's employees. Residential accommodation shall be arranged by BHEL through BHEL Partner free of charge. All other facilities / amenities including air-conditioning of rooms, food, medical, transport and maintenance etc shall be taken care of by the contractor for their employees at his own cost.

7. All traveling expenses including air fares etc., within India, airfare from India to Libya 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.
8. Contractor shall arrange at his cost the passports for all his staff and labour duly incorporating the endorsement for Libya. 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.
9. 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.
10. 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 Libya, in event of accident / injury occurs to contractor's employee or any other person / public / property. The contractor shall arrange local insurance policies at Libya in regard to his workmen and 3rd party liabilities as may be required under the laws also.
11. The contractor shall have due regard to all recognized festivals, days of rest and religious or other customs of Libya.
12. 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.

13. T&P and Consumables

Unless otherwise specified in this specification, the contractor shall provide all the T&P and consumable materials required to complete the works at his cost including expenditure incurred for to and fro transportation , custom clearance etc. for these T&Ps. The contractor shall inform to BHEL a list of items to be exported to Libya on repatriable basis prior to shipment. However, Contractor shall be fully responsible for safe custody and return of his T&P in line with Libyan Laws. Since this contract is to be executed under BHEL's umbrella, all the materials of the contractor brought to Libya for execution of this work shall be in the name of BHEL. However, entire responsibility of its shipment, handling of materials, payment of any charges including custom duty etc., custom clearances and transportation arrangement (To & fro) shall be in the scope of contractor at his own cost. BHEL shall provide administrative support only.

14. 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.

15 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.

16. Presentation of Reports / Programmes / Records / Photographs

The contractor shall submit the following reports prior to starting the works.

- a) Work schedule for erection work and temporary works.
- b) Organization for the site work with brief personal history of each staff member.
The details of personnel for arranging VISA shall be submitted within 7 – 10 days of the LOI for processing for issue of VISAs. For subsequent deputation, the list with all relevant details shall be given well in advance for processing issue of VISAs.
- c) Proposed T&P deployment list and monthly plan for the same.
- d) Expected monthly programme for required labour deployment.
- e) List of all personnel employed for site work.
- f) Proof of qualification or certificates for welders and other specific labour (welders employed on any work under this contract, either at works or on site, shall be qualified in accordance with A.S.M.E.
- g) Boiler and pressure vessel code section IX. "Welding qualification".

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

The Erection contractor shall confirm that he will comply with this requirement and the certificates of competence shall be produced during the contract stage. No welder will be allowed to work under this contract if he does not possess above certificate.

Should such qualified welder and labour be changed, the contractor shall notify BHEL in writing and get approval in prior.

- h) Erection procedure and strength calculation for heavy materials and equipments lifting etc., including details of T&P to be deployed for the same.
- i) Insulation resistance tests.
- j) Sequence and function tests.
- k) Calibration and adjusting records of instruments.
- l) Other records, if any, as considered necessary by the `Engineer`.

17 Photographs

Contractor shall duly submit with every monthly progress report, six (6) sets of colour digital photographs (in post card size) along with 2 sets of CDs for the respective area of work done during the month of reporting including photographs for key events etc. The contractor shall also arrange for copies of photographs in bigger sizes as and when required.

18. Organizing for erection works

- 1) 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.

19. The contractor shall supply necessary numbers of qualified welders to execute erection works.

20. 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.

21. Site Facilities

- a. Limited space for Site Office shall be made available by BHEL. Water for construction and testing purpose shall also be made available at the site at one terminal point free of charge. Subsequent distribution including supply of items for the same shall be the responsibility of contractor. Electric power for construction and Site office shall also be made

available free of charge at the site terminal points. Subsequent distribution including supply of items for the same shall be the responsibility of contractor.

- b. The contractor shall make all necessary arrangements for all temporary storage, distribution and drainage of water as well as provide all necessary arrangements for the distribution of lighting and power for the proper execution and security of the work including temporary wiring, fittings and portable power generating units, where local power supply does not exist.
- c. The contractor shall install and maintain the temporary work as necessary and remove it and make good on completion.

22. Ensuring Safety:

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 supply the requisite safety precautions and any delays attributed to the work stoppage shall not affect the agreed contractual finishing dates.

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

Non adherence of safety requirements may subject to imposition of penalty for which decision of BHEL Engineer shall be final and binding on the contractor.

23. Safety facilities:

The contractor shall install at his own cost the following facilities in order to ensure the safety of the structures installed by the owner on and around the site.

- a) The contractor shall install the facilities necessary to keep safe the structures of the Owner or the third party when the works are executed in the vicinity of these structures.

