

Bharat Heavy Electricals Ltd
Electronics Division
Mysore Road, Bangalore – 560 026

Tender Document for "UPS to Ennore project"

TENDER REFERENCE	SBA0000581
TENDER DOCUMENT AVAILABLE FROM	As per https://eprocurebhel.co.in website
LAST DATE AND TIME FOR SUBMISSION OF TENDER	
DATE AND TIME FOR TENDER OPENING	
SUBMISSION OF TENDER	The bidder should submit their offer in e-Procurement portal only : https://eprocurebhel.co.in

Note:Bidder to refer E-procurment portal(<https://eprocurebhel.co.in>) for any corrigendum, due date extension, etc.

This Tender Document Contains documents as per below index:

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 भारत हेवी इलेक्ट्रिकल्स लिमिटेड

Bharat Heavy Electricals Ltd.,
(A Government of India undertaking)
Electronics Division

PB 2606 , Mysore Road Bangalore , 560026 INDIA

CE:PR:001- Rev 04

INSTRUCTIONS TO BIDDERS

Bidder is requested to read the instructions carefully and submit their quotation taking into consideration of all the points:

A. GENERAL INSTRUCTIONS:

1. Any Purchase Order resulting from this enquiry shall be governed by the Instructions to Bidders (document reference: CE: PR: 001 – Rev 03), General Conditions of Contract (document reference: CE: PR: 002 - Rev 02) and Special Conditions of Contract, if any, of the enquiry.
2. Any deviations from or additions to the “General Conditions of Contract” or “Special Conditions of Contract” require BHEL’s express written consent. The general terms of business or sale of the bidder shall not apply to this tender.
3. Regret letter (either through post or by mail or by EPS) indicating reasons for not quoting must be submitted without fail, in case of non-participation in this tender.

Supplier shall be liable for removal as a registered vendor of BHEL when the supplier fails to quote against four consecutive tender enquiries for the same item or all enquiries in last two years for the same item, whichever is earlier.

4. Procurement directly from the manufacturers is preferred. However, if the OEM/ Principal insist on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender.

Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. Agent/Representative authorized by the OEM/Principal in turn cannot further sub authorize any other firm for submitting the offer or for placement of order.

In case bids are received from the manufacturer/ supplier and his agent, bid received from the agent shall be ignored.

5. Consultant / firm (and any of its affiliates) shall not be eligible to participate in the tender/s for the related goods for the same project if they were engaged for consultancy services for the same project.
6. If an Indian representative/associate/liaison office quotes on behalf of a foreign based bidder, such representative shall furnish the following documents:
 - a. Authorization letter to quote and negotiate on behalf of such foreign-based bidder.
 - b. Undertaking from such foreign based bidder that such contract will be honored and executed according to agreed scope of supply and commercial terms and conditions.
 - c. Undertaking shall be furnished by the Indian representative stating that the co-ordination and smooth execution of the contract and settlement of shortages/damages/replacement/repair of imported scope

till the equipment is commissioned and handed over to customer will be the sole responsibility of the Indian representative/associates/agent/liaison office.

d. Refer **Annexure I** on “Guidelines for Indian Agents”.

7. In case of imported scope of supply, customs clearance & customs duty payment will be to BHEL account after the consignment is received at Indian Airport /Seaport. Bidders must provide all original documents required for completing the customs clearance along with the shipment.

Warehousing charges due to incomplete or missing documentation will be to supplier’s account. All offers for imported scope of supply by air, must be made from any of the gateway ports (within the country) indicated **(Refer Annexure II)**.

8. The offers of the bidders who are on the banned list and also the offers of the bidders, who engage the services of the banned firms, shall be rejected. The list of the banned firms is available on BHEL website: http://www.bhel.com/vender_registration/vender.php
9. Business dealings with bidders will be suspended if they are found to have indulged in any malpractices/misconduct which are contrary to business ethics like bribery, corruption, fraud, pilferage, cartel formation, submission of fake/false/forged documents, certificates, information to BHEL or if they tamper with tendering procedure affecting the ordering process or fail to execute a contract, or rejection of 3 consecutive supplies or if their firms / works are under strike/lockout for a long period. Bidder may refer “Guidelines for Suspension of Business Dealings with Suppliers/ Contractors” available on www.bhel.com for more details.

The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies / guidelines.

10. The bidder along with its associate/collaborators/sub-contractors/sub-vendors/consultants/service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to your notice.
11. Offer is to be submitted in English language only.
12. For this procurement, the local content to categorize a supplier as a Class-I local supplier/ Class-II local supplier/ Non-local supplier and purchase preference to Class-I local supplier, is as defined in Public procurement (Preference to Make in India), Order 2017 dated 16.09.2020 issued by DPIIT.

In case of subsequent Orders issued by the Nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of price bids against this NIT. Default margin of purchase preference shall be 20% for Class-I local supplier only.

13. The Bidder shall mandatorily submit Declaration as mentioned under Rule 144(xi) of General Financial Rules, 2017 amendment dt 23.07.2020 issued by Ministry of Finance, Govt. of India. Where applicable, evidence of valid registration by the Competent Authority shall be attached.

The Competent Authority for the purpose of registration under this Order shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT). Refer Annexure-X for ‘Restrictions under Rule 144(Xi) of General Financial Rules,2017 amendment dt: 23.07.2020’.

