



एचपीसीएल बायोफ्यूल्स लिमिटेड

(हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड के पूर्ण स्वामित्व वाली सहायक कम्पनी)

HPCL BIOFUELS LIMITED

(A wholly owned subsidiary company of Hindustan Petroleum Corporation Ltd.)

पंजीकृत कार्यालय : प्रथम मंजिल, श्री सदन, प्लॉट न. 09, पाटलीपुत्र कॉलोनी, पटना-800013, बिहार

Regd. Office : 1st Floor, Shree Sadan, Plot No.09, Patliputra Colony, Patna-800013, Bihar

दुरभाष / Telephone : 0612 - 2260185 / 2270483, Website : www.hpclbiofuels.co.in, CIN - U24290BR2009GOI014927

TENDER ENQUIRY (Unpriced BID)

तकनीकी बीड

(This is only a Price Enquiry not a Purchase Order)

From: (Name & Address to be written below by the tenderer)

To,

M/s _____ _____ _____ _____ _____ _____
--

Tender No: HBL/TEN/PUB/20-21/224

Tender Date: 06.02.2021

Direct Queries Related to Sugauli

To: ABHISHEK KUMAR SINGH

Designation: PROJECT- ENGINEER

Mobile No:- +917277705022

Title : Bid for the supply, delivery, installation and commissioning of the goods, materials and equipment for 3 MW Extraction cum Condensing Steam turbine Generator Set & Aux. each, for their proposed Incineration boiler based cogen power plants at village Sugauli , East Chmaparan and Lauriya, West Champaran, Bihar on Engineering, Procurement and Commissioning basis, respectively.

Tender (Technical & unpriced commercial bid and priced bid) to be received on or before 05/03/2021 by 1430 Hrs at the address mentioned below.

Tenders are to be dropped in the designated tender box at the address mentioned below. In situation where the tenders are big which cannot be dropped in the box or where the specific tender boxes are not available, tenders are to be submitted with the concerned purchasing authority at the following address.

**HPCL Biofuels Limited.
1St Floor, Shree Sadan,
Plot No. 09, Patliputra Colony,
Patna, Bihar - 800013.**

Tender received after due date and time due to whatever reasons will be rejected.

Signature and Seal of the Bidder

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(COMMERCIAL & TECHNICAL UNPRICE BID)

1. For any grievance related issue, queries to be sent to Grievance Redressal cell of HPCL Biofuels Limited (HBL) at above address.
2. All unit rates in **Indian Rupees** (Specify currency)

Prebid meeting for above EPC Package will be held on February 17, 2021, 1.00 pm at MITCON Consultancy, Pune Office, following address:

MITCON Consultancy & Engineering Services Ltd
Kubera Chambers, 1st Floor, Shivajinagar
Pune, Maharashtra 411005

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SECTION I- COMMERCIAL EPC BID FOR 2x 3MW STG & AUX

I. INSTRUCTION TO BIDDERS

1. Scope

- 1.1 M/s **HPCL Biofuels Ltd, Sugauli** (hereinafter referred to as the **PURCHASER**) wishes to receive the Bid for the supply, delivery, installation and commissioning of the goods, materials and equipment (such goods, materials and equipment hereinafter referred to as the goods) for 3 MW Extraction cum Condensing Steam turbine & Generator Set, **each** for their proposed Incineration boiler based cogen power plants at village Sugauli , East Chmaparan and Lauriya, West Champaran, Bihar on Engineering, Procurement and Commissioning basis respectively.

Also, Purchaser wish to receive technical & operation support assistance for two years for the above EPC project. For two years and above, it will be based on **PURCHASER** proration. Also, Bidder to deploy one technical manpower (either from bidder or OEM) after warranty period, to ensure smooth operation of the above plant. Within warranty period, it will be bidder's responsibility.

In addition to the deployment of OEMs/ Bidders Engineer to ensure Guarantee run for 2 years post commissioning, the bidder shall also provide technical, operational and troubleshooting support to the Purchaser, post commissioning for 2 years. One expert should be sent at site on call (within 3 days from the date of communication). Bidder to provide the man-day rates. This man day rate to be indicated separately in the Price Schedule. This shall be considered in the evaluation. (The boarding and travel expenses shall be provided by the Purchaser)

- 1.2 All bids are to be completed and returned to the **PURCHASER** in accordance with these instructions to **BIDDERS**.
- 1.3 Before submitting the offer, the **BIDDERS** are advised to inspect the site and the environment and be well acquainted with the actual working and other prevalent conditions, facilities available, position of material and labour. No claim will be entertained later on the ground of lack of knowledge.

2. Cost of bidding

- 2.1 The **BIDDER** shall bear all costs associated with the preparation of the bid. **PURCHASER / CONSULTANT** will, in no case, be responsible or liable for such costs, regardless of the conduct or outcome of the bidding process.

3. Joint Ventures

- 3.1 In the event that the successful **BIDDER** is a joint venture formed of two or more companies, the **PURCHASER** requires that the parties to the joint venture accept liability jointly and severally for all obligations under the contract.

4. Assurance

The successful **BIDDER** will be required to give satisfactory assurance of its ability and intention to supply the goods and services pursuant to the contract, within the time set forth therein.

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5. Bidding Documents

- 5.1 The required goods and services, bidding procedures and contract terms are prescribed in this volume I of the bidding documents. The volume II of the bidding documents gives the technical specification, data sheets and the drawings according to which the equipment is to be designed, manufactured and erected. The Appendix I in volume - I of the bidding documents gives bid form and price schedule to be filled up and submitted along with the offer by the Supplier.
- 5.2 BIDDERS shall carefully study all sections of these bidding documents and shall clearly indicate in the schedule of deviations, all deviations from technical specification as well as those from general terms and conditions. If no deviation is indicated in the schedule of deviations or except for the deviations indicated, it will be understood that in all other aspects, the offer conforms to the specification and the PURCHASER reserves the right to evaluate the bid as such without any further reference to the BIDDER.
- 5.3 If the **BIDDER** indicates any comment on this specification in their bid, the same will not be accepted. No extra claims on account of the lack of understanding of the clauses/articles on the part of the **BIDDER** will be entertained by the **PURCHASER** after the award of contract.
- 5.4 BIDDERS shall furnish all the data/information called for in the various schedules in Volume II, more specifically the provided data sheets in soft and hard versions failing which the bid will be considered as incomplete and non-responsive and the PURCHASER reserves the right to reject the bid.

6 Clarification on bidding documents

- 6.1 In case, any clarification is required, the **BIDDER** shall obtain the same from the **PURCHASER/CONSULTANT** in writing by E-mail so as to ensure submission of bid on or before the bid closing date. All such clarifications shall be binding both on the **PURCHASER** and the **BIDDERS**.
- 6.2 All communications seeking clarification shall be sent to the **CONSULTANTS with copy to PURCHASER**.
- 6.3 Written copies of the **PURCHASER's/ CONSULTANT's** response (including an explanation of the query, but without identifying the source of the enquiry) will be sent to all prospective **BIDDERS** who have been issued the bid documents.

7. Amendment of Bidding Documents

- 7.1 At any time prior to the deadline for submission of bid, the **PURCHASER** may, for any reason, whether at their own initiative or in response to a clarification requested by a prospective **BIDDER**, modify the bidding documents by amendment through corrigendum which will be hosted on the HBL Website
- 7.2 The amendment shall be part of the bidding documents and will be notified in writing or by E-Mail to all prospective **BIDDERS** who have received the bidding documents, and will be binding on them. **BIDDERS** will be required to acknowledge receipt of any such amendment to the

bidding documents.

- 7.3 In order to afford prospective **BIDDERS** reasonable time in which to take the amendment into account in preparing their bid, the **PURCHASER** may, at their discretion, extend the deadline for the submission of bid.

8. Language of the bid

The bid prepared by the **BIDDER** and all correspondence and documents relating to the bid exchanged by the **BIDDER** and **PURCHASER/CONSULTANT**, shall be written in the English language, provided that any printed literature furnished by the **BIDDER** though written in another language, shall be accompanied by an English translation in which case, for purpose of interpretation of the bid, the English translation shall govern.

9 Qualification of BIDDERS

- 9.1 Only **BIDDERS** who have previous experience in the work of this nature and description detailed in this tender specification are expected to quote for this work, duly detailing their experience along with the offer. Offers from **BIDDERS** who do not have proven and established experience in the field are not likely to be considered.
- 9.2 The documentary evidence of the **BIDDER's** qualifications to perform the contract if the bid is accepted shall be established to the **PURCHASER's** satisfaction.
- 9.3 In the case of a **BIDDER** offering to supply goods under the contract which the **BIDDER** does not manufacture, the **BIDDER** shall have been duly authorized by the good's manufacturer, to supply and service the goods in India.
- 9.4 In the case of a **BIDDER** where a collaborator is associated with this bid, the bid shall be accompanied by a document addressed to the **PURCHASER** and signed by the collaborator declaring the collaboration agreement.
- 9.5 In addition to the above, to be eligible for the award of the contract, all of the following basic criteria shall be fulfilled. Performance of such installations shall be satisfactory and necessary documentary evidence to prove this shall be submitted along with the bid.
- 9.5.1 The **BIDDERS** should have designed, engineered, supplied, erected and commissioned minimum of two (2) complete Steam Turbine Generator & Aux. project, 3 MW or above capacity Extraction cum Condensing type and the same projects should be in satisfactory operation for a minimum period of two (2) years.

10. Previous Experience

- 10.1 A statement giving particulars, duly supported by documentary evidence of the various services rendered for similar work by the **BIDDER** indicating the particulars and value of each work, the site location and the duration and date of completion and also such work that are under progress shall be submitted by the **BIDDERS** along with their offers.
- 10.2 Bidder to submit duly signed original completion certificate from principal client for similar job, work order contract copy and payment proof from the Principal client for establishing credentials of the party.

11 Documents Comprising the Bid

11.1 The bid prepared by the **BIDDER** shall comprise of the following:

- a) Completed bid form and with complete technical details including the data sheets and all schedules completed in accordance with the requirement of volumes - I and II.
- b) Documentary evidence established to the requirement of the relevant clause that the **BIDDER** is qualified to perform the contract if the bid is accepted.

11.2 The bid prepared by the **BIDDER** shall be in Three (3) parts.

Part - I -Technical & Unpriced Commercial Bid

Part - II -Price Bid

Part III- EMD

11.3 PART - I -TECHNICAL & UNPRICED COMMERCIAL BID

Technical bid shall indicate the following to the extent applicable:

- a) **BIDDER's** confirmation that the goods and ancillary services to be supplied by the **BIDDER** conform to the bidding documents.
- b) Complete scope of supply supported by documents, brochures, standards, catalogue etc. as applicable.
- c) List of spare parts for the erection and commissioning of all systems and equipment.
- d) List of spare parts for operation and maintenance,
- e) List of maintenance tools and tackles.
- f) Layout drawings and sketches with dimensions of equipment and indicating limits of supply.
- g) Nature of maintenance assistance available / offered by **BIDDER**.
- h) Delivery schedule and place of manufacture.
- i) Reference list of customers using similar equipment and materials.
- j) Complete filled up data sheets (to be submitted in given format in word / excel soft copy on provided email id's),
- k) Training facilities offered.

Unpriced Commercial Bid shall indicate the following:

- a) Terms of Payment as per tender.
- b) Confirmation that firm prices have been quoted.
- c) Port/place of shipment.

- d) Statement that all taxes and duties levied by the exporting country, if any are included.
- e) Acceptance of general terms and conditions of the purchase.
- f) Confirmation that validity of bid for 90-days and 120-days for spares from the price bid opening date.
- g) Information requested under Clause - 9.
- h) No deviation letter.

11.4 PART - II -PRICE BID

Should cover the bid price and other related costs, in the provided format.

11.5 PART – III- EMD

EARNEST MONEY DEPOSIT (EMD) of **Rs 4, 00,000** in form of account payee crossed Demand Draft, drawn in favor of HPCL Biofuels Ltd. payable at Patna of any schedule bank (Co-operative not acceptable). Tender without the valid EMD, will not be considered for evaluation. SSI/NSIC/MSME registered vendor shall be exempted from EMD. However, vendor has to submit/enclosed the supporting documents

12 Price and Rates

- 12.1 The price to be quoted by the **BIDDERS** shall be in Indian rupees and the quotation shall be in accordance with the requirement of the relevant schedules in the bid specification. The price shall be separately for basic price, taxes and duties as called for elsewhere in this specification.
- 12.2 The prices quoted shall be for complete supply, inspection, packing and forwarding, freight and transit insurance, port clearances, statutory fees payable, unloading at site, erection, commissioning and testing of equipment which will include all the required procurement and allied activities for completion of the job in all aspect and handing over the same to the **PURCHASER**.
- 12.3 Indigenous **BIDDERS** shall arrange for their own required licenses and foreign exchange, if imported components are considered in the equipment supply.

13 Validity and Firm Price

- 13.1 The prices quoted by the **BIDDERS** shall be kept open and valid for acceptance for a minimum period of ninety (90) days from the date of opening of the offers. The quotation shall be for the entire scope of work on the '**FIRM PRICE**' basis. No escalation whatsoever is acceptable. The quotations not on the basis of '**FIRM PRICE**' will be treated as non-responsive and they run the risk of rejection.
- 13.2 Prices shall be written in both words and figures. In the event of difference, the prices in words shall be valid and binding. Unit prices shall be considered correct in the event of any discrepancy with regard to the total price.

14. Format and Signing of Bid

- 14.1 The original bid form and accompanying documents clearly marked “Original”, must be received by the **PURCHASER / CONSULTANT** at the date, time and place specified, pursuant to

Signature and Seal of the Bidder

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clauses-15 and 16. In the event of any discrepancy between the original and the copies, the original shall govern.

- 14.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by the **BIDDER** or a person or persons duly authorized to sign on behalf of the **BIDDER**. Such authorization shall be indicated by written power-of-attorney accompanying the bid.

All pages of the bid, except for un-amended printed literature, shall be initialed by the person or persons signing the bid. The name and position held by each person signing must be typed or printed below the signature.

The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors and such corrections shall be initialed by the person or persons signing the bid.

15 Sealing and Marking of Bid

- 15.1 The **BIDDERS** are requested to prepare their offers in one (1) original and one (1) copy and shall submit in 2 sealed envelopes, **for each site Separately (Sugali & Lauriya)** to the Purchaser's address.

One additional copy of the technical & unpriced commercial bid shall be addressed to the Consultant and submit at the Consultant's email address (in soft copy format only) as given in project information.

- 15.1.1 **The first envelope (for each site)** should contain three (3) sets (One original and two copies) of technical bid and two (2) sets (One original and one copy) of unpriced commercial bid, no deviation letter, and documents for eligibility. This envelope should be clearly marked **“Technical & Unpriced Commercial Bid” and shall be addressed to the PURCHASER at the address given in project information (both soft & hard copy)**
- 15.1.2 **The second envelope (for each site)** should contain one original copy of price bid and should be clearly marked as **“PRICE BID’ and shall be addressed to the registered / site office of PURCHASER only (hard copy only)**
- 15.1.3 **The third envelope (for each site)** should contain **Original EMD of Rs 4 Lakhs** in form of account payee crossed Demand Draft, drawn in favor of HPCL Biofuels Ltd. payable at Patna of any schedule bank (Co-operative not acceptable). It should be clearly marked as “EMD” and shall be addressed to the registered / site office of **PURCHASER only (Hard copy only)**
- 15.1.4 All the envelopes shall bear the title, “3 MW STG & Aux, Project Name & enquiry number, bid closing date and brief description of the contents”.
- 15.1.5 The name and address of the **BIDDER** shall be clearly marked on the envelope to enable the bid to be returned unopened in case it is declared "late".
- 15.2 If the envelopes are not sealed and marked as required in this clause, as the case may be, the PURCHASER will assume no responsibility for the bid's misplacement or premature opening.

16 Deadline for Submission of Bid

- 16.1 **The original TECHNICAL & UNPRICED COMMERCIAL BID and PRICE BID with EMD** together with the required copies, must be received by the **PURCHASER**, not later than **March 5, 2021, 2:30 PM**. Also, soft copy (word or excel file) of duly filled technical data sheets to be submitted on the given email id of Consultant / Purchaser within informed time limit.
- 16.2 The **PURCHASER** may, at their discretion, extend the deadline for the submission of bid by amending the bidding documents, in which case all rights and obligations of the **PURCHASER** and **BIDDERS** previously subject to the deadline will thereafter be subject to the deadline as extended.

17. Late Bid

Any bid received by the **PURCHASER** after the deadline for submission of bid so prescribed by the **PURCHASER**, shall be declared “late”.

18 Modification and Withdrawal of Bid

- 18.1 The **BIDDER** may modify or withdraw the bid after submission of bid, provided that written notice of the modification or withdrawal is received by the **PURCHASER** prior to the deadline prescribed for submission of bid.
- 18.2 The **BIDDER's** modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions of clause-15. A withdrawal notice may also be sent by E-mail but must be followed by a signed confirmation copy.
- 18.3 No bid shall be modified subsequent to the deadline for submission of bid.
- 18.4 No bid shall be withdrawn in the interval between the deadline for submission of bid and the expiration of the period of bid validity specified by the **BIDDER** on the bid form.

19. Acceptance / rejection of quotation

- 19.1 The acceptance / rejection of the bid will rest with the **PURCHASER** who do not bind themselves to accept the lowest bid or any bid and reserve to themselves the full rights for the following without assigning any reason whatsoever.
- To reject any or all of the bids.
 - To split up the work amongst two or more **BIDDERS**.
 - To award the work in part.
- 19.2 Conditional and unsigned bids, bids containing absurd or unworkable prices bids which are incomplete and otherwise considered defective and bids not in accordance with the tender conditions and specification, etc., are all liable to be rejected.
- 19.3 If a bidder quits business after the submission of the bid or after the acceptance of their bid, the **PURCHASER** may at their discretion reject such bid. If a partner of a firm exists from business after the submission of the bid or after acceptance of the bid, the **PURCHASER** may cancel such a bid at their discretion unless the firm retains its character.

19.4 The successful **BIDDER** should not sub-contract a part of the complete work undertaken by them without written permission from **PURCHASER**. The **BIDDER** on whom the contract is awarded is solely responsible to the **PURCHASER** for the completion of the awarded work.

20. Opening of the price Bids by Purchaser

20.1 The technical bids will be evaluated with regard to the PQC, scope, terminal points, exclusions and the general technical specifications of all the equipment to be supplied by the **BIDDER** and the qualification of the **BIDDER** to execute the job.

20.2 Subsequent to the technical evaluation, the **PURCHASER** will inform the qualified **BIDDERS** to attend the opening of **Price Bids in the presence of BIDDER's representatives who choose to attend. The venue will be informed at later stage.**

21. Process to be confidential

21.1 Information relating to the examination, clarification, evaluation and comparison of bids and recommendations for award of contract shall not be disclosed to the **BIDDERS** or any other persons not officially concerned with such process. Any effort by a **BIDDER** to influence a **PURCHASER's** processing of bids or award decisions may result in the rejection of the **BIDDER's** bid.

22. Clarification of Bid

22.1 To assist in the examination, evaluation and comparison of bid, the **PURCHASER/CONSULTANT** may at their discretion, ask the **BIDDER** for a clarification of their bid. All responses to request for clarification shall be in writing and no change in the price or substance of the bid shall be sought, offered or permitted.

23. Preliminary Examination

23.1 The **PURCHASER** will examine the bid to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.

23.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total cost will be corrected. If there is a discrepancy between the total bid amount and the sum of total costs, the total cost shall prevail and the total bid amount will be corrected.

23.3 Prior to the detailed evaluation, pursuant to clause-23, the **PURCHASER** will determine the substantial responsiveness of each bid to the bidding documents. A substantially responsive bid is one which conforms to all the terms and conditions of the bidding documents without deviation.

23.4 A bid determined as not substantially responsive will be rejected by the **PURCHASER** and may not subsequently be made responsive by the **BIDDER** by correction of the non-conformity.

24 Conversion to Single Currency

24.1 To facilitate evaluation and comparison, all the bid prices in the various currencies, shall be converted to Indian rupees, at the selling exchange rate established by the Reserve Bank of India for similar transactions, on the date of opening of the price bid to be decided by the **PURCHASER/CONSULTANT**.

25 Evaluation and Comparison of Bid

25.1 The **PURCHASER** will evaluate and compare the bid previously determined to be substantially responsive.

25.2 The **PURCHASER**'s evaluation of a bid will take into account, in addition to the bid price, the following factors, in the manner and extent indicated below:

(a) Work schedule offered in the bid;
The **PURCHASER** requires that the goods under the contract shall be delivered, erected and commissioned within twelve (12) months from the date of notification of award. No credit will be given to earlier deliveries.

Bid offering delivery, erection and commissioning more than twelve (12) months will be rejected.

(b). Deviations in payment schedule from those specified in the conditions of the contract.

25.3 The **PURCHASER / CONSULTANT**'s evaluation shall also take into account the following:

a) **BIDDER**'s experience in manufacturing and supply of similar plants for the intended service on the basis of information provided by **BIDDER**. Incineration Boiler & Aux. with BoP project of similar or larger scope to that required by technical specification should have been in operation satisfactorily for a minimum period of two years in Sugars plant installation for project completed within the previous five years. Bid not fulfilling this requirement will not be considered technically acceptable.

b) Availability in India of spare parts and "after-sale service" for the equipment offered in the bid, for minimum 3 sugar seasons.

c) The quality and adaptability of equipment offered.

d) **BIDDER**'s guarantees nature of warranties and warranty period.

e) Willingness to give shop drawings of spare parts and main equipment. –

f) Confirmation from the sub-vendors that for future supply of spare parts for bought out items, the sub-vendors shall supply such spares directly to the **PURCHASER** as and when **PURCHASER** so requests.

26. Notification of Award

26.1 Prior to the expiration of the period of bid validity, the **PURCHASER** will notify the successful **BIDDER** by E-mail to be confirmed by letter that their bid has been accepted and this "notification of award" as above will constitute formation of contract".

26.2 The successful **BIDDER** on receipt of "notification of award" shall convey his acceptance by return E-mail and to be confirmed by letter within 7-days.

26.3 Delivery shall be counted from the date of receipt of this "notification of award".

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27. Award of contract and purchaser's right to vary quantities at the time of award.

- 27.1 The **PURCHASER** will award the contract to the successful **BIDDER** whose bid has been determined to be substantially most responsive after the final negotiations held with the most competitive **BIDDERS**.
- 27.2 Wherever applicable, the **PURCHASER** reserves the right at the time of award of the contract to increase or decrease by upto 40% the quantity of goods and services without any change in unit price or other terms and conditions.
- 27.3 Under possible circumstances, the **PURCHASER** reserves the right to split the contract which may result from this enquiry, between two or more **BIDDERS** at the prices accepted.

28. Signing of contract

- 28.1 **PURCHASER** will send the contract to the successful **BIDDER** who, within seven (7) days of its receipt, shall countersign and return it to the **PURCHASER** as a token of unconditional acceptance failing which, the **PURCHASER** has the right to cancel / withdraw the contract.

29 Exceptions

- 29.1 As far as possible, no exception is to be taken by the **BIDDER** to the bid documents including technical specification and terms and conditions of contract. However, unavoidable exceptions, if any, both technical and commercial, are required to be listed and submitted separately, including the applicable cost and time implications. Such exceptions giving the cost implications should be separately enclosed in the priced commercial bid and exceptions should be clearly stated in the unpriced commercial bid with a statement that cost implications have been given in the priced commercial bid. Time schedule implications of exceptions should be given in the unpriced commercial bid. Unless the exceptions are listed separately as explained above, it will be assumed by the **PURCHASER** that **BIDDER** is complying with the bid documents, and no cognizance shall be taken of any exception stated anywhere else in the bid.

30 Verification by purchaser

- 30.1 All statements submitted by **BIDDER** regarding experience, manpower availability, equipment and machinery availability etc., are subject to verification by the **PURCHASER** either before placement of order or after placement of order. If any data submitted by the contractor at the bid stage is found to be incorrect, the offer is liable to be rejected or the contract is liable to be terminated.

IMPORTANT

THE OFFER SHALL BE BASED ONLY ON THE TERMS AND CONDITIONS GIVEN IN THESE BID DOCUMENTS. THE BIDDERS ARE ADVISED TO PREPARE THE BIDS COMPLETELY IN LINE WITH THE TENDER REQUIREMENT WITHOUT ANY DEVIATIONS. IN CASE THE BIDDERS NEED ANY CLARIFICATIONS ON THE TENDER DOCUMENTS, THEY ARE ADVISED TO CONTACT THE PURCHASER & CONSULTANT OR GET THEIR POINTS CLARIFIED BEFORE THE SUBMISSION OF THE BIDS. THE OFFER OF ANY BIDDER GIVING THEIR OWN SEPARATE SET OF TECHNICAL AND COMMERCIAL TERMS AND CONDITIONS WILL BE CONSIDERED AS NONRESPONSIVE AND REJECTED.

BIDDERS SHOULD ENCLOSE THE PROFORMA FOR PERFORMANCE STATEMENT AS PER THE FORMAT GIVEN IN VOLUME-I, TO GET QUALIFIED

II. TERMS & CONDITIONS FOR THE SUPPLY CONTRACT

1. GENERAL CONDITIONS OF CONTRACT FOR SUPPLY

1.1 Use of Contract documents and information

- 1.1.1 The **SUPPLIER** shall not, without the **PURCHASER**'s prior written consent, disclose the contract, or any provision thereof, or any specification, drawing, pattern, sample or information furnished by or on behalf of the **PURCHASER** in connection therewith, to any person other than a person employed by the **SUPPLIER** in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.
- 1.1.2 The **SUPPLIER** shall not, without the **PURCHASER**'s prior written consent, make use of any document or information specified in clause-1.1.1 above, except for purposes of performing the contract.
- 1.1.3 Any document other than the contract itself, specified in clause-1.1.1 above, shall remain to be the property of the **PURCHASER** and shall be returned (in all copies) to the **PURCHASER**, on completion of the **SUPPLIER**'s performance under the contract, if so required by the **PURCHASER**.

1.2 Change orders

- 1.2.1 The **PURCHASER** may at any time, by written notice to the **SUPPLIER**, make changes within the general scope of the contract.
- 1.2.2 Upon notification by the **PURCHASER** of such change, the **SUPPLIER** shall submit to the **PURCHASER** an estimate of costs for the proposed change (hereinafter referred to as the change or changes), including any change in the schedule of payments, within ten (10) calendar days of receipt of notice of the change, and shall include an estimate of the impact (if any) on the delivery dates under the contract, as well as a detailed schedule for the execution of the change, if applicable.
- 1.2.3 The **SUPPLIER** shall not effect changes in accordance with clause-1.2.1 above until the **PURCHASER** has authorized a change order in writing on the basis of the estimate provided by the **SUPPLIER** as described in clause-1.2.2 above.
- 1.2.4 Adjustments in the work schedule or the contract price authorized by a change pursuant to clause-1.2.3 are not subject to renegotiation, and such adjustments shall be deemed to include any cumulative effect of this and previously authorized changes.
- 1.2.5 Changes mutually agreed upon shall constitute a part of the work under this contract, and the provisions and conditions of the contract shall apply to the said changes.
- 1.2.6 In the event, the **PURCHASER** shall cause the **SUPPLIER** to expend labour or materials, or both, of any nature in order to provide the **PURCHASER** with information upon which to base a decision as to whether a change should be ordered, the **PURCHASER** shall reimburse the **SUPPLIER** for the total costs related to supplying such information. However in cases, where

such costs are involved, prior approval of **PURCHASER/PURCHASE COMMITTEE** shall be obtained.

- 1.2.7 Except with the express permission of the **PURCHASER**, the supply of goods shall not be delayed pending agreement of costs or schedules affected by minor changes.

1.3 Contract amendments

- 1.3.1 Subject to clause-1.2, no variation in or modification of the conditions and terms of the contract shall be made except by written amendment signed by the parties.

1.4 Sub-contracts & make of plant and machinery

- 1.4.1 The **SUPPLIER** shall not sub-contract all or any part of the contract without notifying the **PURCHASER** in writing, of the details of the sub-contractor and the item sub-contracted. Only approved sub-contractors of the **SUPPLIER** shall be employed.
- 1.4.2 The **SUPPLIER** guarantees that any and all sub-contractors of the **SUPPLIER**, for performance of any part of the work under the contract, will comply fully with the terms of the contract applicable to such part of the work under the contract.
- 1.4.3 The make of the main components to be supplied by the **SUPPLIER** shall be one of the makes specified in the **LIST OF APPROVED MAKES OF VENDORS** mentioned in Technical Part, Section II of this bid, mutually agreed and specified in final technical offer. If the make of the component is not one of the vendors given in the approved list, the approval from the **PURCHASER & CONSULTANT** has to be obtained.

1.5 Country of origin

All major equipment shall be manufactured in India at the **SUPPLIER's** works.

1.6 Inspection and tests

- 1.6.1 The **SUPPLIER** shall submit the quality plan within six (6) weeks of entering into an agreement with the **PURCHASER**. The quality plan shall indicate the quality control procedure adopted by the **SUPPLIER** for inspection and in-process quality control procedures for the various items to be manufactured / procured / fabricated from their sub-vendors works. Based on the list, the **PURCHASER** or their inspecting agency shall send the **SUPPLIER** within two (2) weeks of receipt of the quality plan, the list of items of machinery and equipment requiring **PURCHASER's** inspection before dispatch.
- 1.6.2 The **PURCHASER / CONSULTANT / PURCHASER INSPECTION AGENCY**, shall have the right to inspect the work being carried out under this contract and to test the goods to confirm their conformity to the specification. The Special Conditions of Contract or the specification or both shall specify what inspections and tests the **PURCHASER** requires and where they are to be conducted. The **PURCHASER** shall notify the **SUPPLIER** in writing of the identity of **PURCHASER's/CONSULTANT's** technical staff retained for this purpose. Notwithstanding the inspection mentioned above, the **PURCHASER** has the right to reject the goods even after the supply, if they do not conform to the specification, and any defect found at the time of

installation and commissioning shall be rectified at **SUPPLIER's** cost and / or replaced if the defect cannot be rectified.

- 1.6.3 The inspections and tests may be conducted at the premises of the **SUPPLIER** or their sub-contractor(s), at point of delivery and at the final destination of goods. Where conducted at the premises of the **SUPPLIER** or their sub-contractor(s), all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the **PURCHASER**.
- 1.6.4 Should any inspected or tested goods fail to conform to the specification, the **PURCHASER** may reject them, and the **SUPPLIER** shall either replace the rejected goods or make all alterations necessary to meet the requirement of the specification, free of cost to the **PURCHASER**.
- 1.6.5 The **PURCHASER's** right to inspect, test and, where necessary, reject the goods after its arrival at the site of installation (the rejection shall be with proper justification and reasonably adequate time will be given to the **SUPPLIER** to remedy the default) shall in no way be limited or waived by reason of the goods' having already been inspected, tested and passed by the **PURCHASER** or their representatives prior to dispatch of the goods.
- 1.6.6 Nothing in the clause-1.6 shall in any way release the **SUPPLIER** from any warranty or other obligations under the contract.
- 1.6.7 Bidders to note that inspection report wherever applicable, MTC and Guarantee certificates will be required for all the supply items which will be cross checked with the OEMs and in case of fake supply of any item, action deemed fit will be taken by the Purchaser which will be binding on the Bidder.

1.7 Patent and copy rights

The **SUPPLIER** shall hold and have the **PURCHASER**, its Officers, Agents, Servants and Employees harmless from liability of any nature or kind including costs and expenses for over an account of any copy-right or un copy right, composition, secret process, patented or appliance un-patented invention, articles or manufactured or used in the performance of this contract including their use by the **PURCHASER** unless otherwise specifically stipulated in this contract. In the event of any claim or demand being made or action being brought against the **PURCHASER** for infringement or patent in respect of any machine, plant used or supplied by the **SUPPLIER** under this agreement or in respect of any method of using or working by the **PURCHASER** or such machine, Plant or thing, the **SUPPLIER** will indemnify the **PURCHASER** against such claims or demand and all cost and expenses arising from or incurred by reason of such claims or demands.

PROVIDED THAT the **PURCHASER** shall notify in writing the **SUPPLIER** immediately if the claim is made and that they shall be at liberty, if they so desire, with the assistance of the **PURCHASER**, if required, but at the **SUPPLIER's** own expenses to conduct all negotiations for the settlement of the same or any litigation that may arise there from and

PROVIDED THAT no such machines, plant or thing shall be used by the **PURCHASER** for any purpose or in any manner other than that for which they have been supplied by the **SUPPLIER** as specified in this tender.

1.8 Bank Guarantees

- 1.8.1 The formats for Bidders Bank Guarantees (BGs) will be as per standard formats. All nationalized banks and private banks viz ICICI, HDFC, Axis Bank, Standard & Chartered, Citi Bank are eligible for issuing of BGs.
- 1.8.2 The Bank guarantee in respect of guaranteed performance of the plant and machinery supplied by the SUPPLIER in the form of the PURCHASER, after mutual discussions between PURCHASER and SUPPLIER, before eight (8) months of scheduled commissioning of the plant. This guarantee shall be valid for two years from the date of commissioning. In the event of non-submission of performance guarantee, in the form of the PURCHASER after mutual discussions between the PURCHASER and SUPPLIER, the SUPPLIER shall deduct from their all bills, equivalent amount of bank guarantee till such time the bank guarantee is furnished, before drawing their bill
- 1.8.3 If the SUPPLIER shall abandon this contractor otherwise fail to supply and deliver the plant within the scheduled period or any extension thereof granted by the PURCHASER or if the work or any part thereof is taken out of the SUPPLIER hands, then and in any such case the SUPPLIER shall refund to the PURCHASER within thirty (30) days of demand such part of the advance payments hereunder made as the PURCHASER may deem fit to protect their interest.
- 1.8.4 The bank guarantee or guarantees required to be furnished by the SUPPLIER under the provisions thereof to secure the timely delivery or performance of the plant and machinery supplied by the SUPPLIER or for any other purpose under the provisions thereof shall be in the form of the PURCHASER and the SUPPLIER, which forms shall invariably include the provision that the decision of the PURCHASER as to whether there has been any loss or damage or default and or negligence on the part of the SUPPLIER will be final and binding of the guarantor, that the right of the PURCHASER shall not be affected or suspended by the reason of the fact that any dispute or disputes have been raised by the SUPPLIER with regard to their liability of that proceedings are pending before any tribunal / arbitrators or court with regard thereto or in connection therewith, that the guarantor shall pay to the PURCHASER the sum under the guarantee(s) without demur or first demand and without requiring the PURCHASER to invoke any legal remedy that may be available to them, that it shall not be open to the guarantor to know the reason of or to investigate or to go into the merit of the demand or to question or to challenge the demand or to know any facts affecting the demand or to required proof of the liability of the SUPPLIER before paying the amount demanded by the PURCHASER, under the guarantee(s).

The Bank Guarantee or guarantees required to be furnished by the SUPPLIER under the provisions thereof to secure the timely delivery or performance of the plant and machinery supplied by the SUPPLIER or for any other purpose under the provision hereof shall be for such period as may cover the period of complete supply and performance respectively, as the case may be as stipulated under the tender, if, however, the period of agreement is extended due to force majeure. The SUPPLIER shall have such guarantee extended upto the corresponding extended period, and failure of the SUPPLIER to do so will amount to a breach of the contract, and in no case the extension of the period of the contract shall be construed as waiver of right of the PURCHASER to enforce the guarantee.

1.9 Indemnity

- 1.9.1 The SUPPLIER and the PURCHASER shall indemnify and hold harmless each other from and against such claims and liabilities as provided in the Special Condition of Contract.

1.9.2 Notwithstanding anything in this contract to the contrary, it is agreed that neither the **SUPPLIER** nor the **PURCHASER** shall be held liable to the other party for loss of production, loss of profit, loss of use or any other indirect or consequential damage.

1.10 Insurance

1.10.1 All goods supplied under this contract shall be fully insured against loss or damage incidental to manufacture or acquisition in the manner specified in the Special conditions of contract.

1.10.2 Without limiting the **SUPPLIER's** liability (limited only to the contract price) as provided under this contract, the **SUPPLIER** shall procure or ensure that their **SUB-CONTRACTORS** also procure such additional insurance cover as specified in the Special Conditions of Contract.

1.10.3 All insurances to be provided by successful bidders, including transit insurance will be as per standard rules.

1.11 Transfer of title

1.11.1 The goods, shall immediately, in consideration of payment of the first installment of the contract price to the **SUPPLIER** by the **PURCHASER**, become and remain the property of the **PURCHASER**; provided always that the **SUPPLIER** shall have a particular possessory lien on the goods to the extent the value thereof exceeds the total value of the installment payments made by the **PURCHASER** to the **SUPPLIER**. Transfer of title of goods shall be ex-works.

1.12 Acceptance

1.12.1 Upon completion of the supply under the contract and erection and commissioning by the **PURCHASER's** contractor, a meeting shall be held for the purpose of accepting the goods (hereinafter called the final acceptance). Such meeting shall constitute the final acceptance of the goods and services under the contract, unless the **PURCHASER** during the meeting shows defects or shortcomings or both. In case of defects or shortcomings or both which in the **PURCHASER's** opinion are considered essential, another meeting shall be convened when the **SUPPLIER/CONTRACTOR** has given notice of completion of the corrective work carried out with regard hereto. Otherwise the **PURCHASER** may accept the goods if the defects or shortcomings or both are not considered serious, and the **SUPPLIER** has agreed to carry out the repairs in conformity with this contract.