- b) The walkways on the site, such as catwalks, ladders and temporary bridges, shall be protected and shall be equipped with safety provisions for workers and materials.
- c) Slope protection works, nets, fences and other protection works shall be installed at excavated area and other places where an accident may occur.
- d) The contractor shall in connection with the works provide and maintain at his own cost all lights, guards, fencing, and watching when and where necessary or required by the Engineer or by any duly constituted authority for the protection of the works or for the safety and convenience of the public or others.
- e) The safety guide marks posts, sign etc., indicating falling stones and landslide, traffic sign posts when blasting and other necessary guide posts shall be installed whenever and wherever they are necessary throughout the entire site.
- f) The contractor shall take sufficient measures so as not to cause any danger, hazard or obstruction to the public by installing work sign boards, traffic sign posts, lighting and protection facilities and other necessary safety devices in case the works are executed in the vicinity of the public.
- g) The contractor shall install the road guard facilities.

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

24 Statutory Regulations :

As required under local statutory regulations (Libyan Laws), contractor has to employ local Libyans for this work. The Contractor has also to impart training to local Libyan as per Libyan statutory regulations.

25. 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

26. 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. ”
27. The contractor shall perform any other services although not specified but nevertheless required for the completion of the work.
28. Where it is necessary to provide and/or store petroleum products or petroleum mixture and explosives, 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 Petroleum Act, Explosive Act and Petroleum and Carbide of Calcium manual, published by the Chief Inspectorate of Explosives of India. All such storage shall have prior approvals of the Engineer. In case any approvals are necessary from the Chief Inspector of Explosives or any other statutory authorities, the contractor shall be responsible for obtaining the same. In case of any equivalent laws/rules are in force in Libya, these will supersede the Indian laws/rules.
29. All workmen of the contractor working in construction areas shall wear safety helmets, goggles, hand gloves, safety boots, safety belts etc. All the above safety conditions are not exhaustive but gives an idea for the contractor and the contractor shall adhere to all the safety precautions given by the BHEL Engineer at site. The BHEL Engineer in charge will have the right to stop the work till safety requirements as above are complied with. Failing which the same shall be arranged by BHEL at Contractor's risk and cost.
30. The contractor shall be responsible for the safe storage of his radioactive sources.
31. 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.

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

- 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.
- 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. Refer clause no.50.0 of the contract.
- 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 Libyan Government.

60.0 FACILITIES TO BE PROVIDED BY BHEL/CONTRACTOR

- 60.1 Contractor shall construct sheds, provide all facilities etc., as a part of his scope of work and within the accepted rates. Water for construction purposes will be provided free of cost at one point. Electricity for office and erection work will be provided free of charge at one point from the nearest available construction power transformer / distribution board. Further distribution of water and electricity shall be done by contractor within his quoted prices. The contractor shall dismantle and clear the site after completion of work or as and when required within the accepted rates.
- 60.2 Contractor will be required to arrange adequate facilities for calibration of instruments, relays etc. with proper calibration & test equipments at site within the accepted rates.
- 60.3 Though the contractor will be provided electricity and water free of charges at one point, the contractor shall however ensure that there is no wastage. Periodical audits will be held to ensure that these resources are being optimally used .In case any wastage is observed, BHEL reserves the right to recover any charges /penalty as deemed fit and as decided by BHEL Engineer.
- 60.4 The Contractor shall submit his electrical power requirements to Engineer. Construction power shall be provided at a single point within erection site free of any charge. Further distribution shall be done by contractor at his cost. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply.

- 60.5 Provision of distribution lines of electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the State shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS / Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.
- 60.6 Following points should be strictly adhered to by the contractor while drawing construction power supply from Distribution Board.
- (a) All electrical installations should be as per Libyan / International Electricity rules.
 - (b) All distribution Boards installed by the contractor should be constructed with fire proof materials viz. steel frames, bakelite sheets etc.
 - (c) Connection for single phase should be taken from phase and neutral. No where the connection should be taken with earth as neutral.
 - (d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
 - (e) Contractor have to make their own earthing arrangement for their equipment / DB earthing. Earthing connection have to be done with copper conductor and copper / brass clamps with BHEL's prior permission.
 - (f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
 - (g) Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
 - (h) Contractor should ensure that all the CBs / TPNs / Fuses / MCCB / ELCB cables etc. should be of adequate rating / capacity.
 - (i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected / proposed loads. Contractor will submit a report on all electrical connected load by the 7th of every month.
 - (j) ELCB will be tested once in a week or as deemed fit by BHEL Engineer by actually simulating the earth leakage for all installations and the same

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

shall be recorded by BHEL Engineer in the log book to be maintained by the contractor.

- (k) In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.
- (l) Adequate lighting facilities such as flood lights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.

60.7 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, same will be got done by the Engineer and expenses 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 The contractor is required to commence the work within 30 days from the date of issue of letter of intent unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up zero date of the contract, will be certified by BHEL Engineer after adequate mobilisation of manpower and T&P by the contractor.
- 61.2 **Entire work as detailed in the tender specifications shall be completed within 12 months from the date of start of erection (Zero Date). However, all efforts shall be made to synchronize unit 5, 6 by end July'09 and end Aug'09 respectively.**
- 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 OVER RUN

- 62.1 In case due to reasons not attributable to the contractor, the work gets delayed and the scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of first 3 (Three) months after the contractual completion date. In case the scheduled completion time gets extended beyond 3 (Three) months as stated above, the contractor shall be considered for payment of fixed over run charges, @ Rs. 5,00,000/- per month (Rupees Five Lacs only) on receipt of advance notice intending to claim over run and on fulfillment of following conditions:-

- (a) The reasons for delay in completion of work are not attributable to contractor but however subject to the provisions of clause – 31.
- (b) Contractor achieves the targets fixed during the over run period.