B. GUIDELINES FOR PREPARATION OF OFFER:

1. Quotation shall be submitted in Single Part Bid, Two Part Bid or Three Part Bid, as called for in the tender:
 - **SINGLE PART BID:** Technical and Commercial Bid with prices along with price summary & filled in BHEL Standard Commercial terms and conditions in a single sealed envelope.
 - **TWO PART BID:** Unpriced offer i.e. “Techno-commercial Bid” with filled in BHEL Standard Commercial terms and conditions in a sealed envelope **along with the copy of the “Price Bid” without the prices** should be enclosed in one cover and the cover must be super scribed **“Techno-commercial offer)** and Priced offer i.e. “Price Bid” containing price summary in a separate sealed envelope and must be super scribed **“Price Bid”**.

Both these envelopes shall be enclosed in a single sealed envelope superscribed with enquiry number, due date of tender and any other details as called for in the tender document.

- **THREE PART BID:** Pre-qualification Bid (Part-I), Techno Commercial Bid with filled in BHEL Standard Commercial terms and conditions (Part-II), and Price Bid (Part-III). All three envelopes shall be enclosed in a single sealed envelope superscribed with enquiry number, due date of tender and any other details as called for in the tender document.

If any of the offers (Part I, Part II or Part III) are not submitted before the due date and time of submission (or) if any part of the offer is incomplete, the entire offer of the bidder is liable for rejection.

2. Supplier shall ensure to superscribe each envelope with RFQ number, RFQ Date, RFQ Due date and time, Item Description and Project clearly & boldly. Also mention on the envelope whether it is “Techno Commercial Bid” or “Price Bid” or “Pre-Qualification Bid”.

Please ensure complete address, department name and purchase executive name is mentioned on the envelope (before dropping in the tender box or handing over) so that the tender is available in time for bid opening.

3. BHEL standard Commercial Terms and Conditions (duly filled, signed & stamped) must accompany Technical-Commercial offer without fail and should be submitted in original only.

The above indicated submission of Offers in “sealed envelope/hard copy” as mentioned in points B.1-B.3 is applicable for tenders that are not floated through E-Procurement System (EPS).

4. Validity: Unless otherwise specified in SCC (special commercial conditions of contract), the offer will be valid for a period of 90 days from the date of part-I bid opening and in case of Negotiation/Counter-offer/Reverse Auction, price validity will apply afresh for a period of 60 days from the date of according final price by bidder (or) up to original validity period, whichever is later.
5. Any of the terms and conditions not acceptable to supplier, shall be explicitly mentioned in the Techno-Commercial Bid.

If no deviations are brought out in the offer it will be treated as if all terms and conditions of this enquiry are accepted by the supplier without deviation.

6. Deviation to this specification/item description, if any, shall be brought out clearly indicating “DEVIATION TO BHEL SPECIFICATION” without fail, as a part of Techno-Commercial Bid.

If no deviations are brought out in the offer it will be treated as if the entire specification of this enquiry is accepted without deviation.

7. Suppliers shall submit one set of original catalogue, datasheets, bill of materials, dimensional drawings, mounting details and/or any other relevant documents called in purchase specification as part of Technical Bid.
8. "Price Bid" shall be complete in all respects containing price break-up of all components along with all applicable taxes and duties, freight charges (if applicable) etc. Once submitted no modification / addition / deletion will be allowed in the "Price Bid." Bidders are advised to thoroughly check the unit price, total price to avoid any discrepancy.
9. In addition, bidder shall also quote for erection & commissioning charges/erection supervision & commissioning charges (E&C service charges), documentation charges, testing Charges (type & routine), training charges etc. if & as applicable along with corresponding tax. The price summary must indicate all the elements clearly.
10. Wherever applicable, bidders should indicate "lumpsum" Erection and Commissioning (or) Erection Supervision and Commissioning charges, as applicable (including To & Fro Fare, Boarding, Lodging, Local Conveyance etc.) for carrying out E&C activity and further handing over to customer.
The quotation shall clearly indicate scope of work, likely duration of commissioning, pre-commissioning checklist (if any).
11. Wherever bidders require PAC (Project Authority Certificate)/applicable certificates for import of raw materials, components required for DECC,EPCG Power Projects, Export Projects or other similar projects wherein supplies are eligible for customs duty benefits, lists and quantities of such items and their values (CIF) has to be mentioned in the offer. Prices must be quoted taking into account of such benefits.
12. Prices should be indicated in both figures & words. Bid should be free from correction/overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.
Any typographical error, totalling mistakes, currency mistake, multiplication mistake, summing mistakes etc. observed in the price bids will be evaluated as per **Annexure III** "Guidelines for dealing with Discrepancy in Words & Figures – quoted in price bid" and BHEL decision will be final.
13. Documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder. However, this requirement is not mandatory for offers uploaded through E-Procurement System (EPS).

C. GUIDELINES FOR OFFER SUBMISSION:

The under-mentioned clauses 1, 2&3 will not be applicable for EPS tenders.

1. Offers / Quotations must be dropped in tender box before 13.00 Hrs. on or before due date mentioned in RFQ. The offers are to be dropped in the proper slot of the Tender Box kept in our reception area with caption "CE, SC&PV, DEFENCE".

Tenders are opened on 3 days in a week (Monday/Wednesday/Friday). Tender must be deposited in the slot corresponding to the day (Monday - Box no.4/Wednesday - Box no. 6 /Friday - Box no.8) while depositing the offer.