1.13 Maintenance Warranty

1.13.1 For a period of two years from the date of commissioning of plant and machinery including the year in which the plant is commissioned (called the maintenance warranty period), the **SUPPLIER** shall remain liable to rectify / replace any machinery and equipment or part thereof, such as may be found to be defective or below the rated capacity under proper use and arising due to faulty design, material, workmanship. The **PURCHASER** shall give the **SUPPLIER** notice in writing setting out the particulars of the defects or failure and the **SUPPLIER** shall thereupon rectify and make good the defective or under rated equipment or replace the same free of cost to make it comply with the requirements of the Agreement. If the **SUPPLIER** fail to do so within reasonable time so as to reduce the production loss to the minimum as required by the **PURCHASER**, the **PURCHASER** may rectify and replace at the cost of the **SUPPLIER** the whole or any portion of the equipment, as the case may be, which is defective or under rated or

fail to fulfill the requirements of the Agreement and may recover the actual cost thereof from the SUPPLIER or adjust the same from any balance payment to be made to the SUPPLIER, or recover by raising debit note. Such rectification / replacement shall be carried out by the PURCHASER within short a time as possible and at a reasonable price under advice to the SUPPLIER.

In case of such rectification / replacement by the PURCHASER the SUPPLIER shall be liable to pay the PURCHASER the whole cost of such rectification / replacement done and the defective equipment on being replaced shall be taken away by the SUPPLIER at their own cost. The PURCHASER shall have the right to operate any and all equipments after the commissioning date of the plant except that this shall not be considered to permit operation of any equipment which may be materially damaged by such operation before any required rectification or alternation have been carried out.

- 1.13.2 If it becomes necessary for the SUPPLIER to replace or renew any defective part of the machinery under this clause the provisions of the first paragraph of this clause shall apply to the parts of the plant and machinery so replaced or renewed until the expiration of six months from the date of such replacement or renewal or until the end of the aforesaid maintenance period of two (2) years, whichever is later.
- 1.13.3 The rectification or new parts will be delivered F.O.R. PURCHASER's factory site. The SUPPLIER shall also bear the cost of rectification / replacement carried out on their behalf by the PURCHASER as mentioned above at the site. At the end of the maintenance period, SUPPLIER liability shall cease. In respect of plant and machinery not covered by the first paragraph of this clause, the PURCHASER shall be entitled to the benefit of any guarantee given to the SUPPLIER's by the original supplier or the manufacturer of each plant and machinery.
- 1.13.4 The responsibility of the SUPPLIER for rectification / replacement under this clause shall extend to the actual cost of rectification / replacement of the defective items of plant and machinery and shall not, in any way, be deemed to be limited to the amount of the performance guarantee.
- 1.13.5 The SUPPLIER shall provide one supervisor at their own expenses for first one month of the first crushing season in order to assist the PURCHASER in the working and maintenance of said machinery and equipment.

1.14 Payment

- 1.14.1 The PURCHASER shall pay the contract price in the following manner free of interest:
- 1.14.2 The payment terms will be as per *Appendix – II*.
- 1.14.3 All Payments shall be made in Indian rupee only. In case of imports, the terms of payments will be as per standard International practice
- 1.14.4 Subject to clause-1.2 of the General Conditions of Contract and as provided for in the price schedule, prices charged by the SUPPLIER for goods under the contract shall not vary from the prices agreed by the SUPPLIER and given in the price schedule. **This is the firm price contract for SUPPLY.**
- 1.14.5 Taxes and duties shall be reimbursable at actual, based on the production of documents by the SUPPLIER.

1.14.6 The **PURCHASER** shall not make any deductions against any claims he may have on the **SUPPLIER** as per the contract terms, unless the details of claim have been communicated to the **SUPPLIER** in advance.

1.15 Extension in the SUPPLIER's performance

1.15.1 Delivery of the goods shall be made by the **SUPPLIER** strictly in accordance with the delivery schedule, pursuant to the Special Conditions of Contract.

1.15.2 The **SUPPLIER** may claim extension of the time limits as set forth in the delivery schedule in case of:

- a. Changes ordered by the **PURCHASER** pursuant to clause-1.2;
- b. Delay in the receipt of any material, drawings or service which are to be provided by the **PURCHASER** (services provided by the **PURCHASER** shall be interpreted to include all approvals by the **PURCHASER** under the contract as well as access to the site);
- c. Force majeure pursuant to clause-1.21; and
- d. Delay in performance of work caused by instructions issued by the **PURCHASER**.

The **SUPPLIER** shall demonstrate to the **PURCHASER's** satisfaction that they have used their best endeavour to avoid or overcome such causes of delay, and the parties will mutually agree upon remedies to mitigate or overcome such causes of delay. The extension of time limit shall be mutually discussed and agreed.

1.15.3 Notwithstanding clause-1.15.2 above, the **SUPPLIER** shall not be entitled to an extension of time for completion, unless the **SUPPLIER**, at the time such circumstances arise, has immediately notified the **PURCHASER** in writing of any delay that it may claim as caused by circumstances pursuant to clause-1.15.2 above; and, upon request of the **PURCHASER**, the **SUPPLIER** shall substantiate that the delay is due to the circumstances referred to by the **SUPPLIER**.

1.16 Termination for default

1.16.1 The **PURCHASER** may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the **SUPPLIER**, terminate the contract in whole or in part:

- a. If the **SUPPLIER** fails to deliver any or all of the goods within the time period(s) specified in the contract, or any extension thereof granted by the **PURCHASER**, pursuant to clause-1.15; or
- b. If the **SUPPLIER** fails to perform any other obligation(s) under the contract; and if the **SUPPLIER**, in either of the above circumstances, does not cure their failure within a period of ten (10) calendar days (or such reasonably longer period as the **PURCHASER** may authorize in writing) after receipt of a notice of default from the **PURCHASER** specifying the nature of the default(s).

1.16.2 In the event the **PURCHASER** terminates the contract in whole or in part, pursuant to clause-

1.16.1 above, the **PURCHASER** may procure, upon such terms and in such manner as it deems appropriate, goods similar to those undelivered, and the **SUPPLIER** shall be liable to the **PURCHASER** for any incidental excess costs for procurement of such similar goods. Notwithstanding the above, the **SUPPLIER** shall continue performance of the contract to the extent not terminated.

1.17 Termination for insolvency

1.17.1 The **PURCHASER** may at any time terminate the contract by giving written notice to the **SUPPLIER**, without compensation to the **SUPPLIER**, if the **SUPPLIER** becomes bankrupt or otherwise insolvent. Notwithstanding the above, such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the **PURCHASER**.

Provisions for termination for insolvency shall apply viz-a-viz to both the parties. In the event of termination for insolvency by the Supplier, provisions for termination for convenience by the Purchaser shall apply.

1.18 Termination for convenience

1.18.1 The **PURCHASER** may, by written notice to the **SUPPLIER**, terminate the contract, in whole or in part, at any time for their convenience. The notice of termination shall specify that termination is for the **PURCHASER**'s convenience, the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

1.18.2 The goods that are complete and ready for dispatch within thirty (30) days after the **SUPPLIER**'s receipt of notice of termination shall be purchased by the **PURCHASER** at the contract prices and on the other contract terms. For the remaining goods, the **PURCHASER** may elect:

- (a) to have any portion thereof completed and delivered at the contract prices and on the contract terms; and/or
- (b) to cancel the remainder and pay to the **SUPPLIER** an agreed amount for partially completed goods and for materials and parts previously procured by the **SUPPLIER** for the purpose of the contract, together with a reasonable allowance for overhead and profit and a reasonable compensation, based on mutual discussions, for the financial commitments made by the **SUPPLIER** for fulfilling their obligations under this contract.

1.19 Resolution of disputes

1.19.1 The **PURCHASER** and the **SUPPLIER** shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the contract.

1.19.2 If, after thirty (30) days from the commencement of such informal negotiations, the **PURCHASER** and the **SUPPLIER** have been unable to resolve amicably a contract dispute, either party may require that the dispute be referred for resolution by arbitration by the mechanism described in the Special Conditions of Contract. The award shall be final and binding on the parties.

1.20 Jurisdiction for legal proceedings

1.20.1 The contract shall be governed by and interpreted in accordance with the Indian laws. No suit or any proceedings in regard to any matter arising in any respect under this contract shall be instituted in any court other than the court at Patna. No other court shall have jurisdiction to entertain any suit or proceedings even though part of the cause of action might arise within their jurisdiction.

1.21 Force majeure

1.21.1 In the event that the **SUPPLIER** or any of their subcontractors, or the **PURCHASER** delays performing any of their respective obligations under the contract, and such delay is caused by force majeure, by acts of God / Government in its sovereign capacity, including but not limited to war, civil insurrection, riots, strikes, fires, floods, epidemics, earthquakes, quarantine restrictions and freight embargoes, such delay may be excused as provided in clause-1.15, and the period of such delays, or a period mutually discussed and agreed, may be added to the time of performance of the obligation delayed.

1.21.2 If a force majeure situation arises, the **SUPPLIER** shall promptly notify the **PURCHASER** in writing of such condition and the cause thereof along with documentary evidence. Unless otherwise directed by the **PURCHASER** in writing, the **SUPPLIER** shall continue to perform their obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event.

1.21.3 In no event shall, a force majeure event excuse the obligations of a party, if those obligations are required to have been completely performed, prior to the occurrence of that force majeure event.

1.21.4 If performance of the Contractor's obligations or obligations of its vendors and subcontractors are delayed under the contract and such delay is caused by force Majeure conditions which prevents or impedes due performance of the contract despite due diligence by the contractor, the contractor shall get corresponding extension plus an additional period, if any, in time for completion without any claim of the Purchaser for damages for delayed performance.

If, Force Majeure affects the performance of the Purchaser for the reasons including land acquisition, environmental clearances or otherwise in such event the supplier shall be entitled to receive enhanced cost on a mutual agreed basis in addition to extension in time for corresponding period.

If Force Majeure prevails for more than three months, both the parties shall discuss and agree to further course of action including cost implications. Force Majeure shall not apply on payment obligations of the parties.

If, parties agrees to terminate the contract due to prolonged Force Majeure conditions affecting the performance of the purchaser. In such event of termination, provision for 'Termination for Convenience' shall apply.

1.22 Modification, Assignment and Subletting

1.22.1 The **PURCHASER's** contract may be amended, modified or rescinded only in writing signed by both the parties or their authorized agents or representatives by a change order issued by the **PURCHASER** and accepted by the **SUPPLIER** pursuant to the terms stated therein.

1.22.2 The **SUPPLIER** shall not assign, sublet in whole or in part, their obligation to perform under the contract, except with the **PURCHASER's** prior written consent. Such written permission if given shall not relieve the **SUPPLIER** from their obligations under the contract and they shall take full responsibility for all the work done by their **SUB-SUPPLIER**.

1.23 Contract language

1.23.1 The **SUPPLIER** and **PURCHASER** hereby represent that they have sufficient knowledge of the English language to understand fully the contract. The contract shall be in the English language, and all documentation related hereto will also be in the English language, except if otherwise specifically agreed in writing between the parties.

1.23.2 The **SUPPLIER** shall bear all costs of translation of documents to English and all risks of the accuracy of such translation.

1.24 Taxes and duties

1.24.1 **The SUPPLIER shall be responsible** for Central / State Sales Tax, Excise Duties, Special Excise Duties, Local Taxes and Other Taxes or duties at the destination point, on finished bought-out items supplied directly to site from sub-contractors works. The proof for the taxes duties and special excise duties, actually paid by the **SUPPLIER**, shall be submitted to the **PURCHASER** separately for own manufactured items and for bought-out items and claimed by the **SUPPLIER** from the **PURCHASER** as a reimbursement of the same in each Invoice / Bills to be submitted by **SUPPLIER**. The amount included in **SUPPLIER's** bill for payment of all such taxes, surcharges and duties will be computed on the basis of relevant statutory provision in force on the date of dispatch and shall be actual amount as paid by the **SUPPLIER**.

Price excludes all kinds of taxes, duties and levies including GST Central Sales Tax, Excise Duty (if levied) including Central Sales Tax, Works Contract Tax, BOWC cess etc. and fresh impositions and variations in rates of taxes, duties and levies, which shall be reimbursed by the Purchaser to the Supplier at actual on the basis of documentary proofs.

Entry tax, special entry tax and octroi duty, if applicable, will be settled and paid directly by the Purchaser.

GST, duties and levies shall also be remitted by the Purchaser to the Supplier.

If Purchaser wishes to avail benefit of concessional Central Sales Tax (as applicable) for interstate sales, Purchaser shall provide to the Supplier Central Sales Tax Declaration Forms C'/E-1 within 30 days of the end of each quarter.

In the event of Purchaser's inability to provide Central Sales Tax Declaration Form C'/E-1 and / or any other form/document as may be applicable and consequent to imposition of final demand upon the Supplier by the authorities, the Purchaser shall pay the differential sales tax, penalty and interest to the Supplier as per the demand notice so issued.

1.24.2 The **SUPPLIER** shall furnish to the **PURCHASER** with their bill excise duty gate passes in support of excise duty and special excise duty paid for the base price.

1.24.3 The **SUPPLIER** shall indicate in the contract price, (Refer price schedule), the estimated amount of GST, Central / State Sales Tax, Excise Duty, Special excise duties, Customs duty, local taxes and any other taxes or duties and octroy, if any payable by the **PURCHASER** for own manufactured items and bought-out items under the contract based on the rates prevailing at the time of submission of offer. The actual taxes and duties payable by the **PURCHASER** shall not exceed more than two (2) percent of the indicated values by the **SUPPLIER** in the price schedule, unless there is a change in rate of the taxes and duties imposed by State / Central Authorities. The **SUPPLIER** shall indicate clearly the rate at which the taxes and duties, octroi, etc. have been estimated by the **SUPPLIER** at the time of giving this offer.

1.24.4 The **PURCHASER** or their authorized representative shall be shown all original documents and accounting records in support of excise duties, customs duties on imported components charged and the original bill of the sub-contractors for satisfying that the single point sales tax, excise duty and special duties as aforesaid have actually been paid to the sub-contractors.

1.25 Headings

1.25.1 Headings, whether of clauses or of other parts of the contract, are for reference only and are not to be construed as part of the contract.

1.26 Waiver

1.26.1 Failure of either party to insist upon strict performance by the other party of any provision of the contract shall in no way be deemed or construed to affect in any way the right of that party to require such performance.

1.27 Foreign Exchange

Any foreign exchange required for import of the raw materials of equipment shall be arranged by the **SUPPLIER**, non-availability of foreign exchange shall not entitle the **SUPPLIER** any extension of time for commissioning of the plant.

2. SPECIAL CONDITIONS OF CONTRACT FOR SUPPLY

2.1 Definitions

In this document, the words and phrases listed shall have the meaning specified against each word or phrase. Words imparting singular shall include plural and vice versa and words imparting the masculine gender shall include feminine gender and words imparting persons shall include bodies corporate.

- a) "The **PURCHASER**" means M/s **HPCL Biofuels Ltd (HBL), Village Suguali, East Chmaparan and Village Lauriya, West Champaran, Bihar**
- b) "The **CONSULTANT**" means M/s. **MITCON Consultancy & Engineering Services Ltd.**, having their Registered Office at First Floor, Kubera Chambers, Shivajinagar, Pune – 411 005.
- c) "The **SUPPLIER**" means the individual or firm supplying the goods and providing the services under this contract.
- d) "The **GOODS/EQUIPMENT/PLANT**" means all of the equipment, machinery and/or other materials which the **SUPPLIER** is required to supply to the **PURCHASER** under the contract.
- e) "**The CONTRACT / AGREEMENT**" means the agreement entered into between the **PURCHASER**, and the **SUPPLIER**, as recorded in the contract signed by both the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- f) "**FOB**", "**C&F**" and "**CIF**" have the meanings assigned to them by the current edition of the international rules for the interpretation of the trade terms published by the International Chamber of Commerce.
- g) "The **SUB-SUPPLIER**" means any individual or firm or company, to whom part of the contract has been sublet by the **SUPPLIER** with the consent of the **PURCHASER**.
- h) "The **INSPECTOR**" means any person or agency nominated by the **PURCHASER**, from time to time, to inspect equipment stage-wise including final stage, before dispatch at **SUPPLIER's / SUB-SUPPLIER's** works as per the terms of the contract.
- i) "**SUB CONTRACT**" shall mean order placed by the **SUPPLIER** for any portion of the Contract or work, with the necessary consent of **PURCHASER**.
- j) "**CONTRACT PRICE**" means the `consideration' payable by the **PURCHASER** directly to the **SUPPLIER** as per the agreement and desire of **SUPPLIER** for the full and proper performance of contractual obligations under the contract between the **PURCHASER** and the **SUPPLIER**.
- k) "**DELIVERY**" shall mean the completion of delivery of all such goods within the delivery date specified in the contract, vide clause No.2.8.2 of the Special Conditions of Contract.
- l) "**SITE**" shall mean and include the land and other places on, into or through which the works and

the related facilities are to be erected or installed, at the **PURCHASER's** site at **Village Suguali, East Champaran and Village Lauriya, West Champaran, Bihar**

- m) "**DRAWINGS**" shall mean the technical specification which shall include engineering drawings, sketches showing plans, sections and elevations related to the contract together with modifications and/or revision thereto.
- n) "**SPECIFICATION**" shall mean and include schedules, detailed description, statements of technical data, performance characteristics, standards (Indian as well as International) as applicable and specified in the contract.
- o) "**ENGINEER/ENGINEER-IN-CHARGE**" shall mean the person so nominated by the **PURCHASER** for the time being or such other person as may be duly authorized and appointed in writing by the **PURCHASER** to act as site engineer for the purpose of the contract. In cases where no such engineer is so appointed, the word 'engineer' shall mean the **PURCHASER** or their duly authorized representatives.
- p) "**TESTS**" shall mean such process or processes to be carried out by the **SUPPLIER** as are prescribed in the contract or considered necessary by **CONSULTANT / PURCHASER** and **SUPPLIER** together after mutual discussions, in order to ascertain quality, workmanship, performance and efficiency of equipment or part thereof.
- q) "**APPROVAL**" shall mean and include the written consent, either manuscript, type written or printed statement, under signature or seal, as the case may be, of the **PURCHASER/CONSULTANT** or their authorized representative on documents, drawings or other particulars in relation to the contract.
- r) "**DATE OF CONTRACT**" shall mean the date on which the parties have signed the Contract Agreement.
- s) "**THE ZERO DATE OF THE CONTRACT**" shall be the date on which the Letter of Intent (LOI) is given or Contract Agreement is signed.
- t) "**MONTH**" shall mean the calendar month.
- u) "**DAY AND DAYS**" shall mean the calendar day or days of twenty four (24) hours each.
- v) "**WEEK**" shall mean a continuous period of seven (7) days.
- w) When the words 'Approved', 'Subject to Approval', 'Satisfactory', 'Required', 'As Directed', 'Where Directed', 'Determined By', 'Accepted', 'Permitted', or words or phrases of like importance are used, the approval, judgment, direction etc., are understood to be a function of **PURCHASER / CONSULTANT**.
- x) "**SCOPE OF WORK**" shall mean all the work to be performed by the **SUPPLIER** under this contract.
- y) "**OPERATING MONTHS**" shall mean the period of actual operation of the equipment without taking into account the intervening off-season shutdown or shutdown due to major plant breakdown.

- z) “**COMMISSIONING**” shall mean the first operation of the equipment (after all initial adjustments, trials, cleaning and reassembly required at site if any, have been completed) and the equipment is ready for commercial use.
- aa) “**SATISFACTORY COMMISSIONING**”, means the continuous operation of the equipment to the full capacity and establishment of its strict performance of the contractual requirement.

2.2 Scope of the contract

- 2.2.1 The **SUPPLIER's** scope of work comprises of the detailed design, procurement, fabrication / manufacture, inspection and testing at the works and supply of plant and machinery on F.O.R. site basis, as defined in the technical specification, with all their accessories, fittings, supports and all the auxiliary equipment and material as detailed in the specification.
- 2.2.2 Wherever it is stated in this contract that such and such a supply is to be effected or such and such a work is to be carried out, or provided, it shall be understood that the same shall be effected/carried out by the **SUPPLIER** within the contract price, unless a different intention is specifically and expressly stated herein or otherwise explicit from the context.
- 2.2.3 Completeness of the equipment, within the battery limits, shall be the responsibility of the **SUPPLIER**. Any equipment, fittings and accessories which may not be specifically mentioned in the specification or drawings, but which are usual or necessary for the satisfactory functioning of equipment (successful operation and functioning of the equipment being **SUPPLIER's** responsibility) shall be provided, by the **SUPPLIER** without any extra cost to the **PURCHASER**.
- 2.2.4 Furnishing to the **PURCHASER**, foundation drawings and loading details relating to plant and machinery within the **SUPPLIER's** scope progressively at an agreed time schedule.
- 2.2.5 The **SUPPLIER** shall ensure that the work shall be of the first class quality and shall be performed:
- a. with due diligence and efficiency.
 - b. in accordance with the provisions of the Contract and the time schedule indicated in this Contract.
- 2.2.6 The **SUPPLIER** shall at all times ensure that the work is carried out by fully qualified and experienced personnel to warrant the performance of the work in accordance with this agreement.
- 2.2.7 The **SUPPLIER's obligations** towards this contract include participation in the performance testing, trial operation and reliability run of the plant and equipment.
- 2.2.8 The training of the **PURCHASER's** personnel at the **SUPPLIER's** works and / or at the site.
- 2.2.9 The **SUPPLIER** is responsible for packing (sea worthy wherever necessary) protecting and marking as per instructions to be given by the **PURCHASER**.

2.2.10 Providing all the necessary drawings / documents / manuals. Instructions for all the equipment /

components / materials required for the proper understanding, erection and commissioning of the equipment by the **PURCHASER's** erection and commissioning contractor.

2.2.11 Bidders to note that inspection report wherever applicable, MTC and Guarantee certificates will be required for all the supply items which will be cross checked with the OEMs and in case of fake supply of any item, action deemed fit will be taken by the Purchaser which will be binding on the Bidder.

2.3 Limit of contract

Equipment supplied shall be complete in every respect with all mounting, fittings, fixtures and standard accessories, tools etc., normally provided with such equipment and / or needed for maintenance, completion of installation and commissioning and safe operation of the equipment as required and within the battery limits, though they may not have been specifically detailed in the respective specification. All similar standard component / part of similar standard equipment provided shall be interchangeable with one another.

Any additional equipment or material which are not specifically mentioned but are required to complete the equipment and system offered, in every respect in accordance with the technical specification and required for safe and reliable operation and guaranteed performance, shall also be deemed as included in the scope of work of this contract. The **SUPPLIER** shall not be eligible for any extra payment in respect of such mountings, fittings, fixtures, accessories, etc., which are needed for the safe operation of the equipment as required by applicable codes, though they may not have been explicitly spelt out in the contract. However if new equipment are to be added due to change of government rules, then such new equipment will come under additional scope of work.

2.4 Codes and Standards

The goods supplied under this contract shall conform to the codes and standards mentioned in the technical specification, and, when no applicable standard is mentioned, to the authoritative codes and standards and such standards shall be the latest issued by the concerned institution. In the event that the language of such codes and standards happens to be anything other than English, the **SUPPLIER** shall furnish the English translation of all such codes and standards proposed to be used in the contract. Such English translations shall be provided to the **PURCHASER / CONSULTANT** within the first four (4) weeks from the date of the contract and the **SUPPLIER** shall undertake the full responsibility for the accuracy of such translations.

2.5 Materials and workmanship

The materials and workmanship shall meet the requirement of relevant standards and good engineering practices. In any case, the material shall be the best grade obtainable and the most suitable and proven for the purposes intended in accordance with the modern engineering practices. **All materials shall be new.** Substitutions for specified materials or variations from designed methods of fabrication will be permitted only if approved in writing by the **PURCHASER/CONSULTANT**. Such approvals may be granted only if a compelling reason exists for making a substitution.

Before any defect in material or workmanship is repaired, the **SUPPLIER** shall outline the procedure proposed for rectification of the defect and obtain approval in writing, of the **PURCHASER/CONSULTANT**. Such repairs shall be done free of cost to the **PURCHASER**, if the defects are established to have occurred during the warranty period.

2.6 Statutory approval for works

- 2.6.1 The application for submission to inspector, or any other authority required as per statutory rules and regulations of State / Central governments along with copies of required certificates complete in all respects shall be prepared by the **SUPPLIER**. The primary responsibilities for statutory approvals and liaison with government authorities for approvals, during the manufacturing and till such time the equipment and material are shipped from the **SUPPLIER's / SUB-SUPPLIER's** premises, shall be with the **SUPPLIER**.
- 2.6.2 Any change / addition required to be made to meet the requirement of the statutory authorities, if such change / addition of the statutory requirement come into force before the date of signing of the contract, shall be carried out by the **SUPPLIER** free of charge. The changes / additions required and additional charges thereon, consequent to the statutory regulations coming into force after the date of signing of the contract, shall be paid by the **PURCHASER** after mutual agreement. The inspection and acceptance of the work by statutory authorities shall, however, not absolve the **SUPPLIER** from any of their responsibilities under the contract.

2.7 Testing and inspection

- 2.7.1 The equipment will be inspected and where practicable, submitted to such tests at the works as deemed necessary by the **SUPPLIER** before dispatch.
- 2.7.2 The **SUPPLIER** shall give the **PURCHASER** a minimum of seven (7) days' written notice whenever any equipment / component / material is ready for testing. The **PURCHASER** shall, unless they waive witnessing of the tests, attend such tests on the notified scheduled date of testing. In case the Inspection Agency feels that inspection will be delayed before despatch, they will accordingly send a clearance to the **SUPPLIER** with an instruction to despatch the material. Such materials will be inspected at site. The **SUPPLIER** shall show necessary test certificates and documents for the verification of the same as per the specification of contract.
- 2.7.3 Where the **PURCHASER's** representative is present to witness the tests, the test certificate shall be signed by him on successful completion of tests at **SUPPLIER's / SUB-SUPPLIER's** works. In case the **PURCHASER** is not satisfied with the tests, they shall within seven (7) days of witnessing the tests, inform the **SUPPLIER**, in writing, of any objection they have with regard to any equipment and workmanship with reference to the contractual provisions. The **SUPPLIER** shall give due consideration to such objections and shall either make the modification that may be necessary to meet the said objections or shall confirm in writing to the **PURCHASER** giving necessary reasons, that no modification is necessary to comply with the contract. Notwithstanding the test certificates, any defect found at the time of installation or after installation and commissioning shall be rectified at the **SUPPLIER's** cost.
- 2.7.4 Bidders to note that inspection report wherever applicable, MTC and Guarantee certificates will be required for all the supply items which will be cross checked with the OEMs and in case of fake supply of any item, action deemed fit will be taken by the Purchaser which will be binding on the Bidder.

2.8 Work schedule

- 2.8.1 Timely delivery of the plant and equipment shall be the essence of the contract. The **SUPPLIER** shall so organize their resources and perform this work as to complete it on or before the date given in the following clause.
- 2.8.2 The following shall be the schedule for the completion of various milestone activities for this package. The **SUPPLIER**'s time schedule shall strictly conform to this schedule.

Milestone activity	Completion date
1. Engineering Activities 2. Completion of Supply 3. Commencement of erection 4. Completion of commissioning	To suit commissioning within 12-months for 3 MW STG & Aux. from zero date of the contract i.e. date of issue of LOI/PO, whichever is earlier (For Each site, Sugali & Lauriya)

- 2.8.3 If the situation warrants, consequent to a delay in the manufacturing process, the **SUPPLIER** shall arrange to air lift the equipment to meet with the delivery commitment. All expenditure towards such air lifting, including tax implication if any, shall be to the **SUPPLIER**'s account, in case the delay in supply is directly attributable to the **SUPPLIER**.
- 2.8.4 The **SUPPLIER** within fifteen (15) days of the signing of agreement shall furnish dispatch wise break-up prices. The **SUPPLIER** within fifteen (15) days of signing of contract agreement shall furnish a time schedule of deliveries relating to major equipments and erection work, which shall be adhered to, for enabling completion of erection and commissioning. The delivery schedule shall be finalized with the approval of **PURCHASER/CONSULTANTS**.
- 2.8.5 Time schedule network / bar chart.
- 2.8.5.1 The **SUPPLIER** shall submit to **PURCHASER / CONSULTANT**, their time schedule regarding the documentation, manufacture and supply of the equipment and materials as well as information on their sub-contracts to be placed with third parties, including the dates on which the **SUPPLIER** intends to issue such sub-contracts.
- 2.8.5.2 The time schedule will be in the form of a network or a bar chart clearly indicating all main or key events regarding documentation, supply of raw materials, manufacturing, testing and delivery.
- 2.8.6 Progress trend chart / monthly report.
- 2.8.6.1 **SUPPLIER** shall report monthly on the progress of the execution of contract and achievement of targets set out in time bar chart.
- 2.8.6.2 The progress will be expressed in percentages as shown in the form of progress trend chart.
- 2.8.6.3 The monthly reporting will be the updating of the progress trend chart.
- 2.8.6.4 The progress reports shall be submitted once in every month for the first three months

and subsequently once in every fortnight till the completion of the contract.

2.8.6.5 The monthly progress report shall be in the form to be given by the **PURCHASER** showing the progress in connection with the all the items like the progress of the submission of drawings, placing of order for bought outs, delivery of plant and machinery and compliance of contractual obligations, before the Tenth day of month, with a copy thereof endorsed to CONSULTANT

2.8.6.6 Photographs wherever necessary shall be submitted. The progress report shall further compare actual versus projected completion dates as well as describe current and anticipated problems and delaying factors, if any, and corrective action taken or proposed to be taken without in any way relieving or affecting the **SUPPLIER's** responsibility to deliver the equipment within the stipulated delivery date(s) / period(s).

2.9 Invoices and payments

Upon delivery of the goods, the supplier shall notify the purchaser and the insurance company by E-mail the full details of the shipment including contract number, transport carrier receipt number and date, description of goods, quantity, name of the consignee etc. The **SUPPLIER** shall mail the following documents to the purchaser with a copy to the insurance company:

- (i) Three (3) copies of the **SUPPLIER's** invoice showing description of goods, quantity, unit price and total amount.
- (ii) Transport receipt / acknowledgement of receipt of goods from the consignee(s);
- (iii) Certificate of origin for imported direct despatchable finished goods.
- (iv) Packing list as required as per clause-2.10.

The above documents shall be received by the **PURCHASER** before receipt of the goods (except where the goods have been delivered directly to the consignee with all documents) and, if not received, the **SUPPLIER** will be responsible for any consequent expenses/losses.

- (v) The **SUPPLIER** shall send all duplicate for Transporter copies of cenvat invoices along with original for Buyer copies directly to the **PURCHASER** to their registered office address to avoid loss of such documents in transit. The **SUPPLIER** shall send only Xerox of the duplicate for Transporter copies of the cenvat invoices through the vehicles carrying the consignments.
- (vi) If the **SUPPLIER** fails to send such documents directly and in the event of such documents getting lost in transit, the **SUPPLIER** shall be fully responsible to compensate the **PURCHASER** from loss of cenvat credit and the **PURCHASER** shall be at liberty to deduct from the dues of the **SUPPLIER**, amounts equivalent to such losses towards compensation.
- (vii) All Payments will be released by the **PURCHASER** only after 30 days from the date of certification of the **SUPPLIER's** bill by **EIC & Consultant**

2.10 Packing

2.10.1 The **SUPPLIER** shall provide such packing of goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the contract. The packing

shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

2.10.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirement as shall be provided for in the contract and in subsequent instructions by the **PURCHASER**.

2.10.3 **SUPPLIER** shall furnish one (1) original and five (5) copies of a packing list for each shipment. This packing list shall be prepared on **SUPPLIER's** standard formats. Packing list must include the following:

- Date
- Supplier's reference number
- Full name and address of the supplier or manufacturer
- Full name of consignee (**PURCHASER**)
- Import license number, where applicable
- Itemized list of contents of each package, case, crate etc. identified by the contract number, item number and equipment or tag number, where applicable.
- Quantity of each item actually being shipped
- Copy of all marking as shown in each package or piece
- Number and type of package and/or pieces in each shipment. Each package and / or piece shall be numbered consecutively to indicate individual and total packages: i.e., 1 of 5, 2 of 5 etc. (succeeding shipments against same order number will carry progressive package numbers: i.e., 3 of 5, 4 of 5, 5 of 5 etc.)
- Shipment number - packing list must indicate if shipment is partial or final shipment of order. Each partial shipment will be consecutively indicated as "partial shipment" No.1 or 2 or 3 etc. as applicable. Final shipment shall be indicated as "final shipment". A shipment of an entire order in one shipment shall be indicated as "complete shipment".
- Net and gross weight of each package and / or piece, and the total weight of the shipment.
- Dimensions and volume of each package and / or piece and the total volume of the shipment.

2.11 Documents, drawings & instruction manuals

2.11.1 All drawings, specification, design calculations and bill of material prepared by the **SUPPLIER**, shall comply with the following instructions unless otherwise directed in writing by **PURCHASER/CONSULTANT**. The term "drawing" as used in this specification shall mean and include sketches, design drawings, design calculations, specification and bill of materials unless otherwise defined. Design calculations to be submitted by the **SUPPLIER** shall include the working stress, the safety factor used, codes and standards used, etc., excepting those proprietary in nature. Drawings and data, furnished by the **SUPPLIER** for construction use, shall be certified as such and shall bear the signature of one of the authorized persons, whose names shall previously be given in writing to the **PURCHASER/CONSULTANT**.

- 2.11.2 The **PURCHASER/CONSULTANT** will after mutual discussions with the **SUPPLIER**, select the drawings / documents for approval by **PURCHASER/ CONSULTANT** or for their information.
- 2.11.3 It is understood that the approval or release by **PURCHASER/CONSULTANT** does not include the checking of drawings and other errors, but only review of basic concepts and general principles involved. Approval does not relieve the **SUPPLIER** of responsibility for correctness of design, details, dimensions and guarantee obligations.
- 2.11.4 All design drawings shall be oriented to match the plant arrangement drawings and shall have a key plan identifying the plant area to which they apply. All layout drawings shall be made with the north arrow pointing to the top of the sheet or to the left. There shall be sufficient reference notes on the drawings to permit identification of all the drawings which are required for a proper understanding.
- 2.11.5 All drawings shall be dimensioned in the metric system. Where drawings are usually made in the British (or other) system, they shall also have metric system dimensions in parentheses or below dimension line. Titles and written notations shall be in English.
- 2.11.6 The scale of the drawing shall be shown clearly in the title block of the drawing. Wherever possible scales of drawings shall correspond to the recommendation of the Bureau of Indian Standards.
- 2.11.7 All reproducible must be made from original drawings.
- 2.11.8 All revised drawings shall clearly indicate the number, date and subject of each revision.
- 2.11.9 The **SUPPLIER** shall submit to **PURCHASER/CONSULTANT**, in the first contract meeting, a list of all drawings and data, by title, which the **SUPPLIER** expects to supply against the contract. On receipt of the list **PURCHASER/ CONSULTANT** and **SUPPLIER** shall jointly finalize a schedule for the submission of drawings.

The **SUPPLIER** shall maintain the pace of work as required by the schedule. Drawing list shall be kept upto-date, incorporating all new additions, cancellations and changes and will be reissued periodically with the periodical progress reports.

- 2.11.10 The **SUPPLIER** will be required to furnish all the necessary drawings, data, etc. of the plant/equipment with appropriate "status" stamp in adequate number of copies as indicated below.

S.No	Status of the drawing/ document etc.	No. of copies for Purchaser	No. of copies for Consultant
1.	Reference/information	4 prints	2 prints
2.	For approval	2 prints	3 prints
3.	Final & certified duly signed	6 Prints & 1 CD	1 Print & 1 CD

4	Operation and maintenance manual	4 copies	1 copy
5	Performance and acceptance test procedure	2 copies	1 copy
6	All other documents including erection drawings	2 copies	1 copy

2.11.11 Within a period of ten (10) days after the receipt of those drawings/documents, the **PURCHASER / CONSULTANT** shall signify their approval or otherwise. Corrected drawings / documents shall be submitted to the **PURCHASER / CONSULTANT** within ten days after the receipt of the commented drawings/documents by the **SUPPLIER**. The **SUPPLIER** shall submit copies of all drawings which are required to be approved by the **PURCHASER / CONSULTANT**. The drawings which are approved by the **PURCHASER / CONSULTANT** shall not be deviated from, without the further approval of the **PURCHASER / CONSULTANT**.

2.11.12 All drawings submitted for approval shall contain the name of the **PURCHASER**, name of the **CONSULTANT**, project title, drawing title, scale, **SUPPLIER**'s drawing number, date of drawing etc. in the lower right hand corner.

2.11.13 The **SUPPLIER** shall have the right to improve with the **PURCHASER**'s approval, the design of equipment without affecting the basic requirement of the **PURCHASER**, and without affecting the agreed contract price.