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

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

63.0 TERMS OF PAYMENT

63.1 The Terms of payment shall be as under:-

ADVANCES: - Advance payments shall be made as follows

- i) 5% of the contract value shall be paid as interest bearing advance after issue of LOI and on submission of Bank Guarantee for an amount equal to 1.15 times of advance valid for 12 months initially and thereafter extension for a period up to which the advance is fully adjusted. Out of 5% advance amount, some portion of the advance shall be released in India in INR and balance in Libya in LD as per requirement of the contractor. However, advance in India shall be paid maximum to the extent of 4%.
- ii) Additional interim interest bearing advance can also be made to the contractor for resource augmentation required at site based on certification and recommendation of Site Incharge against matching Bank Guarantee. However, the total unadjusted amount of advance paid {Against (i) and (ii) } shall not exceed 5% of the total contract value at any point of time.
- iii) The amount of advance shall be adjusted @ 10% along with applicable interest from each running bill till its complete recovery. However, the amount of advance paid along with the interest shall be fully recovered by the time the contractor reaches 90% billing of total value of works to be executed.
- iii) The interest chargeable shall be prime lending rate of State bank of India plus 2%.
- iv) The Bank Guarantee shall be released after full adjustment of the entire amount along with interest wherever applicable.

63.2 PROGRESSIVE PAYMENT TOWARDS E/T/C WORKS

63.2.1 The progressive payments limited to 95% of total contract value shall be payable for different stages of erection, commissioning works and demonstration tests for different systems as given in appendix-I.

- 63.2.2 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.
- 63.2.3 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. **Construction Manager, BHEL may, at his discretion, allow Contractor to raise fortnightly bills if the need arises for any reason.** The format for billing shall be approved by BHEL before raising invoices.
- 63.2.4 2.5% of the contract value shall be released on Provisional Take Over by Customer and completion of all pending work, rework wherever required, area cleaning, reconciliation of materials, fulfillment of contractual obligations and on submission and passing of Final bill
- 63.2.5 Balance 2.5% of the contract price / value shall be paid within one month of issue of Final Takeover certificate by GECOL and provided the contractor has submitted to BHEL "No dues certificate" issued by Site Manager and a bank guarantee of 2.5% of the contract price/value. Such bank guarantee shall remain valid for a period of 12 months from the date of provisional taking over certificate.

(a) Currency of Payment and Exchange Rate

(i) Payment IN Indian Rupees(INR)

60% of the Total Contract Price will be paid in INR in India.

(ii) Local Currency Payment(LD)

Balance 40% of the Total Contract Price will be paid in local currency (i.e. Libyan Dinar) in Libya.

Exchange rate from Libyan Dinar to Indian Rupees for the entire period of contract including extended period, if any, shall be One Libyan Dinar = Rs. 38.85, which is the rate applicable as on 28.11.2008.

NOTES:-

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, however, be as detailed under scope of work and Appendix 'F'.
2. All levies, charges, taxes payable in India and Libya will be borne by the Contractor or his Employees as applicable.
3. No interest shall be payable / allowed on Earnest money, security deposit or any money to the contractor, by BHEL.
4. All payments are subject to deductions which BHEL may be authorized to make under the contract.

64.0 LIQUIDATED DAMAGES (LD)

64.1 For delay in completion of work attributable to the contractor, the LD shall be applicable @ 0.1 % of the contract value per day or part thereof subject to a ceiling of 10% of the contract value.

65.0 SECURITY DEPOSIT

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

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

66.0 OTHERS

66.1 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.

66.2 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.

APPENDIX-I

PAYMENT BREAKUP

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	Packag e %	Total %	Group Total %
1	Gas Turbine			2			4.0%		8.00%
			Placement of Gas Turbine		PKG		1.5%	3.0%	
			Placement of Skids		PKG		1.0%	2.0%	
			Placement of Pipes + CC		PKG		1.5%	3.0%	
2	Gas Turbine Generator			2			4.0%		8.00%
			Placement of GTG		PKG		1.5%	3.0%	
			Rotor Insertion		PKG		0.5%	1.0%	
			Cooler Erection		PKG		1.0%	2.0%	
			Alignment of GTG Set		PKG		1.0%	2.0%	
3	Gas Turbine Auxiliaries			2					25.00%
			Inlet Air Filter	2	PKG		3.00%	6.00%	
			Filter Housing		PKG		1.50%		
			Filter System		PKG		1.50%		
			Exhaust Stack	2	PKG		3.00%	6.00%	
			Shell Erection		PKG		1.50%		
			Insulation		PKG		1.50%		
			Air Blast Cooler	2	PKG		1.00%	2.00%	
			Fin Fan Cooler	2	PKG		1.00%	2.00%	
			Vapour Evacuation System	2	PKG		1.00%	2.00%	
			Gas Detection System	2	PKG		0.50%	1.00%	
			Fire Fighting System	2	PKG		0.50%	1.00%	
			Cooling Water System	2	PKG		1.00%	2.00%	
			Gas Turbine Insulation	2	PKG		1.00%	2.00%	
			Ignition Gas system	1	PKG		0.50%	0.50%	