2. E-Mail/ Internet/EDI offers received in time shall be considered only when such offers are complete in all respects. In case of offers received through E-mail, please send the offer to the email ID specified in the SCC document of the tender.
3. Offers of Vendors who already have a valid Technical/Commercial MOU with BHEL-EDN for the items of the RFQ shall mention the relevant MOU reference no. and give only such other details not covered in the MOU.

4. In cases where tender documents are bulky, or due to some reasons tender documents are required to be submitted by hand or through posts/couriers, the offers are to be handed over either of the two purchase officers whose names are mentioned in the SCC document of tender RFQ.
5. Tenders will be opened on due date, time and venue as indicated in the RFQ in the presence of bidders at the venue indicated in the RFQ. For EPS tenders, e-mail notifications will be automatically generated and forwarded to registered e-mail ID/s of bidders during opening of tenders.
6. Bidder will be solely responsible:
 - a. For submission of offers before due date and time. Offers submitted after due date and time will be treated as "Late offers" and will be rejected.
 - b. For submission of offers in the correct compartment of the tender box based on the day of due date (Monday/Wednesday/Friday). Please check before dropping your offer in the correct tender box.
 - c. For depositing offers in proper sealed condition in the tender box. If the bidder drops the tender in the wrong tender box (or) if the tender document is handed over to the wrong person, BHEL will not be responsible for any such delays.
 - d. For offers received through email etc., suppliers are fully responsible for lack of secrecy on information and ensuring timely receipt of such offers in the tender box before due date & time (This clause will not be applicable for EPS tenders).

The above indicated submission of Offers as mentioned in points 6.a-6.d is applicable for tenders that are not floated through EPS.

- e. In case of e-tender, all required documents should be uploaded before due date and time. Availability of power, internet connections, system/software requirements etc. will be the sole responsibility of the bidder.

Wherever assistance is needed for submission of e-tenders, help-line numbers as available in the website of service provider of BHEL may be contacted.

Purchase Executive/ BHEL shall not be responsible for any of the activities relating to submission of offer.

D. PROCESSING OF OFFERS RECEIVED:

1. Any discount/ revised offer submitted by the supplier on its own shall be accepted provided it is received on or before the due date and time of offer submission (i.e. Part-I bid).
The discount shall be applied on pro-rata basis to all items unless specified otherwise by the bidder.
2. Changes in offers or Revised offers given after Part-I bid opening shall not be considered as a part of the original offer unless such changes/revisions are requested by BHEL.
In case of withdrawal of any Technical/Commercial deviation(s) by the bidder before opening of price bids/conducting the Reverse Auction, revision of price/impact bid will not be accepted.
3. In case there is no change in the technical scope and/ or specifications and/ or commercial terms & conditions, the supplier will not be allowed to change any of their bids after Technical bids are opened (after the due date and time of tender opening).

4. In case of changes in scope and/ or technical specifications and/ or commercial terms & conditions by BHEL and it accounts for price implications from bidders, all techno-commercially acceptable bidders shall be asked by BHEL (after freezing the scope, technical specifications and commercial terms & conditions) to submit the impact of such changes on their price bid.

Impact price will be applicable only for changes in technical specification / commercial conditions by BHEL. The impact price must be submitted on or before the cut-off date specified by BHEL and the original price bid and the price impact bid will be opened together at the time of price bid opening.

5. Un-opened bids (including price bids) will be returned to the respective bidders after release of Purchase order.

Regarding Offers for EPS tenders that get rejected on PQC/ techno-commercial grounds, the bids for the subsequent parts will not be opened i.e., both technical bid and price bid (Parts-II & III) will not be opened in case of rejection on PQC ground and price bid (Part-II/Part-III, as applicable) will not be opened in case of rejection on techno-commercial ground.

6. After receipt of Purchase Order, supplier should submit required documents viz., specified drawings, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report , O & M Manuals and/or any other relevant documents as per Specification/Purchase Order, as and when required by BHEL/Customer.
7. Any deviation to the terms and conditions not mentioned in the quotation by supplier in response to this enquiry will not be considered, if put forth subsequently or after issue of Purchase Order, unless clarification is sought for by BHEL and agreed upon in the Purchase Order.
8. Evaluation shall be on the basis of delivered cost (i.e. "Total Cost to BHEL").

"Total Cost to BHEL" shall include total basic cost, packing & forwarding charges, taxes and/or duties (as applicable), freight charges, taxes on Services, customs clearance charges for imported items, any other cost indicated by bidder for execution of the contract and loading factors (for non-compliance to BHEL Standard Commercial Terms & Conditions).

Benefits arising out of Nil Import Duty on DEEC, EPCG, DFIA Projects, Physical Exports or such 100% exemptions (statutory benefits), project imports, customer reimbursements of statutory duties (like Basic Customs Duty and cess on customs duty), Input tax credits as applicable will also be taken into account for arriving at the Total cost to BHEL (wherever applicable and as indicated in SCC document of tender).

For EPS tenders, it shall be noted that the prices (including discounts) vis-a-vis currency quoted in EPS portal only will be considered as Final for the purpose of evaluation of the lowest bidder.

Bidder shall ensure to indicate the applicable taxes against each line item in online portal, failing to which the same will be considered as inclusive/NIL.

In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

9. The evaluation currency for this tender shall be INR. For evaluation of offers in foreign currency, the exchange rate (TT selling rate of SBI) shall be taken as under:

Single part bids: Date of tender opening

Two/three part bids: Date of Part-I bid opening

Reverse Auction: Date of Part-I bid opening

In case of Performance Bank Guarantee (PBG) also, exchange rate will be considered as mentioned above for converting foreign currency to Indian currency and vice versa.