2.12 Liquidated damages for delay in delivery

The **SUPPLIER** shall endeavor to complete their scope of work within the time specified in the contract. It may be noted that "time is the essence of this contract", subject to clauses-1.15 and 1.21 of the General Conditions of Contract. If the **SUPPLIER** fails to supply any or all of the goods within contract stipulated time in the contract to suit commissioning within 12-months from the zero date of the contract, the **PURCHASER** shall, without prejudice to their other remedies under the contract, deduct from the contract price, as liquidated damages, a sum equivalent to 0.5% of the total contract price for each week of delay until actual performance, up to a maximum deduction of 5% of the total contract price, the total contract price being inclusive of subsequent modifications and price escalation, if contractual. Once the maximum is reached, the **PURCHASER** may consider termination of the contract.

2.13 Indemnity

2.13.1 The **SUPPLIER** shall indemnify and hold harmless the **PURCHASER / CONSULTANT** from all claims, losses, demands, causes of action or suits arising out of the equipment and material furnished by them. The **SUPPLIER** shall also indemnify the **PURCHASER** against all third party claims, any infringement of trade mark or patent or industrial design rights arising from use of the goods or any part thereof. Indemnity Clause shall apply to both the parties equally.

2.13.2 **SUPPLIER** shall conform to the provisions of Indian Boiler Regulations (as applicable), Indian Factories Act, Indian Electricity Rules etc. relating to the work and to the regulations and by laws of any authority, if required.

2.14 Insurance

2.14.1 The **SUPPLIER** is responsible for comprehensive risk, insurance including transit charges of all machinery and equipments, other consumables, directly dispatched to the **PURCHASER** Sugars plant site from the **SUPPLIER** / Sub-contractors or sub-**SUPPLIER** respective place of manufacture and despatch and the insurance policies in respect thereof shall be arranged by the **SUPPLIER** at such premium rates with such insurance companies as may be approved by the **PURCHASER** and kept in full force and effect until commissioning of the said plant.

2.14.2 Any consignment received at the place of destination in damaged conditions or is lost in transit, the representative of the **SUPPLIER** / **SUPPLIER'S** erection contractor will take an open delivery from the carriers and will give suitable remarks in the delivery book maintained by the Station Master or other carriers about the loss or breakage in transit. The representatives of the **SUPPLIER** shall lodge claims with the Railway or other carriers on behalf of the **PURCHASER** in time with a copy to the **PURCHASER** for information. All realization of claims from the carrier / railway and insurance company, whether in the name of the **SUPPLIER** shall be to the account of the **SUPPLIER**. The **SUPPLIER** shall supply the replacement of machinery and equipments, goods free of cost delivered at the site to the **PURCHASER** within the time as far as possible so as to adhere to the date of commissioning.

2.14.3 All goods supplied under this contract shall be fully insured by the **PURCHASER** on all risks basis against loss/damage during transit from the place of manufacture of the **SUPPLIER** and from the places of manufacture of their Sub-**SUPPLIER** to the site of installation.

2.14.4 If there is any loss or damage to goods, within 15 days of such occurrence the **SUPPLIER** will take action to make good the loss so that it will not affect the overall time schedule of the project.

2.15 Performance guarantee

2.15.1 The **SUPPLIER** shall guarantee that the performance of the equipment supplied under the contract shall be strictly in conformity with the requirement given in the specification and shall perform the duties specified under the contract. The performance trials will be conducted in the presence of authorized representatives of:

- a. Purchaser
- b. Supplier
- c. Consultant
- d. Representative of Erector

2.15.2 If the performance of the equipment fails to prove the guarantee set forth in the specification, **SUPPLIER** shall investigate the causes and provide, free of cost to **PURCHASER**, materials, and equipment within one (1) month or such reasonable period, to be mutually discussed and agreed, to prove the guarantees.

- 2.15.3 If the **SUPPLIER** fails to prove the guarantee within the reasonable period, as mutually agreed upon, **PURCHASER** shall have the option to take over the equipment and rectify, if possible, the equipment to fulfill the guarantees and or to make necessary additions to make up the deficiency at **SUPPLIER's** risk and cost. All expenditure incurred by the **PURCHASER** in this regard shall be to **SUPPLIER's** account.
- 2.15.4 The manufacturers' guarantees for all bought out items/equipment/instruments etc., shall be made available to the **PURCHASER** and shall be valid for the entire maintenance warranty period. If such guarantees are not issued by the manufacturer, the **SUPPLIER** shall guarantee the bought out items for the entire maintenance warranty period along with their guarantee for the plant as a whole.
- 2.15.5 In the event of failure of any particular part of any equipment more than three times during the maintenance warranty period, it shall not be repaired but the complete part shall be replaced by the **SUPPLIER** and the warranty for this particular part shall be extended by one year from the date of last replacement or the maintenance period of two crushing season, whichever is later.
- 2.15.6 In case it is found that the above mentioned failure is due to some connected part of the equipment, that part shall also be rectified or replaced by the **SUPPLIER** to avoid such failure in the future. The warranty for such replaced parts shall be extended by one year, for parts replaced within six (6) months of commissioning of the equipment, and six months for parts replaced after six months of commissioning of the equipment, from the date of last replacement. or the maintenance period of two crushing season, whichever is later.
- 2.15.7 For electrical motors, during the warranty period, in case some important part of the motor like stators, winding, shaft, squirrel cage rotor etc., become defective, the warranty shall cover its replacement, and no repairs shall be allowed.

2.16 Spare parts, lubricants

- 2.16.1 All the spare parts for the equipment under the contract will strictly conform to the specification and other relevant documents and will be identical to the corresponding main equipment / components supplied under the contract and shall be fully interchangeable.
- 2.16.2 Commissioning spares are not envisaged separately. However, any and all requirement of commissioning spares until commissioning of plant shall be **SUPPLIER's** responsibility.
- 2.16.3 The quality plan and the inspection requirement finalized for the main equipment will also be applicable to the corresponding spares.
- 2.16.4 The **SUPPLIER** will provide the **PURCHASER** with the addresses and particulars of all their **SUB-SUPPLIER** while placing the order on vendors for items / components / equipment covered under the contract and will further ensure with their vendors that the **PURCHASER**, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.
- 2.16.5 Apart from the requirement of this clause, the **SUPPLIER** shall maintain all critical spares, and shall undertake to supply them as and when required during the life time of the unit, at the prevailing prices and with in a reasonable time required for supply, such that the **PURCHASER** does not face any hardship due to the machine break down and the consequent loss of production.

2.16.6 Details of all the spare parts are required to be provided in the item master format (format will be shared by Purchaser to L1 bidder after award of PO) which will include all the technical details regarding the spare parts along with indicative price, approved suppliers with their details for ease in procurement after installation

2.16.7 In the event of termination of production of the spare parts by the **SUPPLIER** or their **SUB-SUPPLIER**:

2.16.7.1 The **SUPPLIER** shall give advance notification to the **PURCHASER** of the impending termination of production, in sufficient time to permit the **PURCHASER** to procure their requirement.

2.16.7.2 Following such termination, the **SUPPLIER** shall furnish to the **PURCHASER**, at no extra cost to the **PURCHASER**, blue prints, drawings and specification of the spare parts, if and when required.

2.17 Licenses and permits

The **SUPPLIER** shall procure necessary permits, certificates and licenses such as from the Chief Inspector of Boilers (as applicable), Electrical Inspectorate, Inspector of Factories, and such statutory bodies required by virtue of all applicable law, regulations, ordinances and other rules in effect at the place where any of the work is to be performed and the **SUPPLIER** shall further agree to hold the **PURCHASER** harmless from liability or penalty which may be imposed by reason of asserted or established violation of such laws, regulations, ordinances or other rules.

2.18 Arbitration

If at any time there should be any question, dispute, difference between the parties in respect of any matter arising out of or in relation to the contract, either party may give to the other party notice in writing of the existence of such question, dispute or difference, and the same shall be referred to the arbitration of panel of Engineers appointed by each party as per prevailing arbitration act.

The award of the Arbitrator shall be final and binding of the parties and be accepted by them. This reference to the Arbitrator shall be deemed to be reference, under the provisions of the Arbitration Act, 1996 and the rules made there under and any statutory modifications or recent amendment thereof that may be made from time to time and actually in force at the time of the reference. The cost of arbitration shall be borne by the parties as may be decided upon by the Arbitrator.

2.19 Instructions, directions and correspondence

2.19.1 The materials and equipment described in this contract are to be supplied according to the standards, data sheets, tables, specification enclosed with the contract itself and according to all conditions specified in the contract.

2.19.1.1 All instructions and orders to **SUPPLIER** shall, excepting what is herein provided, be given by **PURCHASER** and/or **CONSULTANT**, in writing.

2.19.1.2 All the work shall be carried out under the direction of and to the satisfaction of **PURCHASER/CONSULTANT**.

2.19.1.3 All communications, from **SUPPLIER**, including technical-commercial clarifications and/or

comments shall be addressed to **PURCHASER** with a copy to **CONSULTANT** and shall always bear reference to the contract.

2.19.1.4 Suitable **PURCHASER** identification numbers shall be shown on all invoices, communications, packing lists, containers and bills of lading, etc.

2.19.1.5 Correspondence on technical and commercial matters shall be dealt in separate letters and each copy of the letter shall be complete with all annexures.

2.20 Excess materials

2.20.1 This contract is for the supply of the equipment as specified, along with all their accessories and auxiliaries and the **SUPPLIER** shall supply all the equipment and material required for this purpose. Any excess material over and above this requirement supplied by the **SUPPLIER** shall be taken back by the **SUPPLIER** after the satisfactory commissioning of the plant.

2.20.2 The **SUPPLIER** has to take all care for the safety of such excess materials and the **PURCHASER** is not responsible for any loss or damage to such materials

2.21 Contract coordination procedure

2.21.1 The **SUPPLIER** shall identify one of their senior executives as the contract coordinator. The contract coordinator shall liaison closely with **PURCHASER's** executives and **CONSULTANTS** for the effective completion of the project within the stipulated time schedule.

2.21.2 The **SUPPLIER** shall prepare a contract coordination procedure in consultation with the **PURCHASER / CONSULTANT** for the smooth execution of the work. It shall cover, but not limited to, the following:

- a. Contract coordinators
- b. Progress review meeting / Engg. review meeting
- c. Progress reporting
- d. Billing procedure
- e. Inspection co-ordination procedure
- f. Shipping procedure
- g. Expediting procedure

2.22 Performance tests and Guarantee

The **SUPPLIER** shall guarantee the following:

- a. That all the machinery and equipment shall work as specified in Volume II forming part of the tender.
- b. That all the machinery and equipments will be brand new of latest design and first-class material and workmanship. Any part found defective, within two crushing season from the date of commissioning of the plant, shall be replaced or satisfactorily rectified by the **SUPPLIER** free of charge, should such defect be due to either faulty design / workmanship or use of defective material.

- c. Defects liability Period: 12 months from the date of completion of the entire job. (To be read together with General terms & Conditions)
- d. As per GTC, Original PBG for defect liability period (If Bidder chose not to deduct 10% retention) to be submitted at Purchase dept, Patna and copy at site.

The performance tests on the Incineration boiler & Aux with BoP shall be conducted within six (6) weeks from the date of commissioning. Upon successful completion of performance tests required by the **PURCHASER** and availability of the documentation including the layout and arrangement as built drawings and maintenance manuals, as well as fulfillment of all other obligations by the **SUPPLIER**, taking over certificate as a proof of final acceptance of the equipment/ system under scope of supply will be issued by the **PURCHASER**. The taking over certificate shall not be unduly delayed without assigning any acceptable reason.

If the performance test could not be conducted within the five (5) months' period, owing to an intervening off-season, the test shall be conducted immediately after the starting and stabilization of the next cane crushing season, applying the internationally accepted ageing factors, failing which the conducting of performance test and any extension of performance bank guarantee will be mutually discussed.

2.23 Penalty for shortfall in performance (detailed in Appendix IV)

2.23.1 The **SUPPLIER's** guaranteed performance included as part of this contract shall be binding on them.

2.23.2 The terms of guarantee fall under two categories:

2.23.2.1 Items for which penalties will be leviable for shortfall in performance.

2.23.2.2 Items for which shortfall in performance is not acceptable beyond a permissible tolerance.

2.23.3 The **Appendix IV** gives the penalties leviable for the shortfall in performance of the plant and equipment supplied.

2.23.4 If the total value of penalties for shortfall in performance exceed ten (10) percent of total contract price, and the **SUPPLIER** has expressed his inability to rectify the defect and bring the equipment performance to the guaranteed level, then the **PURCHASER** retains the option to reject the equipment, and in case of such option the **SUPPLIER** shall, jointly and severally, replace the equipment with the one, which shall meet the guaranteed figures. The replacement shall be done within a reasonable period mutually agreed and at no extra cost to the **PURCHASER**.

2.23.5 For those items for which shortfall in performance is not acceptable beyond a permissible tolerance, vide clause 2.23.4 above, the **SUPPLIER** jointly and severally, shall carry out modifications to obtain the guaranteed performance within the stipulated tolerance. It may be noted that as these are primary parameters, they must be corrected even before the trial run is started, and further, these parameters must remain stable throughout the period of trial run.

2.23.6 If finally, in spite of all practical efforts on the part of the **SUPPLIER**, the stipulated guarantees on these parameters are not established, the **PURCHASER** retains the option to reject the equipment. In case the option to reject is exercised by the **PURCHASER**, the **SUPPLIER** shall jointly and severally be responsible for the replacement of the rejected equipment within a reasonable period of time as will be indicated by the **PURCHASER** and achieve the performance as guaranteed.

2.23.7 In the event of rejection of equipment for above reasons, it is obvious that the overall project schedule will be affected. To minimize the loss due to such an occurrence, the **PURCHASER** retains the right to use as best as possible, the faulty equipment until new replacement arrives at site. Note should be taken that as the faulty equipment has not been taken over by the **PURCHASER**, the responsibility for it lies entirely with the **SUPPLIER**. During this period, the **SUPPLIER** shall not limit the use of the faulty equipment, except for reasons of safety during operation, both of personnel and the equipment.

2.24 PURCHASER's right to withhold payment

PURCHASER shall have the right to withhold or nullify the whole or a part of any application of **SUPPLIER** for payment to such extent as may be necessary to protect **PURCHASER** from sustaining any loss on account of:

- a. short supply not made good by **SUPPLIER**
- b. defective supply not rectified / made good by **SUPPLIER**
- c. defective work not remedied / replaced by **SUPPLIER** and to release the amount withheld after fulfillment by **SUPPLIER**

2.25 Training of PURCHASER's personnel

2.25.1 If considered necessary by the **PURCHASER**, the **SUPPLIER** shall undertake to train, the **PURCHASER**'s engineering personnel (two persons) at their works / their sub-contractors' works without any additional liability to the **PURCHASER**. These engineering personnel shall be given special training in the shops, where the equipment will be manufactured and where possible, in any other plant where equipment manufactured by the **SUPPLIER** is under installation, operation or testing to enable these personnel to become familiar with the equipment being furnished by the **SUPPLIER**. The period of training shall be a minimum of 15-days.

2.25.2 All traveling expenses for the engineering personnel to be trained will be borne by the **PURCHASER**. Accommodation at the place of training, food and local travel facilities shall be provided by the **SUPPLIER**. These engineering personnel while undergoing training shall be responsible to the **SUPPLIER** for discipline.

2.26 Expediting

When deemed advisable, this contract shall be subjected to physical expediting by the **PURCHASER / CONSULTANT** who shall be granted access to any and all parts of **SUPPLIER**'s or the **SUB-SUPPLIER**'s plant and office involved in the manufacture or processing of the contract.

Expediting performance by the **PURCHASER**'s representative shall in no way relieve the **SUPPLIER** of delivery obligations under the terms of the contract.

2.27 Suspension of work & extension of time

The **SUPPLIER** shall, if ordered in writing by the **PURCHASER** or their representative, temporarily suspend the work or any part thereof for such period and such time as so ordered and shall not after receiving such written orders, proceed therewith. In the event of suspension of work for a prolonged time by the **PURCHASER**, for the consequent idle time for the **SUPPLIER**, the **SUPPLIER** shall be compensated based on mutual agreement. The **SUPPLIER** shall not be responsible for the same, provided that the suspension was not consequent to any default / failure on the part of the **SUPPLIER** and the contractual delivery schedule shall be suitably extended after mutual discussion.

2.28 Sequence of delivery

The **SUPPLIER** shall deliver the goods as per the terms and conditions of the contract. Delivery terms are meant to be binding and essential. All materials shall be dispatched as per the agreed sequential order, suitable for erection progress at site. The delivery schedule shall also, indicate the approximate value of the major equipments. No deviation from the agreed sequence is allowed without **PURCHASER's** written approval. In case of deviation, the **PURCHASER** shall have the right to accept the supply but withhold the payment till the agreed date for the delivery of such material. If the delivery of any items as per the delivery schedule is delayed, the delivery of the subsequent items shall not be held up on this account.

2.29 Load data

SUPPLIER shall be responsible for correctness of the load data furnished by them to the **PURCHASER** for civil foundations.

In the event of notice of defects in the civil work, due to incorrect data furnished by the **SUPPLIER**, the cost incurred for redoing / rectifying, shall be borne by the **SUPPLIER**.

2.30 Quality assurance and Quality control

2.30.1 Quality Assurance (QA) shall mean the organizational set up, procedures as well as test, methods and facilities developed by **SUPPLIER** in order to assure that all goods leaving **SUPPLIER's**/ their **SUB-SUPPLIER's** shops are of the highest quality i.e., equal or exceeding the requirement specified by the **PURCHASER**.

2.30.2 Quality Control (QC) shall mean all the tests, measurements, checks and calibrations to be carried out in vendor's shop in order to compare the actual characteristics of the goods with the specified ones, as well as the documentation (certificates, records) containing the data or result of these activities.

2.30.3 The **SUPPLIER** shall submit a detailed procedure for quality control and quality assurance. The **PURCHASER** reserves the right to order for the technical audit of quality control and quality assurance systems followed by the **SUPPLIER** / **SUB-SUPPLIER**.

2.31 Dispatch Notice

SUPPLIER shall notify **PURCHASER** by E-mail, 7-days before the expected date of delivery of a consignment, date of readiness of equipment for shipment, total gross weight and total volume.

III. TERMS & CONDITIONS FOR THE ERECTION & COMMISSIONING SERVICES CONTRACT

1. GENERAL CONDITIONS OF CONTRACT FOR SERVICES

1.1 Use of contract documents and information

- 1.1.1 The CONTRACTOR shall not, without the OWNER's prior written consent, disclose the contract, or any provision thereof, or any specification, drawing, pattern, sample or information furnished by or on behalf of the OWNER in connection therewith, to any person other than a person employed by the CONTRACTOR in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.
- 1.1.2 The CONTRACTOR shall not, without the OWNER's prior written consent, make use of any document or information specified in clause-1.1.1¹ above, except for purposes of performing the contract.
- 1.1.3 Any document other than the contract itself, specified in clause-1.1.1 above, shall remain to be the property of the OWNER and shall be returned (in all copies) to the OWNER, on completion of the CONTRACTOR'S performance under the contract, if so required by the OWNER.

1.2 Change in the contract

- 1.2.1 The OWNER may at any time, by written notice to the CONTRACTOR make changes within the general scope of the service contract.
- 1.2.2 Upon notification by the OWNER of such change/s, the CONTRACTOR shall submit to the OWNER an estimate of costs for the proposed change/s, including any change in the schedule of payments, within ten (10) calendar days of the receipt of notice, and shall include an estimate of the impact, if any, on the time schedule under the contract, as well as the detailed schedule for the execution of the change, if applicable.
- 1.2.3 The CONTRACTOR shall not perform changes in accordance with clause-1.2.1 above until the OWNER has authorized a change in writing on the basis of the estimate provided by the CONTRACTOR as described in clause-1.2.2 above.
- 1.2.4 Changes mutually agreed upon shall also constitute a part of the work under this contract, and the provisions and conditions of the contract shall apply to said changes.
- 1.2.5 In the event the OWNER shall cause the CONTRACTOR to expend labour or consumables, or both, of any nature in order to provide the OWNER with information upon which to base a decision as to whether a change should be ordered, the OWNER shall reimburse the CONTRACTOR for the total costs related to supplying such information.

¹ Any reference to the clause numbers made within section III shall be construed to be the reference with in Section III only.

1.2.6 Except with the express permission of the **OWNER**, the installation of goods shall not be delayed pending agreement of costs or schedules affected by minor changes.

1.3 Contract Amendments

1.3.1 Subject to clause-1.2, no variation in or modification of the conditions and terms of the contract shall be made except by written amendment signed by the parties.

1.4 Sub-contracts

1.4.1 The **CONTRACTOR** shall not sub-contract all or any part of the contract without notifying the **OWNER** in writing, of the details of the sub-contractor and the work sub-contracted. Only approved sub-contractors of the **CONTRACTOR** shall be employed.

1.4.2 The **CONTRACTOR** guarantees that any and all sub-contractors of the **CONTRACTOR** for performance of any part of the work under the contract will comply fully with the terms of the contract applicable to such part of the work under the contract.

1.5 Country of Origin

All services provided under this contract shall be within India.

1.6 Inspection and tests

1.6.1 The **OWNER** or their representative or a reputed third party inspection agency nominated by the **OWNER**, shall have the right to inspect the work being carried out under this contract. However, for IBR items, third party inspection is not necessary. The Special Conditions of Contract or the specification or both shall specify what inspections and tests the **OWNER** requires and where they are to be conducted. The **OWNER** shall notify the **CONTRACTOR** in writing of the identity of representatives or third party agency retained for these purposes.

1.7 Contract performance security (Retention money)

1.7.1 The **CONTRACTOR** shall cause contract performance security to be furnished to the **OWNER** for the amount of ten percent (10%) of the contract price by means of a Bank Guarantee. Such performance security shall be provided, in the form satisfactory to the **OWNER**, within fifteen (15) days after the **CONTRACTOR**'s receipt of the notification of award of contract. The period of validity of the contract performance security shall be until the completion of work under the contract plus one year.

1.7.2 The proceeds of the performance security shall be payable to the **OWNER** as compensation for any loss resulting from the **CONTRACTOR**'s failure to complete the work under the contract. The **CONTRACTOR** shall cause the validity period of the performance security to be extended for such period(s) as the work schedule may be extended pursuant to clause-1.11.2.

1.7.3 The performance security shall be in the following form:

A bank guarantee, issued by a bank acceptable to the **OWNER**, in a form acceptable to the **OWNER**.

1.7.4 The performance security will be discharged or returned or both by the OWNER not later than thirty (30) days following the date of satisfactory commissioning and acceptance.

1.7.5 The bank guarantee as per clause-1.7.3 above, shall be enforceable by the OWNER in case the CONTRACTOR does not commence or continue to work as per the schedule / bar chart by giving 30-days' notice.

1.8 Indemnity

1.8.1 The **CONTRACTOR** and the **OWNER** shall indemnify and hold harmless each other from and against such claims and liabilities as provided in the Special Conditions of Contract.

1.8.2 Notwithstanding anything in this contract to the contrary, it is agreed that neither the **CONTRACTOR** nor the **OWNER** shall be held liable to the other party for loss of production, loss of profit, loss of use or any other indirect or consequential damage, except losses due to defects due to improper handling and installation.

1.9 Insurance

1.9.1 Necessary insurance cover shall be taken by the **CONTRACTOR** as mentioned in the Special Conditions of contract.

1.9.2 Without limiting the **CONTRACTOR's** liability (limited only to the contract price) the **CONTRACTOR** shall ensure that their sub-contractors also procure such additional insurance cover as specified above.

1.9.3 The **CONTRACTOR** shall ensure that further insurance covers as specified in the Special Conditions of the contract are also arranged.

1.10 Payment

1.10.1 The PURCHASER will pay the CONTRACTOR directly for the costs of loading, transportation to site, transit insurance, unloading, storage at site, installation and commissioning services as per **Appendix – I**.

1.10.2 The Price shall be firm and no escalation whatsoever is applicable till the completion of the contract.

1.10.3 All Payments shall be made in Indian rupee only.

1.10.4 Subject to clause-1.2 of the General Conditions of Contract and as provided for in the price schedule, price charged by the CONTRACTOR for services under the contract shall not vary from the prices agreed by the CONTRACTOR and given in the price schedule.

1.10.5 Payment for all invoices shall be made within 30-days from the date of submission and acceptance of the invoices by the OWNER.

1.10.6 The **CONTRACTOR's** invoices shall be paid in full inclusive of taxes and duties, after the deduction of advances and the retention money. The **OWNER** shall not make any deductions against any claims he may have on the **CONTRACTOR** as per the contract terms, unless the details of claim have been communicated to the **CONTRACTOR** in advance.

1.11 Extension in the CONTRACTOR's performance

1.11.1 Installation and commissioning of the goods shall be made by the **CONTRACTOR** in accordance with the time schedule, pursuant to the Special Conditions of Contract.

1.11.2 The **CONTRACTOR** may claim extension of the time limits as set forth in the work schedule in case of:

- a. Changes ordered by the **OWNER** pursuant to clause-1.2;
- b. Delay in any service which is to be provided by the **OWNER** (services provided by the **OWNER** shall be interpreted to include all approvals by the **OWNER** under the contract as well as access to the site);
- c. Delay in timely fulfillment of obligation by the Purchaser.
- d. Delay in timely release of payments by the Purchaser.
- e. Suspension, variations or any other reasons of delay, which is not attributable to the supplier.
- f. Force majeure pursuant to clause-1.17; and
- g. Delay in performance of work caused by orders issued by the **OWNER**.

The Supplier shall be entitled to extension to time for the corresponding period besides escalation/increase in price on account of delays, which shall be mutually discussed and agreed.

The **CONTRACTOR** shall demonstrate to the **OWNER**'s satisfaction that they have used their best endeavors to avoid or overcome such causes of delay, and the parties will mutually agree upon remedies to mitigate or overcome such causes of delay. The extension of time limit shall be mutually discussed and agreed.

1.12 Termination for Default

1.12.1 The **OWNER** may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the **CONTRACTOR**, terminate the contract in whole or in part:

- a. If the **CONTRACTOR** fails to deliver any or all of the services within the time period(s) specified in the contract, or any extension thereof granted by the **OWNER**, pursuant to clause-1.11; or
- b. If the **CONTRACTOR** fails to perform any other obligation(s) under the contract; and if the **CONTRACTOR**, in either of the above circumstances, does not cure their failure within a period of ten (10) calendar days (or such reasonable period as the **OWNER** may authorize in writing) after receipt of a notice of default from the **OWNER** specifying the nature of the default(s).

1.13 Termination for Insolvency

1.13.1 The **OWNER** may at any time terminate the contract by giving written notice to the **CONTRACTOR**, without compensation to the **CONTRACTOR**, if the **CONTRACTOR** becomes bankrupt or otherwise insolvent. Notwithstanding the above, such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the **OWNER**.

Provisions for termination for insolvency shall apply viz-a-viz to both the parties. In the event of termination for insolvency by the Supplier, provisions for termination for convenience by the Purchaser shall apply.

1.14 Termination for Convenience

- 1.14.1 The **OWNER** may, by written notice to the **CONTRACTOR**, terminate the contract, in whole or in part, at any time for their convenience. The notice of termination shall specify that termination is for the **OWNER**'s convenience, the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.
- 1.14.2 For the extent of work terminated, the **OWNER** shall pay an agreed amount for partially completed services by the **CONTRACTOR** for the purpose of the contract, together with a reasonable allowance for overhead and profit and a reasonable compensation, based on mutual discussions, for the financial commitments made by the **CONTRACTOR** for fulfilling their obligations under this contract.

1.15 Resolution of disputes

- 1.15.1 The **OWNER** and the **CONTRACTOR** shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the contract.
- 1.15.2 If, after thirty (30) days from the commencement of such informal negotiations, the **OWNER** and the **CONTRACTOR** have been unable to resolve amicably a contract dispute, either party may require that the dispute be referred for resolution by arbitration by the mechanism described in the Special Conditions of Contract. The award shall be final and binding on the parties.

1.16 Jurisdiction for legal proceedings

- 1.16.1 The contract shall be governed by and interpreted in accordance with the Indian laws. No suit or any proceedings in regard to any matter arising in any respect under this contract shall be instituted in any court other than the court Patna. No other court shall have jurisdiction to entertain any suit or proceedings even though part of the cause of action might arise within their jurisdiction.

1.17 Force majeure

- 1.17.1 In the event that the **CONTRACTOR** or any of their sub-contractors, or the **OWNER** delays performing any of their respective obligations under the contract, and such delay is caused by force majeure, by acts of God / Government in its sovereign capacity, including but not limited to war, civil insurrection, riots, strikes, fires, floods, epidemics, earthquakes, quarantine restrictions and freight embargoes, such delay may be excused as provided in clause-1.11, and the period of such delays, or a period mutually discussed and agreed, may be added to the time of performance of the obligation delayed.
- 1.17.2 If a force majeure situation arises, the **CONTRACTOR** shall promptly notify the **OWNER** in writing within 15 days of such condition and the cause thereof along with documentary evidence. Unless otherwise directed by the **OWNER** in writing, the **CONTRACTOR** shall continue to perform their obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event.
- 1.17.3 In no event shall, a force majeure event excuse the obligations of a party, if those obligations are required to have been completely performed, prior to the occurrence of that force majeure event.

1.18 Assignment

1.18.1 The **CONTRACTOR** shall not assign to any other agency, in whole or in part, their obligations to perform under the contract, except with the **OWNER**'s prior written consent.

1.19 Contract language

1.19.1 The **CONTRACTOR** hereby represents that it has sufficient knowledge of the English language to understand the contract fully. The contract shall be in the English language, and all documentation related hereto will also be in the English language, except if otherwise specifically agreed in writing between the parties.

1.20 Taxes and duties

1.20.1 The **CONTRACTOR** shall be entirely responsible for all taxes, duties and other such levies including entry tax and works contract tax imposed for the performance of the services as per the contract. The **CONTRACTOR** shall indicate the same in the price schedule.

1.21 Headings

1.21.1 Headings, whether of clauses or of other parts of the contract, are for reference only and are not to be construed as part of the contract.

1.22 Waiver

1.22.1 Failure of either party to insist upon strict performance by the other party of any provision of the contract shall in no way be deemed or construed to affect in any way the right of that party to require such performance.

2. SPECIAL CONDITIONS OF CONTRACT FOR SERVICES

2.1 Definitions

In this document, the words and phrases listed shall have the meaning specified against each word or phrase. Words imparting singular shall include plural and vice versa and words imparting the masculine gender shall include feminine gender and words imparting persons shall include bodies corporate.

- a. "The **OWNER**" means M/s **HPCL Biofuels Ltd (HBL), Village Suguali, East Champaran and Village Lauriya West Champaran, Bihar**
- b. "The **CONSULTANT**" means M/S. MITCON Consultancy & Engineering Services Ltd., having their Registered Office at First Floor Kubera Chambers, Shivajinagar Pune 411 005 Maharashtra State.
- c. "The **CONTRACTOR**" shall mean the individual or firm providing the services under this contract.
- d. "The **GOODS/EQUIPMENT/PLANT**" shall mean all of the equipment, machinery and/or other materials which the **OWNER** is required to provide to the **CONTRACTOR** under the contract.
- e. "The **CONTRACT**" shall mean the Contract agreement entered into between the **OWNER**, and the **CONTRACTOR**, as recorded in the contract, signed by both the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- f. "The **SUB-CONTRACTOR**" shall mean any individual or firm or company, to whom part of the contract has been sublet by the **CONTRACTOR** with the consent of the **OWNER**.
- g. "The **INSPECTOR**" shall mean any person or agency nominated by the **OWNER**, from time to time, to inspect equipment stage wise including final stage, at job site as per the terms of the contract.
- h. "**SUB-CONTRACT**" shall mean order placed by the **CONTRACTOR** for any portion of the work, with the necessary consent of **OWNER**.
- i. "**CONTRACT PRICE**" shall mean the 'consideration' payable by the **OWNER** directly to the **CONTRACTOR** as per the agreement and desire of **CONTRACTOR** for the full and proper performance of contractual obligations under the contract between the **OWNER** and the **CONTRACTOR**.
- j. "**DELIVERY**" shall mean the completion of all erection work within the completion date specified in the contract, vide clause 2.7.2 of the Special Conditions of Contract.
- k. "**SITE**" shall mean and include the land and other places on, into or through which the works and the related facilities are to be erected or installed, at the **PURCHASER's** site at Village Suguali, East Champaran & Village Lauriya, West Champaran, Bihar.
- l. "**DRAWINGS**" shall mean the technical specification which shall include engineering drawings, sketches showing plans, sections and elevations related to the contract together with modifications and/or revision thereto.
- m. "**SPECIFICATION**" shall mean and include schedules, detailed description, statements of technical

data, performance characteristics, standards (Indian as well as international) as applicable and specified in the contract.

- n. **“ENGINEER/ENGINEER-IN-CHARGE”** shall mean the person so nominated by the **OWNER** for the time being or such other person as may be duly authorized and appointed in writing by the **OWNER** to act as site engineer for the purpose of the contract. In cases where no such engineer is so appointed, the word ‘engineer’ shall mean the **OWNER** or their duly authorized representatives.
- o. **“TESTS”** shall mean such process or processes to be carried out by the **CONTRACTOR** as are prescribed in the contract or considered necessary by **CONSULTANT / OWNER** and **CONTRACTOR** together after mutual discussions, in order to ascertain quality, workmanship, performance and efficiency of equipment or part thereof.
- p. **“APPROVAL”** shall mean and include the written consent, either manuscript, type-written or printed statement, under signature or seal, as the case may be, of the **OWNER/CONSULTANT** or their authorized representative on documents, drawings or other particulars in relation to the contract.
- q. **“DATE OF CONTRACT”** shall mean the date on which the parties have signed the contract.
- r. **“MONTH”** shall mean the calendar month.
- s. **“DAY AND DAYS”** shall mean the calendar day or days of twenty four (24) hours each.
- t. **“WEEK”** shall mean a continuous period of seven (7) days.
- u. When the words ‘Approved’, ‘Subject to Approval’, ‘Satisfactory’, ‘Required’, ‘As Directed’, ‘Where Directed’, ‘Determined By’, ‘Accepted’, ‘Permitted’, or words or phrases of like importance are used, the approval, judgement, direction etc., are understood to be a function of **OWNER / CONSULTANT**
- v. **“WORK”** shall mean all the services to be rendered by the **CONTRACTOR** under the contract.
- w. **“START UP”** shall mean the time period required to bring the equipment covered under the contract from an inactive condition, when construction is essentially complete, to the state ready for trial operation. The start up shall include the preliminary inspection and checkup of equipment and supporting sub-system, initial operation of the complete equipment to obtain necessary pre-trial data, perform calibration and corrective action and adjustment prior to trial operation period.
- x. **“COMMISSIONING”** shall mean the first operation of the equipment (after all initial adjustments, trials, cleaning and re-assembly required at site if any, have been completed) and the equipment is ready for commercial use.
- y. **“SATISFACTORY COMMISSIONING for the purpose of claiming retention money”**, means the continuous operation of the equipment to the full capacity and establishment of its strict performance of the contractual requirement.
- z. **“THE ZERO DATE OF THE CONTRACT”** shall be issue of LOI OR date of Contract Signed

2.2 Scope of the contract

- 2.2.1 The **CONTRACTOR**'s scope of work comprises of the transportation of the goods to site from the equipment supplier's works, unloading, storage at the site, handling, installation, commissioning and performance testing of plant and machinery as defined in the specification, with all their accessories, fittings, supports and all the auxiliary equipment and material as detailed in the specification.
- 2.2.2 Wherever it is stated in this contract that such and such service is to be provided, it shall be understood that the same shall be effected/carried out by the **CONTRACTOR** within the contract price, unless a different intention is specifically and expressly stated herein or otherwise explicit from the context.
- 2.2.3 The **CONTRACTOR** shall ensure that the work shall be of first-class quality and shall be performed:
- a. with due diligence and efficiency.
 - b. in accordance with the provisions of the Contract agreement and the time schedule indicated in this Contract.
- 2.2.4 The **CONTRACTOR** shall at all times ensure that the work is carried out by fully qualified and experienced personnel to warrant the performance of the work in accordance with this Contract.
- 2.2.5 The **CONTRACTOR**'s obligations towards the contract include besides erection and commissioning of Incineration Boiler and auxiliaries with BoP, performance testing, trial operation, reliability run and handing over of the Incineration boiler & Aux. with BoP to the **OWNER**.
- 2.2.6 Training of the **OWNER**'s personnel at the site.

2.3 Codes & Standards

The services performed under this contract shall conform to the codes and standards mentioned in the technical specification, and, when no applicable standard is mentioned, to the authoritative codes and standards and such standards shall be the latest issued by the concerned institution. In the event that the language of such codes and standards happens to be anything other than English, the **CONTRACTOR** shall furnish the English translation of all such codes and standards proposed to be used in the contract. Such English translations shall be provided to the **OWNER / CONSULTANT** within the first four (4) weeks from the date of the contract.

2.4 Workmanship

The workmanship shall meet the requirement of relevant standards and good engineering practices.

2.5 Statutory approval for work

- 2.5.1 The application for submission to inspector, or any other authority required as per statutory rules and regulations of State / Central governments along with copies of required certificates complete in all respects shall be prepared by the **CONTRACTOR**. At the site the primary responsibilities for statutory approvals and liaison with government authorities for approvals shall be with the **OWNER** and the **CONTRACTOR** shall provide all necessary assistance to the **OWNER** in this regard.