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

	Gas Analyzing System	2	PKG		0.25%	0.50%	
4	Station Mechanical Package						15.00%
	Fire Fighting System	1	PKG		3.00%	3.00%	
	Air Conditioning	1	PKG		0.50%	0.50%	
	Ventilation System	2	PKG		1.00%	2.00%	
	Fuel Oil system	1	PKG		1.50%	1.50%	
	Fuel Gas System	1	PKG		1.00%	1.00%	
	ETP System	1	PKG		1.00%	1.00%	
	EOT Extension and Under Slung Cranes	1	PKG		2.00%	2.00%	
	LP Piping	1	PKG		3.00%	3.00%	
	Water Treatment Plant	1	PKG		1.00%	1.00%	
5	Electrical + C&I Package						35.00%
	Generator Transformer	2	PKG		3.5%	7.00%	
	Unit Auxiliary Transformer	2	PKG		0.5%	1.00%	
	Isolated Phase bus duct	2	PKG		3.0%	6.00%	
	Station 6.6 kV Switchgear	1	PKG		1.00%	1.00%	
	PCC + Gas Turbine Electricals + I&C	2	PKG		2.00%	4.00%	
	LT Auxiliary Transformers	1	PKG		1.00%	1.00%	
	Station LT Switchgear /DCDB	1	PKG		1.00%	1.00%	
	Station UPS	1	PKG		1.00%	1.00%	
	Station Cabling	2	PKG		2.00%	4.00%	
	Master Clock	1	PKG		1.00%	1.00%	
	Station Lighting & lighting protection	1	PKG		3.00%	3.00%	
	Over Ground Earthing	1	PKG		1.00%	1.00%	
	400 KV Cabling & Switch Yard Interface including AGC	2	UNITS		1.00%	2.00%	
	CCTV	1	PKG		1.00%	1.00%	
	Fire Sealing System	1	PKG		1.00%	1.00%	
6	MILE STONES						9.00%

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

	Back Charging Of Generator Transformer # 5				1.00%	1.00%	
	Back Charging Of Generator Transformer # 6				1.00%	1.00%	
	Synchronisation Unit # 5				1.50%	1.50%	
	Synchronisation Unit # 6				1.50%	1.50%	
	Trial run U#5&6	2			1.0%	2.00%	
	PG test U#5&6	2			1.0%	2.00%	

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

ANNEXURE-I

TENTATIVE SUMMARY LIST OF GAS TURBINE PACKAGES (PER SET) FOR 2 X V94.2 GTGs FOR WESTERN MOUNTAIN EXTN. GTPP, LIBYA

Sl.no.	Description	No. of packages	Net wt.	Tentative Gross wt. (KG)	Length(m)	Breadth(m)	Height (m)
1	THERMAL BLOCK GAS TURBINE	2	380000	394000	10.34	4.08	3.93
2	COMBUSTION CHAMBER (RIGHT)	2	47200	60000	7.38	3.75	4.2
3	COMBUSTION CHAMBER (LEFT)	2	47200	60000	7.38	3.75	4.2
4	EXHAUST GAS DIFFUSER	2	12324	20124	6.1	4.7	4.77
5	GENERATOR STATOR	2	404000	404000	8.27	4.54	5.18
6	GENERATOR ROTOR	2	87448	96488	10.72	1.7	1.86
7	GENERATOR TRANSFORMER	2		248000	7.5	3.3	4
	GAS TURBINE - 5						
1	LUBE OIL TANK	1	11500	14690	7	3	4
2	RIGHT SKID	1	3000	6000	10	2	3
3	LEFT SKID	1	4000	7000	10	2	3
4	FRONT RACK	1	1130	1430	3	1	3
5	FUEL GAS PACKAGE	1	2250	3080	3	2	3
6	TURBINE SUPPORT & CENTER GUIDE	1	752	927	2	1	1
7	SUPPORT CENTER GUIDE	1	432	880	2	1	1
8	TURBINE SUPPORT BLOCK	1	477	621	2	1	0
9	COMPRESSOR SUPPORT BLOCK	1	332	412	1	1	0
10	FOUNDATION PARTS OF TURBINE	1	528	658	2	1	1
11	COMBUSTION CHAMBER SUPPORT	1	127	300	1	1	0
12	GRATING FOR COMBUSTION CHAMBER	1	380	580	2	1	1