If the relevant day happens to be a bank holiday, then the exchange rate as on the previous working day of the bank (SBI) shall be taken.

10. Ranking (L-1, L-2 etc.) shall be done only for the techno-commercially acceptable offers.
11. GeM Seller ID shall be mandatory before placement of order/award of contract for goods and services to the successful bidder(s), for orders exceeding Rs.25 lakhs (including all taxes etc.).

Department of Expenditure (DoE) OM no.6/9/2020-PPD dated: 24.08.2020 may be referred in this regard.

E. INFORMATION ON PAYMENT TERMS:

1. All payments will be through Electronic Fund transfer (EFT). Vendor has to furnish necessary details as per BHEL standard format (**Refer Annexure IV**) for receiving all payments through NEFT.(Applicable for Indian vendors only).
2. In case of High Sea Sales transaction, customs clearance of the consignment landed on Indian Sea/Air ports will be done by BHEL based on the original HSS documents provided by vendors.
All warehousing charges due to delay in submission of complete and or correct HSS documents to BHEL will be to supplier's account only. Such recovery will be made out of any of the available bills (**Refer Annexure V**).
3. Statutory deductions, if any, will be made and the deduction certificate shall be issued.
 - A. In case vendor does not provide PAN details, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.
In addition to the above, Foreign vendors shall also submit relevant details of their bankers like Swift Code, Banker's Name &Address etc.
 - B. TDS deduction as per section 51 of CGST Act,2017 shall be applicable as per Gazette Notification No. 50/2018-Central Tax, Dated: 13th September 2018. TDS deduction is also applicable on purchase of goods as per the latest notification under section 194Q, and subsequent notification(s) as and when released by Govt. authorities.
4. Procurement of Goods/ Works/ Services/ Consultancy Services [under clause relating to "Income Tax and Corporate Tax" or "TDS" of Model ITBs]
 - a) Provision w.r.t. TDS on Purchase of Goods under section 194Q of Income Tax Act applicable from 01.07.2021 is as under:
 - i. TDS as applicable will be deducted by BHEL under section 194Q of the Income Tax Act, 1961 on Purchases exceeds, the amount of Rupees. 50 Lakhs or limit defined therein from time to time during the financial year under the Indian Income Tax act 1961.
 - ii. Since BHEL is liable to deduct Income Tax TDS under section 194Q, the provision of TCS as per section 206C(1H) of the Income Tax Act, 1961 shall not be applicable.

b) Higher rate of TDS for non-filers of ITR as per Section 206AB of Income Tax Act, 1961, in case of any vendor who does not filed their Income Tax Return for both of the two previous years preceding to current year and aggregate amount of TDS is more than or equal to Rs. 50,000/- in each of those previous two years (or limit defined by Govt. from time to time), then TDS will be deducted at the higher of following rates:

(i) Twice the rate mentioned in relevant TDS section.

(ii) Twice the rate or rates in force

(iii) 5%

5. Incomplete documentation will not be accepted. Delayed submission of invoice / documents may result in corresponding delay in payment. In this connection, request to also refer clause: G about invoicing & payment formalities under GST regime.

Applicable documents shall be submitted to the purchaser at the time of execution of supplies/services for availing GST input credits.

F. STANDARD PAYMENT TERMS OF BHEL-EDN:

<u>PURCHASE ORDERS FOR:</u>	<u>SUPPLY WITH SERVICE(S)</u>	<u>SUPPLY ONLY</u>
<u>INDIGENOUS PROCUREMENT</u>	<p>a. 100% of basic value with taxes and freight will be paid in 45 days from the date of dispatch or 15 days from the date of submission of complete set of documentation, whichever is later.</p> <p><u>Note:</u> In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice & Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.</p>	<p>b. 100% of PO value with taxes and freight will be paid in 45 days from the date of dispatch or 15 days from the date of submission of complete set of documentation, whichever is later.</p>
<u>IMPORT PROCUREMENT</u>	<p>c. 100% of basic value will be paid against usance draft of 45 days from the date of AWB/BOL on submission of complete set of documents.</p> <p><u>Note:</u> In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice & Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.</p>	<p>d. 100% of PO value will be paid against usance draft of 45 days from the date of AWB/BOL on submission of complete set of documents.</p>

<p><u>HIGH-SEA SALES PROCUREMENT</u></p>	<p>e. 100% of basic value will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later</p> <p><u>Note:</u> In case PBG is not furnished, only 90% payment will be released against 100% claim without the consent of Vendor. This 10% basic amount withheld towards PBG will be paid either against submission of supplementary invoice & Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.</p>	<p>f. 100% of basic value will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later.</p>
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g. Erection and Commissioning:

Evaluation methodology: Unless and otherwise specified in SCC, E&C charges should not be less than 10% of the main supply value. In case the quoted total E&C value is less than 10% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price proportionally from all items and apportioning towards E&C charges.

Payment term: 100% E&C charges along with tax as applicable, will be paid in 15 days from the date of submission of supplementary invoice/documents against proof of completion of E&C.

h. Erection Supervision and Commissioning:

Evaluation methodology: Unless and otherwise specified in SCC, E&C charges should not be less than 5% of the main supply value. In case the quoted total E&C value is less than 5% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price proportionally from all items and apportioning towards E&C charges.