The **PURCHASER** shall pay the statutory inspection and other fees and charges payable under the terms of any act of Regulation in respect of the installation, operation or use of machinery and equipments. But the follow-up work for get the approval is to be done by the **SUPPLIER** at their cost. The **PURCHASER** will extend all co-operation in this respect.

2.5.2 Any change / addition required to be made to meet the requirement of the statutory authorities, if such changes /additions of the statutory requirement come into force before the date of signing of the contract, shall be carried out by the **CONTRACTOR** free of charge.

The changes/additions required, consequent to the statutory regulations coming into force after the date of signing of the contract shall be paid by the **OWNER** after mutual agreement. The inspection and acceptance of the work by statutory authorities shall, however, not absolve the **CONTRACTOR** from any of their responsibilities under the contract.

2.6 Testing and inspection

2.6.1 The equipment will be inspected and where practicable, submitted to such tests at site as deemed necessary by the **OWNER / CONSULTANT**.

2.6.2 Where the **OWNER**'s representative is present to witness the tests, the test certificate shall be signed by him on successful completion of tests. In case the **OWNER** is not satisfied with the tests, he shall within seven days of his witnessing the tests, inform the **CONTRACTOR**, in writing, of any objection with regard to any equipment and workmanship with reference to the contractual provisions. The **CONTRACTOR** shall give due consideration to such objections and shall either make the modification that may be necessary to meet the said objections or shall confirm in writing to the **OWNER** giving necessary reasons, that no modifications are necessary to comply with the contract. However, any defect noticed at the time of installation or after installation and commissioning shall be rectified by the **CONTRACTOR** free of cost.

2.6.3 The extent of **OWNER**'s inspection could be mutually discussed and agreed between the **OWNER** and the **CONTRACTOR**.

2.7 Time schedule

2.7.1 Timely installation and commissioning of the plant and equipment shall be the essence of the contract. The **CONTRACTOR** shall so organize their resources and perform this work as to complete it not later than the date given in the following clause. The schedule of the equipment delivery by the equipment supplier will be furnished to the **CONTRACTOR** two (2) months before the first consignment is ready for dispatch. The **CONTRACTOR** shall mobilize their resources for the transportation of the deliverables from the **SUPPLIER**'s or their **SUB-SUPPLIER**'s works to the site and carefully store the equipment and materials at the site prior to the starting of the erection work.

2.7.2 The following shall be the schedule for the completion of various milestone activities for this package. The **CONTRACTOR'S** time schedule shall strictly conform to this schedule.

Milestone activity	Completion date
1. Engineering Activities 2. Completion of Supply 3. Commencement of erection 4. Completion of commissioning	To suit commissioning within 12-months from zero date for Steam Turbine Generator & Aux. i.e. date of issue of LOI/PO, whichever is earlier (For each site, Sugali & Lauriya)

2.7.3 If the situation warrants, on account of any delay in the performance of the services, the **CONTRACTOR** shall air lift the equipment to meet the delivery commitment. All expenditure towards such air lifting, including tax implication if any, shall be to the **CONTRACTOR's** account, in case the delay in performance of services is directly attributable to the **CONTRACTOR**.

2.7.4 Time schedule network/bar chart

2.7.4.1 The **CONTRACTOR** shall submit to **OWNER / CONSULTANT**, their time schedule regarding the erection and commissioning of the equipment and materials as well as information on their sub-contracts to be placed with third parties, including the dates on which the **CONTRACTOR** intends to issue such sub-contracts.

2.7.4.2 The time schedule will be in the form of a network or a bar chart clearly indicating all main or key events regarding transportation, erection and commissioning.

2.7.5 Progress trend chart / monthly report

2.7.5.1 **CONTRACTOR** shall report monthly on the progress of the execution of contract and achievement of targets set out in time bar chart.

2.7.5.2 The progress will be expressed in percentages as shown in the form of progress trend chart.

2.7.5.3 The monthly reporting will be the updating of the progress trend chart.

2.7.5.4 The progress reports shall be submitted once in every fortnight till the completion of the contract.

2.7.5.5 The progress report shall further compare actual versus projected completion dates as well as describe current and anticipated problems and delaying factors, if any, and corrective action taken or proposed to be taken without in any way relieving or affecting the **CONTRACTOR's** responsibility to complete the services within the stipulated dates.

2.8 Liquidated damages for delay in time schedule

The **CONTRACTOR** shall endeavour to complete their scope of work within the time specified in the contract. It may be noted that "time is the essence of this contract", subject to clauses-1.11 and 1.17 of the General Conditions of Contract. If the **CONTRACTOR** fails to install and commission any or all of the goods within the time period(s) specified in the contract for services, the **OWNER** shall, without prejudice to the other remedies under the contract, deduct from the contract price, as liquidated damages, a sum equivalent to 0.5% of the total contract price for weekly of delay until actual performance, up to a maximum deduction of 5% of the total contract price, the total contract price being inclusive of subsequent modifications and price escalation, if contractual. Once the maximum is reached, the **OWNER** may consider termination of the contract.

2.9 Indemnity

2.9.1 The **CONTRACTOR** shall indemnify and hold harmless the **OWNER / CONSULTANT** from all claims, losses, demands, causes of action or suits arising out of the services and the labour furnished by them.

- 2.9.2 The **CONTRACTOR** shall indemnify the **OWNER** in respect of all actions, suits, claims and demands brought or made against **OWNER** by the workmen of the **CONTRACTOR** or any other person or persons or government authorities whomsoever, in connection with the work or in respect of any matter or thing done or omitted to be done by the **CONTRACTOR** in the execution of or in connection with the work, notwithstanding that all reasonable and proper precautions may have been taken by the **CONTRACTOR**, and against any loss or damage to **OWNER** in consequence of any action or suit being brought against **OWNER** for anything done or committed to be done in connection with the execution of the work.
- 2.9.3 The **CONTRACTOR** shall reinstate all damages of every sort, so as to deliver the whole of the contract work complete and perfect in every respect, within the stipulated time.
- 2.9.4 The **CONTRACTOR** shall ensure compliance with all statutes, laws, rules and regulations of the Central or State governments or any other authority, such as the Workmen Compensation Act, 1923, Payment of Wages Act, Minimum wages Act, 1948, Employees State Insurance Act, Employees Provident Fund Act, etc., and any of the statutory modifications thereof in connection with employees engaged by them or their **SUB-CONTRACTORS** in the work.
- 2.9.5 **CONTRACTOR** shall conform to the provisions of Indian Boiler Regulations (as applicable), Indian Factories Act, Indian Electricity Rules etc. relating to the work and to the regulations and by laws of any authority, if required.

2.10 Insurance

- 2.10.1 The **CONTRACTOR** is responsible for comprehensive risk, insurance including storage-cum erection insurance charges of all machinery and equipments, other consumables, handed over by the owner to the **CONTRACTOR**. The insurance policies in respect thereof shall be arranged by the **CONTRACTOR** at such premium rates with such insurance companies as may be approved by the **OWNER** and kept in full force and effect until commissioning of the said plant.
- 2.10.2 The **CONTRACTOR** shall also lodge claims for damage / loss of material or equipments during storage, erection and commissioning. All realization of claims from the insurance company, whether in the name of the **OWNER** or the **CONTRACTOR**, shall be to the account of the **CONTRACTOR**.
- 2.10.3 The **CONTRACTOR** shall also maintain an insurance policy against all claims which may be made upon the **OWNER** whether under the Workmen's Compensation Act or any other statute in force during the currency of the contract or at common law in respect of any employee of **CONTRACTOR** or their **SUB-CONTRACTORS**.

2.11 Licenses and permits

The **CONTRACTOR** shall procure or render all the assistance to the **OWNER** to procure, as the case may be, necessary permits, certificates and licenses such as from the Chief Inspector of Boilers (as applicable), Electrical Inspectorate, Inspector of Factories, and such other statutory bodies required by virtue of all applicable laws, regulations, ordinances and other rules in effect at the place where any of the work is to be performed and the **CONTRACTOR** shall further agree to hold the **OWNER** harmless from liability or penalty which may be imposed by reason of asserted or established violation of such laws, regulations, ordinances or other rules.

2.12 Arbitration

If at any time there should be any question, dispute, difference between the parties in respect of any matter arising out of or in relation to the contract, either party may give to the other party notice in writing of the existence of such question, dispute or difference, and the same shall be referred to the arbitration of panel of Engineers appointed by each party as per prevailing arbitration act.

The award of the Arbitrator shall be final and binding of the parties and be accepted by them. This reference to the Arbitrator shall be deemed to be reference, under the provisions of the Arbitration Act, 1996 and the rules made there under and any statutory modifications or recent amendment thereof that may be made from time to time and actually in force at the time of the reference. The cost of arbitration shall be borne by the parties as may be decided upon by the Arbitrator.

2.13 Instructions, Directions and Correspondence

2.13.1 The services described in this contract are to be provided according to the specification and conditions specified in the contract.

2.13.1.1 All instructions and orders to **CONTRACTOR**, excepting what is herein provided shall be given by **OWNER** and/or **CONSULTANT**, in writing.

2.13.1.2 All the services shall be provided under the direction of and to the satisfaction of **OWNER/CONSULTANT**.

2.13.1.3 All communications from **CONTRACTOR**, including technical/commercial clarifications and/or comments shall be addressed to **OWNER** with a copy to **CONSULTANT** and shall always bear reference to the contract.

2.13.2 Correspondence on technical and commercial matters shall be dealt in separate letters and each copy of the letter shall be complete with all annexures.

2.14 Excess Materials

2.14.1 To expedite work, the **CONTRACTOR** may keep extra consumable materials in quantities at their cost more than that required for erection, installation and commissioning of the plant and equipment. Such excess material shall be treated as the property of the **CONTRACTOR**.

2.14.2 The **CONTRACTOR** has to take all care for the safety of such materials and the **OWNER** is not responsible for any loss or damage to such materials.

2.15 Contract coordination procedure

2.15.1 The **CONTRACTOR** shall identify one of their senior executives as the contract coordinator. The contract coordinator shall liaison closely with **OWNER**'s executives and **CONSULTANTS** for the effective completion of the services within the stipulated time schedule.

2.16 Trial run and provisional take-over

- 2.16.1 After all the systems have been erected and commissioned and completely stabilized and proved safe, the **CONTRACTOR** in consultation with the **OWNER / CONSULTANT** shall offer concern equipment/ plant as a whole for continuous and safe operation as a “trial run” for 7-days. A “reliability run” at rated design load for 24-hours of uninterrupted operation shall also be undertaken during such “trial run”.
- 2.16.2 In case the trial operation is interrupted by default of the **CONTRACTOR** at any time then, and excepting any trivial tripping, it will be repeated from the beginning, after modification / adjustments / verifications by the **CONTRACTOR** as required and agreed by the **OWNER / CONSULTANT**.
- 2.16.3 After such safe, stable and successful trial run, the package shall be considered operationally reliable and commissioned, and be provisionally taken over by the **OWNER**.

2.17 Performance tests and final take over

The performance test on the unit shall be conducted within six (6) weeks from the date of commissioning. Upon successful completion of performance tests required by the **OWNER** as well as fulfillment of all other obligations by the **CONTRACTOR**, taking over certificate as a proof of final acceptance of the equipment/system will be issued by the **OWNER**. The taking over certificate shall not be unduly delayed without assigning any acceptable reason.

If the performance test could not be conducted within the five (5) month’s period owing to an intervening off-season, the test shall be conducted immediately after the starting and stabilization of the next cane crushing season, applying the internationally accepted ageing factors, failing which the conducting of performance test and any extension of performance bank guarantee will be mutually discussed.

2.18 Co-ordination with other agencies

Work shall be carried out in such a manner that the work of other agencies operating at the site is not hampered due to any action of the **CONTRACTOR**. Proper co-ordination with other agencies shall be the **CONTRACTOR**’s responsibility. In case of any dispute, the decision of the Engineer-in-charge shall be final and binding on the **CONTRACTOR**.

2.19 Setting out and leveling

The **CONTRACTOR**, wherever applicable, shall set out and level the works from the general grid of plot and bench marks furnished by the Engineer-in-charge and will be responsible for the accuracy of the same. The **CONTRACTOR** shall provide all instruments and proper qualified staff for checking their work. The **CONTRACTOR** shall protect survey benchmarks, reference lines and control points from damage or movement during work.

2.20 Loss due to non-compliance of instructions

Losses or damages occurring to the **OWNER** owing to **CONTRACTOR**’s failure to adhere to any of the instructions given by the Engineer / **OWNER** in connection with the contract execution shall be recoverable from the **CONTRACTOR**. The decision of the **OWNER** as to the compensation recoverable shall be final and binding on the **CONTRACTOR**.

2.21 Suspension of work & idle time extension

The **CONTRACTOR** shall, if ordered in writing by the **OWNER** or their representative, temporarily suspend the work or any part thereof for such period and such time as so ordered and shall not after receiving such written orders, proceed therewith. In the event of suspension of work for a prolonged time by the **OWNER** and the consequent idle time for the **CONTRACTOR**, the **CONTRACTOR** shall be compensated based on mutual agreement. The **CONTRACTOR** shall not be responsible for the same, provided that the suspension was not consequent to any default, failure on the part of the **CONTRACTOR** and the contractual time schedule shall be suitably extended after mutual discussions.

2.22 CONTRACTOR's site office

OWNER will provide available open space for the construction of their site office to the **CONTRACTOR** and such office shall be kept open by the **CONTRACTOR** at all reasonable hours to receive instructions, notices or other communications.

2.23 Site organization

The **CONTRACTOR** shall deploy adequately qualified and skilled personnel on the work, and the **CONTRACTOR** shall augment the site personnel as decided by the Engineer-in-charge depending on the exigencies of work.

2.24 Construction equipment

The **CONTRACTOR** without prejudice shall bear the overall responsibility to execute and complete the work as per specification and time schedule, progressively deploy adequate equipment and tools and tackles and augment the same as decided by the Engineer-in-charge depending on the exigencies of work so as to suit the construction schedule. No construction equipment shall be supplied by the **OWNER**.

All tools, tackles and consumables besides items like furniture's etc., shall be accounted for at the site's entrance and also at the **OWNER's** stores, by handing over a spare copy of the delivery challan by the **CONTRACTOR**.

2.25 CONTRACTOR's work force

2.25.1 Registration of contract and labour license

2.25.1.1 The **CONTRACTOR** shall have the responsibility to register the contract with local authorities as per the statutory requirement and shall also obtain necessary license from Factory Inspectorate in respect of the labour force employed by them.

- a. No child labour employment is permitted. No female worker will be permitted to work beyond 6.00 P.M. on any day.
- b. Every worker shall be given a weekly day of rest. Any work done on weekly rest days shall be duly compensated, by the **CONTRACTOR**.
- c. The **CONTRACTOR** shall maintain a register of wages-cum-muster roll.

2.25.1.2 The **CONTRACTOR** shall furnish adequate courteous and competent labour, (skilled, semi-skilled and un-skilled), watchmen, supervisors and engineers of all class for the duration of the

work, to maintain the progress of erection in accordance with the requirement of the schedule of completion.

2.25.1.3 It is important that the **CONTRACTOR** shall employ men known to be reliable and competent for the work

2.25.1.4 **CONTRACTOR** shall be personally present or employ atleast one competent representative (whose name shall have been previously communicated in writing to the **OWNER**) to supervise the erection of the equipment and carrying out of the work under the contract. This representative shall have full technical capability and complete administrative and financial powers to expeditiously and efficiently execute the work under the contract. The **OWNER** or **CONSULTANT** shall normally communicate directly with the said representative at site.

In case the above representative is found to be incompetent and / or non-coordinating by the **OWNER / CONSULTANT**, the **CONTRACTOR** shall replace him with a more competent person.

2.25.1.5 **CONTRACTOR**'s employees shall be provided with identification badges showing employee's name, **CONTRACTOR**'s name and project identification. All employees will be required to wear the badge during the time they are at project site. All workers, watchmen, supervisors, engineers and other staff at the work site shall be provided with safety helmets by **CONTRACTOR** and they shall wear it all the time they are at the work site.

2.25.1.6 **CONTRACTOR** shall ensure that they pay their men regularly their wages, overtime and other compensations. **CONTRACTOR** shall also furnish the **OWNER** at fortnightly intervals, a certificate that they have paid all the dues to their workmen.

2.25.1.7 In case, such payment is not regularly made by the **CONTRACTOR**, **OWNER** will be in the right to make such payments and deduct it from **CONTRACTOR**'s progress payment.

2.25.2 Registration of contract

If the number of workmen employed by the **CONTRACTOR** is more than nineteen (19), they are required to obtain a license from the competent authority as required under the contractors' and Labour (Regulations and Abolition) Act, after obtaining a certificate from the principal employer, to the effect that they have been awarded the contract. They are also required to give to the principal employer, the number of workmen proposed to be employed and produce the license for verification.

2.25.3 E.S.I

All workmen employed by the **CONTRACTOR** shall be covered under ESI immediately on appointment, by the **CONTRACTOR**.

2.25.4 Requirement under Factories Act

All workmen should be allowed to work not more than 9-hours a day and forty eight (48) hours a week. Weekly off on 1st day of the week (Sunday) or a substitute weekly off within 3-days before the 1st day of the week or after the 1st day of the week should be allowed to all the workmen. Overtime wages for working beyond the normal working hours should be given as per labour laws in force. Also overtime for the work on company's declared holidays should be given at the same rate. All the workmen should be allowed leave as per the Factories Act. In case the workmen have not availed leave during the period

of their work, they should be given wages in lieu of leave accrued to their credit at the time of leaving. The **CONTRACTOR** should maintain the Muster Roll, Register of Adult Workers, Overtime Register, Leave Register and submit the Registers to the principal employer for verification, and to the Factories Inspector, if applicable, for inspection, whenever he visits the factory.

2.25.5 Accident register If any accident occurs in the course of and arising out of employment, the **CONTRACTOR** should immediately inform **OWNER**'s representative with the details of the workmen. He should maintain the present and permanent addresses of all the workmen and the name of the person to whom information is required to be given in case of emergencies.

2.26 Safety code

2.26.1 General

CONTRACTOR shall adhere to safe construction practices and guard against hazardous and unsafe working conditions.

2.26.2 First aid and industrial injuries

2.26.2.1 The **CONTRACTOR** / their **Sub-CONTRACTORS** shall make arrangements for the treatment of their workmen for injuries sustained while on duty.

2.26.2.2 All major accidents shall be reported promptly to **OWNER**, and a copy of **CONTRACTOR**'s report covering each personal accident requiring the attention of a physician, shall be furnished to **OWNER** for their information.

2.26.3 **CONTRACTOR**'s barricades

2.26.3.1 **CONTRACTOR** shall erect and maintain barricades required in connection with their operation to guard or protect especially the following areas, if applicable with the scope of **CONTRACTOR**.

- a. Excavations
- b. Hoisting areas
- c. Areas considered hazardous by **CONTRACTOR** or **OWNER** or Engineer.
- d. **OWNER**'s existing property likely to be damaged by **CONTRACTOR**'s / their **SUB-CONTRACTOR**'s operations.

2.26.3.2 Barricades and hazardous areas with the battery limits, adjacent to normal routes of travel shall be marked by red flasher lanterns at nights.

2.26.4 Scaffolding

2.26.4.1 Suitable scaffolding shall be provided for workmen for all work that cannot safely be done from the ground or from solid construction except for such short period work as can be done safely from ladders. When a ladder is used, a helper shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and handholds shall be provided on the ladder. The ladder shall be given an inclination not steeper than 1 in 4 (1 horizontal and 4 verticals).

2.26.4.2 Working platform, scaffolding or staging more than 4-metres above the ground level or floor level shall be closely boarded, shall be of adequate width and shall have a guard rail properly

attached, at least one metre high above the floor or platform of such scaffolding or staging and extending along the entire length and the sides with only such openings as may be necessary for the entry of workmen and for handling of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

2.26.4.3 Every opening in the floor of a building or in a working platform shall be provided with suitable fencing whose minimum height shall be one metre to prevent the fall of persons or materials.

2.26.4.4 Safe-means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9-metres in length while the width between the side rails in rung ladder shall in no case be less than 30-cms for ladder upto and including 3-metres in length. For longer ladder this width should be increased atleast by 5-mm for each additional 300-mm of length. Spacing's of steps shall be uniform and not exceeding 30-cms.

2.26.4.5 Providing all the scaffoldings, staging, ladders etc., shall be the sole responsibility of the **CONTRACTOR**.

2.26.5 General safety rules

2.26.5.1 The **CONTRACTOR** shall use only tested equipment, tools, chains, ropes, etc. and shall periodically test them to ensure good working condition of such equipment, tools, chains, ropes, etc. Whenever required, valid test certificates shall be produced by the **CONTRACTOR** to the **OWNER**.

2.26.5.2 All necessary personnel safety appliances shall be kept available for the use of the persons employed at the site and maintained in conditions suitable for immediate use, and the **CONTRACTOR** shall take adequate steps to ensure proper use of safety appliances by those concerned.

- (i) All labour and supervisory personnel engaged in the erection work shall use safety helmets. All persons working at heights above 2-meters shall use safety belts and/or life lines.
- (ii) Workers employed on mixing asphaltic materials, cement and lime concrete/mortars shall use protective footwear and protective gloves.
- (iii) Those engaged in white washing and mixing or stacking of cement bags or any materials which are injurious to the eyes shall use protective goggles and hand gloves.
- (iv) Those engaged in welding and cutting work shall use protective face/eye-shields, hand gloves etc.
- (v) Stone breakers shall be provided with protective goggles and protective clothing, and seated at sufficiently safe intervals.
- (vi) Wherever men are employed on the work of lead painting, the following precautions should be taken:
 - a. No paint containing lead or lead product shall be used except in the form of paste or ready made paint.
 - b. Overalls and suitable face masks shall be provided for use by the worker when paint is applied in the form of spray or when a surface having lead paint dry is being rubbed or scraped.

2.26.5.3 Use of hoisting machines and tackles including their attachments, anchorage and supports shall conform to the following standard or conditions:

- (i) These shall be of good mechanical construction, sound material and adequate strength and shall be kept in good working order.
- (ii) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from defects.
- (ii) Every crane driver or hoisting appliance operator shall be properly trained and shall be conversant with safety regulation for using such equipment and appliances.
- (iii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained. Every hoisting machine and all gears referred to above shall be clearly marked with the safe working load.

2.26.5.4 All work areas shall be kept reasonably clean for easy movement of men and material.

2.26.5.5 All approach roads shall be kept reasonably free for easy movement of vehicles.

2.26.5.6 Temporary water line shall be so routed as to avoid road crossing and wherever necessary, shall be laid underground. Temporary water storage tank built for construction use shall be properly fenced, wherever necessary. All such temporary water lines and water storage shall be the responsibility of the **CONTRACTOR**.

2.26.5.7 Temporary electrical sub-station, equipment, switchgear, cable and wire, lighting, etc. should be installed in accordance with standard electrical practices and regulations.

2.26.5.8 Temporary cable and wire, including welding cable, shall be so routed as not to clutter the work area. Temporary electrical line for power and lighting shall be run overhead and shall be high enough as not to hinder movement of men, materials and vehicles.

2.26.5.9 Temporary substation equipment, switchgear and distribution boards shall be adequately enclosed, duly protected against rain water, suitably earthed and properly identified with caution boards

2.26.5.10 All joints in the temporary wires and cables shall be properly insulated.

2.26.5.11 All supervisors, welders and electricians engaged in the work shall possess necessary and valid license / certificate of permit to carry out such work and shall be adequately skilled and acquainted with standard rules, regulations, codes and practices.

2.26.5.12 All operators of construction equipment and all tradesmen engaged in different construction activities shall be adequately qualified, experienced and proficient to carry out all their jobs in a safe manner.

2.26.5.13 First aid kits and personnel adequately trained to administer first aid shall be kept readily available for emergencies.

2.26.5.14 Portable hand-lamps being used by construction crew shall be preferably connected on 24-V supply. If 230-V hand lamps are used, the cables shall be heavily insulated and adequately protected,

earthed and bulbs should be protected with safety shields.

2.26.5.15 **CONTRACTOR** shall not use any structure or equipment erected or under erection for fastening, lifting or tying tackles or guy-ropes, which may impose loads which the structure or equipment are not designed to carry safely.

2.26.5.16 The **CONTRACTOR** shall not in the performance of the contract in any manner endanger safety or unlawfully interfere with the convenience of the Public.

2.26.5.17 All areas used for storing and installing inflammable materials shall be adequately identified and shall carry no smoking signs.

2.26.5.18 Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards. Hoisting appliances shall be provided with such means as to prevent the accidental descent of the suspended load. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary shall be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

2.26.5.19 All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and no scaffold, ladder or equipment shall be altered or removed while it is in use.

2.27 **OWNER's Right to Withhold Payment**

OWNER shall have the right to withhold or nullify the whole or a part of any application of **CONTRACTOR** for payment to such extent as may be necessary to protect **OWNER** from sustaining any loss on account of defective work not remedied / replaced by **CONTRACTOR** and to release the amount withheld after fulfillment by **CONTRACTOR**.

2.28 **OWNER's Responsibilities**

2.28.1 The **OWNER** shall provide free of cost to the **CONTRACTOR** suitable open space for putting up the storage for equipment and materials, the **CONTRACTOR's** equipment, tools and tackles etc. brought to the site by the **CONTRACTOR** for the said erection, installation and commissioning work. The **CONTRACTOR** shall arrange for their own covered storage in the space provided to them. The transportation to the site, from the storage, shall be borne by the **CONTRACTOR**.

2.28.2 The **OWNER** shall also provide to the **CONTRACTOR** open office space (levelled, consolidated and with approach road) and drinking water at one point at site free of cost. Power (415-V AC, 4-W) and Telephone with STD facility also shall be provided as far as possible, but on chargeable basis.

2.28.3 The **OWNER** shall provide to the **CONTRACTOR** the required electrical power (415-V AC, 4-W) for erection & commissioning activities only, at one point free of cost. For fabrication activities the power will be provided on chargeable basis.

2.28.4 The **OWNER** shall provide free of cost to the **CONTRACTOR** adequate water supply at one point at factory site.

- 2.28.5 The **OWNER** declares that they have a clear and valid title free of encumbrances, to the site handed over to the **CONTRACTOR** for erection and commissioning of the said plant and that the **CONTRACTOR** shall have uninterrupted access to the use of the site to carry out the erection and commissioning services under this contract. Any breach of this warranty by the **OWNER** shall entitle the **CONTRACTOR** for extension of time proportionately for completion of the erection and commissioning services.
- 2.28.6 Accommodation for the **CONTRACTOR**'s executives shall be provided, if available.
- 2.28.7 Open space, duly levelled, consolidated with approach roads and drinking water at one point for labour sheds shall be provided by the **OWNER**.
- 2.28.8 Permission to use special tools and tackles supplied along with the equipment for erection and commissioning are to be returned in good working condition. In case these tools and tackles are damaged during erection, and becoming worn-out, they shall be replaced free of cost by the **CONTRACTOR**.
- 2.28.9 Supply of service water shall be the **OWNER**'s responsibility.
- 2.28.10 **OWNER** shall provide engineers and staff including skilled, semi-skilled and unskilled manpower for getting training in operation and maintenance during pre-commissioning and commissioning activities under the supervision of competent engineers and staff of the **CONTRACTOR**.
- 2.28.11 Workshop / lab facilities shall be extended to the **CONTRACTOR** by the **OWNER**, against written requests by the **CONTRACTOR** on chargeable basis, without affecting the **OWNER**'s work.
- 2.28.12 Fire fighting assistance, as available with **OWNER**, shall be provided when necessary.
- 2.28.13 Provision of all lubricants and chemicals required until commissioning shall be **SUPPLIER**'s responsibility.
- 2.28.14 Purchaser shall make all arrangements and provide all facilities and materials, adequate technical staff and labor, including skilled and unskilled for carrying out steam and water trial, commissioning and Performance Test.
- 2.28.15 Purchaser shall pay the statutory inspection and other fees and charges payable in respect of the installation, testing and commissioning including IBR fees.
- 2.28.16 Purchaser shall ensure supply of all chemicals, fuels, electric power, water etc. as required for erection and commissioning of Incineration boiler & Aux. with BoP Project except for first fill or flushing which will be in Supplier's scope.
- 2.28.17 Purchaser shall ensure proper drainage and sewage facilities at site, adequate space for construction material, equipments, labor hutment, etc., open store and covered storage space for tools and tackles, machinery and equipment and for storage of delicate items like instruments and motors etc.
- 2.28.18 Purchaser shall ensure that all required permissions, licenses and approvals such as site clearance, approvals for set up of Incineration boiler & Aux. with BoP project, pollution clearance and any other approval not specifically within the scope of the contractor are taken in such a manner so that site activities of the contractor are not stacked for want of these approvals etc.
- 2.28.19 Wherever approvals are required from Purchaser / Engineer the same shall be granted within 7 days except in the case of otherwise provided in the contract.

IV. PROJECT INFORMATION (SUGUALI)

1. PROJECT TITLE : EPC of Steam Turbine Generator & Aux.
(3 MW Extraction cum Condensing)
2. PURCHASER : M/s HPCL Biofuels Ltd (HBL)
3. REGISTERED OFFICE : HPCL Biofuels Limited. House No.9,
Shree Sadan, 1st Floor, Patliputra
Colony, Patna - 800013
4. PURCHASER'S ADDRESS FOR COMMUNICATION: Village Suguali,
Near Suguali Railway Station, East Champaran, Bihar
Pranay@hpcl.in,
manojks@hpcl.in, abhishekkumar.singh2@hpcl.in
5. CONSULTANTS : MITCON Consultancy &
Engineering Services Ltd.
6. CONSULTANT'S ADDRESS FOR COMMUNICATION : First Floor, Kubera chambers
Shivajinagar, Pune - 5
Email: cpn@mitconindia.com
7. PLANT LOCATION : Village Suguali, Near Suguali Railway
Station, East Champaran, Bihar
8. NEAREST RAILWAY STATION : Suguali
9. NEAREST AIRPORT : Patna
10. PORT OF DISEMBARKATION : ---
11. AMBIENT TEMPERATURE (°C) :
- | | | |
|--------------------|---|----|
| MAXIMUM | : | 45 |
| MINIMUM | : | 05 |
| PERFORMANCE DESIGN | : | 40 |
| ELECTRICAL DESIGN | : | 50 |
12. RELATIVE HUMIDITY (%) :
- | | | |
|------------|---|----|
| A. MAXIMUM | : | 70 |
| B. MINIMUM | : | 40 |
| C. DESIGN | : | 60 |
13. RAINFALL (ANNUAL AVERAGE) : 1200 mm

14. ALTITUDE : 73 M above M.S.L.
15. SEISMIC COEFFICIENT: As per IS: 1893 (Zone IV)
16. WIND A. DIRECTION : SW (May-Sept) & NE (Oct-April)
B. DESIGN WIND VELOCITY : As per IS: 875
17. Construction power (E&C Only) : 415V ($\pm 10\%$), 3 Phase, 4 Wire, 50 (47 to 51.5) Hz AC with effectively earthed neutral will be made available at only one point for free of cost. Power for fabrication purpose will be on chargeable basis. Bidder's scope shall include complete distribution beyond this point including hardware required for the same.

PROJECT INFORMATION (LAURIYA)

1. PROJECT TITLE : EPC of Steam Turbine Generator & Aux.
(3 MW Extraction cum Condensing)
2. PURCHASER : M/s HPCL Biofuels Ltd (HBL)
3. REGISTERED OFFICE : HPCL Biofuels Limited. House No.9,
Shree Sadan, 1st Floor, Patliputra
Colony, Patna - 800013
4. PURCHASER'S ADDRESS FOR COMMUNICATION: Village Lauriya
Lauriya Bagha Highway, West Champaran, Bihar
Pranay@hpcl.in,
manojks@hpcl.in, abhishekkumar.singh2@hpcl.in
5. CONSULTANTS : MITCON Consultancy &
Engineering Services Ltd.
6. CONSULTANT'S ADDRESS FOR COMMUNICATION : First Floor, Kubera chambers
Shivajinagar, Pune - 5
Email: cpn@mitconindia.com
7. PLANT LOCATION : Village Lauriya, Lauriya Bagha Highway
West Champaran, Bihar
8. NEAREST RAILWAY STATION : Narkatiaganj, 15 Km
Bettiah, 26 Km
9. NEAREST AIRPORT : Patna
10. PORT OF DISEMBARKATION : ---
11. AMBIENT TEMPERATURE (°C) : MAXIMUM : 45
MINIMUM : 05
PERFORMANCE DESIGN : 40
ELECTRICAL DESIGN : 50
12. RELATIVE HUMIDITY (%) : A. MAXIMUM : 70
B. MINIMUM : 40
C. DESIGN : 60
13. RAINFALL (ANNUAL AVERAGE) : 1400 mm

14. ALTITUDE : 84 M above M.S.L.
15. SEISMIC COEFFICIENT: As per IS: 1893 (Zone IV)
16. WIND A. DIRECTION : SW (May-Sept) & NE (Oct-April)
B. DESIGN WIND VELOCITY : As per IS: 875
17. Construction power (E&C Only) : 415V ($\pm 10\%$), 3 Phase, 4 Wire, 50 (47 to 51.5) Hz AC with effectively earthed neutral will be made available at only one point for free of cost.
Power for fabrication purpose will be on chargeable basis. Bidder's scope shall include complete distribution beyond this point including hardware required for the same.

V. ANNEXURES

A. DRAFT BANK GUARANTEE FORMAT

This Guarantee made on the day of by the having its Branch at (hereinafter called “The Guarantor” which expression shall unless repugnant to the context or contrary to the meaning thereof, include its successors and assigns) of the one part.

IN FAVOUR OF M/s -----, a company, registered in the state of Karnataka under the companies act 1956, having its registered office at -----State (hereinafter called “The Purchaser” which expression shall unless repugnant to the subject or context, include their successors and assigns) of the other part.

WHEREAS M/s. (hereinafter called “The Seller” which expression shall unless repugnant to the subject or context include their legal representatives, administrators, successors or permitted assigns) had entered into an agreement vide letter of Intent dt. (hereinafter called “The said Agreement”) with the purchaser to design, prepare, supply, erect and commissioned the ----- project for purchasers site at ----- (hereinafter called the Site) in accordance with the terms and conditions therein contained (hereinafter referred to as “The Said Plant”).

AND WHEREAS under the said agreement, the Purchaser required to pay to the sellers against security of a Bank Guarantee an advance payment of Rs. (Rupees:

-----) representing of the contract price for the purpose of procurement of materials / equipments for the said plant. Such guarantee to be valid till the full advance amount is adjusted against the base price of the actual deliveries of machinery and equipment received at site.

AND WHEREAS before advance payment as aforesaid is made the Guarantor has, at the request of the Sellers, agreed to give the Guarantee as hereinafter contained.

NOW THIS DEED WITNESSES AS FOLLOWS

- 1). In consideration of the premises the Guarantor, hereby undertake to pay to the Purchaser within 30 days of demand and without demur such a sum not exceeding Rs.

The Purchaser may demand representing of the contract price, and if the Guarantor shall fall to pay the same within the said period, the Guarantor, shall also pay on the sum demanded interest at the Bank lending rate then prevailing reckoned from the date of demand till the date of payment. Provided that the liability of the Guarantor hereunder shall reduce to the extent of the advance adjusted according to of the said agreement.

- 2). The Guarantor shall pay to the Purchaser on demand the sum under Clause 1 above without demur and without requiring the Purchaser to invoke any legal remedy that may be available to them. it being understood and agreed **FIRSTLY** that the Purchaser shall be the sole judge of and as to whether the Sellers have committed any breach(es) of any of the terms and conditions of the said agreement and **SECONDLY** that the right of the Purchaser to recover from the Guarantor any amount due to the Purchaser shall not be effected or suspended by reasons of the fact that any dispute or disputes have been raised by the Sellers with regards to their liability or that proceedings are pending before any Tribunal, Arbitrator(s) or Court with regards thereto or in connection therewith, and **THIRDLY** that the Guarantor shall immediately pay the aforesaid guaranteed amount to the Purchaser on demand, it shall not be open to the Guarantor to know the reasons of or to investigate or to go into the merits of the demand or to question or to challenge the demand or to know any facts affecting the deemed, and **LASTLY**, that it shall not be open to the Guarantor to require proof of the liability of the Sellers to pay the amount, before paying the aforesaid guaranteed amount to the Purchaser.
- 3). This Guarantee shall come into force from the date release of payment hereof and shall remain valid till the full advance amount is adjusted under the said Agreement, which according to the terms and conditions of the said Agreement is stipulated to be adjusted against actual deliveries of the machinery and equipment at site, but if the actual deliveries as aforesaid have not been completed by the seller within the said period for any reasons whatsoever the Guarantor, hereby undertakes that the Sellers shall furnish a fresh or renewed guarantees on the Purchaser's Proforma for such further period as the Purchaser may intimate failing which the Guarantor shall pay to the Purchasers a sum not exceeding Rs. /-(Rupees:) or the residual amount of balance advance left after proportion to adjustment in accordance with Clause 1 above as the Purchaser may demand.
- 4). This Guarantee is in addition to and not in substitution for any other guarantee executed by the Guarantor in favour of the Purchaser on behalf of the Sellers.
- 5). The Sellers and Purchaser will be at liberty to vary and moodily the terms and conditions of the said agreement without effecting this guarantor is, hereby waived and the same shall be deemed to have been done with the assent of the Guarantor.
- 6). This Guarantee shall not be effected by any change in the constitution of the Guarantor or of the Seller nor shall the guarantee be effected by any change in the constitution of the Purchaser or any amalgamation or absorption with any other body corporated and this guarantee will be available to or enforceable by such body corporate.