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

13	PLATFORM AROUND TURBINE	1	941	1412	4	2	2
14	PLATEFORM (AROUND COMBUSTION)	1	2465	3065	4	2	1
15	COMUSTION CHAMBER HOOD	1	2100	3700	5	3	3
16	COMUSTION CHAMBER HOOD	1	1200	1500	4	1	1
17	ANCHORING LUBE OIL TANK	1	163	183	1	1	1
18	LUBE OIL PIPING (GENERATOR)	1	526	1182	5	2	1
19	LUBE OIL PIPING (GENERATOR)	1	177	457	6	1	0
20	LUBE OIL PIPES	1	541	891	3	1	1
21	LUBE OIL COOLER PIPES AND COUN	1	548	898	5	2	2
22	COOLER OIL PIPE & TEMP. CONTROL	1	2000	2800	7	1	1
23	DRAINS LUBE OIL PIPES TURBINE	1	302	672	5	1	1
24	BLOW OFF SYSTEM PIPES	1	65	150	2	0	0
25	BLOW OFF PIPING	1	1535	2575	7	2	1
26	BLOW OFF SYSTEM VALVES	1	800	1245	2	2	1
27	COMBUTION CHAMBERS PIPING &	1	773	1463	6	2	1
28	COOLING AIR,FUEL OIL AND PR.	1	800	1800	5	2	1
29	FUEL OIL, HYDRAULIC OIL, FUEL	1	2318	2834	7	2	1
30	IGNITION GAS AND VENT PIPES	1	279	399	7	0	0
31	INTERMEDIATE SHAFT	1	5885	7110	5	1	1
32	NUTS&BOLTS FOR INTERMEDIATE SH	1	246	251	1	0	0
33	WATER PUMP SEI	1	200	310	2	1	1
34	DRYING DEVICE	1	67	187	1	1	2
35	COMPRESSOR CLEANING AGENT	1	1200	1800	3	2	2
36	FLUSHING OIL EQUIPMENT	1	90	150	1	1	1
37	ELECTRODES	1	100	120	1	1	0
38	NAME PLATES	1	50	100	1	1	1
39	COMMISSIONING SPARES	1	630	780	2	2	2
40	CABLES	1	60	110	1	1	1
41	CABLE CONDUIT DUAL FUEL OPERAT	1	70	160	1	1	1
42	TEMPERATURE MEASUING EQUIPEMEN	1	90	130	3	0	0

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

43	INSTRUMENTS FOR FUEL OIL PIPING	1	40	70	1	1	0
44	TOOL CABINET	1	700	854	2	1	2
45	SPECIAL SPANNER	1	4	17	1	0	0
46	SPECIAL TOOLS	1	40	113	1	1	1
47	WRENCH FOR BALANCING WEIGHTS	1	15	100	2	1	1
48	ASSEMBLY FIXTURE FOR COMPRESSO	1	100	150	2	0	0
49	INTERMEDIATE SHAFT ASSEMBLY DE	1	100	156	1	1	1
50	LIFTING UNIT FOR COMBUSTION CH	1	1160	1360	4	1	1
51	ROTOR LIFTING DEVICE (COMPRESSO	1	180	226	1	1	1
52	ROTOR LIFTING DEVICE (COMPRESSO	1	30	83	1	1	1
53	SPECIAL WRENCHES	1	80	191	1	1	1
54	SPECIAL WRENCHES	1	60	179	1	1	1
55	SPECIAL TOOLS	1	140	220	1	1	1
56	HYDRAULIC TOOLS OF SPECIAL TOO	1	120	274	2	1	2
57	COMBUSTION CHAMBER HOOD	1	2100	3700	5	3	3
58	MISCELLENEUS SITE MOUNTING MAT	1	11	36	1	1	0

GAS TURBINE 6

1	LUBE OIL TANK	1	11500	14690	7	3	4
2	RIGHT SKID	1	3000	6000	10	2	3
3	LEFT SKID	1	4000	7000	10	2	3
4	FRONT RACK	1	1130	1430	3	1	3
5	FUEL GAS PACKAGE	1	2250	3080	3	2	3
6	TURBINE SUPPORT & CENTER GUIDE	1	752	927	2	1	1
7	SUPPORT CENTER GUIDE	1	432	682	2	1	1
8	TURBINE SUPPORT BLOCK	1	477	612	2	1	1
9	COMPRESSOR SUPPORT BLOCK	1	332	412	1	1	0
10	FOUNDATION PARTS OF TURBINE	1	528	658	2	1	1
11	COMBUSTION CHAMBER SUPPORT	1	127	300	1	1	0
12	GRATING FOR COMBUSTION CHAMBER	1	380	580	2	1	1
13	PLATFORM AROUND TURBINE	1	941	1412	4	2	1
14	PLATEFORM (AROUND COMBUSTION)	1	2465	3065	4	2	1