Payment term: 100% E&C charges along with tax as applicable, will be paid in 15 days from the date of submission of supplementary invoice/documents against proof of completion of E&C.

i. Comprehensive Annual Maintenance Contract:

Evaluation methodology: Unless and otherwise specified in SCC, CAMC will be applicable for a period of 04 years from the date of expiry of warranty period (or) from the date of completion of commissioning of equipment, whichever is later and the total CAMC value should not be less than 20% of the main supply value. In case the quoted total CAMC value is less than 20% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price proportionally from all items and apportioning towards CAMC charges.

Payment terms: 100% CAMC charges along with tax as applicable, will be paid in 15 days from the date of submission of supplementary invoice/documents against proof of completion of CAMC on yearly basis.

j. Terms of Payment for Training: 100% payment will be made in 45 days from the date of completion of Training or 15 days from the date of submission of complete set of invoice along with documentary evidence, whichever is later.

LOADING FACTORS FOR DEVIATION IN PAYMENT TERMS (APPLICABLE FOR IMPORT PROCUREMENT ONLY):

- 1) For offers received with Sight draft payment term in place of Usance draft, loading applicable will be 1.0% of basic value.
- 2) For offers received with Letter of Credit payment term with Usance of 45 days, loading applicable will be 2.5% of basic value.
Additional loading of 2% will be applicable for payment term as Letter of Credit at Sight.
- k. Any payment term with credit period of less than 45 days for indigenous supply/HSS and any other variation of payment terms are liable for rejection.
- l. Standard payment terms indicated in Clauses: F (a), (b), (c), (d), (e), (f), (g), (h), (i) & (j) will not attract any loading.

Note 1: Basic value of Purchase Order mentioned above will include all components of the purchase order and will exclude only taxes, duties, freight, training charges, E&C and AMC charges (wherever applicable). Wherever the Purchase Order is split into import portion and indigenous portion of supply, minimum % to be quoted for Services, wherever mentioned, will be of both purchase order values put together.

Note 2: In case of multiple packages/units in a power plant, payment of E&C charges will be processed on pro-rata basis.

Note 3: No deviation will be permitted from the duration of Guarantee/Warranty and/or Comprehensive Annual Maintenance Contract period specified in SCC.

G. Terms & Conditions to be complied under GST regime:

1. All invoices to contain BHEL-EDN (buyer) GSTIN number: 29AAACB4146P1ZB. However for CGST +SGST/UGST billing outside the state of Karnataka, invoice has to be generated with BHEL's Nodal Agency GSTIN number. Address of Nodal Agency along with GSTIN number will be provided by BHEL at the time of issuing dispatch clearance.
2. The Bidder shall mention Bidder's GSTIN number in all quotations and Invoices submitted.
3. The Bidder shall also mention HSN (Harmonized System of Nomenclature) / SAC (Services Accounting Code) mandatorily in all quotations and invoices submitted.
4. Invoice submitted should be in the format as specified under GST Laws viz., all details as mentioned in Invoice Rules like GST registration number(GSTIN), invoice number with date of issue, quantity, rate, value, taxes with nomenclature – CGST, SGST, UGST,IGST mentioned separately, HSN Code / SAC Code etc. Invoice should be submitted in original for buyer plus duplicate for credit availment.
5. Payment of GST to Vendor will be made only if it is matching with data uploaded by the Vendor in GST portal.
6. For invoices paid on Reverse charge basis – “Tax payable on reverse charge basis” to be mentioned on the invoice.
7. In case GST credit is delayed/denied to BHEL due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount will be recoverable from vendor along with interest levied/ leviable on BHEL.
8. In case vendor delays declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law will be recoverable from vendor/contractor along with interest levied/ leviable on BHEL.

9. Vendor should intimate BHEL immediately on the same date of invoicing without any delay.
10. In case of discrepancy in the data uploaded by supplier in the GSTN portal or in case of any shortages or rejection in the supply, then BHEL will not be able to avail the tax credit and will notify the supplier of the same. Supplier has to rectify the data discrepancy in the GSTN portal or issue credit note (details to be uploaded in GSTN portal) for the shortages or rejections in the supplies, within the calendar month notified by BHEL.
11. Bidders to note that Rules & Regulations pertaining to E-way bill system are to be strictly adhered to, as and when notified by Govt. authorities.
12. As per Notification 88/2020-Central Tax dated 10th November 2020 (applicable w.e.f. 01 January 2021), the turnover for applicability of E-invoicing provisions has been reduced from 500 crores to 100 crores. In other words, registered person [other than a SEZ unit and those referred in Rule 54(2), 54(3), 54(4) and 54(4A) of the CGST Rules], whose aggregate turnover in any preceding financial year from 2017-18 onwards exceeds 100 crores, is required to comply with the requirement of IRN and QR code in respect of supply of goods or services or both to a registered person or for exports.

H. Performance bank guarantee (PBG):

Performance bank guarantee (PBG) will be applicable as called in the tender documents. Unless otherwise specified in the SCC, the PBG against performance of the contract shall be valid for a period of 24 months from the date of dispatch of goods + claim period of 03 months, for a value equal to 10 % of the basic value of the purchase order which will include all components of the purchase order and will exclude only taxes, duties, freight, training charges, E&C and AMC charges (wherever applicable).

1. The BG issued in Indian Rupees by Banks in India is to be executed on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Bank issuing the guarantee.
2. No deviation for the duration and value of PBG will be permitted.
3. PBG shall be from any of the BHEL consortium of bankers (**refer Annexure VI**).
4. PBGs from nationalized banks are also acceptable.
5. PBG should be sent directly by the bank to the dealing executive mentioned in the purchase order located at the address mentioned in the purchase order.
6. PBG should be in the format specified (**refer Annexure VII**). No deviation to this format will be allowed. However in case BHEL changes the PBG format, bidder shall honor the same.
7. Bank Guarantee should be enforceable in Bangalore.
8. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in Bangalore.
 - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)
 - b.1 Please note that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter-Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India.