- 7) This Guarantee is irrevocable except with the written consent of the Purchaser.
- 8) The neglect or forbearance of the Purchaser in enforcing any payment of moneys, the payment whereof is intended to be hereby secured or the giving of time by the Purchaser for the payment thereof, shall, in no way, release the Guarantor from its liability under this Deed.
- 9) The invocation of this guarantee shall be by a letter signed by the Purchaser
- 10) Notwithstanding anything stated herein before the liability of the Guarantor under this guarantee is restricted to Rs. /- (Rupees :) and interest as provided in Clause 1. This guarantee shall remain in force upto // unless a demand or claim under this guarantee is presented to the Guarantor in writing within Six Months from the date, all rights of the Purchaser under the guarantee shall be forfeited and the Guarantor shall be released and discharged from all liability hereunder.

IN WITNESS WHEREAS for any on behalf of the Guarantor has signed this Deed on the day and year above written.

for and on behalf of

B. PROFORMA FOR PERFORMANCE STATEMENT (For the last Five Years)

Bid No..... date of opening
 Time Hours

Name of the bidder

No. of years in service.....**

Order placed by (full address of purchaser)	Order No. and date	STG & Aux. project capacity (MW)	Value of order	Date of completion of delivery		Remarks indicating reasons for late delivery, if any	Has the STG & Aux has been satisfactorily Functioning? (Attach a cert. From the Engineer in charge)
				As per Contract	Actual		
1	2	3	4	5	6	7	8

Signature and seal of the bidder

Note : **- Indicate the number of years in the line of business.

APPENDIX - I

BID FORM AND PRICE SCHEDULES

To
M/s -----

Gentlemen,

Having examined the Tender Document, including the Specifications, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to engineer, design, manufacture, supply, deliver, install and commission the specified ----- on EPC basis in conformity with the said Tender Document, for the sum of (Sum of Total Bid Amounts for Goods and Services in Words and Figures), or such other sums as may be ascertained in accordance with the Price Schedules attached hereto and made part of this Bid.

We undertake, if our Bid is accepted, to commence delivery within (60) days, and to complete installation and commissioning of all the items specified in the Contract within (365) days, calculated from the date of receipt of your Notification of Award.

If our Bid is accepted, we will provide the performance security, equal to 10 percent of the Contract price, for the due performance of the Incineration boiler & auxiliaries with BoP and required bank guarantees for advances.

We agree to abide by this Bid for the period of 90 days from the date fixed for bid closing and it shall remain binding upon us and may be accepted at any time before the expiration of that period. Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof in your Notification of Award, shall constitute a binding contract between us.

We understand that you are not bound to accept the lowest priced or any Bid that you may receive.

Dated this _____ day of _____ 2021

(Signature) _____

(In the Capacity of)

Duly Authorized to sign Bid for and on behalf of _____

(Signature of Witness)

Witness

Address

Note:

- All bids are to be only firm price bids.
- Purchaser may award separate contracts for supply and E&C
- Civil works, are excluded from scope. However, all structural steel, insert plates, pipe sleeves, foundation bolts, templates, fixtures, required to be embedded in RCC works, are in the bidders scope.

Price Schedule

(To be submitted, separately for each Project i.e. Suguali & Lauriya)

The bidder agrees to engineer, design, procure, manufacture, supply, erect and commission excluding civil works of the ----- on EPC basis as specified in and forming part of this tender document at a Total Price as mentioned below, exclusive of taxes & duties, hereinafter referred to as the “Contract Price”, subject to terms and conditions as hereinafter provided, as per the break-up given below:

Sr. No	Description	Project	
		Suguali	Lauriya
A	Supply Ex-works (Ex-bidders or their sub-contractors workshop or place of supply) price in Lakhs, of :		
(1)	EPC of Steam Turbine Generator & Aux. Project according to specifications and details given	NOT TO QUOTE HERE	NOT TO QUOTE HERE
(2)	Price of following necessary facilities in respect of above ➤ Final painting (it shall include primer and final painting as per colour scheme to be given by the Purchaser / Consultant).- ➤ Packing, forwarding charges ➤ Freight up to the site ➤ All consumable items such as welding electrodes, gases, emery papers, etc. required for erection purposes. ➤ All insurance charges applicable	NOT TO QUOTE HERE	NOT TO QUOTE HERE
(3)	Spares as mentioned in Final Technical Offer	NOT TO QUOTE HERE	NOT TO QUOTE HERE
	Subtotal in Rs Lakh :		
	Sub total of A(1), (2) and (3)	NOT TO QUOTE HERE	NOT TO QUOTE HERE
B.	Indicative Taxes & duties for Supply & Service: Custom duty @ ____ Excise duty @ ____ GST @ ____ Any other taxes & duties	Extra at actual	
C.	Price for Erection & Commissioning (Including all loading, unloading & handling at site), commissioning and trial run and supervision thereof including supply of all consumables, Rs. In Lakhs:	NOT TO QUOTE HERE	NOT TO QUOTE HERE
D.	Price for Deployment of OEM's/ Vendors technical manpower for supervision for another 2 years post commissioning to ensure guarantee run, Rs in Lakhs	NOT TO QUOTE HERE	NOT TO QUOTE HERE
E.	Price for Man day rates for deployment of Expert to the site to provide technical, operational and troubleshooting support to the Purchaser, post commissioning, for 2 years, Rs (The boarding and travel expenses shall be provided by the Purchaser)	NOT TO QUOTE HERE	NOT TO QUOTE HERE
F.	Indicative Taxes & duties for Erection & Commissioning and post commissioning Supervision: GST @ ____ Any other taxes & duties	Extra at actual	

The above price is firm & final. There is no provision for escalation in the cost of this project, for which both the parties have agreed to between as per scope of supply described herein.

Supply, Erection and completion of the Job (Installation of STG & Aux) in all aspect as per satisfaction of the Purchaser/consultant including supply of all materials, consumables and labor and no extra cost will be borne by the client in any manner.

The total contract price offered above is exclusive of GST /Central / State VAT, Excise duty, Special Excise Duties, Custom Duties, works contract tax, local taxes and any other duties at the site only imposed by law, leviable on the plant and machinery supplied to the purchaser at total price offered and is also exclusive of single point Sales Tax, Excise Duties and special excise duties on finished bought items supplied directly to site from sub-contractors work. Bidder to quote with break-up of all applicable taxes & duties.

The increase or decrease in the amount of taxes and duties due to change in the rate / structure in the taxes and duties will be on Purchaser's Account, provided the material is supplied as per delivery / dispatch schedule.

Signature of Bidder with seal _____

Note :

- a. In case of Discrepancy between UNIT PRICE and total cost, the unit price shall prevail.
- b. Kindly mention unit price per meter also, for all piping and cabling.
- c. Bidder to give a statement of all taxes and duties and their rates applicable.
- d. Bidder to include description of goods being quoted, along with data sheet.
- e. Details of all the spare parts are required to be provided in the item master format (format will be shared by Purchaser to L1 bidder after award of PO) which will include all the technical details regarding the spare parts along with indicative price, approved suppliers with their details for ease in procurement after installation

APPENDIX - II

PAYMENT SCHEDULE

The PURCHASER shall pay the contract price in the following manner free of interest:

1. The payment terms will be as indicated below:

Total contract value will be divided as:

- **Total Supply value shall be maximum 80% of the total contract value**
- **Total E&C value shall be minimum 20% of the total contract value**
- **All Payments will be released only after 30 days from the date of certification of the bill by EIC & Consultant**

Supply:

- 5% of contract value for supply on signing of supply contract and submission & approval of design basis report and plant equipment layout
- 7.5% of contract value for supply on submission / approval of mutually agreed key drawings / information / documents/ civil load data (to be paid within 45 days of contract date) and against bank guarantee of requisite amount.
- 7.5% of contract value for supply on submission of copies of unpriced purchase orders for mutually agreed major bought out items / equipment (to be paid within 90 days of contract date) and against bank guarantee of requisite amount.
- 70% of contract value for supply against proforma invoice, payable pro-rata on receipt of material at site along with all test certificates, warranty documents & other relevant documents, if any , as per mutually agreed billing / delivery schedule (to be submitted within 30 days of signing of the contract), duly certified by Purchaser / Consultant
- 10% of contract value for supply on receipt of all material at site duly certified by Purchaser / Consultant and on submission of performance bank guarantee of requisite amount and valid for Two year, after successful commissioning of the plant.

Erection & Commissioning:

- 10% on signing of E&C contract and on mobilization and start of major erection work at site
- 80% of contract value for E&C pro-rata on completion of erection as per mutually agreed E&C schedule, duly approved by Purchaser / Consultant
- 10% of contract value for E&C on successful commissioning and performance proving and on submission of performance bank guarantee of requisite amount and valid for two crushing seasons after successful commissioning of the plant

2. All Payments shall be made in Indian rupee only. In case of imports, the terms of payments will be as per standard International practice
3. Prices charged by the SUPPLIER for goods under the contract shall not vary from the prices agreed by the SUPPLIER and given in the price schedule. This is the firm price contract for SUPPLY.
4. Taxes and duties, transportation, shall be reimbursable at actuals. Based on the production of documents by the SUPPLIER.
5. Defects liability Period: 12 months from the date of completion of the entire job. (To be read together with General terms & Conditions)
6. As per GTC, Original PBG for defect liability period (If vendor chose not to deduct 10% retention) to be submitted at Purchase dept, Patna and copy at site.
7. SECURITY DEPOSIT: Successful bidder has to submit security deposit of 1% of the Purchase Order Value in form of Demand Draft / Bank guarantee of any Scheduled (Other Than Cooperative Bank) Bank drawn in favor of HPCL Biofuels Ltd, Patna, and Payable at Patna.

Security deposit will be acceptable in the form of Demand draft upto Rs. 50,000/- and in the form of Demand draft / Bank guarantee beyond Rs. 50,000/-. Composite Performance Bank Guarantee (CPBG) valid upto a period of 3 months beyond the expiry of defect liability period. Demand Draft/ BG should be drawn on Scheduled Banks, other than co-operative bank.

In case of no defects observed, the Security deposit shall be refunded interest free within 3 months of the completion of the job.

8. RETENTION MONEY- Retention Money under Defect Liability Period should be 10% of PO value and will be released after one year from the date of commissioning & handover. Bidder may submit BG of equivalent amount or this 10% will be deducted from his bills against retention money

10% of the total value of the Running Account and Final Bill will be deducted and retained by the Owner as retention money on account of any damage/defect liability that may arise for the period covered under the defect liability period clause of the Contract free of interest. Any damage or defect that may arise or lie undiscovered at the time of issue of completion certificate connected in any way with the equipment or materials supplied by contractor or in workmanship shall be rectified or replaced by the contractor at his own expense failing which the Owner shall be entitled to rectify the said damage/defect from the retention money. Any excess of expenditure incurred by the Owner on account of damage or defect shall be payable by the Contractor. The decision of the Owner in this behalf shall not be liable to be questioned but shall be final and binding on the Contractor. Thus, deduction towards retention money is applicable only in case of job/works contracts (civil, mechanical, electrical, maintenance etc.) where any damage or defect may arise in future (i.e. within 12 months from the date of completion of job) or lie undiscovered at the time of issue of completion certificate.

APPENDIX - III

NO DEVIATION LETTER

(To be submitted separately for each site i.e. for Sugali & Lauriya)

(On Bidders Letter Head)

Ref No. :

Date :

To,
The Chief Executive Officer
HPCL Biofuel Ltd
Patna, Bihar
800013

Subject: Declaration of No Deviation for Technical & Commercial Bid Submission for EPC of Steam Turbine Generator & Aux. project, Sugali & Lauriya Site

Dear Sir,

We refer the bid document Volume - I (Commercial) & Volume-II (Technical) for above package, queries raised by us & clarifications received, discussion during pre-bid meeting held on -----

We hereby confirm that, there are no commercial & technical deviations in our bids & our bids shall comply with the Commercial (Volume I) & Technical (Volume II) bid documents, clarifications & MOM of Pre-bid meeting.

Regards,

(Authorized signature)

APPENDIX IV

PENALTY FOR SHORTFALL IN PERFORMANCE

1. Incineration Boiler & Aux. with Balance of Plant

The following gives the penalties leviable for the shortfall in performance of the plant and equipment supplied.

Sr. No.	Nature of shortfall	Penalty applicable
1.	Failure to meet the guaranteed auxiliary Power consumption (for every kW increase or part thereof from the guaranteed parameter)	Rs.1,20,000
2.	Shortfall in gross power output for every KW reduction in output	Rs.1,20,000

The following items are those guarantee parameters in which the shortfall in Performance is not acceptable more than the permissible tolerance indicated:

Sr. No.	Item	Unit	Tolerance
1	The Power generation capacity is lower than the guaranteed value by more than	%	2.0
2	The total auxiliary power consumption of the continuously operated electrical equipment is higher than the guaranteed figure by more than	%	5.0
3	The temperature rise in the alternator & excitation system higher than the guaranteed	%	2

**SECTION II- TECHNICAL EPC BID FOR STG & AUX (SUGUALI & LAURIYA)
(3 MW EXTRACTION CUM CONDENSING)**

1. SCOPE OF WORK

1.1 Scope of Work

The scope of work of the Bidder will include supply of the Steam Turbine Generator & Auxiliaries (3 MW, extraction cum condensing) as detailed in chapter on specifications. The bidder will need to complete all electrical, mechanical and instrumentation jobs of installation and commissioning at site.

The bidder will be responsible for providing an efficient, reliable and state of art technology steam turbine generator of extraction cum condensing type. The bidder's scope of work includes designing appropriate turbine / generator sizing for maximizing power generation from the cogeneration plant after meeting the energy needs of the adjoining distillery. The detailed specifications in the next chapter, define the bidders scope and specifications. However, the onus of providing the appropriate steam turbine, generator and auxiliaries rests with the bidder.

The scope of work for the Steam Turbine Generator & Auxiliaries package covered under the specification will include but not limited to the following.

a) **Supply**

Engineering, Design, fabrication, manufacture, assembly, shop testing and inspection at manufacturer's works.

Providing all labourers, materials and equipment for testing at shop as required.

All spare parts required for the commissioning of the Steam Turbine Generator and auxiliary systems.

Recommended spare parts, as per Appendix II.

Special tools and tackles required for operation & maintenance, inspection and repair of the equipment / systems offered.

b) **Services Under Scope Of Supply**

Inspection and expediting, handling, packing, forwarding, port clearance, transporting (including transport insurance), technical inputs for obtaining statutory approvals and documentation to be provided by the Bidder.

Preparation of necessary drawings and documents and technical assistance in obtaining approval and safely clearance certificate from the Chief Electrical Inspector to the Government (CEIG) of Bihar for the trial runs and commercial operation of the plant.

c) **Erection and Commissioning**

Unloading, handling and storage at site, pre-fabrication/assembly if any, erection, testing, commissioning, trial operation, final painting and guarantee performance testing of one (1) No. Steam Turbine & Generator of rating as specified in this tender document with all necessary accessories and auxiliaries as well as associated electrical and instrumentation and control equipment, as specified.

d) **Services Under Scope of Erection and Commissioning**

Providing warehousing, testing facilities, facilities for Contractor's personnel, obtaining approvals from statutory authorities and providing required documentation, data etc. All Equipment and instruments required for erection, start-up, initial filling, commissioning and performance guarantee tests.

e) Training of technical personnel in O&M of STG package. Training will be for a period of 2 weeks after commercial synchronisation.

1.2 Scope of supply and services of basic equipment

This section details out the scope of supply and services for One number Turbo-generator with auxiliaries as indicated. Components and services not specifically mentioned here but necessary to complete the stipulated work in all respects, regardless of any omission in this specifications or drawings, is deemed to have been included in this section.

All materials supplied under this contract shall be new and unused.

1.2.1 Scope of supply

a) Mechanical

One (1) No. Turbine and auxiliaries comprising of,

- Extraction cum condensing, multistage, impulse & reaction or only reaction type steam turbine, complete with casing, rotor, blades, bearings, glands, etc.
- Provisions for one controlled extraction at 4.5 kg/cm² a.
- Heavy duty reduction gear box (double helical type) capable of continuously transmitting the maximum power generated by the turbine.
- High speed coupling between the turbine and the gear box, and low speed coupling between the gear box and the alternator with coupling guards.
- Emergency trip cum stop valve with steam strainer, governing valves, etc.

- Microprocessor based Electro-Hydraulic or Electronic governing system including speed changer, capable of operating in parallel with the grid and also independently in case of islanding. Woodward 505XT digital governor with required actuator & accessories. Governing console to be provided. Digital AVR of approved make with auto power factor adjustment capability to maximise power exports. One standby AVR of similar make also required.
- Vibration monitoring system. (Bently-Nevada / Pro vibtech / Shinkawa)
- One shell and tube horizontal surface condenser with integral hot well and atmospheric relief valve and sacrificial anodes for the water boxes, butterfly valves, RE joints, bellows, control valves, level control station etc.
- Interconnection between the turbine and the inlet of condenser.
- Main ejector of two stage, single element type, with surface type inter and after condensers. (2 x 100%), with silencer.
- One hogging ejector with silencer (1 x 100%)
- Gland sealing steam system consisting of gland steam condenser, steam jet air ejectors, valves, etc. GSC to have CS tube sheet, SS / tubes with shell, water box, foundation bolts, sole plates, primer coating, 2 x 100% SJAE water relief valve, stand pipes, isolation and drain valves. All gland sealing steam to be recovered & returned to hot well.
- Lube and control oil system common for turbine, gear box and alternator.
- One oil reservoir complete with filters and oil vapour extractors.
- Two 100% oil coolers with necessary three way switching valves. Coolers to have tubes of SS - SA249 TP 304 removable tube bundle, CS shell, water box & tube sheet, bolted end covers, sole plates, coating, valves for change over & isolation, mating flanges. Water quality is provided in the specifications.
- Two 100% oil filters for the lube and control oil. Oil mist fan
- One main oil pump driven by the low speed side gearbox shaft or A.C. motor, one auxiliary oil pump driven by A.C. motor and one emergency oil pump driven by D.C. motor. Jacking oil pump with AC motor.
- One centrifugal type oil purifier.
- Automatic exhaust hood spray system, as applicable.
- A.C. motor driven barring gear system with automatic engagement and automatic disengagement.

- Main hydraulic stop & emergency valve suitable for remote opening & emergency shutdown, with internal strainer. Flow meters in throttle, extraction and condenser lines, temperature & pressure transmitter, safety valves, QCNRV, control valve in controlled extraction, DSH in extraction line, expansion bellows to be supplied loose.
- 2 x 100% capacity motor driven condensate extraction pumps.
- Base frame for turbine, gear box, and alternator with necessary foundation bolts or sole plates.
- Trip system for safe operation of turbine during abnormal steam, vacuum or oil conditions.
- Electric drive barring gear, to drive the turbine incase of shut- down or start-up to prevent thermal distortion.
- Safety devices for speed, lube, displacement & steam parameters.
- Set of removable hot insulation within the battery limit.
- Complete piping with valves, fittings & insulation as required along with pipe supports associated with turbine, condenser, lube, drains & control oil system within the battery limits of the turbo generator system. Set of QCNRV, control valve, isolation valve, DSH and flow relief valves for the extraction.
- Set of matching flanges for all interconnections at battery limits.
- Adequate system of drainage from all steam spaces within the unit to the flash tank.
- Flash tank for connecting all high & low pressure steam drains.
- All other drains upto nearest or suggested drain trench.
- Special lifting tackles and special tools required for the normal maintenance work.
- Acoustic hood, required minimum for gear box. In any case, bidder to meet norms of noise pollution. Present norms is less than 75 dB(A) during day time and 75 dB(A) during night time, within the premises.

b) Electrical

One (1) no. Three Phase Synchronous Generator

- The complete excitation system consisting of the brush less exciter with PMG and thyristor driven type AVR mounted on the generator shaft and the excitation panel housing the automatic voltage, VAR / power factor controller etc. Including field breakers and field dischargers. In either case, voltage regulation of + 1 % and adjustment

of +10% to –10% is needed. AVR to be digital type with two auto and two manual redundant channel, along with PF controller.

- Stator with output leads taken from sides, rotor suitable for overhang, bearings, base frame, built-in RTD's.
- Local panel gauge to give all important inlet and outlet steam parameters, major electrical parameters and oil / cooling water temperatures.
- Auto & manual synchronizing system, with panel.
- The closed air circuit water (CACW) cooling system for the generator with ducting and coolers. Side mounted coolers to be provided.
- Space heaters, CT's, PT's, LA and SP equipment.
- Generator protection panel.
- Metering and control panel.
- Neutral grounding resistor cubicle with connection from neutral.
- Lighting arrestor and surge protection.
- Relays as required and as described in the specification.
- Current and potential transformers for protection and metering and voltage regulation.
- MCC's for all TG auxiliaries and all loads of TG island alongwith starters and turbine speed indicator and raise / lower buttons & local control stations. 415V, 3ph, 50Hz, power will be given at all MCC incomers. MCC to have interconnectivity to DCS. MCC to have potential free dry contacts for DCS signals with clear identification. Incomer to be ACB and all outgoings to be either ACB / MCCB.
- Starter for EOP motor alongwith DCDB.
- All power and control cabling within the battery limit and cable trays.
- Generator air coolers to be with tubes & tube sheets, frame, water box, sole plate, anchor bolts, primer coating and valves. Air coolers to be side mounted.
- Condenser orientation to be designed to minimise elevation of TG deck.
- Special tools for the Generator and accessories and sling for lifting.

- All AC and DC motors required for the successful operation of the plant. The motors shall be suitable for the equipment/area specified and supplied as a complete unit with its driven equipment. The terminal box of motor shall be complete with cable gland and lugs.
- Earthing upto earth-mat / pit for equipment supplied under this package.
- All pipe / equipment mounted local gauges as required.
- All pressure test points complete with root isolating valves (bonnet less) and temperature test points complete with thermo wells and screwed plugs and chain for performance measurements.
- Local gauge board at Turbine floor complete with gauges and accessories.
- Safety devices and shut down systems.
- Complete I&C system upto & including junction boxes.

1.2.2 Scope of Erection & Commissioning

a) **Mechanical**

All items covered under scope of supply.

b) **Electrical**

All items covered under scope of supply.

c) **Control and Instrumentation (DCS based)**

Complete I&C system upto marshalling cabinet of DCS (DCS by others) for the STG & auxiliary package.

d) **Consumables**

Specifications including brand names and quantities of all consumable materials such as lubricants, flushing oil, hydraulic fluids etc., required for start-up, initial filling, commissioning and performance tests and yearly requirements of the same for normal operation are to be submitted by the Bidder.

However, supply of all consumables required for initial filling is included in the scope and shall be supplied by the successful bidder at appropriate time.

e) **Spare Parts**

All spare parts as per Appendix II

In addition to the above spares the Bidder shall also supply spare parts (commissioning spares) along with this main equipment as per his experience, for replacement of managed or unserviceable ones during the execution of the project at site, to avoid delay in the Project Schedule.

f) Special Maintenance Tools and Tackles

Two sets of special tools and tackles required for operation maintenance, inspection and repair neatly packed in steel boxes complete with instructions for the Turbine, Generator and all other Equipment covered in this scope of work.

1.3 Terminal Points

a) Mechanical

1. Steam

Main steam	At inlet of strainer + ESV (All instrumentation & steam meter to be supplied loose)
Steam for gland sealing steam & ejector	At the auxiliary equipment at 8 to 10 kg/cm ² g. Mating flanges to be provided by bidder
Extraction steam at 4.5 kg/cm ²	At the outlet flange of the turbine, Mating flanges to be provided by bidder. NRV, control valve, pressure & temperature gauges & transmitters, DSH, FFRV and flow transmitters, expansion bellows to be supplied loose by bidder)
2. Condensate	CEP pump outlet through control stations inter condenser, after condenser and gland steam condenser terminated at one point in powerhouse.
3. Cooling water for condenser	At the inlet and the outlet flanges of surface condenser at 2.5kg/cm ² g. Mating flanges to be provided by bidder.
4. Cooling water for auxiliary equipments	To be drawn and returned to the auxiliary inlet & outlet headers (headers will be provided by others and located in power house). CW will be at 2.5 kg/cm ² g.
5. Instrument/Plant air	At one point in power house

- | | | |
|----|---------------------------------|--|
| 6. | All steam drains & other drains | To be taken to flash tank. The supply of tank is in the scope of the TG supplier. Other drains will be terminated at drain channel at 0m level |
| 7. | Safety valve exhaust and vents | To atmosphere at safe elevation. |
| 8. | Auxiliary Steam condensate | To hot well. |

b) Electrical

- | | |
|------------------|---|
| HT power | At generator terminals |
| LT (415 V) power | At one point in the switchgear room at incomer of STG MCC in bidder's scope. |
| DC power | Entire DC system including battery charger, DCDB, cabling, etc. in bidder's scope |
| UPS | UPS power (230 V AC) will be given at one point in power house. |

c) Control and Instrumentation

Complete I&C system upto marshalling cabinet of DCS for STG & auxiliaries

Power, Control & Signal cables: Complete within battery limits

1.4 Performance Guarantee

1.4.1 General

- a) All equipment shall be guaranteed for workmanship and materials and for satisfactory performance in accordance with the relevant clauses of the General Conditions of Control.

The guarantee for performance shall cover individual items and systems including the electrics for their ratings/outputs, as required in the specification.

- b) The Bidder shall conduct performance/acceptance tests on each of the major items of equipment supplied to demonstrate that the equipment supplied is capable of achieving the performance parameters specified and contracted for, in accordance with the General Conditions of Contract, Instruments, gauges and flow meters installed for the normal operation of the equipment shall be made use of during the acceptance tests as far as practicable.

1.4.2 Performance Tests

- a) The performance tests shall be conducted for the demonstration of the following guaranteed values.
- b) Turbine Generator System Capability

The turbine generator system capability for generating power as follows :

- Maximum Continuous Electrical Power Output (MCEPO) at the generator terminals, as guaranteed by the bidder for the guarantee conditions.
- MCEPO at generator terminals, as guaranteed by the bidder for the maximum power generation operating conditions, with the specified power factor and condenser cooling water temperature of 32⁰C.
 - Total Auxiliary Power Consumption (motor input) for all the continuous running auxiliaries covered in the scope, under both the above conditions.
- SJAE & Gland steam consumptions under both the conditions
- Weighted Average Heat Rate

1.5 Correction Curves

The results of the performance test shall be corrected to the specific conditions by correction factors, which shall be defined by means of correction curves. All correction curves shall be submitted by the Bidder.

A certified copy of the correction curves, giving the corrections to the steam turbine generator unit performance for variations in the inlet steam conditions, condenser cooling water inlet temperature, power factor, ambient conditions etc. as will be applicable to the plant shall be submitted.

1.6 Other Requirements

- a) The guarantee tests and tolerance permissible shall be in accordance with the relevant Indian Standards and where Indian Standards are not available, in accordance with International Standards acceptable to the PURCHASER such as ASME PTC-6 / IEC / JIS / DIN-1943. The performance test will be with online instruments with calibration certificates from suppliers.
- b) Should the tests specified show that the unit has failed to achieve the guaranteed parameters, the Bidder shall carry out modifications if considered necessary to meet the guaranteed figures and the guarantee tests shall be repeated in accordance with the applicable codes.

If the specified guarantees are not established within 90 days, after the trial run, the PURCHASER shall have the option either to reject the equipment or to accept the equipment with such penalties as earlier detailed.

1.7 Data Required During Kick-off Meeting with Select Bidder

- 1.7.1 Steam curve depicting KW generated at generator terminals at various conditions of extraction and condensing steam flows and in the permissible ranges of inlet and extraction steam flow parameters and CW temp.
- 1.7.2 Utility needs of the STG i.e. cooling water, auxiliaries steam supply, air supply and power to be clearly indicated. UPS power to be separately indicated.
- 1.7.3 Data on turbine design to include casing and rotor type, over speed device type, construction of rotor (solid / build Up), no. of exhaust flows, detailed governor specifications, details of auto governing and extraction valves, blade design data, material of construction of various components of turbine, details of bearings, packing, gland sealing, base plates and soleplates.
- 1.7.4 Maximum steam flow capabilities through extractions and condensing stage, future potential maximum power, hydraulic test pressures etc.
- 1.7.5 List of all shop and site inspection tests.
- 1.7.6 List of instruments including pressure gauges, temp. gauges, vibration defectors, axial movement defectors, alarms, annunciators, bearing temp. devices speed sensors, local control panel etc. with list of Bidders.
- 1.7.7 Details of all coolers, heat exchangers etc.
- 1.7.8 Details of heat exchangers including no. of passes, heat transfer area, velocity of fluids, design flow of fluids, design parameters like pressure, temperature etc., hydraulic test pressures, nozzles and sizes, etc.
- 1.7.9 Details of condenser including no. of passes, heat transfer area, velocity of fluids, design flow of fluids, design parameters like pressure, temperature etc., hydraulic test pressures, nozzles and sizes, etc
- 1.7.10 Data sheet for condensate pumps and motors, GVC, steam jet air ejectors, gear box, etc
- 1.7.11 The following documents are to be submitted : fabrication schedule, typical inspection and quality assurance plan, all technical data, outline and cross sectional drawing, foundation block diagram, priced list of spare parts.
- 1.7.12 The following documents in triplicate will be furnished after purchase order but before supply as per terms of payment : GA drawing, detailed foundation drawing, P & I of all hook-ups, electrical single line drawings, list of sub-vendors. The same will be frozen during the kick-off meeting.
- 1.7.13 The following generator data to be submitted : make, frame size, code, nominal output, full load current, speed, direction of rotation, cooling system, SC ratio, run up time to synchronisation speed, rate of loading, minimum time for no load to full load, maximum temperature rise over ambient, overload capability, efficiency vs. load curve, speed rises v. load rejection, cooler details and cooling water and air needs, bearing type, lubrication system, no. and location of RTD's, space heater, approx. weight, list and cost of spares.
- 1.7.14 The enclosed data sheet in Appendix I for STG to be submitted, positively, alongwith the offer. Soft copy to be submitted by email in word / excel format.

2. SPECIFICATIONS

2.1 General

This specification is intended to cover the design, manufacture, delivery, erection, testing and commissioning of two (2) Number turbo generator unit with surface steam condenser, gear box, and all other auxiliaries, with a nominal power output of 3 MW at the generator terminals at the site conditions with 40°C ambient and at 0.8 PF, 11 KV and 50 Hz. The unit will be operated in parallel with the local Electricity Board Grid with the frequency variation of +/- 5% and voltage variation of +10% to -10%. The steam turbine shall be a extraction cum condensing type with extraction at 4.5 kg/cm² a. One unit will be installed at Lauriya site and the other at Sugauli site of HBL.

The supplies and services within the scope shall be rendered inclusive of all appliances and interconnecting arrangements with other supplies, necessary for installation of all accessories and for satisfactory maintenance and repair.

The scope of supply and services shall include all necessary work and supply of equipment and material whether mentioned in these specifications or not, but which are necessary for the satisfactory, reliable and safe operation and maintenance and required for achieving guaranteed performance of the plant.

Any equipment, device or material even if not included in the original bid but found necessary for the safe and satisfactory functioning of the unit under the bid, shall be supplied, erected and commissioned by the Bidder at no extra cost to the PURCHASER, as though, such equipment, material or work were originally specified and formed part of the scope of work.

Scope of relays, metering & protection will necessarily meet standard requirements.

2.2 Codes & Standards

The design, manufacture, testing and performance of the Turbo Generator and Accessories shall comply with the requirements of applicable Indian / British / American / Japanese / (ASME / IS / EN / DIN / JIS / IEC / ISO) Standards, such as those indicated in the respective sections of this specification, and those standards specified therein, in so far as they apply. The bidder should specifically mention relevant codes.

2.3 Performance Test

After completion of erection, the plant shall be trial operated and performance tested as detailed in the relevant sections of the specifications. The Bidder may note that the performance parameters guaranteed shall be considered in the bid evaluation.

The values of performance parameters that are to be guaranteed by the Bidder as furnished by him. The Bidder shall furnish these and other parameters as required in the performance data sheets.

2.4 Work Schedule

The earliest feasible schedule to be given by the bidder.

2.5 Design Basis

The Turbo - Generator and the Auxiliary Equipment covered under this specification shall be designed to achieve maximum power generation as per normal steam flow rates from the extraction cum condensing set. The turbine to be capable of maximum flow indicated from the extraction. The condensing system to be designed for maximum condensing steam flow of 8 TPH.

Major part of the generated power will be fed to the distillery plant and the rest will be exported to the existing cogen switch board. The extraction from the turbine provide the sources for the steam for the use in the distillery & power plant auxiliaries, deaerator and SCAPH.

The steam will be available at the turbine isolation valve at $40 \pm 2 \text{ kg/cm}^2$ and $395 \pm 5^\circ\text{C}$. The project viability depends on the continuous, uninterrupted running of the plant, for a minimum of 8000 hours per annum and it is essential that the equipment are designed for the maximum availability.

The turbo alternator shall be designed taking into consideration all possible electrical parameters affecting the choice of the machine, assuring stable and reliable operation in a rural network. For this tender the bidder shall offer their standard instrumentation system with panels etc, in line with this tender document for the start up, shut down and operation with all standard features.

2.6 Performance Parameters

2.6.1	Steam flow at the Turbine	:	normal: 22,000 kg/hr Up to 24,000 kg/hr (max) Min: 5,000 kg/hr
2.6.2	Steam pressure at the turbine stop valve	:	$40 \pm 2 \text{ kg/cm}^2$
2.6.3	Steam temperature at the turbine stop valve.	:	$395 \pm 5^\circ\text{C}$
2.6.4	Exhaust pressure with surface condenser	:	0.1 ata
2.6.5	Extraction steam requirements	:	
	Controlled extraction at 4.5 kg/cm^2 a		up to 21,000 kg/hr, Normal 18000 kg/hr, Min: 2000 kg/hr

Flow to Condenser Minimum (or only Cooling flow) quantity of steam to condenser during peak extraction flows

kg/hr
Normal 2500
Maximum 8000 kg/hr

Note :1) The extraction flow will vary from 4 TPH to 21 TPH based on the transient conditions of distillery operations. Based on actual steam generation on slop firing, balance steam will be sent to condenser. Condenser to be designed for maximum 8 TPH and minimum cooling steam flow requirements of 10 to 12% of rated throttle flow as per bidders design.

- 2) Condensing pressure as achieved by bidders design, with water cooled condenser. For design purpose, the same to be 0.1 ata.
- 3) Bidder to submit power generation at given conditions of normal, minimum and maximum and submit HBDs of the same.
- 4) Turbine to be designed for continuous operation at 40 kg/cm² and 395⁰C

2.6.6	The economical steam rate required at percentage load	:	80 to 100
2.6.7	Condenser cooling water inlet temperature (avg)	:	32 Deg. C
2.6.8	Nominal Generator Output	:	3 MW
2.6.9	Power factor (lagging)	:	0.8 (design), 0.8 – 0.98 (actual operation)
2.6.10	Generation Voltage	:	11 KV
2.6.11	Ambient temperature for Electrical equipment design	:	50 Deg. C
2.6.12	Parallel operation with grid	:	Required
2.6.13	Duty requirements	:	Continuous 8000 hrs per year
2.6.14	The minimum continuous loads at which the TG is expected	:	30 %

to operate as percentage of
rated load

2.6.15 Atmospheric conditions : Dusty (as prevalent in the
existing sugar mill)

2.6.16 The maximum noise pressure
level at 3.0 m distance for
any equipment from the : 75 db (A)
equipment surface shall be
equal to or less than

2.7 Utilities

	Min	Normal	Max
2.7.1 Instrument Air			
Pressure Ata	4.5	5.5	6.5
Temperature Deg. C	40	45	85

2.7.2 Cooling Water for auxiliaries

Water temperature Dec.C	32.0
Water pressure, kg/cm ² g	2.0 (maximum)

2.7.3 Auxiliary steam

To be taken by the bidder from one point near the TG

2.7.4 A C Power (Single point supply will be provided by the Purchaser)

Voltage	V	415 (Three Phase)
Frequency	Hz	50

2.7.5 DC Power Voltage V 110 (in Bidders' scope)

2.7.6 UPS Power : at one point in power house, 230 V AC. (Single point supply will be provided by
the Purchaser)

2.8 Conditions of Service

- a) The steam turbine will be installed in a power house.
- b) The turbine control shall be located in the adjacent control room whereas important indicating instruments shall be provided near the turbine in the turbine control panel in addition to the transmitters. Emergency stop arrangements shall be provided in the local panel. The turbine will be normally controlled and monitored from the DCS in the control room.

2.9 Design and Engineering

- 2.9.1 The turbine shall be single cylinder, single exhaust, extraction cum condensing type. All castings and stator blade carries shall be horizontally split and the design shall be such as to permit examination of the blading without disturbing shaft alignment or causing damage to the blades.

The design of the casing and the supports shall be such as to permit free thermal expansion in all directions. The bidder shall describe and illustrate by means of diagrams the method used to support the casing and to accommodate the expansion.