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

15	COMUSTION CHAMBER HOOD	1	2100	3700	5	3	3
16	COMUSTION CHAMBER HOOD	1	1200	1500	4	1	1
17	ANCHORING LUBE OIL TANK	1	163	183	1	1	1
18	LUBE OIL PIPING (GENERATOR)	1	526	1182	5	2	1
19	LUBE OIL PIPING (GENERATOR)	1	177	457	6	1	0
20	LUBE OIL PIPES	1	539	889	3	1	1
21	LUBE OIL COOLER PIPES AND COUN	1	548	898	5	2	2
22	COOLER OIL PIPE & TEMP. CONTROL	1	2000	2800	8	1	1
23	DRAINS LUBE OIL PIPES TURBINE	1	312	646	5	1	1
24	BLOW OFF SYSTEM PIPES	1	65	150	2	0	0
25	BLOW OFF PIPING	1	1535	2575	7	2	1
26	BLOW OFF SYSTEM VALVES	1	800	1245	2	2	1
27	COMBUSTION CHAMBERS PIPING &	1	793	1483	6	2	1
28	COOLING AIR,FUEL OIL PR.	1	800	1800	5	2	1
29	FUEL OIL, HYDRAULIC OIL, FUEL	1	2324	2840	7	2	1
30	ASSY.PARTS FOR ACTUATOR GUIDE	1	62	74	0	0	0
31	ROTOR ATTACHMENT	1	115	205	1	0	0
32	COVER,OIL GUARD RING(COMPRESSO	1	470	579	1	1	1
33	FIXTURE ACTUATOR (STATOR BLADE)	1	365	468	1	1	1
34	CONNECTING ROD	1	49	69	3	0	0
35	ACTUATOR COMBUSTION AIR	1	530	700	2	2	1
36	INTERMEDIATE SHAFT	1	5885	7110	5	1	1
37	NUTS&BOLTS FOR INTERMEDIATE SH	1	246	251	1	0	0
38	THERMAL AND NOISE INSULATION	1	1100	1850	4	2	2
39	DRYING DEVICE	1	67	187	1	1	2
40	COMPRESSOR CLEANING AGENT	1	1200	1800	3	2	2
41	ELECTRODES	1	100	136	1	1	0
42	NAME PLATES	1	50	100	1	1	1
43	ELECTRIC DEVICES FOR COMBUST	1	190	250	2	0	0
44	ELECTRICAL FITTINGS OF FT BEAR	1	52	117	3	1	0

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

45	CABLES	1	60	110	1	1	1
46	CABLE CONDUIT DUAL FUEL OPERAT	1	70	160	1	1	1
47	TEMPERATURE MEASUING EQUIPEMEN	1	90	130	3	0	0
48	INSTRUMENTS FOR FUEL OIL PIPING	1	40	70	1	1	0
49	COMBUSTION CHAMBER HOOD	1	2100	3700	5	3	3
50	ROTOR LIFTING DEVICE	1	3816	4296	9	0	1
51	ROTOR LIFTING DEVICE	1	1060	1310	2	1	2
52	GUIDE BOLTS	1	45	75	2	0	0
53	BOLT HEATER	1	26	46	1	0	0
54	BOLT MEASURING UNIT AND RING	1	480	540	2	1	0
55	SUPPORT BLOCK,ROTOR	1	350	560	2	1	1
56	ROTOR TURNING FIXTURE	1	4092	4542	3	2	2
57	CLAMPING DEVICE	1	1812	1897	1	1	1
58	CLAMPING DEVICE	1	2105	2375	3	2	1
59	LIFTING DEVICE FOR ROTOR PARTS	1	775	950	2	2	1
60	HITCHING EQUIPMENT	1	450	700	2	2	2
61	HITCHING EQUIPMENT	1	160	230	1	1	1
62	MISE SITE MOUNTING C&I MATERIA	1	40	70	3	1	1

GENERATOR-5

1	FOUNDATION PARTS FOR GENERATOR	1	6542	8942	9	1	1
2	EMBEDDED PARTS FOR GENERATOR	1	3144	3900	4	2	1
3	FOUNDATION CONSUMABLES	1	39	89	1	1	1
6	COOLER HOUSING ASSEMBLY	1	9800	10435	8	3	2
7	BEARING SHELLS	1	1430	1670	1	1	1
8	GENERATOR ACCESSORIES-I	1	795	1162	5	2	1
9	GENERATOR ACCESSORIES-II	1	450	810	4	2	1
10	END SHIELD ASSEMBLY (EE)	1	3122	3492	3	2	1
11	DRY AIR BLOWER	1	110	261	2	1	1
12	SUPPORTS FOR COOLER HOUSING	1	400	515	2	1	1
13	END SHIELD ASSEMBLY (TE)	1	3122	3492	3	2	1
14	BRUSH GEAR ASSEMBLY	1	247	397	1	1	1
15	EXPANSION TANK	1	1132	1770	3	2	2

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

16	LIQUID DETECTOR RACK	1	40	90	1	1	1
17	PIPING FOR LIQUID DETECTOR RACK	1	80	100	2	0	0
18	Y-STRAINER	1	500	700	1	1	1
19	LOOSE VALVES FOR GENERATOR AUXILIARIES-I	1	2050	2550	4	1	1
20	LOOSE VALVES FOR GENERATOR AUXILIARIES-II	1	600	800	1	1	1
21	LOOSE INSTRUMENTS FOR GENERATOR AUX.	1	200	350	1	1	1