It shall be noted that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor.

b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 is required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

9. Expired PBGs will be returned only after expiry of the claim period.

10. PBG shall not be applicable for spares.

I. PURCHASE PREFERENCE FOR MSE(MICRO AND SMALL ENTERPRISES) VENDORS:

Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product. Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.

1. If tendered quantity is Splittable: In tender, participating MSEs quoting price within price band of L1+15 percent shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price from someone other than a MSE and such MSE shall be allowed to supply at least 25% of total tendered value. In case of more than one such MSE, the supply shall be shared proportionately (to tendered quantity).

- 3% of the 25% will be earmarked for women owned MSEs.
- 25% of the 25% (i.e., 6.25% of the total enquired quantity) will be earmarked for SC/ST owned MSE firms provided conditions as mentioned in (1) & (2) are fulfilled.
- In case where no SC/ST category firms are meeting the conditions mentioned in (1) and (2) or have not participated in the tender, the 6.25% of earmarked quantity for SC/ST owned MSE firms will be distributed among the other eligible MSE vendors who have participated in the tender.

2. If tendered quantity is Non-Splittable: If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15% of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 100% of total value.

J. INTEGRITY COMMITMENT IN THE TENDER PROCESS, AND EXECUTION OF CONTRACTS:

1. Commitment by BHEL: BHEL commits to take all measures necessary to prevent corruption in connection with the Tender process and execution of the Contract. BHEL will, during the tender process, treat all bidder / suppliers in a transparent and fair manner, and with equity.
2. Commitment by Bidder(s)/ Contractor(s):
 - a. The Bidder(s)/ Contractor(s) commit(s) to take all measures to prevent corruption and will not directly or indirectly try to influence any decision or benefit which he is not legally entitled to.
 - b. The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding or any actions to restrict competition.
 - c. The Bidder(s)/ Contractor(s) will not commit any offence under the relevant Acts. The Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain or pass on to others, any information or document provided by BHEL as part of business relationship.

- d. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to the relevant guidelines issued from time to time by Government of India/ BHEL.

If the Bidder(s) / Contractor(s), before award or during execution of the Contract commit(s) a transgression of the above or in any other manner such as to put his reliability or credibility in question, BHEL is entitled to disqualify the Bidder(s) / Contractor (s) from the tender process or terminate the contract and/ or take suitable action as deemed fit.

K. Integrity Pact (IP):

- a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

1. Shri Arun Chandra Verma,IPS (Retd.)
Email: acverma1@gmail.com
2. Shri Virendra Bahadur Singh,IPS (Retd.)
Email: vbsinghips@gmail.com

- b) Please refer Section-8 of the IP for Role and Responsibilities of IEMs (Annexure IX). In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEM/s shall be done through email only.

Note: No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are indicated in SCC document of tender.

Annexure

Annexure I
Guidelines for Indian Agents

- **Definition of Indian Agent:** An Indian Agent of foreign principal is an individual, a partnership, an association of persons, a private or public company, that carries out specific obligation(s) towards processing of BHEL tender or finalization or execution of BHEL's contract on behalf of the foreign supplier.

In case of yes, vendor to note the following and reply accordingly:

- i. BHEL shall deal directly with foreign vendors, wherever required, for procurement of goods. However, if the foreign principal desires to avail of the services of an Indian agent, then the foreign principal should ensure compliance to regulatory guidelines - which require mandatory submission of an Agency Agreement.
- ii. It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.
- iii. The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.
- iv. Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.
- v. Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.
- vi. In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.
- vii. The "Guidelines for Indian Agents of Foreign Suppliers" enclosed at annexure - 'A' shall apply in all such cases.

- viii. The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on 'total cost to BHEL'. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines of Supplier Evaluation, Approval & Review Procedure (SEARP), before opening of price bids. In this regard, details may be checked as per Annexure-B (copy enclosed). It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on www.bhel.com.

The responsibility for successful execution of the contract (including indigenous supplies/ services) lies with the OEM/ foreign principal. All bank guarantees to this effect shall be in the scope of the OEM/ foreign principal.

--x--

Vendor's Signature with Seal

Guidelines for Indian Agents of Foreign Suppliers

- 1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BHEL shall apply for registration in the registration form in line with SEARP.
- 1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the Principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/ remuneration/ salary/ retainership being paid by the principal to the agent before the placement of order by BHEL.
- 1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.
- 2.0 **Disclosure of particulars of agents/ representatives in India, if any.**
- 2.1 Tenderers of Foreign nationality shall furnish the following details in their offers:
 - 2.1.1 The Bidder(s)/ Contractor(s) of foreign origin shall disclose the name and address of the agents/ representatives in India if any and the extent of authorization and authority given to commit the Principals. In case the agent/ representative be a foreign Company, it shall be confirmed whether it is existing Company and details of the same shall be furnished.
 - 2.1.2 The amount of commission/ remuneration included in the quoted price(s) for such agents/ representatives in India.
 - 2.1.3 Confirmation of the Tenderer that the commission/ remuneration, if any, payable to his agents/ representatives in India, may be paid by BHEL in Indian Rupees only.
- 2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:
 - 2.2.1 The Bidder(s)/ Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any, indicating their nationality as well as their status, i.e. whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/ representatives.
 - 2.2.2 The amount of commission/ remuneration included in the price (s) quoted by the Tenderer for himself.
 - 2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/ remuneration, if any, reserved for the Tenderer in the quoted price(s), may be paid by BHEL in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.
- 2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission/ remuneration, if any payable to the agents/ representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.
- 2.4 Failure to furnish correct and detailed information as called for in paragraph 2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BHEL. Besides this there would be a penalty of banning business dealings with BHEL or damage or payment of a named sum.