- 2.9.2 Solidly forged and machined rotor with integral disks is preferred. The rotor after fully machined and bladed be given a overspeed test. None of the critical speeds of the rotor shall fall within the range of 20 % above and 20 % below the normal running speed of the rotor. The turbo generator Bidder, with the unit responsibility, shall analyse the complete couple train for both lateral and torsion vibrations, and ensure proper separation margins. The rotor shall be designed to withstand the maximum shock loading that may occur during any power system disturbance.

Such shock loading values shall be taken for the design of the gear box and the generator rotor. The bidder shall clearly describe in his offer, the construction of the rotor, the heat treatment proposed and the procedure for inspecting the shaft to ensure soundness and homogeneity of the material. The material of construction shall be consistent with proven practices and standards.

- 2.9.3 The blades shall be designed to withstand all vibrations, thermal shocks, and other loading that may be experienced during service and system disturbances. The blades shall be machined from forge bars or die forged and the materials used shall be chromium steels consistent with proven experience and standards. Any blade coating used to improve performance or resistance to erosion shall be described.

The bidder shall clearly indicate the type of fastening of the blades on to the wheels and also give the specific advantages of the particular fastening method. The rotating blades are either shrouded or tied with lacing wires depending on the stresses and the excitation frequencies, and the offer shall indicate the arrangement. The details of the seal strips used to control the steam leakages shall also be indicated.

- 2.9.4 The glands shall preferably of labyrinth type and sealed with steam. The complete piping, valves, pressure gauges, regulators etc., required for the end seals shall be provided by the Bidder. A vacuum system if required by the design shall be provided. All piping and components of shaft seal and vacuum system, if provided, shall be sized for 300 percent of the calculated new clearance leakages. Steam leaving the glands shall be condensed in seal steam condenser and recovered in the hot well. It shall be possible to inspect and replace the end seals without opening the casing and without damaging the thermal insulation.

- 2.9.5 The Turbine shall be provided with liberally rated hydrodynamic radial and thrust bearings. The radial bearings shall be split for ease of assembly, and of the sleeve of pad type, with steel shell backed, babbitted replaceable pads. These bearings shall be equipped with anti-rotation pins and shall be positively secured in the axial direction. The thrust bearings shall be of the steel backed babbitted multiple segment designed type, designed for equal thrust capacity in both directions.

A liberal flow of lube oil under pressure shall be supplied to all the bearings for lubrication and cooling.

The bidder shall provide the complete details regarding the radial and the thrust bearings in his offer.

2.9.6 It is preferred that :

- a) All integral pipings for steam, water air, lube oil etc to be supplied in pre-fabricated condition to the site to avoid delay in E&C.
- b) Supply of cooling water to STG auxiliaries like SJAE, GSC, etc. to be from CEP.
- c) Condensate from cogen auxiliaries like SJAE, GSC, etc. to be returned by bidder to the hot well.

2.9.7 Lubrication and control oil system

- i) A pressure lubrication and control oil system shall be furnished for the turbo generator unit to supply oil at the required pressure to the steam turbine, gear box, generator and governing system. Oil in the reservoir shall be maintained at appropriate temp when TG set is idle by providing suitable electric heaters and temperature controls.

For the hottest ambient conditions to be encountered at the site oil outlet temperature at any bearing shall neither exceed the maximum permissible temperature for the bearing metal nor the maximum safe operational temperature of the oil.

ii) The oil system shall include the following:

- Main oil pump preferably driven by the low speed side gearbox shaft /motor driven.
- A 125% capacity A.C. motor driven auxiliary oil pump arranged to cut in automatically if the oil pressure falls to a preset value. This pump shall also meet the requirements during the start up and shutdown.
- A D.C. motor driven emergency oil pump of sufficient capacity to provide adequate lubrication in the event of a failure of the unit A.C. motor driven pump. This pump also shall cut in automatically at a pre set value of the oil Pressure.
- Two 100% capacity (one working and one standby) water cooled oil coolers.
- Two 100 % duty oil filters arranged in such a way that it is possible to clean one oil filter while the other is in continuous flow transfer valves.
- An accumulator to maintain sufficient oil pressure, during transients conditions and while standby pump acceleration from idling to full speed.
- Oil storage tank with adequate reservoir capacity, settling tank, if applicable, duplicate strainers, level indicators with float switches and alarm contacts, vent and oil mist eliminators.
- Overhead oil tank for gravity flow to the system in case of emergency.
- Flow indication for oil from every bearing by sight glasses.
- Centrifugal oil purifier.

Supply of the flushing oil and the first fill up of lube oil for turbine and accessories shall be the responsibility of the bidder and preferably from the Indian market.

iii) Oil coolers

The oil coolers shall be water cooled with a duplicate arrangement and changeover valves. The coolers shall be of shell and tube type with removable tube bundle. The coolers shall be constructed in accordance with TEMA class C. The provided surface area shall be adequate to cool the oil with 32 Deg. C inlet cooling water temperature even with 5% of the tubes plugged.

The sizing of the coolers shall consider a tube side (water side) cleanliness factor of 0.85. The water velocity shall be not less than 1.5 m/sec.

The material of the cooler will be SS 304 (SA 249 TP 304) and shall conform to the requirements of TEMA C / HEI. The coolers shall be amenable for easy inspection & maintenance and cleaning of one cooler while the other one is in service shall be possible. The bidder shall indicate any emergency cooling water requirements in his offer.

iv) Filters

Full flow oil filters shall be used downstream of the coolers and shall be piped in a parallel arrangement with a continuous flow transfer valve. Filtration shall be 25 microns nominal for lube oil and 10 microns for control oil. Filter cartridges shall have a minimum collapsing differential pressure of 3.5 ata. The minimum design pressure for the filters shall be the maximum discharge pressure of the oil pumps.

v) Oil reservoir

The interior of oil reservoirs shall be desalted and rust proofed with a permanent coating. Reservoirs with top mounted equipment shall have sufficient rigidity. All openings for piping shall be made dust and water proof.

The oil reservoir shall be so located to permit draining of the contents by gravity and shall be equipped with fine coarse mesh strainers.

vi) All necessary piping, valves and fittings for the complete oil system shall be provided by the Bidder. The lube and control oil piping from the outlet of the filters and up to the user point shall be of stainless steel.

The piping from the reservoir to the filters and the return oil piping shall be of carbon steel. All piping from overhead tank will be SS.

All governor oil piping to be of SS.

vii) Oil purifier

A centrifugal type oil purifier shall be provided for the removal of water, sediments and other oxidation products. The purifier shall be a separate complete package. The capacity of the purifier shall be at least one (1) percent of the rate of normal flow through the reservoir. Feed to the purifier shall be from the drain end of the reservoir and its operation shall be independent of the oil systems.

viii) Steam Turbine Governing System

The turbine governing system shall be electro-hydraulic designed for high accuracy, speed and sensitivity of response. The electrical / electronic and hydraulic component of the control system shall be selected on the basis of reliability over a wide range of operating conditions.

All components used shall be well proven to assure overall system reliability and shall be designed for easy and quick replacement when necessary. The governor shall ensure controlled acceleration of the turbo generator and shall prevent over speed without tripping the unit under any operating condition or in the event of maximum rejection.

The governor (Woodward 505XT) shall have linear droop characteristics with a suitable range for stable operation and shall have provision for adjusting the droop in fine steps.

The governing system shall have the following important functions:

- Speed control
- Over speed control
- Load control
- Extraction steam pressure control

2.9.8 External Forces and Moments

The bidder shall furnish the allowable forces and moments on the turbine nozzles.

Thermal Insulation and Lagging :

The steam turbine and the other high temperature parts, including piping supplied, shall be insulated with low conductivity insert material, where required, reinforced by stainless steel wire net between applied layers.

The insulation shall be so arranged that it can be removed for access to the flange bolting, control valves and other parts that require periodic maintenance. MAT / blanket type removable insulation for the turbine is required.

2.10 Performance Requirement

2.10.1 Controlled extraction

The bid documents call for one extraction at 4.5 kg/cm² a. The extraction is to be internally controlled. The system shall be complete with the necessary control valves, relief valves and non return valves included in the bidder's scope.

2.10.2 Economic Load

The specific steam consumption shall be the lowest for operating loads between 80 to 100%.

2.10.3 Over Loading

The system offered shall be suitable for an over load. The overload capacity to be clearly indicated by the Bidder.

2.10.4 No load and Minimum load operation

The turbine shall be capable of operating under home load condition (only auxiliary load of power plant of 8% of generator capacity) during loss of grid.

2.10.5 Specific steam consumption

This guaranteed specific steam consumption / heat rate shall be for a load range of 80 to 100 percent of rated capacity and the testing shall be as per IEC Publication 46, DIN 1943, Recommendations or ASME PTC-6-S.

2.10.6 Governing Characteristics

When the machine is operating with rated steam conditions and at rated speed, and the maximum load is thrown off, the operation of the electronic speed governor shall prevent the speed rising to a value at which the over speed trip is set to operate.

The speed governor droop i.e. permanent speed variation from no load to rated output etc., shall be within the limits specified in IEC Recommendations Publication 45.

2.10.7 Parallel operation

The characteristics of the turbine shall be such that the turbine generator set can be run in parallel with the State power grid and / or with the installed sugar cogen STG and possess no abnormal features either individually or collectively.

2.10.8 Speed adjustment

The turbine speed at no load shall be adjustable between 100% to 95% of rated speed. Means are to be provided whereby the speed of the turbine at no load can be raised in a controlled manner for the purpose of testing the over speed trip mechanism and provision made to ensure that such means do not interfere with the action of the speed governor in normal.

The device to raise speed at no load must incorporate limiting means to prevent it from reaching a dangerous speed.

Governor droop of minimum 4% to be considered.

During emergency condition, the turbine may be operated at speeds as low as 96% of the rated speed.

2.10.9 Over speed trip

In addition to the speed governor, the turbine and generator shall be protected against excessive over speed by a separately actuated over speed device which operates the trip system.

In the event of sudden load rejection, should the speed governor fail to meet the requirements the over speed trip shall operate to prevent any damage.

The over speed trip setting shall be stated by the bidder in his offer and in the operating instructions. The over speed trip mechanism shall be automatically restored when the speed of the turbine has decreased to a speed lower than the rated speed.

2.10.10 Trip system

The turbine shall be provided with a system for the complete and rapid closure of inlet steam valve and extraction QCNRV's effectively preventing all steam admission to the turbine independently of the closure of the governing valves, on receipt of trip signal.

In order to avoid sudden re-admission of steam to the turbine the trip system shall be fitted with interlocking devices so that trip resetting cannot take place until steam admission can be achieved as per normal operating procedure. Essential trip circuits to be provided are:

- Steam inlet pressure falling below / above pre-determined level.
- Steam inlet temperature falling below / above pre-determined level.
- Condenser vacuum falling below / above pre-determined level.
- Lubricating oil pressure falling below / above pre-determined level.

2.10.11 Maximum speed

An over speed test of the turbine rotor shall be carried out preferably at the bidder's works or prior to commissioning. The over speed tests shall be at a speed exceeding by 2% of the maximum calculated over speed that would occur if the governor failed and if the maximum over speed was limited by the action of the over speed trip device only. The duration of the over speed test shall be less than 2 minutes. The over speed shall not be more than 20% of the rated speed.

2.10.12 Vibration

Vibration measuring and monitoring systems shall be provided for all the bearings.

This system shall include the generator bearings also. The maximum allowable vibration under specified operating conditions shall be indicated by the bidder.

Minimum two nos. vibration probes to be provided at each bearing of turbine, generator and gearbox.

2.10.13 Critical speed

The critical speed for the combined turbine and generator shall be sufficiently away from the rated speed to avoid any adverse effect of the operation of the unit over the range of operating speeds.

2.10.14 Materials of construction

The selection of materials for parts of the machine shall be based on the experience of the bidder and experimentally determined data and shall conform that under conditions of stress temperature and time, the components will not fracture or deform to a greater extent than is permissible. The materials selected shall be clearly indicated in the turbine and auxiliary data sheets.

2.10.15 Variation of steam pressure and turbine

The turbine shall be capable of accepting variations from the rated conditions within the limits specified by IEC Recommendation Publication. 45.

2.10.16 Limit of lubricating oil temperature

The bidder shall furnish the permissible temperature for the bearing metal in his offer.

2.11 Safety

- a) All controls shall operate in a fail safe mode.
- b) All coupling and gears shall be provided with adequate guards.
- c) Piping shall be arranged in such a manner as to avoid tripping or overhead problems.
Piping or tubing which is standing or hanging shall be protected from personnel traffic.
- d) Surface temperature on any point shall not exceed 60 Deg. C.
- e) Very high standard of safety shall be built into the set with high degree of redundancy.

2.12 Condenser

- a) The condenser shall be of non-contact surface type condenser designed as per the requirements of Heat Exchange Institute Standards for Steam Surface Condensers.

The condenser shall sized to condense the maximum quantity of exhaust steam of 8 TPH. The temperature rise on CW side will be 8°C.

The cooling water for the condenser will be supplied from the cooling tower basin through cooling water pumps.

The water velocity through the tubes shall not be less than One (1) meter per second and the cleanliness factor on the tube side shall be 0.85.

The pressure drop on CW side not to exceed 6 mwc.

Condenser design should ensure safe and reliable operations with only 10% of throttle flow to condenser.

- b) The condenser design and supply shall be complete with the neck, expansion joint, condensing chamber and tubes, tube sheets, epoxy coated hot well, water boxes, air removal system and accessories, rupture disc, bellows, surge & stand pipes, water expansion relief valves, vent & drain valves, sacrificial anodes & baffles.

The condenser neck shall be suitably designed to reduce the inlet steam velocity to ensure low pressure drop and to protect the tubes from impingement of steam.

The condenser shall be adequately designed for the external pressure and stiffeners and bracings wherever required shall be provided.

The tubes shall be provided with supports to eliminate any serious tube vibration problems and sagging. The tubes shall be expanded into the tube sheets at both the ends and flared at the cooling water inlet side.

The condenser neck shall be connected to the turbine exhaust hood with a properly designed stainless steel expansion bellow, as applicable, which allows free expansion of the condenser unit without exerting undue thrust on the turbine exhaust hood and facilitate independent supporting of the condenser on the foundations without resorting to springs.

The hot well at the condenser bottom shall have a minimum capacity of 2 minutes storage while handling maximum quantity of exhaust steam.

The hot well shall be provided with level gauges and connections for condensate extraction and drain. A suitably designed level control system shall be provided. No makeup will be added in the condenser hot well. Condensate of STG auxiliaries will be returned by bidder to the hot well.

- c) The condenser shall be of divided water box design and the water boxes shall provide easy accessibility to the tubes. It shall be possible to clean one section of the tubes with the condenser load suitably reduced.

The circulating water inlet and outlet connections shall be of adequate size to reduce the waterside pressure drop to the minimum.

The water boxes shall be coated internally with epoxy paint to prevent corrosion from the cooling water and shall be provided with sacrificial anodes.

The condenser water boxes and the tubes shall be designed for a pressure corresponding to the full shut-off head of the cooling water pumps which will be about 4 ata.

- d) The condenser shall be provided with an atmospheric relief valve sized as per the recommendations of HEI standards with water seal around the valve disc to ensure proper sealing.
- e) The material selection for the various components of the condenser shall be as per the Bidder's standard and adequate to meet the duty requirements. Condenser tubes to be of SS 304 welded. Tubesheet & shell to be of IS 2062.

The bidder's offer shall furnish the complete data on the condenser including the material of construction for the various components. The foundation bolts for the condenser shall be included in the scope of supply.

- f) The condenser will operate in two distinct modes in season and off-season. During season mode, as the flow to condenser will be small, to save auxiliary power consumption, the flow of cooling water will be reduced and is expected to be about half of the flow during season mode, when maximum steam is condensed.
- g) Condenser Air Removal Equipment

One steam operated hogging ejector (1 x 100%) of single stage shall be furnished for the initial pulling of the vacuum in the system. The capacity shall be so as to reach 60% vacuum in 20 minutes time.

Hogging ejector shall be without any condenser, discharging to the atmosphere through a suitably designed silencer (1 x 100%)

Two steam operated main ejector of two stage single element type with inter and after condensers shall be provided. All vents to be provided with silencers.

Cooling medium in the inter and after condensers (2 x 100%) in the ejector system shall be condensate from CEP discharge. Condensate after CEP control station will be taken to deaerator. Condensate piping from hot well to ejector & other auxiliaries in bidder's scope. Condensate from auxiliaries to be returned to hot well by bidder.

Both the ejector systems shall be complete with piping, valves, rupture disk etc. Valves to include isolation for steam supply individual ejector elements, expansion relief, vent & drain, etc. Safety valve to be provided at steam inlet to ejector assembly.

The bidder shall provide the complete details of the ejector systems with material of construction and the steam consumption.

2.13 Condensate Extraction Pumps

Two numbers 100% capacity condensate extraction pumps to pump the condensate from the condenser hot well shall be provided.

Both the pumps shall be driven by electric motors and the flow shall be controlled by discharge throttling and auto cut-in / cut-out of the pumps.

The pumps shall be of centrifugal, vertical, multistage type and shall be supplied complete with all valves, inlet and discharge piping with manifolds.

The pump shall be designed to have a minimum discharge head considering friction losses, deaerater head, pressure drop across deaerater nozzles and control valves. However, the required head will be finalised during the technical kick-off meeting with select bidder, based on design of boiler's deaerater.

2.14 Barring Gear

The turbine, shall be provided with a barring gear of mechanical type driven by an A.C. motor, to rotate the turbine and generator after shutdown to prevent thermal distortion of the rotor.

The barring gear shall be capable of starting the rotor from rest and run it continuously at low speeds.

The barring gear shall be interlocked with the lubrication system to prevent its operation without lubrication.

If provided, the system shall be capable of automatic engagement and automatic disengagement when the turbine speed goes above the normal barring gear speed.

The system shall also have facility for manual turning in case of A.C. supply failure. The turbine panel shall be provided with necessary push buttons, alarms and switches for the operation of the barring gear.

2.15 Base Frame

Suitable base frame or sole plates either common or individual shall be provided for the turbine, generator and the gear box. Provisions shall be made to level each piece of equipment separately and as a package.

2.16 Control System for Steam Turbine

The entire I & C package will be in bidder's scope. The I & C will be DCS based. Entire governing, AVR & synchronization in STG scope. The scope of STG bidder will be complete I&C system upto marshalling cabinet. All intelligent devices should be monitored and controlled through the DCS. DCS will be provided by others. All intelligent devices should be realized in the DCS. Supplier will provide the control philosophy, control logic, trip logic for turbine & generator, ladder diagram for control & operation, detailed list of I/Os and all other inputs required by the DCS supplier for safe & reliable

operation of the STG & auxiliaries. All panels will communicate to DCS through RS 485. Emergency systems should be capable of operating even in outage condition of DCS.

This specification outlines only the broad requirement of the controls for the turbine. It is the responsibility of the turbine bidder to provide all the controls, instrumentation and gauges required for the safe and efficient operation of the turbine system.

The inputs and outputs are to be protected against polarity reversal. All inputs to be potential free contacts. Outputs to be short circuit proof and provided with fuses.

The basic requirements are as follows.

- a) The complete steam turbine generator & auxiliaries package will be normally operated only through the DCS in the control room. It is not envisaged to have any operator or workman in the field. Normal start-up operation should also be accomplished through the DCS, except for manual drain valves. Hence, start / stop of all drives, speed regulation where required, operation of actuators / dampers / solenoid valves, operation of all motorised valves, operation of all sub-systems, changeovers of filters, coolers, etc. should be interconnected through the DCS with appropriate & required I/Os.
- b) The starting and stopping provision for steam turbine shall be provided at the remote control panel in the control room. The steam turbine will normally be started from remote, except for operation of manual valves.
- c) All instruments and controls shall be supplied by the bidder and tested along with the turbine / generator.
- d) All sequential start-stop, shutdown / interlocking and other auxiliary equipment shall be through DCS.
- e) The turbine shall be supplied with a self-checking solid state fully automatic sequential start system designed to provide reliable programmed starting, acceleration, synchronization and loading to selected loads, operatable through the DCS. Turbine logics will be derived in Purchaser's DCS
- f) The control system shall provide redundancy for key functions by use of separate sensors, monitors, control valves, converters, etc.
- g) The control system shall include all the standard control monitoring and alarming.
- h) Control panels shall be supplied fully wired and complete with all a necessary special wiring for interconnection of panels.
- i) Vibration detector/proximity meters/axial position detectors monitors shall be of Bently Nevada / Provibtech / Shinkawa make and shall be provided for all bearings including the bearings of the turbine & gearbox and for turbine axial displacement, shaft vibrations at gearbox high speed shafts.

- j) Annunciation scheme will be given as part of DCS.
- k) Control shall have suitable facilities for trouble shooting through provision of diagnostic lamps, bypass lamps / switches, test switches, etc.
- l) Remote on/off indication & control of all drives of lube oil system & CEP should be available in control room.

2.16.1 Turbine Control System :

The turbine control system has to be capable to provide the following inputs to the DCS system :

- Centralized monitoring of turbine mechanical parameters (rotor axial shift, bearing supports vibration, speed)
- Control of control valves
- Provides turbine protection against rotor rotating frequency rise above the permissible limit.

2.16.2 Protection System :

Following protections are to be provided for turbine :

- a) Over speed protection with 100% redundancy with 2/3 logic
- b) Low lubricating oil pressure
- c) Increase of backpressure in condenser
- d) Increase of condensate level in condenser
- e) All other TG protections such as
 - High / low control oil pressure
 - High axial shift
 - High shaft vibration
 - Low live steam temperature & pressure
- f) Provision is made for the relay blocking the possibility to start-up turbine during shaft turning device being in operation and automatic start of start-up oil pump at turbine shutdown.

2.17 Local Instrumentation

The local instrumentation in minimum will include the following at the turbine gauge panel :

- Steam inlet pressure and temperature
- Steam extraction pressure & temperature
- Steam turbine / generator speed indicator
- Lube oil pressures at header
- Run light
- Control oil pressure, if applicable
- Emergency shutdown push bottom
- Local horn for audible alarm and horn silence push button.
- KW, pf, frequency

2.18 Controls & Turbine Control Panel

2.18.1 Controls

All control signals will be supplied to the DCS for safe, efficient, start up, monitoring, control and shutdown operation of the steam Turbine.

The supervisory instruments to measure the following shall be provided, with provision of all signals to DCS : Speed, load, inlet & extraction steam pressures & temperatures, turbine wheel case pressure, emergency and control valve lift, control fluid pressure, journal bearing metal temperature, thrust pad metal temperature, axial position of thrust collar relative to its own housing, shaft vibration, especially with a view to ensuring safety during starting operations and under transient conditions.

2.18.2 Turbine Control Panel

Turbine Control Panel shall house the following:

- Electronic governor with keyed-in operating program for control of speed, load, inlet & extraction pressures.
- Push buttons for turbine speed raise and lower
- Turbine remote trip/reset push buttons.
- Temperature scanner for Monitoring turbine and gearbox bearing temperature or directly to DCS.
- Vibration monitoring system
- Electronic overspeed

The panel shall be complete with AC supply & DC supply on / off control switches and indicating lamps.

2.19 Lube Oil System (with all signals to DCS system)

- Level gauge in main oil tank
- Bearing temperature gauges for turbine + gear box and alternator
- Bearing temperature RTD for turbine gear box + alternator
- Alternator hot air and cold air temp gauge
- Alternator hot air and cold air temp RTD
- Alternator winding temp. 6 RTD
- AOP & EOP discharge pressure gauge
- Temperature gauge before filter
- Temperature gauge after filter
- Temperature element after filter
- DPIS for lube oil filter
- Pressure transmitter control oil
- Pressure transmitter lube oil header pressure

- Pressure switch for lube oil pressure
- Lube oil pressure switch for auto start of auxiliary oil pump and emergency oil pump
- Pressure switch for barring gear interlock

2.20 Control Oil System (with all signals to DCS system)

- PDIS across control oil filter
- Pressure gauge after filter
- Pressure gauge after oil pr. Regulator
- Pressure gauge control oil pressure to ESV
- Pressure switch control oil pressure to ESV
- Pressure gauge control oil pressure to Trip device
- Vibration probes for turbine & gear box bearing (8 points)
- Axial movement sensor (1-point)
- Pressure transmitter after CPC

2.21 Protection (with all signals to DCS system)

Turbine Protection with interlocks, trip logic & annunciation

- Over speed protection (high / very high)
- Governor emergency trip
- Axial shift protection, vibration high
- Lube oil pr - low
- Lube oil pressure too low
- Manual trip
- Remote trip
- Bearing temperature hi (turbing front / rear, thrust, gear box bearing, generator front journal)
- Live steam temp low
- Live steam temp high
- Live steam pressure low
- Live steam pressure high
- Generator / Electrical Faults : Differential fault
- Extraction pressures & temp. - high
- Extraction pressures & temp.- too high
- Control oil pr. – low trip and alarm
- Thrust wear high trip and alarm
- Hot well level – low, very low high, very high

2.22 Measurement

Steam flow meters for main steam and extraction to be given as loose supply connected to DCS for inlet steam and extraction. Steam flow measurements to be temperature and pressure compensated. Vortex type flow meter to be provided for CEP return.

Generator metering panel with energy meter, frequency meter, KVA, KvaR & trivector meter with modbus RTU connectivity to DCS system. Electrical metering panel can be inbuilt by the supplier into the turbine control panel or provided separately. Class of metering to be 0.2. This panel could be separate or part of the TCP.

2.23 Piping, Valves and Fittings

2.23.1 Scope

The bidder's scope will include the below mentioned piping. Wherever applicable, the bidder will furnish stress analysis for approval. Routing of all non-integral piping will be jointly discussed and decided alongwith Purchaser / Consultant. All piping will be as per good engineering practices and IBR, when applicable. Bidder will have to provide required IBR certification and IBR approval for all piping & fittings under purview of IBR. All steam piping will be duly insulated to have maximum skin temperature of 60 °C and consultant will provide or approve the thickness and material of insulation.

- All integral piping to the STG for lube oil, control oil, compressed air, HP steam, LP steam and cooling water
- Piping of all drains to nearest drain channel.
- Piping of all steam drains to flash vessel connected to hotwell. Spray water to be taken from CEP header.
- Exhaust steam to condenser. Expansion bellows, if required, in bidder's scope.
- All required control valves, DSH, QCNRV, relief valves, flow meters, drain lines, air vents and expansion bellows, as applicable, in the extraction line, to be provided as loose supply.
- Condensate after control station and STG auxiliaries at one point in power house.
- Controlled extraction at 4.5 kg/cm² will be terminated at the STG outlet flange alongwith mating flange. All required fittings will be provide in loose condition by the bidder.
- HP main steam piping will be provided at the ESV. Mating flange and all required fittings will be provided loose by the bidder.

2.23.2 General

All piping required for effectively connecting the turbine with the subsystem within the battery limit shall be provided. The piping will be supplied in pre-fabricated condition.

The piping provided shall be complete in all respects including valves, fittings, supports, etc. as required and include the following :

- i) The design of the piping system shall be based on the ASME B31.1. code. In addition the statutory requirements of the Indian Boiler Regulation (IBR) shall also be taken care of wherever required.

Flexibility and stress analysis shall be made for all piping systems with operating temperatures above 100 Deg. C.

The correct locations of hangers and supports, with as applicable spring stiffness, shall be considered for the flexibility analysis.

Suitable expansion loops restraints and anchors shall be provided so as to ensure compliance with the applicable codes and to limit the stress and reactions to within the allowable values.

ii) The flow velocities in pipes shall be limited to the following values :

Super-heated Steam ..	30 to 60 m/sec, depending on pipe size
Saturated Steam ..	20 to 35 m/sec
Cooling water ..	up to 3 m/sec

iii) Drains at all low points and vents at all high point shall be provided.

iv) All local instruments shall be located on pipelines so as to render them observable from the nearest available platform.

v) Oil drains shall be sized to run no more than half full when flowing at a velocity of 0.3 m/sec, and shall be arranged to ensure good drainage.

2.23.3 Materials

Pipe materials for various services and materials for fittings, flanges, fasteners shall not be inferior to the specifications given below.

All piping except, for cooling water, raw water, and air services shall be of seamless steel. For cooling water & raw water applications the piping could be ERW.

i) Super-heated steam services, metal temperatures equal to or greater than 400 Deg. C and less than 535 Deg. C, 1¼% chromium, ½% molybdenum ferritic alloy steel seamless pipe as per ASTM A- 335, P12.

ii) Steam services at temperatures less than 400 Deg .C, condensate and drain piping, carbon steel piping as per ASTM A-106 Grade B or equal.

iii) Other Services: Carbon Steel Piping as per ASTM A-106 Grade B or ASTM A-53.

iv) Fittings and Flanges: As per applicable codes conforming to pipe material specifications.

v) For cooling water and raw water applications the piping material shall be IS 1239 Black Medium Class.

vi) For Service air applications the piping shall be IS 1239 Black Medium Class.

vii) For instrument air applications : IS 1239 GI pipes

viii) The Fittings for ERW applications shall be as per IS 1239 Part II

2.23.4 Hangers and supports.

- i) The bidder shall design, fabricate and furnish erection drawings for all hangers, anchors, guides, clamps, stops and supports, auxiliary structures, etc. required for the proper installation and support of the piping.
- ii) It is desirable that supports should as far as practicable, be arranged adjacent to the pipe joint.
- iii) Constant load hangers / spring hangers shall be provided wherever necessary for critical piping systems.

The variation between hot and cold loads, If variable spring hangers are used, shall not exceed $+ / - 25\%$ of the rated load.

- iv) Lugs and additional structural members should be suitably welded to the pipes wherever necessary for hangers and restraints.

2.23.5 Valves

- i) All valves shall be suitable for the service conditions i.e., flow, temperature and pressure under which they are required to operate and those performing similar duties shall be interchangeable with one another unless otherwise approved and of a higher rating than design pressure.
- ii) All gate valves shall be of the full way type and unless otherwise approved and when in the full open position the bore of the valve shall not be obstructed by any part of the gate.
- iii) Globe valves shall have curved or spherical seating and the discs shall be free to revolve on the spindle.
- iv) All non-return valves shall have an arrow cast or embossed on the side of the valve body to indicate the direction of the flow.

For severe service conditions cushioned check valves are preferred to obviate valve clatter. In the case of swing-check valves the body seat shall be inclined at such an angle to the vertical as will facilitate closing and prevent clatter.

- v) The internal diameter of all valve ends to be connected to pipes shall be the same as the internal diameter of the pipe to which they are joined so as to minimise use of reducers / expanders.
- vi) Where applicable valves shall be of the outside screw and yoke type.

- vii) All the important valves shall be fitted with indicators so that percentage of valve opening can be readily determined locally and in the control room
- viii) Steam valves shall not be fitted in an inverted position. Eye bolts shall be provided where necessary to facilitate handling heavy valve or part of valves.
- ix) Special attention shall be given to operating mechanism for large size valves with a view to obtaining quick and easy operation and to ensure that minimum of maintenance is required.

For valves of size 250 mm and above either level or spur gearing shall be provided to facilitate manual operation.

- x) The materials, design and construction of all types of valves shall be subject to the approval of the PURCHASER.
- xi) All sampling and root valves furnished shall be of bonnet less type, cast steel construction.
- xii) All high pressure drain or vent valves or other valves to be provided with one control & one isolating valve set, to prevent any passing of the operating valve.

2.24 Gear Box

The reduction Gear Box between the turbine and the generator shall be of proven design of double helical arrangement with proven performance on STG of 3 MW and above.

It shall be capable of transmitting the maximum rating of the set and be able to withstand 5% overspeed over a period of minimum five minutes. The gearbox shall also be designed for the short circuit condition of the generator.

All bearings of the gear box shall be readily renewable and it shall be possible to inspect the bearings and the gears readily without disturbing the shaft alignment.

Illuminated sight glasses shall be provided to inspect the lube oil drain from each individual bearing. The gearbox design shall be as per the requirements of AGMA.

The flexible couplings between the turbine and the gearbox and between the gearbox and the generator shall be of reputed make, used regularly in similar installations.

The power rating of the coupling shall be at least equal to the turbine rated power times the service factor in accordance with AGMA 6011 I03. Easily removable coupling guard shall be placed over each of the exposed coupling.

The service factor of gearbox to be 1.4.

2.25 Tests & Inspection

2.25.1 The PURCHASER / consultant shall be advised on the provisional test date at least 30 days in advance of the scheduled test date and the final test date at least 15 days prior to the tests. The PURCHASER / Consultant may choose to witness the important tests.

Signature and Seal of the Bidder **HBL/TEN/PUB/20-21/224 dated 06.02.2021** **Page 114 | 156**

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- 2.25.2 The entire turbine generator package instruments controls and safety devices must be assembled and tested / calibrated to check all instruments, control and safety systems and total system operation thereby ensuring minimum commissioning / installation time at site. Instrument engineers of the bidder will also witness and contribute to the FAT at the DCS manufacturer's works.
- 2.25.3 The contractor shall guarantee the purchaser and / or his representatives unrestricted entry to his / his sub-bidders works where the concerned equipment is being manufactured / tested / packed.
- 2.25.4 The bidder shall, in his offer, include a detailed quality plan indicating the various tests to be conducted both in the shop and at site.

All tests called for by the applicable EC recommendations shall be conducted. As a minimum requirement the following tests shall be conducted.

- Hydrostatic test on turbine casing.
- Complete unit test at rated speed with superheated steam / air. If the bidder does not have testing facilities, he has to depute his testing team to site to carry out these trials and provide a report of the same to the Purchaser / Consultant
- Overspeed test
- Rotor static and dynamic balance and vibration analysis
- Check bearings and seals after the test.

2.26 Specification for Generator

2.27.1 SCOPE

The equipment shall include one (1) No. Horizontal Shaft Three Phase Alternating Current, synchronous generator of nominal capacity 3750 kva or higher as per bidders recommendation based on normal steam flows, 11 KV, 50Hz at site condition of 45 Deg. C ambient, brushless exciter, automatic voltage regulators.

Neutral grounding cubicle, lightning and surge protection panel, protection relay and metering panels, cooling water system, instrumentation control and safety devices and other accessories, spares and special tools that will be required for satisfactory erection and efficient operation of the Station, including periodic maintenance.

The generator to be coupled to the turbine matched in respect of speed, over speed, moment of inertia, overload capacities, coupling and other relevant requirements.

The generator to be designed to be operated with the expected variations in power generation. Bidder to provide loading v/s. efficiency curve. Sizing of the generator to be done keeping in view the maximum and minimum power generated by the turbine as per specified steam conditions.

2.27.2 Standards

The synchronous generators and their components shall comply with the latest edition of the applicable standards listed below.

In the event of any conflict between the standards referred to and the requirements of this specification, more stringent of the two shall govern

Application Standards: IS 4722 / IEC 34-1

IS:5422 - Specification of turbine type generators.

IS:2253 - Designation for type of construction and mounting arrangements of rotating electrical machines

IS:4691 - Degree of protection provided by enclosures of rotating electrical machinery.

IS:4728 - Terminal marking of rotating electrical machines.

IS:4729 - Rotating electrical machines, vibration measurements

IS:4889 - Methods of determination of efficiency of rotating electrical machines.

IS:6362 - Designation of methods of cooling for rotating electrical machinery.

IS:7132 - Guide for testing synchronous machines.

IEC-34 - Rotating electrical machines.

IS:1271 - Insulating materials for electric machinery and apparatus in relation to their thermal stability in service.

IS:4722 - Specification for rotating electrical machines.

IS:7818 - Guide for testing of insulation resistance of rotating machines.

API 614 - Lubrication and sealing.

2.27.3 General

- a) The generator shall be of closed circuit air cooled type housed in a IP54 (CACW) enclosure and driven by steam turbine through a speed reducer, if necessary. The necessary coupling bolts shall also form part of the supply.
- b) The bidder shall furnish all technical particulars of the Generator in the data sheet for the STG.
- c) The Nominal output of the unit shall be sufficient to deliver the maximum output of the turbine obtainable under any conditions of operation at 0.8 pf., 11 KV, 50 Hz, at site

conditions. Unit shall be capable of continuous operation at overload subject to permissible temperatures of the windings.

The excitation system shall be suitable for maintaining the voltage for a grid voltage variation of $\pm 10\%$ with a combined voltage and frequency variation of 10% , and shall have a control accuracy of $\pm 0.5\%$.

- d) Generation voltage of the unit shall be 11 KV, 3 Phase R,Y,B in anti-clockwise rotation. A voltage range of 90% to 110% of the above is permitted.
- e) The rating and specification of all the required accessories should be suitable for 11 KV rated voltage.
- f) Synchronous speed, short circuit ratio and the inertia constant shall be specified by the Bidder. The selection of the critical parameters of the generator shall be to operate the machine parallel to the existing 20 MW STG of sugar cogen.
- g) The generators shall be suitable for operation in all respects and shall deliver rated output over a range of voltage variation and operate satisfactorily under system conditions stated earlier.

The generator shall remain stable on the sudden application of maximum load or sudden loss of maximum load and during momentary short circuits or sustained ground faults.

- h) The generator shall be star connected and the main and neutral leads shall be brought out of the stator frame for insertion of current transformer for protection, metering and surge protection apparatus. The generator shall be suitable for grounding through grounding resistor.
- i) The Short Circuit Ratio (SCR) shall be optimized to ensure stable parallel operation with a rural grid and to ensure minimum voltage changes under fluctuating loads.