GENERATOR-6

1	FOUNDATION PARTS FOR GENERATOR	1	6542	8942	9	1	1
2	EMBEDDED PARTS FOR GENERATOR	1	3144	3900	4	2	1
3	FOUNDATION CONSUMABLES	1	39	89	1	1	1
6	COOLER HOUSING ASSEMBLY	1	9800	10435	8	3	2
7	BEARING SHELLS	1	1430	1670	1	1	1
8	GENERATOR ACCESSORIES-I	1	795	1162	5	2	1
9	GENERATOR ACCESSORIES-II	1	450	810	4	2	1
10	END SHIELD ASSEMBLY (EE)	1	3122	3492	3	2	1
11	DRY AIR BLOWER	1	110	261	2	1	1
12	SUPPORTS FOR COOLER HOUSING	1	400	515	2	1	1
13	END SHIELD ASSEMBLY (TE)	1	3122	3492	3	2	1
14	BRUSH GEAR ASSEMBLY	1	247	397	1	1	1
15	EXPANSION TANK	1	1132	1770	3	2	2
16	LIQUID DETECTOR RACK	1	40	90	1	1	1
17	PIPING FOR LIQUID DETECTOR RACK	1	80	100	2	0	0
18	Y-STRAINER	1	500	700	1	1	1
19	LOOSE VALVES FOR GENERATOR AUXILIARIES-I	1	2050	2550	4	1	1
20	LOOSE VALVES FOR GENERATOR AUXILIARIES-II	1	600	800	1	1	1
21	LOOSE INSTRUMENTS FOR GENERATOR AUX.	1	200	350	1	1	1

EDN PACKAGES

1	UPS (2X220KV)	2		1500	5	1	2
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TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

2	ACDB BATTERY	6		500	1	1	2
3	ECB 2 VERT. PANELS	2		1500	1	1	2
4	SLAVE CLOCK	1		300	0	0	0
5	TELECOM PKG	1		150			
6	CCTV			1000			
7	CRT DESK			1000			

BHOPAL PACKAGES

1	Medium Voltage Switchgear	3		7500			
2	GENERATOR TRANSFORMER AUXILIARIES			52300			
3	Oil for Transformer			95700			

HWR BOP PACKAGES

1	HYDRAULIC OIL SUPPLY UNIT: HYD. POWER PACK	1	865	1950	2	2	2
2	HYDRAULIC OIL SUPPLY UNIT: MANDATORY SPARES	1	15	27	1	0	1
3	Thermal Insulation	1	7731	11700	12	3	3
4	Thermal Insulation	1	4558	6800	6	3	3
5	Fuel Oil Injection Skid						
	Package 1/2	2 nos	5300	6860	6	3	3
	package 3/4	2 nos	3700	4320	3	2	2
	package 5/6 (Mandatory spares)	2 nos	40	65	2	1	0
6	Fuel Gas Treatment Plant	tentative / * supplier may increase the packages instead of container					
	Piping lot	3 nos		25000	12	3	3
	Container	4 nos		9000	5	3	3
7	Fuel Oil Forwarding skid	1 no	1000	2000	4	2	3
8	Fuel Oil piping, fittings etc	lot	14000	16000			
9	Fuel Oil Valves (covered with Fuel Oil Forwarding Skid)						
10	Fin Fan Coolers (Water & Oil)	23		85960			
11	Air Intake System	238		226956			
12	Exhaust Gas System	54	194210	230205			
13	Gas Vapour Evacuation System	1st of 2 Crates	2620	2925	4	4	1

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

	Gas Vapour Evacuation System	2nd of 2 Crates	3127	3580	6	2	2
	Gas Vapour Evacuation System	1st of 3 W.Boxes	650	800	1	2	1
	Gas Vapour Evacuation System	2nd of 3 W.Boxes	400	500	2	2	2
	Gas Vapour Evacuation System	3rd of 3 W.Boxes	400	500	2	2	2
	Gas Vapour Evacuation System	1st of 2 W.Boxes	100	175	2	1	1
	Gas Vapour Evacuation System	2nd of 2 W.Boxes	1100	1350	3	1	3
14	CO2 Fire Fighting System			2275			
15	Lube Oil Purification System	1		3250			
16	Ignition Gas Cylinder Heating System	6		3710			
18	GCB	1	6500	6600	5	2	2
19	UPS Power Cable	9	320	430	1	1	1
20	Battery Testing Equipment	1		500	1	1	1
21	Junction Box			70			
22	Control Cable	6	850	1000	1	1	1
23	Forced Cooling Water Pump			1800			
24	DM water make up Pump			160			
25	Expansion Tank			700			
26	Piping for Forced Cooling water system			39084			
27	Sound Absorbing cover for Generator			3150			
28	Water treatment unit			2000			
29	Gas Detection system			2400			
30	Gas Analyser system			1265			
31	Moisture Measuring Sys			400			
32	Power Cable for GT	12 Drums		1000			
33	Control Oil			950			
34	Gas Turbine Blades (HGPI)						
35	PIPING (piping center)			10000			