ANNEXURE - II
LIST OF INTERNATIONAL GATEWAY AIRPORTS

For air based consignment, terms of delivery will be on FCA basis from following listed airports only. Vendors are requested to verify this list for use before submission of offer.

SCHEDULE NO	COUNTRY	CURRENCY CODE	AIRPORT
D01	UK	GBP	LONDON (HEATHROW)
D02	UK	GBP	NEW CASTLE
D03	UK	GBP	OXFORD. CHETLAM
D04	UK	GBP	BRISTOL. WELLINGBOROUGH
D05	UK	GBP	BIRMINGHAM
D06	UK	GBP	EAST MIDLANDS
D07	UK	GBP	MANCHESTER
D08	UK	GBP	LEEDS
D09	UK	GBP	GLASGOW
D10	FRANCE	EURO	PARIS (ROISSY) & LYON
D11	SWEDEN	EURO	STOCKHOLM
D12	SWEDEN	EURO	GOTHENBERG & MALMO
D13	ITALY	EURO	ROMA, MILAN
D14	ITALY	EURO	TURIN, BOLOGNA, FLORENCE
D15	NETHERLANDS	EURO	AMSTERDAM, ROTTERDAM
D16	AUSTRIA	EURO	VIENNA, LINZ, GRAZ
D17	BELGIUM	EURO	ANTWERP, BRUSSELS
D18	DENMARK	DKK	COPENHAGEN
D19	JAPAN	JPY	TOKYO, OSAKA
D20	SINGAPORE	SGD	SINGAPORE
D21	CANADA	CAD	TORONTO
D22	CANADA	CAD	MONTREAL
D23	USA	USD	NEW YORK, BOSTON
D24	USA	USD	CHICAGO
D25	USA	USD	SAN FRANCISCO, LOS ANGELES
D26	USA	USD	ALANTA, HOUSTON
D27	GERMANY	EURO	MUNICH, KOLN, DUSSELDORF, HANNOVER, HAMBURG, STUTTGART, DAMSTADT, MANIHIEM, NURUMBERG
D28	GERMANY	EURO	FRANKFURT
D29	GERMANY	EURO	BERLIN
D30	SWITZERLAND	SFR	BASLE, ZURICH, GENEVA
D31	SPAIN	EURO	BARCELONA
D32	AUSTRALIA	AUD	SYDNEY
D33	AUSTRALIA	AUD	MELBOURNE
D34	AUSTRALIA	AUD	PERTH
D35	CZECH	EURO	PRAGUE
D36	HONG KONG	HKD	HONG KONG
D37	NEW ZELAND	NZD	AUCKLAND
D38	RUSSIA	USD	MOSCOW
D39	SOUTH KOREA	USD	KIMPO INTERNATIONAL, INCHEON
D40	FINLAND	EURO	HELSINKI
D41	ROMANIA	EURO	BUCHAREST
D42	NORWAY	EURO	OSLO
D43	IRELAND	EURO	DUBLIN
D44	ISRAEL	USD	TEL AVIV
D45	UAE	USD	DUBAI
D46	OMAN	USD	MUSCAT
D47	EGYPT	USD	CAIRO
D48	TAIWAN	USD	TAIPEI
D49	UKRAINE	USD	KIEV
D50	CHINA	USD	SHANGHAI, SHENZHEN
D51	PHILIPINES	USD	MANILA
D52	MALAYSIA	USD	KUALALUMPUR, PE NANG
D53	CYPRUS	USD	LARNACA
D54	SOUTH AFRICA	USD	JOHANNESBERG, DURBAN
D55	SLOVAKIA	EURO	BARTISLOVA
D56	SAUDI ARABIA	SAR	RIYADH
D57	TURKEY	EURO	ISTANBUL
D58	THAILAND	USD	BANGKOK
D59	BRAZIL	USD	SAO PAULO, RIO DE JANEIRO

ANNEXURE – III

DISCREPANCY IN WORDS & FIGURES – QUOTED IN PRICE BID

Following guidelines will be followed in case of discrepancy in words & figures-quoted in price bid:

(a) If, in the price structure quoted for the required goods/services/works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.

(b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

(c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

(d) If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.

ANNEXURE - IV
Electronic Funds Transfer (EFT) OR
Paylink Direct Credit Form

Please Fill up the form in **CAPITAL LETTERS** only.

TYPE OF REQUEST(Tick one): CREATE CHANGE

BHEL Vendor / Supplier Code:

Company Name :

Permanent Account Number(PAN):

Address

City: PINCODE STATE

Contact Person(s)

Telephone No:

Fax No:

e-mail id:

1 Bank Name:

2 Bank Address:

3 Bank Telephone No:

4 Bank Account No:

5 Account Type: Savings/Cash Credit

6 9 Digit Code Number of Bank and branch appearing on MICR cheque issued by Bank

7 Bank IFSC Code(applicable for NEFT)

8 Bank IFSC code(applicable for RTGS) (Indian Financial System Code)

- A I hereby certify that the particulars given above are true, correct and complete and that I, as a representative for the above named Company, hereby authorise BHEL, EDN, Bangalore to electronically deposit payments to the designated bank account.
- B If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold BHEL / transferring Bank responsible.
- C This authority remains in full force until BHEL, EDN, Bangalore receives written notification requesting a change or cancellation.
- D I have read the contents of the covering letter and agree to discharge the responsibility expected of me as a participant under ECS / EFT.