The selection of the SCR value, within IEC specifications, shall be fully justified for the operation of the machine in a rural network and the calculations shall be provided with the offer.

The generator shall be capable of withstanding without damage a stator current of 150 % for a period of 30 seconds.

The generator shall be capable of withstanding without damage a three phase, a line-to-line, a line- to-earth or two line-to-earth short circuit for a period of three seconds, when operating at the rated speed and with an excitation corresponding to a 5 % over voltage at no load.

- j) The maximum line charging capacity at rated voltage that can be obtained without negative excitation and with stable operation of the generator may be indicated, which shall not be less than 38 % of rated KVA.

- k) The unsaturated / saturated direct axis transient reactance of generator should be with IEC tolerance and shall be around 34% to 38.6%, as per IEC.
- l) The moment of inertia of the generator shall be so selected that it meets the requirement of over speed.
- m) The machine shall be capable of operating continuously on an unbalanced system such that, with none of the phase current exceeding the rated current, the ratio of the negative sequence component of current (1/2) to the rated current (I/N) does not exceed 0.1 and under fault conditions shall be capable of operation with the product of $(1/2 L/M)^2$ and time (t) in seconds not exceeding 20 or as per IEC.
- n) In the design of generator, each part shall be so proportioned that the maximum unit stresses therein resulting from any continuous operating conditions specified shall not exceed one third of the yield point or one fifth of the ultimate strength of the material whichever is less.
- o) The design of the generator structure and housing in which resonance might become objectionable shall be so proportioned as to avoid the possibility of resonance with higher rated frequency or within the frequency variation.
- p) Suitable provision shall be made in the base frame of the Generator to facilitate easy removal of the stator body by sliding on the bed plate.

2.27.4 Over Speed

The generator shall be designed so as to be capable of running at over speed of the turbine, and all parts of the generator and other equipment shall fully and safely withstand stresses resulting from over speed operation. The rotor shall be tested at 1.2 times the rated speed for two (2) minutes.

2.27.5 Insulation

- a) The offer shall give a full description of the windings offered both as to the conductor and insulation. Detailed drawings shall be submitted showing the arrangement of conductors and the thickness and nature of all materials used both for insulation and mechanical protection in the slots of the stator.
- b) Insulation of only 'F' class as specified in I.E.C., specification of the latest issue shall be used for stator, rotor and excitor.

The quality of the insulation must be such that it is non-hygroscopic and no deterioration will take place when subjected to the maximum, specified operating temperatures nor must it be permanently injured when exposed as the machine is to operate in a most tropical climate.

- c) The end turns and coil connections, shall have not less than full insulation, equivalent to, and of the same construction as the coil insulation in the stator slots.

The coil and end turns shall be impregnated with high grade insulating varnish. Provision shall be made for tightly wedging the coils in the lot with the wedges which shall not shrink or buckle. Care shall be exercised that the blocking of air passages shall not occur.

- d) The insulation and taping of the coils shall be such as to prevent permanent injury from exposure to dampness to provide adequate corona shielding, to withstand high temperatures without injury, to prevent the entering of magnetic particles and to prevent formation of zones.

2.27.6 Temperature Rise

- a) Even through insulation of 'Class F' must be used when operating continuously at the maximum continuous rating at its rated 0.80 PF at any working voltages and any frequency in the range stipulated, the temperature rise shall not exceed the limits specified for 'Class-B'.

The temperature of the bearing shall be measured by means of bi-metallic gauge thermometers in the bearings metal.

- 0 The bearing metal temperatures shall be realized at the DCS in the control room.

- b) Measurement of temperature shall be made as specified in IEC. The maximum temperature of ambient air shall be taken as 40 Deg. C and the maximum cooling water inlet temperature as 35 Deg .C and the guaranteed temperature rises in the windings for the rated and 110 % loading shall be furnished.

These shall be within the Class 'B' insulation Temperature rise limits.

- c) The machine shall further be capable of operating continuously at full load at 0.80 power factor at 11 KV at frequency 5 % below normal, satisfactorily and without undue heating.
- d) The machine shall be capable of generating more KW than the rated KW during operation of the machine from 0.8 to 0.95 lagging power factor but within the KVA rating of the machine.

2.27.7 Efficiency & Output Guarantees

- a) The guaranteed overall efficiency of the generator at rated terminal voltage 0.80 PF lag and 75 Deg .C winding temperature, for the percentage rated output of 100%, 90%, 80%, 70%, 60%, and 50% shall be furnished.

The efficiencies shall be determined by summation of losses method as specified in the latest edition of IEC Publication No. 34.2 or IS4889 or equivalent standards. A tolerance will be permitted in the determination of efficiencies as per IEC Code 34.2.

- b) The generator shall be guaranteed to be capable of giving its rated output under the conditions described earlier without exceeding the temperature rise as specified and without tolerance. The equipment shall be rejected if the temperatures exceed the given limits by 15 Deg.C.
- c) Guaranteed maximum temperature rise, for the stator and rotor windings of the machine above the inlet temperature of the cooling air at 40 °C, when operating under rated load conditions with all coolers in service shall be as follows:
 - i. Stator winding by embedded temperature detectors : 85 K
 - ii. Rotor winding by resistance: 90 K

2.27.8 Cooling

- a) Each generator shall be provided with adequate cooling systems based on air circulation principles complete with fans etc., depending on the capacity of the units.

The air passages in the stator, rotor fans, coolers, etc., shall be designed to give a smooth and quick flow of air. The bidder should explain in detail the cooling system he proposes for his equipment so that it meets the requirements of the purchaser as stipulated earlier.

The bidder shall give a detailed description of the cooling system taking note of the class of insulation and maximum permissible temperature, size of the unit. Justification for the adequacy shall be given in the description of the cooling system.

- b) Dial type thermometer or RTD's shall be provided in air coolers for indication of inlet and outlet air temperatures and to provide alarm in case of high temperature of inlet / outlet air. Thermostats shall also be provided in the cold and hot air passages.
- c) The coolers shall be constructed out of welded stainless steel tubes and shall be located clear of the stator at a lower level. Any leakage from the cooler shall be drained safely and properly and there shall not be any chance of the cooling water finding its way to the stator / rotor windings.

Suitable moisture detector device shall be used to detect and warn accidental leakage of water into the cooling air stream.

The coolers shall be designed for the shutoff head of the cooling water pumps which will be about 4 ata and tested for two times the design pressure.

The cooler shall be sectionalised and designed to be suitable for shutting off sections by section for cleaning.

The design shall be such that the generator can continue operation even with one section out of service.

2.27.9 Construction

- a) The generator shall be of synchronous type. The bidder has to clearly specify the type of bearing arrangement provided, with proper recommendations for its suitability.
- b) All parts of generator shall be designed and constructed to safely, withstand maximum stresses during operation, over speed, short circuit conditions, out of phase synchronizing. The pedestal of each generator will be supported on the concrete foundation.

All necessary accessories like shims, dowel etc., shall be furnished by the Bidder. All sole plates shall be interchangeable and suitably machined and prepared for use at site with minimum amount of work.

- c) The bidder shall give full particulars of the extent to which the generator will be assembled for purpose of shipment and the work to be done at site.

2.27.10 Stator

The stator frame shall be a single piece to consist of a cylindrical casing of welded plate construction, reinforced internally in the radial and axial direction by stationary web plates making the entire frame perfectly rigid. Light non magnetic alloy end shields shall be made up of segmental, annealed punching of high quality silicon steel to give minimum electrical losses. The stator winding shall be of the double layer lap type with Class 'F' insulations.

2.27.11 Rotor

- a) The generator rotor shall be forged from a single piece ingot of special alloy steel carefully heat treated to obtain excellent mechanical and magnetic properties, a comprehensive series of ultrasonic examinations on the rotor body shall be done to ensure that absolutely no inadmissible internal failures are present and that the material meets the quantity standards.
- b) The design and construction of the rotor shall be in accordance with the best modern practice and shall be fully described in the offer. The factor of safety on yield point of material shall not be less than 1.5.
- c) The insulation between turns of field winding shall consist of special epoxy impregnated asbestos paper / equivalent.
- d) The rotor spider, if applicable, shall be of steel constructions. To facilitate synchronization a shorted damper consisting of several round copper bars in each pole head shall be provided.

- e) The field poles shall be provided with adequate damper windings to ensure stability under fault conditions.

2.27.12 Earth Terminal

Two Nos. of Earth terminals shall be provided. The earth terminals shall be designed to terminate Galvanised Iron conductors. The size shall be as specified IEC 34-1.

2.27.13 Speed Regulation

The moment of inertia of the alternator together with that of the turbine shall be sufficient to ensure stability and the speed regulation specified in the section covering turbine for full load rejection. The fly wheel effect shall be incorporated in the alternator and turbines as integral part and not added in the shape of separate weights, rings or other means.

2.27.14 Shaft

- a) The generator shaft shall be made of best quality forged alloy steel, properly treated. The shaft shall be of ample size to operate at all speed, including maximum over speed without vibration or distortion and shall be able to withstand short circuit and other stress without damage. To prevent the flow of harmful shaft currents damaging the bearings, suitable shaft earthing shall be provided.
- b) A complete set of test reports covering metallurgical strength and others performed on the shaft during various stages of its manufacturing shall be furnished as also the complete specifications of the shaft material forging and its design parameters such as stresses and critical speed.
- c) The generator shaft shall have a suitably shaped flange for coupling to the turbine /gear box shaft. The coupling shall comply with the requirements of IEC for shaft coupling. All coupling bolts, nut and nut guards for coupling shall be furnished by the bidder. The alignment limit for the shaft shall be as per the latest NEMA/DIN standards.

2.27.15 Space Heaters

Suitably rated heaters shall be installed within the enclosure of the generator. Location and the maximum temperature of the heaters shall be such that no damage can be caused to any insulation. Heater shall be suitable for operation on a single phase 230 V AC supply. A suitable double pole switch shall be mounted on or adjacent to the stator frame for the manual switching of the heaters.

2.27.16 Excitation System

- a) The excitation system can be without PMG. Excitation transformer to be provided.
- b) Excitation shall be through microprocessor based Digital system using thyristor converters with two (2) auto and two (2) manual channel.

c) Brushless excitation system shall be provided. A high speed, fully tropicalised, printed circuit, draw out type, automatic digital voltage regulator shall be provided. It should be complete with necessary sensing PT's, cable entries, cast resin type current transformer, adjusting rheostats, auto/manual and on/off selector switches.

d) Excitation Control System (AVR)

The excitation control system shall ensure the following operational modes and parameters:

1. Initial excitation
2. Idle run of generator
3. On-switch of generator to the power line by precise synchronizing method.
4. Operation in united (extraction cum condensing STG or grid connected) and independent power systems with loads from idle run up to nominal.
5. Steady regulation of excitation at sharp alternating loads up to separate outbursts of load caused by simultaneous on-switch of a synchronous motors with short-circuited rotor of total output upto 35% of the turbo generator nominal output.
6. Maintaining of voltage at turbo generator terminals in accordance with the specified setting with accuracy of 1% relative to the specified static characteristic. The value of constant-error response of regulation shall vary from 0 to 10% in the modes of reactive power generation and from 0 to 100% in the modes of reactive power consumption.
7. Steady distribution of reactive power between generators united at the level of generator voltage.
8. Change of automatic regulator setting at the rate of 0.5% within the range for 80 to 110% of the generator voltage.
9. Limitation of the rotor overload by time depending characteristic in accordance with the generator data.
10. Limitation of the minimal current of excitation by a value precluding the shift of generator into the mode of deep consumption of reactive power at nominal active load.
11. Independence of voltage at generator terminals during variable frequency within the range from 47 Hz to 52 Hz.
12. Forcing of excitation with ratio upto 2 vel. unit and duration upto 10 secs. during faults in the power system, causing voltage reduction at the generator bus bar relative to the specified characteristic log of control system during forcing in no more than 0.025 dia-excitation of generator at nominal shut down.
13. Field killing in emergency modes by breaking its excitation circuit.
14. To ensure all specified parameters and modes during deviation of feed voltage from nominal :
From 10% to -15% continuously
From 20% to -45% briefly upto 50s
Deviation of operative feeding from nominal from 10% to -15%
15. To sustain voltage rise upto 140% during 1 S.
16. To ensure the maintaining of operational mode during disappearance of operative feeding.

17. The excitation control system shall comprise a stand-by excitation regulator and provide the following protections:
- ➔ Against internal short-circuits and short-circuits in the exciter's excitation circuit.
 - ➔ Against loss of excitation
 - ➔ Against rise of generator voltage
 - ➔ Against non-symmetrical short-circuits in circuits of rotating core of exciter (inter phase short-circuit, break-down of diodes, etc.)
18. The excitation control system shall provide for a unified signal 4 – 20 mA and pro-rata for the generator active power, to be produced to the turbine governing system.

e) The system offered shall have the following facilities:

- Manual mode of operation.
- Auto mode of operation.
- Follow on mode for each operation to have bump less transfer from each mode of operation.

Auto/ Manual changeover facility shall be provided. For Manual mode Voltage lower/raise by push button switch for manual mode to be provided in AVR. Following minimum alarms shall be transmitted to the DCS. The excitation system shall have diode protection relays to detect failure of the Rotating Diodes.

- AVR Fault.
- AVR automatic changeover to manual.
- Diode failure.

2.27.17 Accessory Equipment

a) Terminal boxes shall be provided to enclose the leads and current transformer. The terminal boxes shall be adequately designed to accommodate termination of required busbars. The generator shall be provided with stator temperature sensors installed in the stator winding with leads, brought out to the terminal boxes.

Platinum RTDs shall be provided which shall be hooked up to the temperature scanner or DCS. Thermostats for bearing temperature, for anti-condensation heaters and for fire detection shall also be provided. Necessary vibration & temperature measurements of all bearings shall be provided which shall be looked up to the DCS in the control room.

b) Adequately rated neutral grounding resistor shall be supplied and the resistor shall be of stainless steel edge wound type mounted in shielded safe enclosure. A current transformer shall be provided for ground fault current measurements for protection. The rating of the resistor shall be furnished.

c) Necessary surge capacitors and lightning arrestors shall be provided for generator protection. The surge capacitors shall conform to the latest IS:2834 and shall be rated 0.25 Micro Farad. The capacitors shall be suitable for indoor mounting and shall be provided with built in discharge resistor.

The lighting arrestors shall be heavy duty indoor station class gapless metal oxide type suitable for repeated operation to limit voltage surges on alternating current power circuits. The arrestors shall conform to IEC 99-4. LA will be of 11kV grade.

2.27.18 Electrical Controls

Control and monitoring cubicles shall conform to the approved specifications. Protective relays, control switches indicators and monitoring devices shall be mounted on the front. The relays, terminals, motor starter and control circuit breakers shall be inside the panel. The completed panel shall be factory inspected and tested and a standard simulation test shall be performed on the system before shipment in the presence of the purchaser's representative.

The electrical panels shall consists of:

- Relay & Protection Panel.
- Synchronization & metering panel (can be part of turbine control panel)
- Excitation Cubicle. (can be part of turbine control panel)
- Turbine control panel
- LA, SC and PT Panel / terminal box
- NGR Panel.
- LT - MCC's with necessary sockets for lighting & welding, two spare feeders and marshalling rack for DCS.

All electrical motors will be of energy efficient type. All motors required to be operated on a shift or daily basis for changeover or otherwise will have start & stop from DCS. Indication of motor ON / OFF of all motors to be given to DCS.

2.27.19 Unit Control System / Turbine Control Panel

DCS will be provided by Purchaser. All other required panels including TCP, unit control system, as applicable to be provided by Bidder.

The unit control system shall basically have the following controls for sequential operations for the start and stop of the unit with Annunciation / Visual and Audible Alarm facilities.

The sequential start system shall have the following minimum functions, which will be operated by the DCS system:

- "Turbine-Generator power on" for start up after pre start condition checks like main breaker open and MS stop valve closed.
- Control switches for auxiliaries etc. switched on remote control.
- Master relay picks up.
- Auxiliaries of the unit start.
- MS stop valve starts opening and the unit starts rotating and accelerate.
- At slightly below no load speed, valve position is controlled to accelerate the unit to synchronous speed at controlled speed.
- At 95% speed, voltage regulator cut into service.

- At synchronous speed, if phase sequences voltages and frequencies match unit breaker closes and synchronises.
- The unit should be ready for accepting the load.
- Adequate monitoring facilities, checks and interlocks should be provided in the sequential control, so that in the event of incomplete operations, the unit shuts down giving requisite annunciations.

2.27.20 Earthing

The Turbo-Generators shall be earthed through neutral grounding resistors, lightning arrestors, surge capacitors, CTs and Voltage Transformers for AVR etc. Ground earth mat will be provided by others. All above ground earthing in bidders scope.

2.27.21 Protective Devices

The bidder shall study the system conditions like voltage, frequency variations, etc. level at the location of the proposed generating units and offer suitable generating equipment with necessary accessories required for satisfactory working of the generating units.

2.27.22 LA, SC and PT panel

- a) The Bidders shall supply 1 no. terminal cubicle for housing surge capacitor, potential transformers, current transformers, lightning arresters, cable boxes, etc., The cubicle shall be complete with necessary tapping for excitation system, etc.,. The rating of the CTs for AVR shall be decided by the Bidder taking into account the requirements of the AVR.
- b) The cubicles shall be sheet steel, suitably compartmentalised with doors and shall be furnished complete with base mounting arrangement, foundation bolts etc. The internal illumination or cubicles shall be provided with guarded lamps with on/off switch. Copper / Aluminium conductors shall be suitably insulated to make them compatible with generator temperature rise and insulation. The support insulators for the bus connection will be provided as necessary, GL earth bus of adequate cross-section will be provided in the cubicle.
- c) LA – 3 nos, 11kV grade, surge capacitors – 11kv low resistance grounded, PT's for protection, metering & AVR sensing – 11kV, ratio: 11kV $\sqrt{3}$ /132kV $\sqrt{3}$, PT for generator protection

2.27.23 Potential Transformers

The potential transformers will be single phase, epoxy cast, dry type units. Potential transformer will be protected on primary and secondary side by current limiting fuses. The PT shall conform to IS: 3152. The accuracy class for Metering will be 0.2 and protection 3P10.

2.27.24 Current Transformers

- a) The current transformer will be single phase, epoxy cast, dry type unit confirming to IS:2705. The current transformer shall be designed to withstand the thermal and magnetic

stresses resulting from the maximum short-circuit current. The accuracy class for metering will be 0.2 and protection 5P20.

- b) The generator Bidders shall supply suitable transformers for the protection scheme and these shall be installed in the neutral grounding and line terminal cubicles.

2.27.25 Tests

- A) The generator shall be completely assembled at works and type tests as specified below shall be conducted on the assembled unit and auxiliaries as per the latest edition of IS:4722. Detailed test reports shall be furnished.

i) Type Tests

The following shall constitute the type tests.

- Measurement of DC resistance of stator and rotor windings.
- Insulation resistance of stator winding (before and after high voltage tests), rotor winding, bearings and embedded temperature detectors.
- Stator winding capacitance and tan delta measurement.
- High voltage test of stator and rotor windings at industrial frequency.
- Phase sequence.
- Determination of open-circuit characteristics.
- Determination of short-circuit characteristics.
- Over speed.
- Pressure test on coolers.
- Determination of efficiency by separation of losses method
- Vibration.
- Temperature-rise test of windings.
- Instantaneous Three (3) phase short circuit test at rated voltage and speed.
- Voltage wave-form.
- Determination of reactance's and time constants.

ii) Routine Tests.

The following shall constitute the routine tests.

- Measurement of dc resistance of stator and rotor windings.
- Insulation resistance of stator winding (before and after high voltage test), rotor winding bearings and embedded temperature detectors.
- High voltage test of stator and rotor windings at industrial frequency.
- Phase sequence.
- Determination of open-circuit characteristics.
- Determination of short-circuit characteristics.
- Over speed.
- Pressure test on coolers for close-circuit cooling.

- Determination of efficiency by separation of losses methods.
- Vibration.
- Impedance of the rotor winding.
- Stator winding capacitance and tan delta measurement.

ii-(i) TESTS ON EXCITERS AND REGULATING EQUIPMENT (FOR ROTATING EXCITERS)

- High voltage test
- Temperature rise test
- Measurement of resistance
- Measurement of insulation resistance
- Regulation test
- Commutation test
- Excitation response ratio.

ii-(ii) ROUTINE TESTS ON STATION EXCITATION EQUIPMENT

Additional Test:-

- 10% over voltage on open circuit excitation for five (5) minutes, voltage recovery test after fault clearance over speed of 30% for two (2) minutes

B) Site test for each generator shall include the following.

- Mechanical run and vibration measurement
- High voltage dielectric test
- Measurement of shaft voltage (if applicable)
- Measurement of stator and rotor winding resistance
- Phase sequence test
- Load acceptance and rejection test at selected loads from no load to full load.
- Overall response of machine and excitation system
- Adjustment of AVR
- Synchronising test
- Checking and commissioning of various other auxiliary equipment

Test on the equipment like CTs, PTs, LAs, shall comply with routine tests etc., as per relevant standards.

Test report or all the type tests on the generator, CTs, PTs, & LAs carried out on similar equipment already supplied shall be furnished for approval.

2.27 Specification for Relay & Control Panels

2.28.1 Scope

This specification covers the requirements of relay and or control panels and desks and the associated equipment mounted therein.

2.28.2 Codes & Standards

- a) The design, manufacture and performance of equipment covered by this specification shall conform to the relevant Indian Standards and Codes.

Where Indian Standards are not available, they shall conform to relevant British, IEC and American Standards.

- b) The equipment shall conform to following standards in particular.

IS:3231 - Electrical relays for power system protection.

IS:2795 - Auxiliary current transformers.

IS:3156 - Auxiliary potential transformers.

IS:1248 - Direct acting electrical indicating instruments.

IS:722 - Energy meters.

BS:90 - Recorders.

IS:2208 - HRC cartridge fuse links up to 650 V.

IS:3202 - Code of practice for climate proofing of electrical equipment.

IS:375 - Marking and arrangement of switchgear, bus bars, main connection and aux wiring.

2.28.3 Scope of Work

The scope of design, manufacture, testing and supply of equipment covered under this specification shall include but not necessarily be limited to the following:

- a) Design, engineering and fabrication of panels as per the specifications.
- b) Supply and mounting of all the equipment and auxiliary equipment like auxiliary relays, test switches, test blocks, plugs, timers, indicating instruments, etc., necessary for satisfactory functioning of the control and protection of the turbine generator systems.
- c) The protection system shall be provided with additional auxiliary contacts for the purpose of interconnectivity to the DCS.
- d) All internal wiring between all equipment up to the terminal blocks and the inter panel wiring.
- e) Preparation and furnishing of all date /drawings/ documents as per the bidder data requirement and specifications.
- f) Testing at works of the panels and the mounted equipment.

2.28.4 Design Requirement

- a) Constructional Features

- i) Final design of all panels will be freezed by owner / consultant during technical kick off meetings with select bidder.
- ii) Panels / desks shall be sheet steel enclosed dust and vermin proof type. Panels/desks shall be floor mounting, free standing, formed on a framework of standard sections.

The enclosure shall be of cold rolled sheet of 3mm for front and back and 2.5 mm thick for test. Panel supporting structure shall be so designed to form a rigid structure.

- iii) All doors and openings shall be provided with neoprene gaskets.
- iv) The panels / desks shall be suitable to be installed on a base frame supplied in one piece along with foundation bolts.

These base channels shall be despatched 3 months in advance to the despatch of panels so that they can be buried and grouted in the concrete floor.

Amply dimensioned oblong holes shall be provided at the bottom of all the panels for their installation on base frame in addition the panels / desks shall have an additional base channel at the bottom with smooth surface. Anti vibration type mounting shall be provided.

- v) A suitable removable un-drilled gland plate shall be provided for cable entry from bottom.

b) Mounting

- i) All instrument and control gears and relays shall be mounted on the front. All equipment shall be flush or semi-flush type.
- ii) Checking and removal of components shall be possible without disturbing the adjacent equipment. It shall be possible to set all the measuring relays 'in-situ'

All mounted equipment inside the panels /desks shall have "identification tags of self sticking Engraved tapes, in addition identification numbers shall be painted on panel wall to give permanent identification mark.

The mounting of terminal blocks and any other auxiliary equipment such as transducers, interposing CTs etc, shall be done in such a way so as to be readily accessible but without impeding the access to internal wiring and components.

- iii) The centre line of switches, push buttons and indicating lamps shall be not less than 750 mm from the bottom of the panel. The centre line of relays, meters, recorders shall not be less than 450 mm from bottom of the panel. All switches, push buttons, indicating lamps, relays, etc., shall be neatly arranged in a matching manner.

iv) The control panels/desks shall be matched with other panels in dimension, colour and mimic.

c) Wiring

i) All wiring shall be done with PVC insulated, 1100 V grade, single-core multi strands (minimum 3 strands) annealed copper conductors suitable for temperature and humidity specified.

The cross sectional of the wires for voltage, current and control circuits shall be 2.5 Sq.mm and that for the alarm circuits shall be 1.5 Sq.mm., the wires shall be vermin proof and shall be laid in plastic gutters.

ii) Each wire shall be identified at both ends with wire numbers by means of PVC ferrules. Colour coding for the wires shall be as per IS:375.

iii) The terminal boards shall be set at 45 Deg. to the side panels for easy access. Minimum 20 % spare terminals shall be provided on the panels.

iv) The terminals shall be suitable to receive crimped wires to give positive connection. All terminals shall be properly shrouded against accidental contact.

Sufficient terminals shall be provided so that more than one wire is connected to each terminal. The terminal blocks shall be 1100 V grades 15 amps rated, one piece moulded complete with insulated barriers, stud type terminals, washers, nuts and lock nuts and identification strips.

Terminal blocks for the CT and PT secondary leads shall be provided with test links and isolation facilities. Also CT secondary leads shall be provided with short circuiting and earthing links.

d) Painting

i) All metal surface shall be thoroughly cleaned and degreased to remove mill scale, rust, grease and dirt. Fabricated structure shall be pickled and then rinsed to remove any trace of acid.

The under surface shall be prepared by applying a coat of phosphate paint and a coat of yellow zinc chromate primer. The under surface shall be made free from all imperfections before undertaking finishing coat.

ii) After preparation of the under surface, the relay and control panel/desk shall be spray painted with two coats of final paint.

Colour shade of final paint shall be Smoke Grey and shall be duly approved by the purchaser before final painting is done. The finished panel/desks shall be tried in stoving oven in dust free atmosphere.

Panel finish shall be free from imperfections like holes, orange peels, run off paint etc. The bidder shall furnish painting procedure details along with the bids.

iii) All unpainted steel parts shall be cadmium plated or suitable treated to prevent rust corrosion. If these parts are moving element then these shall be greased.

e) Panel illumination

i) LED lamps working on 240 V AC, operated by door switches shall be provided for internal panel illumination.

ii) A 240 V, 1-Phase, 5Amp., 3 Pin Socket shall be provided in the panel corridor or interior of each cubicle with on-off switch for connection of hand lamps. This socket shall be metal clad type with a spring loaded flap.

f) Earthing

i) A continuous 25 mm x 3 mm copper (tinned) or equivalent aluminium / GI earth bus shall be provided running along the full lengths of the panels.

Suitable arrangement shall be provided at the two ends for connection to the plant earthing system.

ii) Each panel and the equipment mounted on each panel shall be securely connected to the earth bus.

For this purpose, the earth wire shall be looped from equipment to equipment and both ends of the earth wire shall be connected to the earth bus.

g) Space Heaters

Panel space heaters shall operate at 230 V AC and shall be supplied complete with on-off switch, fuse and thermostat.

A common thermostat shall be provided for the entire panel. The thermostat shall maintain the internal temperature above the ambient temperature to prevent moisture condensation.

2.28.5 List of Protective Relays

The following minimum protective relays shall be provided for the generator protection to meet SEB norms:

- DC supply supervision relay

- Over/Under voltage relay
- Under/Over frequency relay
- Loss of excitation relay
- Static Negative sequence relay
- Field failure relay
- Reverse power Protection relay - active and reactive
- Voltage restrained over current relay
- Differential protection relay
- Stator earth fault relay
- Rotor earth fault relay
- Over current relay
- Restricted earth fault relay.
- PT fuse failure relay.
- Triple pole circulating current relay
- Thermal relay
- High speed tripping relay for generator
- High speed tripping relay for turbine
- Inst. U/V relay with aux. for field failure

Auxiliary Relays :

- Voltage balance relays
- Timers
- Auxiliary relays
- Master trip relay

2.28 Specification for Neutral Grounding Equipment

2.29.1 Introduction

- a) This specification cover the design, manufacture, testing, packing and supply of neutral grounding resistors.

Rated voltage : $11\text{kV}/\sqrt{3}$ volts $\pm 10\%$, duty rating : 10 secs, grid type : punched steel, to restrict fault current to 100 A for 30 secs.

- b) Standards

The resistors covered by this specification shall conform to the following and other relevant Indian Standards.

Wherever Indian Standards are not available, they shall conform to relevant British or IEC Standards.

IS : 3043 Code practices for earthing.

BS : 162 Electric power switchgear and associated apparatus (applicable to Class-B apparatus in BS 162)

Wherever the stipulation in this specification are in conflict with any of the above standards, the requirement under this specification shall be binding.

2.29.2 General Specifications

Resistors

- a) Resistor element shall be made of unbreakable, corrosion proof, joint less stainless steel grids. It shall be suitable for use in monsoon tropical climate.
- b) Resistors shall be able to carry the rated current for the rated time with temperature rise not exceeding 325Deg. C over the maximum specified ambient temperature when the resistor is housed in a covered space.
- c) Grids shall be mounted on steel rods insulated by special heat resistant micanite paper tubes. Grid washers shall be of natural mica. Porcelain insulators shall be used to used to insulate the resistor element from body of the enclosure.

2.29.3 Enclosure (IP 33)

- a) The resistors shall be housed in a metal clad enclosure totally enclosed type. It shall vermin proof, weatherproof and suitable for outdoor installation.
- b) The enclosure shall have an arrangement for fixing it on concrete foundations / floor and its thickness shall be not less than 3 mm.
- c) The terminals for neutral and earthing connection shall be housed in a separate vermin proof, weather proof compartment.
- d) A canopy shall be provided on the top. It shall cover the terminal compartment also. Hooks or handle shall be provided to lift the canopy.
- e) It shall be possible to periodically clean the resistors after lifting the top cover or canopy.
- f) It shall be possible to earth the cabinet or enclosure at two places and for this suitable size of studs shall be provided on the sides, as low as possible, to accommodate the GI strips size mentioned in particular specification.

2.29.4 Terminals

- a) Porcelain insulated through terminals shall be provided for neutral and earth connection and they shall be housed in a metal clad panel. The terminals shall be suitable for terminating the XLPE cables.
- b) Suitable washers shall be provided between grid and terminals to maintain good contact.

- c) The two ends of the resistor shall be brought out to weatherproof bushing type terminals of adequate rating. Bolted type link shall be provided for isolating the resistor.
- d) The connection between generator neutral and NGR shall be done by means of single core XPLE armoured cable, having aluminium conductor. Size of the cable shall be as suitably selected and approved by PURCHASER/CONSULTANT.
- e) The connection between NGR and earthpit shall be done by means of GI Earthing Strip.

2.29.5 Space Heater

Suitable space heater shall be provided inside the resistor cabinet to prevent condensation of moisture. This shall be rated to operate from 240 V, 50 Hz supply. The terminals of the space heaters shall be brought out in a separate terminal box.

The cable used for heater shall be aluminium conductor PVC insulated armoured cable. The entire arrangement shall be complete double pole switch, HRC fuse and thermostat.

2.29.6 Cooling

The NGR shall be natural air cooled and any type of forced cooling will not be used. However, if required louvers can be provided in the enclosure. But wherever the louvers are being offered it shall be completely guarded on inside with a fine wire mesh (holes less than 0.5 mm) to make it vermin proof.

2.29.7 Nameplate Marking

The equipment shall have a nameplate located conspicuously giving particulars, such as make, name the equipment, rating and other relevant details.

2.29.8 Painting

After manufacture, all surfaces to be painted shall be thoroughly cleaned, descaled, made free from rust and given a priming and final coat of the paint.

2.29.9 Inspection & Test

Inspection shall be carried out by the purchaser or purchaser's representative and following tests shall be conducted.

- a) Measurement of resistance value at rooms temperature by Kelvin Double Bridge.
- b) One minute power frequency high voltage withstand test shall be as per applicable voltage.

2.29.10 Heat Run Test

The test shall be conducted by passing the rated current for rated time on the complete assembly or by any method mutually agreed Upon.

2.29.11 Test Certificates

Test certificates of the equipments shall be furnished at the time of inspection.

2.29 Specification for Power & Control Cables

2.30.1 Scope

This specification covers requirements for the supply of PVC cables for Medium Voltage, XPLE cables for High Voltage Systems and cable accessories for high voltage systems.

2.30.2 Standards

The cables shall comply with the latest edition of the following standards:

IS : 1554 (Part-1) - PVC insulated (heavy duty) electric cables - Part-I for working voltage Up to and including 1100 V.

IS : 7098 (Part-II)- Cross-linked Polyethylene insulated PVC sheathed cables : Part-II for 3.3 KV Up to and including 33 KV.

IS : 8130 - Conductors for insulated electric cables and flexible cords.

IS : 5831 - PVC insulation and sheath of electric cables.

IS : 3961 (Parts-II)-Recommended current ratings for cables : Part-II PVC insulated and PVC sheathed heavy duty cables.

IS : 1753 -Aluminium conductors for insulated cables.

IEC: 502 - Extruded solid electric insulated power cables for rated voltages form 1 KV Up to 30 KV.

2.30.3 General Construction

The cables shall be brand new and in good condition. These shall be suitable for laying in trays, trenches, ducts, conduits and underground buried installation with uncontrolled backfill and possibility of flooding by water.

Extra PVC/ Rubber and caps for each XLPE Cable size shall be supplied. The terminating and straight thro' joint kits for the cables shall be suitable for the type of cables offered and for storage without deterioration upto 50 Deg. C ambient temperature.

a) PVC CABLES

All the power cables shall be of aluminium and all the control cables shall be of copper.

- i) All power / control cables for use on medium voltage systems shall be heavy duty type, 1100 V grade with aluminium / copper conductor, PVC insulated, inner sheathed, armoured and overall PVC sheathed.
- ii) The construction of the conductors shall be 'stranded' for aluminium cables and 'solid' for copper cables.
Conductors of nominal area less than 25 Sq. mm shall be circular only. Conductors of nominal area 25 Sq. mm and above may be circular or shaped.
- iii) The core insulation shall be with PVC compound applied over the conductor by extrusion and shall conform to the requirements of Type 'A' compound of IS : 5831. Control cables having 6 core and above shall be identified with prominent and indelible Arabic numerals on the outer surface with a spacing of maximum 500 mm between two consecutive numbers.
- iv) The inner sheath shall be applied over the laid- UP cores by extrusion and shall be of PVC conforming to the requirements of Type STI PVC compound of IS : 3831. The extruded inner sheath shall be of uniform thickness of size not less than 0.5 mm upto 16 Sq. mm 0.8 mm from 25 Sq. mm upto 120 Sq. mm and 1.0 mm above 120 Sq. mm conductor size.
- v) For multicore cables, the armouring shall be by single round galvanized steel wires where the calculated diameter below armouring does not exceed 13 mm and galvanized steel strips where this dimension is greater than 13 mm.
- vi) The outer sheath for the cables shall be applied by extrusion and shall be PVC compound conforming to the requirements of type STI compound of IS : 5831. To protect the cables against rodent and termite attack, suitable chemicals shall be added into the PVC compound of the outer sheath.

b) XLPE CABLES

- Power cables for 11 KV system shall be with Aluminium Conductor, XPLE insulated, screened, sheathed, armoured and overall PVC sheathed.
- The construction of the conductors shall be stranded and compacted circular for all cables.
- The cables shall be provided with both conductor screening and insulation screening. The conductors shall be provided with non-metallic extruded semi-conducting shielding.
- The core insulation shall be with cross-linked polyethylene unfilled insulating compound.
- It shall be free from void and shall withstand all mechanical and thermal stresses under steady state and transient operating conditions.
- The insulation shielding consist of non-metallic extruded semi-conducting compound in combination with a non-magnetic metallic screening of copper.

- The insulation screen shall be strippable without application of heat. The copper screen shall be capable of carrying the single line to ground fault current for a duration of one (1) second.
- The screen XPLE insulation and insulation screen shall all be extruded in one operation by "Triple Extrusion" process to ensure perfect bonding between the layers.
- The core identification shall be coloured strips or by printed numerals.
- The inner sheath shall be applied over the laid Up cores by extrusion and shall conform to the requirements of Type ST 2 compound of IS : 5831. The extruded inner sheath shall be of uniform thickness of size not less than 0.7 mm for all sizes of cables.
- For multicore cables, the armouring shall be by galvanized steel strips armouring for single core cables shall be with hard-down aluminium round wire of 2.5 mm diameter.
- The outer sheath for the cables shall be supplied by extrusion over the armouring and shall be of PVC compound conforming to the requirements of Type ST 2 compound of IS : 5831. To protect cable against rodent and termite attack, suitable chemicals shall be added into the PVC compound of the outer sheath.

c) Cable Accessories

The termination and straight through joint kits for use on high voltage systems shall be suitable for the type of cables offered as per this specification. The termination and joints shall be supplied in kit form.