JHANSI PKGS

1	BUSDUCTS			109000			
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PEM PACKAGES

				73300			
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ISG PACKAGES

1	Emergency Diesel Generating set			12000			
2	Acoustic Enclosure			8000			
3	Installation Auxiliaries			10000			
4	Mechanical Auxiliaries			5000			
5	DG AMF panel			3000			

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

6	Auxiliary Distribution Board			3000			
7	Battery Charger			1000			
8	Local control PB stations			500			
9	Cables & Accessories			2000			
10	General Items			10000			

TBG Packages

1	Insulators			9900			
2	198kV LA			1200			
3	Conductor Drum			1500			
4	Control & Protection Panels			1200			
5	400KV CABLES (10 to 12 drums)			220000			

ANNEXURE-II

<u>LIST OF T&P and IMTEs being provided by BHEL for use of contractor free of hire charges .</u>			
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

Note:

1. T&P and IMTEs 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. 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

<u>LIST OF Tentative T&P and IMTEs to be Provided by Contractor at his own cost .</u>			
S.NO.	EQUIPMENT	CAPACITY	QTY
T&P			
1.	Crane	100 to160 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

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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.	Wire ferrule printing m/c		1 no
36.	Star Delta Motor Starter with Main Switch	50 kW	3nos
37.	Air Compressor for Maxi Gun		1 no
38.	Special Tools for EHV Cables		set
39.	Brazing Kit		set
40.	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.				
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/cm ²	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 Tachometer	0-5000 rpm		1 no
16.	Non Contact type			1 no

	Thermometer			
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.				
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/cm ²	LC-0.5Kg/cm ²	2 nos
19.	Comparison test set	0-4 k g/cm ² 0-6 Kg/cm ² 0-10kg/cm ² 0-25Kg/cm ² 0-60Kg/cm ² 0-250 Kg/cm ²	+0.25%Lc-0.25 Kg/cm ²	1 set

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

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).

ANNEXURE-VI

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this NIT for the subject work, **tender may be processed through Reverse Auction mode i.e., ON LINE BIDDING ON INTERNET. The General Terms and Conditions of the RA shall be as follows;**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
3. BHEL will inform to the vendor in writing, in case of reverse auction along with the details of Service Provider to enable them to contact & get trained.
4. **'Business rules'** like event date, time, Start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to Participate in the event.
6. BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL".
7. Reverse auction will be conducted on scheduled date & time.
8. At the end of Reverse Auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to Fax the duly signed Filled-in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.
10. During Reverse Auction, if no bid is received within the specified time, BHEL at its discretion, may decide to revise opening price/scrap the reverse auction process/proceed with conventional mode of tendering.
11. **Sealed bid Reverse Auction:** The opening bid (In the initial auction) of the bidders shall be same as that quoted in their Final Sealed price submitted to BHEL. **The bidders shall confirm in writing to BHEL that their opening bid (In both cases) shall be same as that quoted in their final sealed price bids submitted to BHEL against this NIT along with Technical Bid (Part-I).**
12. BHEL reserves the right to cancel Reverse Auction (RA) without assigning any reasons and resort to considering the sealed bids submitted by vendor for processing and finalizing the tender.
13. Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.
14. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.
15. Bids-given by the bidders during the Reverse Auction process will be taken as an offer to execute the work. Bids once made by the bidder, can not be cancelled/withdrawn and bidders shall be bound to execute the work as mentioned above at the final bid price. Should be bidder (Lowest) back out and not execute the contract as per the rates quoted, BHEL shall take action as appropriate.

**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:

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.....)

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 2 X 157 MW Gas Turbines which includes Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, Electrical and C&I Auxiliaries at EXISTING WESTERN MOUNTAIN GAS TURBINE EXTENSION POWER STATION, RUWAIS, LIBYA

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

Dear Sirs,

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

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

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

Thanking you,

Yours faithfully,

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

RATE / PRICE SCHEDULE

TENDER NO. BHEL: NR (SCT): LIBYA: MECH-GTP: 573

FOR TOTAL MECHANICAL, ELECTRICAL & C&I PACKAGES OF 2 X 157 MW GAS TURBINE EXTENSION POWER STATION , RUWAIS-LIBYA		
SL. NO.	DESCRIPTION	RATE IN Rs.*
1.	Total lumpsum price for shifting of material from storage yard/stores etc. to erection site, E/T/C, trial operation, handing over etc. as defined in tender specifications for total Mechanical, Electrical and C&I Packages including Main Gas Turbines, Generators, Gas Turbine Auxiliaries, Balance of Plant, Inter Connecting Piping, etc. Including all Taxes, Levies, charges etc. in Libya as well as in India of 2 X 157 MW GAS TURBINE STATION at Western Mountain Gas Turbine Extension Power Station, Ruwais, Libya	

(SIGNATURE AND SEAL OF AUTHORISED REPRESENTATIVE OF THE BIDDER)