The kit shall include all insulating and sealing materials apart from conductor fitting and consumable items.

An installation instruction shall also be included in each kit. Makes of kits other than those specified may be considered by PURCHASER if type test certificates accompany the offer.

i) Termination Kits

The terminating kits shall be suitable for termination of the cable to an indoor switch gear or to a weather proof cable box of a outdoor mounted transformer / motor. the terminating kits shall preferably be one of the following types or equivalent:

- Heat-shrinkable sleeve type of M/s. Raychem.
- 'TAPEX' of M-SEAL make using non-linear resistance material for stress grading.
- 'PUSH-ON' type of CCI makes using factory moulded silicone rubber insulators.
- Cold shrinkable type 3 M Birla

For outdoor terminations, weather shields / sealing ends and any other accessories required shall also form part of the kit.

ii) Jointing Kits

The straight thro' jointing kits shall be suitable for underground buried installation with uncontrolled backfill and possibility of flooding by water. The jointing kits shall be one of the following types :

- 'TAPEX' of M-SEAL make.
- 'TROPOLINK' type of CCI make.
- Heat shrinkable sleeve type of M/s Raychem.
- Cold shrinkable type 3 m Birla

2.30.4 Testing & Inspection

The cables shall be tested and examine at the manufacturer's works. All the materials employed in the manufacture of the cable shall be subjected, both before and after manufacturer of the cable, to examination, testing and approval by PURCHASER / consultant.

Manufacturer shall furnish all necessary information concerning the supply to PURCHASER's inspectors.

The inspector shall have free access to the manufacturer's works for the purpose of inspecting the process of manufacture in all its stages and he will have the power to reject any wire or other material which appears to him to be of unsuitable description or of unsatisfactory quality.

a) CABLES

- i) After completion of manufacture of cables and prior to despatch, cables shall be subjected to type, routine, acceptance and special tests as detailed below.

Consultant / PURCHASER reserves the right to witness all tests with sufficient advance notice from bidder. The test reports for all cables shall be got approved from the Engineer before despatch of the cables.

- ii) All routine tests, acceptances tests, type tests as well shall be carried out on PVC cables as listed in IS : 1554, Part-1.
- iii) The inner and outer sheath of XLPE cables shall be subjected to all the tests applicable for PVC cables.

The test requirements for insulation and sheath of PVC cables. The test requirements for insulation and sheath of PVC cables shall be as per latest revision of IS : 5831.

The tests shall be carried out on XLPE cables as per IS : 7098 Part-II.

b) Cable Accessories

Type tests shall have to be carried out to prove the general qualities and design of a given type of termination / jointing system. The type test shall be conforming to the latest IEC 502-2, 466 specifications. The type test certificates shall be submitted along with the offer.

2.30.5 Packing and Marking

- a) Cable shall be despatched in wooden drum of suitable barrel diameter, securely battened, with the take-off end fully protected against mechanical damage. The wood used for construction of the drum shall be properly seasoned, sound and free from defects. Wood preservatives shall be applied to the entire drum.
- b) On the flange of the drum necessary information such as manufacturer's name, type size voltage grade of cable, length of cable in meters, drum No. cable code, ISI Certification mark, gross weight etc. shall be printed. An arrow shall be printed on the drum with suitable instruction to show the direction of rotation of the drum.

2.30 Specification for Erection of Mechanical Equipment

2.31.1 Pre-qualification of E&C Contractor

The E&C contractor should have executed minimum of 2 similar or larger turbine erection under his own company contract. He should be able to provide required documentation including PAN, Balance sheet, valid insurance certificates, etc.

2.31.2 Checking of foundations

The contractor shall as a first field activity check the foundations for the correctness of the same as per relevant drawings & and certify the same for concreting and the same may be rechecked for its correctness after concreting, such as levels, location of bolt holes, sleeves, pockets, openings, fixture plates and other embedments in RCC works, etc. All the structural fixtures required shall be supplied by the contractor.

2.31.3 Before starting erection job on turbine floor contractor shall ensure that turbine area is sufficiently enclosed against ingress of dust and wastes, and that all debris have been cleared off from the floor.

2.31.4 Where turbine holding down bolts carry washers and where these plate washer rest on concrete surface such concrete surface shall be finished and dressed true to get full surface contact between the concrete surface and the plate washers as required.

2.31.5 Contractor shall provide his tool stores for special tools and instruments at a convenient location in the turbine hall.

2.31.6 Contractor shall set up longitudinal and axial centrelines, and two or more level bench marks accurately on turbine floor which shall be certified by PURCHASER / consultant.

This certified turbine centre line and datum level shall be reference for turbine and all auxiliary erection and alignment work.

2.31.7 Where required by manufacturers the concrete surfaces shall be chipped and finally dressed up true to obtain the required contact between sole plates and concrete surfaces. The fine dressing of the concrete shall be with Prussian blue match checks.

2.31.8 Contractor shall ensure that while lifting turbines/generator, piping and other auxiliaries for transporting, slings shall be put over the points indicated on the equipment.

Slings over casing shall have gunny bags or soft wood packings to avoid the scratches and nicks on the equipment.

Slings / D-Shackles of proper sizes shall be used for all lifting and rigging purposes. All care shall be taken to safeguard the equipment against any damage.

2.31.9 Contractor shall thoroughly clean all machine surfaces / slings, surfaces/keys, brackets sole plates etc. and apply anti-souffing paste or other recommended equivalent before assembly of the said parts. The components whose surfaces are coated with protective coating are to be thoroughly cleaned.

2.31.10 The contractor shall carry out all necessary checks such as accuracy of levels, centres lines, bolt positions, of installation of all equipment covered in the scope of work.

2.31.11 Checking of Equipment after Grouting

After the grout is set and cured, the contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centring of rotors with respect to their seating 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 PURCHASER.

2.31.12 Shaft Alignment

All the shafts of rotating equipment shall be properly aligned to those of the matching equipment to the required accuracy.

The equipment shall be free from excessive vibration so as to avoid over-heating of bearing or other conditions which may tend to shorten the life of the equipment.

All bearings shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

2.31.13 The contractor shall maintain a record in the form acceptable to PURCHASER / consultant of all the operations carried out on each weld and maintain a record indicating the number of welds, the names of the welders who welded the same.

All site joints shall be subject to acceptance of PURCHASER / consultants. Any joints declared rejected shall have to be redone at the contractor's cost.

- 2.31.14 The contractor shall carry out the tightening of the bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of nut method.

The methods used, the tools and the equipment deployed shall be subject to the approval of PURCHASER / consultant. The bolting work shall be carried out by competent technicians.

- 2.31.15 The contractor shall install all necessary platforms, stairways and ladders required for the safe and convenient operation and maintenance of all the equipments, valves etc. covered in this specification at no extra cost.

- 2.31.16 The contractor shall completely erect all the equipments for the complete E & M portion including hangers and supports, valves & accessories in accordance with the approved drawings.

This includes all necessary bolting, welding, testing and cleaning. Systems shall be demonstrated in condition to operate continuously in a manner acceptable to PURCHASER / consultant.

Welding shall be used throughout for joining pipes except where flanged screwed or other type joints are lines & elevation as indicated in the drawings.

- 2.31.17 While erecting the field run pipes the contractor shall check the accessibility of valves, instrument tapping points and maintain minimum head room requirements and other necessary clearances for adjoining work areas.

- 2.31.18 The contractor shall be responsible for correct orientation of all valves so that seats, stem and hand wheels will be in desired location.

- 2.31.19 All supports & hangers for the pipes have to be fabricated and provided for approximately every three metre (3 m) of pipe.

However in any case sufficient numbers shall be provided so that the deflection of pipe between hangers shall not exceed the limits indicated in the drawings.

- 2.31.20 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydrostatic testing on all piping / equipment with motor operated pump.

- 2.31.21 All piping flanges are required to be blue matched using surface plate to obtain at least 80% contact area before installation.

- 2.31.22 All welded joints of pipes shall be cleaned of welding slag's, & burrs by hand file wire brushes and flexible grinders wherever required and using white cloth. No cotton waste shall be used while cleaning the equipment / piping.

2.31.23 The contractor shall dismantle the valves & actuator for overhauling, servicing and lubricating wherever required as advised by PURCHASER/ Consultant.

The contractor shall also lap or grind the valve seat for ensuring the satisfactory performances of valves at no extra cost. All consumables such as gaskets, gland packing which form the permanent part of equipment shall be in the contractor's scope.

2.31.24 The hanger assemblies 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 & building structure.

2.31.25 All temporary rigging shall be removed in such a way that pipe supports are not subjected to any sudden load. During hydro static testing of pipes, all piping having variable spring type supports shall be secured in place by temporary pinned or blocked solid during the test.

2.31.26 The contractor shall carry out the pre-commissioning activities such as chemical cleaning of piping system, water flushing, flushing of oil systems, flushing of control fluid system.

The scope of pre-commissioning activities covers installation of all temporary piping, supports, valves, tanks, pumps & all other accessories & services to complete the process.

2.31.27 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to PURCHASER/ consultants.

Wherever possible machining or automatic flame cutting will be allowed only wherever edges 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 PURCHASER / consultants.

2.31.28 Contractor shall carry out all the electrical pre commissioning tests on the generator, excitation system, as stipulated by the relevant specification and codes.

2.31.29 The contractor shall hand over all parts/materials remaining extra over the normal requirement with proper identification tags, in a packed condition to the PURCHASER / consultant.

2.31.30 The work to be carried out is of highly sophisticated nature requiring quality precision workmanship, engineering and construction management.

It should also ensure successful and timely commercial operation of equipment in stalled. The contractor must have adequate quantity of precision tools, construction aids in his possession. Contractor must also have adequate trained, qualified and experienced supervisory staff and skilled personnel.

2.31.31 All temporary scaffolding shall be removed before the start of the commissioning activities to prevent hazards.

2.31 Specification for Erection of Electrical Equipments

2.32.1 Scope

The specification covers the installation, testing and commissioning of all electrical equipments and accessories required for the power plant for efficient and trouble free operation.

2.32.2 Standards

The electrical installation work covered by this specification shall unless otherwise stated comply with the requirements of the latest edition of relevant Indian Standard, statutory regulations and codes of practices.

- a) Indian Electricity Rules.
- b) Tariff advisory committee.
- c) IS-10118 : Code of practice for selection, installation & maintenance of switchgear and control gear
- d) IS-6600 : Guide for loading of oil immersed transformers
- e) IS-3043 : Code for practice for earthing
- f) IS-2309 : Code of practice for protection of building and allied structures against lightning
- g) IS-2274 : Code of practice for electrical wiring installation
- h) IS-6665 : Code of practice for industrial lighting

2.32.3 General Requirements

- a) The installation shall be carried out by an electrical contractor holding a valid license as required by the State Government. The contractor shall provide particulars of the license held by him or his subcontractor to the purchaser.

The installation shall require approval of the Chief Electrical Inspector to the Government of Bihar and the contractor shall prepare all necessary drawings / documents in obtaining the approval.

He shall also fully assist the purchaser in obtaining approval from any other statutory authorities for the successful commissioning of the power plant and the Substation.

- b) Any modification in the equipment or installation that may be demanded by the inspector shall be carried out at no additional cost to the purchaser.
- c) In accordance with the specific installation instructions or as directed by the purchaser, the contractor shall unload, erect, assemble, install, wire, test and commission all electrical equipments included in this contract. Equipments shall be installed in a neat workmen like manner with highest regard for safety.
- d) Erection materials, tools, testing instruments or any other machinery of any nature shall not be supplied by the purchaser.

The contractor shall arrange for the same in a timely manner and he shall not be allowed to claim for any delay or extra cost of any nature.

- e) Consumable materials of any nature required for the job shall also have to be arranged by the contractor.
- f) Clearing the site after completion of erection as well as regular clearance of unwanted materials from site, returning all packing material and excess material shall also be covered under the scope of work.
- g) All equipments and instruments of indoor and outdoor, shall be inscribed with number, nomenclature, danger boards and other instructions.
- h) The contractor shall touch up the surface for all equipments, which are scratched and / or damaged during transportation and erection. The paint used shall match exactly the surface being touched up.
- i) The contractor shall employ skilled and semiskilled labourers for erection, installation & testing as required.

All electricians, cable jointers, wiremen, welder and others employed shall be suitably qualified possessing certificates / licenses recognised by the competent authorities.

- j) The contractor shall also furnish a list of Engineers /Supervisors and staff employed by him for erection and installation jobs, giving in brief, qualification and experience of such staff and indicating whether they hold such competency certificates / licenses to supervise the electrical installation jobs as required under Indian Electricity Rules & State electrical inspectorate Rules.
- k) The contractor shall set up his own workshop and other facilities at site to undertake fabrication jobs, pipe bending, threading etc.
- l) The contractor shall be responsible for recording of all readings and observations during erection, testing and commissioning, in registers or on prescribed performs.

These shall be carried the presence of Purchaser's representative. All such test data and records shall be duly signed by the contractor's Engineer / Purchaser's representative and shall be submitted to Purchaser in triplicate.

- m) The contractor shall carry out all tests at site for outdoor and indoor Electrical equipment and commission the installation in the presence of Purchaser's representative . The contractor shall be responsible for final adjustment of relays, instruments, meters breakers etc. and also for submission of relay settings and calculations.

2.32.4 Equipment Erection

- a) All support insulators, Isolators, Power Transformers, Instrument Transformers, etc. shall be properly handled and erected as per the relevant codes of practice and manufacture's drawings and instruction manuals.
- b) For power transformers, drying out oil filling as required, after checking and testing the dielectric strength shall be carried out by the contractor. If required oil filtration shall be carried out and the contractor shall arrange for the necessary equipment.
- c) Handling equipment, sling ropes etc. should be tested before erection and periodically for strength.
- d) Necessary Junction boxes for CT's and PT's shall be supplied and installed.

2.32.5 Power Cables

- a) Contactor's scope of work include unloading, laying, fixing, jointing, bending and terminating of cables. Contactor shall also supply all the necessary hardware's for jointing and terminating of cables.

Cable shall be laid directly buried in earth, on cable rakes in built Up trenches, on cable trays and supports in conduits and ducts or bare on walls, ceiling etc. Where specific cable layouts are not shown in the drawing contractor shall route these cables as directed by purchaser.

- b) It is contractor's responsibility to ensure that he acquaints himself with the nature of the ground conditions of the project site.
- c) Markers shall be installed at all road crossing and joint positions. Their provision and installation shall be included in the areas.
- d) All necessary care must be taken by the contractor while designing, excavating trenches and installation of cables.
- e) Contractor shall install, test and commission the cables specified in accordance with the latest revisions of Indian Standards.
- f) All cable work and the allied apparatus shall be designed and arranged to reduce the risk of fire and any damage that may cause in the event of fire. Wherever cables pass through any floor or wall opening suitable bushes supplied shall be sealed using resisting materials to prevent fire spreading.
- g) Standard cable installation tools shall be utilised for cable pulling. Maximum pull tension shall not exceed the manufacturer's recommended value.

Cable grips, eels or pulleys used shall be properly lubricated. The lubricant shall not injure the overall covering and shall not set Up undesirable conditions of electrostatic stress.

- h) Sharp bending and kinking of cables shall be avoided. The bending radius for various types cables shall not be less than those specified by manufacturer.
- i) Power and control cables shall be laid in separate trenches shall be as specified below :
 - 11KV cables on top most tier from top.
 - 415KV cables on middle tier.
 - Control cables in bottom cable tier.
- j) Where cables cross roads and water, oil gas or sewage pipes the cables shall be laid in reinforced spun concrete pipes.

For road crossing the pipe for the cable shall be buried at not less than one metre depth. Cable shall be protected at all times from mechanical injury and from absorption of moisture.
- k) Some extra length shall be kept in each cable run at a suitable point to enable one or two straight through joints to be made at a later date, if any fault occurs.
- l) Cable jointing shall be in accordance with relevant Indian Standard Codes of practice and Manufacture's special instructions. Materials and tools required for cable jointing work shall be supplied by Contractor.

Cable shall be firmly clamped on either sides of a straight through joint at not more than 300 mm away from the joints. Identification tags shall be provided at each joint and at all cable terminations. Before jointing insulation resistance of both sections of cables to be jointed shall be checked.
- m) Metal sheath and armour of the cable shall be bonded to the earthing system of the station.
- n) Each cable shall be identified with its designation number as indicated in the drawings.
- o) Cable clamps, double compression type, shall be of 3 mm thick galvanised M.S. spaced at every 1.5 M interval.

2.32.6 Cable Trays, Accessories & Tray Supports

- a) Cable trays shall either be run in concrete trenches or overhead supports from building steel, floor slab, etc.
- b) Cables shall be clamped to the cable trays in both horizontal runs and vertical runs by suitable prefabricated clamps.
- c) All cable trays and fitting will be ladder type and fabricated from M.S. sheet. They shall be hot dip galvanised.
- d) Cable trays shall be suitably supported at an interval of not more than one metre.

2.32 List of preferred vendors

Approved makes are specified in the tender for various equipment /materials, but it is sole responsibility of the bidder to ensure that all equipment /materials of best quality & genuine make are procured and decision of Purchaser with regard to selection of any of the makes stipulated in the tender shall be final. In case specifications/ make of any item or work is not mentioned in the list of approved list for any particular item then contractor has to provide the documentary proof for the same & basis the documentary proof, Purchaser may approve the revised specification / make on their sole discretion.

The following are the major list of vendors:

Major Equipment Suppliers

Steam Turbine	Triveni/ MAN/Siemens/ Qualified Bidder
Alternator	TDPS/ Siemens/ BHEL/WEG

2.32.1 MECHANICAL

Condensate Extraction Pumps	Sulzer / KSB
Condenser	BHEL / BDT // L&T
Ejector	Mazda / Newfield
Fire Protection systems (CO ₂)	New Fire / Vijay / Agni Heavy Ind / Mather & Platt
Gate, Globe & Check Valve CI 600 and below	BHEL / KSB / Crane/ Forbes Marshall
Gate, Globe & Check Valve CI 600 and above	BHEL / KSB / Crane/ Forbes Marshall
Gear Box	Lufkins / Flender / Skoda / Mitsubishi / Premium / Hitachi / Triveni
Governor	Woodward 505 XT
GVC	Eskay / Patel Airtemp / Newfield
Insulation	Lloyds / Minwool
Lube oil purifier	Alfa Laval / Pennwalt
Miscellaneous valves	Audco / KSB / BDK
Non IBR valves	BDK / L&T / KSB
NRV	BHEL / Hopkinson / KSB/ Crane
Oil coolers	Eskay / Reynolds / Southern Lubricants / Enpro
Pumps	KSB / Sulzur / Beacon Weir/ Micri finish / Crane
Rupture disc	FMC Sanmar
Safety Switches	AG / Jayshree
Safety valves	BHEL / L&T / Anderson Greenwood
SJAE	BHEL / Newfield / Thermal Systems / Mazda
Spring hangers	BHEL / L&T / Sarathi / Myricks
Steam traps	Spirax Marshall / Pennant
Steam Strainers	Spirax Marshall

2.32.2 ELECTRICAL

Air Circuit Breakers	ABB / GE Power / L&T/ Siemens
Analog Meters	AE / IMP
Auto Excitation Regulation System (Digital)	Basler / BHEL / Elin / GE / Siemens / ABB
Auto Synchroniser	Alstom / AVK-SEGC / L&T / Siemens / Woodward / ABB
Battery	Exide / Panasonic/ V-Guard
Battery Charger	BCH / Trittech / Sab Nif / Universal / Masstech / Servilink
Busduct	C&S / Elpro / Power gear / Enpro / General Engineering/ Spaceage
Cables	CCI / Universal / Finolex / RPG / Polycab
Capacitor Banks	L&T / CGL / Siemens
Control Cables	CCI / Universal / Finolex / RPG / Finecore / TCL / KEI / Udeypyro
CTs & PTs	ABB / AE / CGL / Intrans / Pragati / KAPPA
DC Distribution Board & EOP starter	Alstom / GE Power Controls / L&T / Siemens / ICA / BCH / BHEL
DC Motors	IEC / KEC / Rotodel
df/dt Relay	Alstom / L&T / AVK-SEG
Digital Meters	AE / Enercon / L&T / Siemens
Distance Protection Relays	ABB / Alstom / Easun Reyrolle / GE / Siemens
Generator	BHEL / TDPS / Skoda
Generator Protection Relays	ABB / Alstom / L&T / GE Multilin / Siemens
Instrument Transformers 11kV & 415V)	AE / Intrans / Kappa
LAVT & Terminal Cubicles	C&S / Elpro / Enpro / Vee Vee Controls / EIC
Lightning Arrestors	IGE / Elpro / Lamco / Oblum / WS
LT Motors	ABB / KEC / CGL / Siemens / Alstom
LT Panels	ABB / Alstom / GE Power Controls / L&T / Siemens / EIC / CPRI approved
LT Switchgear Components	ABB / GE Power / L&T / Siemens
Master Trip & Auxiliary Relays	ABB / Alstom / Easun Reyrolle
MCB Distribution Boards & MCBs	L&T / MDS / Siemens
Microprocessor Based Motor Overload Relays	Alstom / Siemens / L&T
Motor Protection Relays (Numerical / Microprocessor Based)	ABB / Alstom / AVK-SEG / Easun Reyrolle / GE multilin / L&T / Siemens
NGR Panel	Ampcontrols / Narkhede / Essen / National switch gear / Ohmark Control / EIC
Power Quality Meters	GE Multilin / Conserv / L&T

Pressure Guages	Bells / H. Guru / Waree
Protection, Metering, Synchronising & Control Cubicle Relays	ABB / Alstom / Easun Reyrolle / Elpro / Enpro / Vee Vee Controls Alstom / AVK-SEGC / Siemens
Rotor Earth Fault & Sensitive Directional Earth Fault Relays (Microprocessor / Numerical Version) RELAYS	ABB / Alstom / AVK-SEGC
Semiconductor Fuses	GE Power / Siemens
Temperature Scanner	ABB / Massibus / Yokogawa
Transducers	ABB / Siemens
XLPE Cable Termination Kits	3M Birla / CCI

2.32.3 INSTRUMENTATION

Air filter regulators	Shavo-Norgon / Placka
Analysers	Yokogawa / Emerson
Control valves	MIL / Fisher Xomox
Desuperheaters	Chemtrols / Forbes Marshal / Fisher
Draft Gauges	Switzer / Bells
Flow nozzles / Orifice	Starmech / Sankalp
IP converters	Bells / Rosemount / JNM / ABB / H & B
Power cylinders	Bells control / Emerson/ ABB
Pressure switches	Switzer / Danfoss
SWAS	Emerson / E&H
Temperature Gauges	H. Guru / Waree
Thermocouples	General Instruments / Pyro-electric / Altop
Transmitters	Yokogawa / Emerson / Siemens

APPENDIX – I

DATA SHEET FOR STEAM TURBINE GENERATOR & AUXILIARIES

Bidder to kindly submit data sheet duly filled in along with offer (both soft & hard copies)

Sr. No.	Parameters	Value
1.	Capacity, KW	
2.	Inlet steam parameters, kg/cm ² , Deg C	
3.	Power generation with extraction flow of 15 TPH and condensing flow of 8 TPH	
4.	Power generation with extraction flow of 19.8 TPH and condensing flow of 2.2 TPH.	
5.	Minimum condensing steam flow, TPH	
6.	Maximum possible steam flow through 4.5 kg/cm ² extraction	
7.	Minimum possible flow through 4.5 kg/cm ² extraction	
8.	Electronic over-speed trip.	
9.	No. of nozzle control valves	
10.	Make and model of governor.	
11.	Pneumatically operated quick acting Non-return valve	
12.	Gland sealing system.	
13.	No. of steam vent fans in gland condenser.	
14.	Interconnecting pipe-work for oil, steam and condensate.	
15.	Flash vessel for drain.	
16.	Local gauge panel.	
17.	Lagging and cladding.	
18.	Base plate.	
19.	Temperature monitoring system.	
	a) All bearings (Turbine, Gear box, and Generator) Nos.	
	b) Turbine casing – Nos.	
20.	Make & model of vibration monitoring system.	
21.	Non-contact type vibration transducers for each bearing.	
22.	High speed coupling type.	
23.	Provision of coupling guard.	
24.	Type of gear box and service factor	
25.	Gear Box – input /output speed	
26.	Gear ratio.	
27.	Type of main oil pump.	
28.	Capacity of main oil pump.	
29.	Barring arrangement.	
30.	Motor rating.	

31.	Auto engagement and disengagement provision.	
32.	Low speed coupling type.	
33.	Provision of coupling guard.	
34.	Description of base plates for ST, GB, generator	
35.	Inclusion of MOP	
36.	Inclusion of AOP	
37.	Inclusion of EOP	
38.	Oil cooler	
	Nos.	
	MOC	
39.	Oil reservoir capacity as holding time	
40.	Oil centrifuge system as % of total lube + control oil	
41.	AOP type (Screw / Gear)	
42.	EOP (Type)	
43.	Inclusion of Control Oil pump	
44.	Aux. Control oil (AOP) pump type (screw / Gear).	
45.	Provision of Duplex oil filter (Lubricating)	
46.	Provision of Duplex oil cooler (Control)	
47.	Area & MOC of surface condenser, sq.m.	
48.	Differential oil pressure switch / Alarm across filter for lube / control)	
49.	No. of oil vapour extractor.	
50.	Alternator Rating, KW Voltage, KV Speed, RPM Class of insulation Cooling Efficiency at 100%, 80%, 60% capacity rating	
51.	Rated frequency	
52.	Power Factor.	
53.	Overload Capacity	
54.	Applicable Standard.	
55.	No. of bearings.	
56.	Insulation Class for Rotor, Stator and Exciter "F"	
57.	Temperature rise class "B"	
58.	Excitation system	
59.	Short circuit ratio.	
60.	Location of water cooler (preferred side)	
61.	Capacity of cooler	
62.	Provision of water leakage detector.	
63.	Provision of Rotor earth fault detector.	
64.	No. of RTDs.	
	- In stator (2 per phase min.)	
	- In cold air circuit (min 2)	
	- In warm air circuit (min 1)	
	- In each bearing (min 2 nos.)	

65.	Provision of modes in AVR.	
66.	No. of Auto modes	
67.	No. of Manual mode	
68.	Provision of rotating diode failure detector.	
69.	Metering Panel including amps, voltage, kw, kvar, kva, kwh	
70.	Provision of TVM with output signal to monitor & record all electrical parameters	
71.	Transducers for power parameter measurements	
72.	List of included relays	
73.	NGR to restrict fault current to 100 A for 30 Sec.	
74.	LA and VT panel	
75.	Rating of station class lightening arrestor (10 kA, 12 kV)	
76.	Rating of station class surge capacitor (0.25 micro farad, 11 kV)	
77.	Synchronization panel	
78.	Auto synchronizer	
79.	Check synchronization relay	
80.	Motor control centre (MCC)	
81.	Inclusion of all Above ground Earthing	
82.	Interconnecting cables to turbine auxiliaries from MCC	
83.	Instrumentation cabling	
84.	Cable trays and supports	
85.	Inter panel cabling	
86.	Number of probes of temperature scanner	
87.	Make of auto synchronizer	
88.	Inclusion of DC power system, AH	
89.	Inclusion of external PRV, mating flange, pressure & temperature gauge, flow transmitters, safety valve, DSH and QCNRV for extraction	
90.	Auxiliary power need of STG	
91.	Compressed air need of STG	
92.	Auxiliary steam needs of STG	
93.	First fill of lube oil and all other consumables are included	
94.	Spares as per Appendix II	
95.	Supply of commissioning spares (to be confirmed)	
96.	Supply of commissioning consumables (to be confirmed)	
97.	No. of turbine stages	
98.	Delivery & Commissioning period (months)	
99.	Inclusion of Scope of Work and Terminal points / Battery limits as per tender / MoM, if any.	

APPENDIX - II

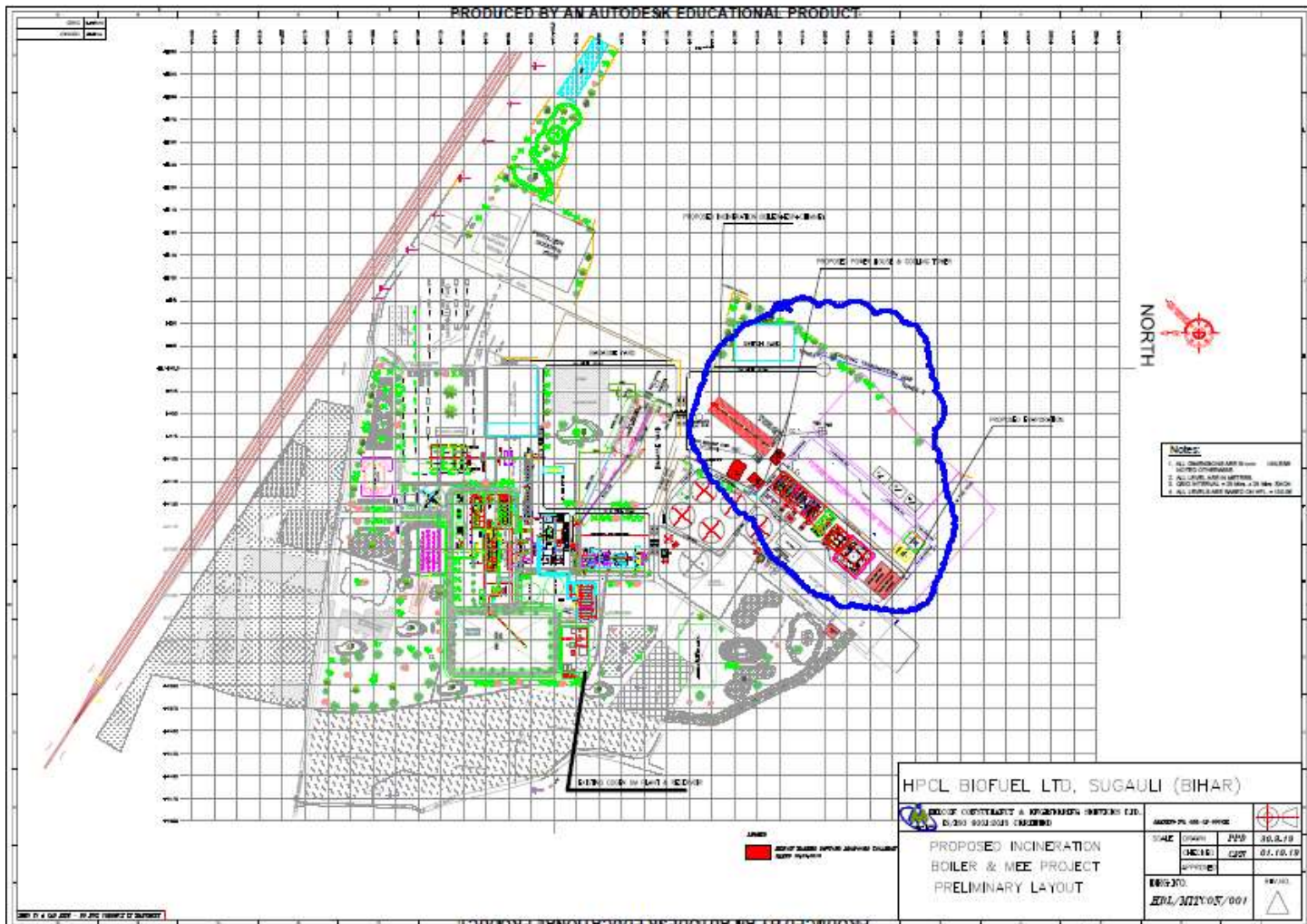
LIST OF SPARES

Details of all the spare parts are required to be provided in the item master format (format will be shared by Purchaser to L1 bidder after award of PO) which will include all the technical details regarding the spare parts along with indicative price, approved suppliers with their details for ease in procurement after installation

Sr. No.	Description	Quantity
1.	Set of radial bearing pads	1 set of each type
2.	Set of thrust bearing pads	1 set of each type
3.	Front bearing supporting plates	1 set of each type
4.	Rods for grid valve actuator	1 set of each type
5.	Rods for HP governor valve	1 set of each type
6.	Oil retaining rings	1 set of each type
7.	Fuses	1 of each type
8.	RTD's and Thermocouple	1 of each type
9.	Gear box bearings, both high & low side	1 set
10.	Oil filter element for control and lube oil	1 set of each
11.	Spare vibration probes	1 set
12.	Packing for Condensers	1 set of each
13.	Packing for Air Ejector	1 set of each
14.	Gaskets for emergency stop valve	1 set
15.	Gaskets for governor valve	3 sets
16.	Bearing for CEP	1 set of each type
17.	Sheet packing for air cooler	1 set of each
18.	Oil seal for main oil pump	1 set of each type
19.	Oil seal for Aux. Oil pump	1 set of each type
20.	Oil seal for emergency oil pump	1 set of each type
21.	Rotating diodes	1 set
22.	Bearing inserts for AC Generator	1 set of each

APPENDIX –III

PLANT LAYOUT FOR SUGALI SITE



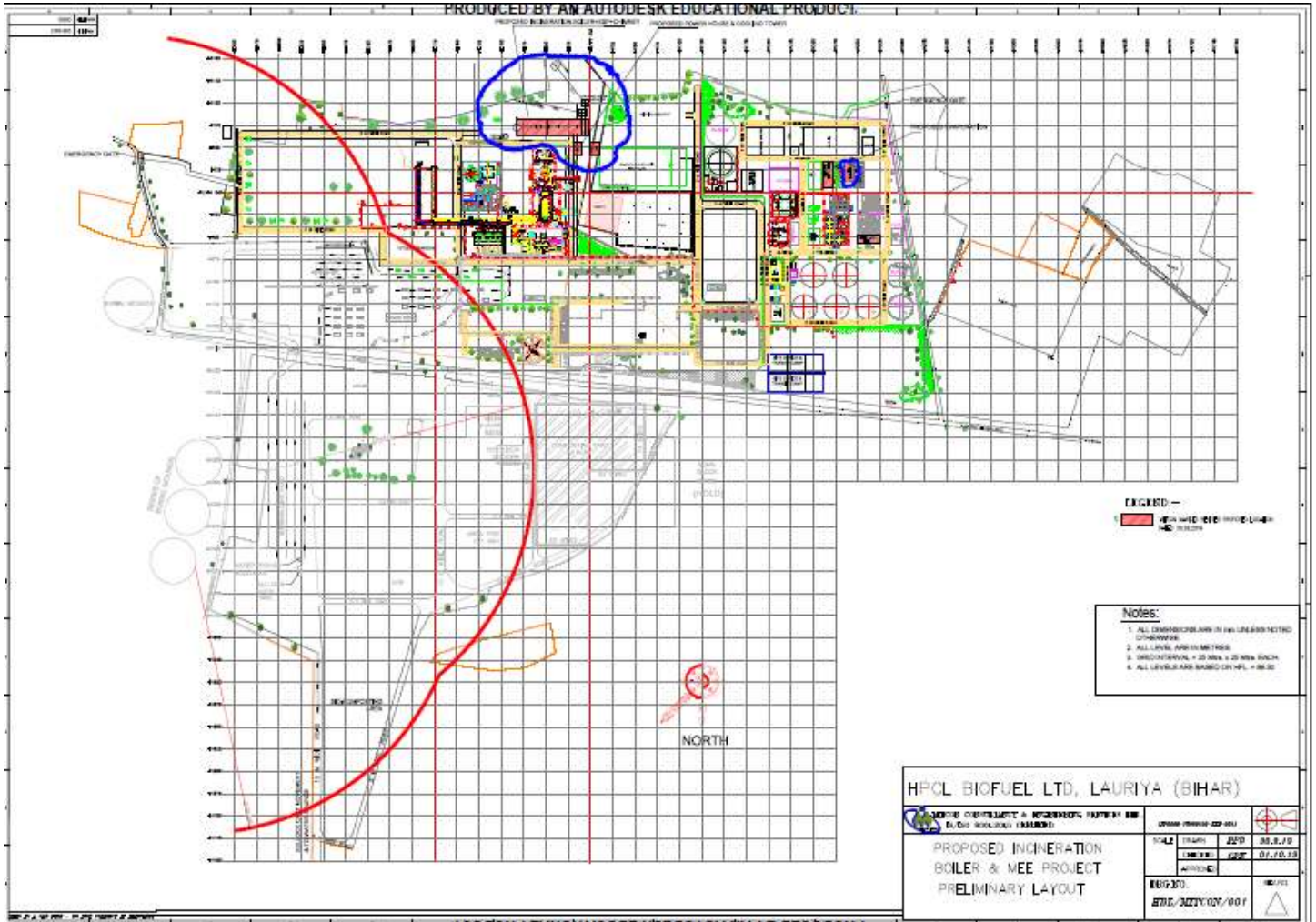
Signature and Seal of the Bidder

HBL/TEN/PUB/20-21/224 dated 06.02.2021

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(COMMERCIAL & TECHNICAL UNPRICE BID)

PLANT LAYOUT FOR LAURIYA SITE



Signature and Seal of the Bidder

HBL/TEN/PUB/20-21/224 dated 06.02.2021

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(COMMERCIAL & TECHNICAL UNPRICE BID)