Date:

Authorised Signatory:

Designation: Telephone No. with STD Code

Company Seal

Bank Certificate

We certify that has an Account No with us and we confirm that the bank details given above are correct as per our records.

Date: (.....)

Place: Signature

Please return completed form along with a blank cancelled cheque or photocopy thereof to:

Bharath Heavy Electricals Ltd,

Attn:

Electronics Division, Mysore Road,

BANGALORE - 560 026

In case of any Query, please call concerned purchase executive.

ANNEXURE - V
PRESENT PROCEDURE FOR SALE IN TRANSIT (HIGH SEA SALES)

In case of High Sea Sales, vendor should submit following documents:

1. ORIGINAL HIGH SEA SALES AGREEMENT

- Sale agreement (on Rs. 200/- non-judicial stamp paper & notarised with 2 witnesses with identity) has to be signed between BHEL and the Party importing material. The date of the sale documents should be in between the date of House Air Way Bill / Bill of Lading and before landing of the goods in Indian origin.
- Following shall be included in the High Sea Sales Agreement:
"THE BUYER ALSO UNDERTAKE DISCHARGES, THE OBLIGATION AND FULFILLMENT OF CONDITIONS, IF ANY, ATTACHED TO THE IMPORTATION, ASSESSMENT AND CLEARANCE OF THE GOODS IN TERMS CUSTOMS TARIFF ACT 1975, THE CUSTOMS ACT 1962 & RULES & REGULATIONS MADE THERE UNDER AND OTHER RELEVANT ACTS, ORDERS, NOTIFICATIONS".

2. ORIGINAL INVOICES: INDIGENOUS RUPEE INVOICE & FOREIGN CURRENCY INVOICE

- Prices should be C.I.F., designated airport/seaport basis.
- I.E.C., C.S.T., K.S.T. Nos. to be mentioned.
- Description of item (Nomenclature), Unit & Quantity in both the Foreign Currency & the Indigenous Invoice in Rupee shall be exactly as per Purchase Order Description of item, Quantity and Unit. The Indigenous Invoice value shall be exactly as per Purchase Order value.
- Seller should give Foreign Currency Invoice from the original consignor. The Foreign Currency Invoice value should be at least 2% (two per cent) less than the Indigenous Rupee Invoice value in equivalent foreign currency.

4. ORIGINAL HOUSE AIR WAY BILL/ BILL OF LADING

- The sale agents should duly endorse House Air Way Bill (HAWB) for air shipments or original Bill of Lading (O.B.L.) for sea shipments and Foreign Currency Invoice in favour of BHEL-EDN.

5. ORIGINAL CARGO ARRIVAL NOTICE FROM FORWARDER.

6. ORIGINAL DELIVERY ORDER ISSUED IN NAME OF BHEL-EDN.

7. ORIGINAL PACKING LIST.

8. A LETTER TO THE COMMISSIONER OF CUSTOMS FOR EFFECTING ABOVE SALE.

9. A LETTER TO THE DEPUTY ASSESSOR (OCTROI) FOR EFFECTING ABOVE SALE IN FAVOUR OF BHEL.

REMARKS: In case vendor needs any clarifications on the above, the same may be sought in writing.



ELECTRONICS DIVISION, BANGALORE

Annexure-VI

BHEL MEMBER BANKS (LIST OF CONSORTIUM BANKS)

Bank Guarantee (BG) shall be issued from the following banks only:

Sl. No.	Nationalised Banks	Sl. No.	Public Sector Banks
1	Allahabad Bank	18	IDBI
2	Andhra Bank		
3	Bank of Baroda	Sl. No.	Foreign Banks
4	Canara Bank	19	CITI Bank N.A
5	Corporation Bank	20	Deutsche Bank AG
6	Central Bank	21	The Hongkong and Shanghai Banking Corporation Ltd. (HSBC)
7	Indian Bank	22	Standard Chartered Bank
8	Indian Overseas Bank	23	J P Morgan
9	Oriental Bank of Commerce		
10	Punjab National Bank	Sl. No.	Private Banks
11	Punjab & Sindh Bank	24	Axis Bank
12	State Bank of India	25	The Federal Bank Limited
13	Syndicate Bank	26	HDFC Bank
14	UCO Bank	27	Kotak Mahindra Bank Ltd
15	Union Bank of India	28	ICICI Bank
16	United Bank of India	29	IndusInd Bank
17	Vijaya Bank	30	Yes Bank

Note:

- All BGs must be issued from BHEL consortium banks listed above.
- This list is subject to changes. Hence vendors are requested to check this list every time before issuing BGs.
- Bank Guarantees issued by Co-operative Banks/Financial Institutions cannot be accepted under any circumstance.

Annexure-VII

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____¹ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) with its registered office at _____² hereinafter referred to as the 'Vendor / Contractor / Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated³ valued at Rs.....⁴ (Rupees -----)/FC.....(in words.....) for⁵ (hereinafter called the 'Contract') and the Vendor / Contractor / Supplier having agreed to provide a Contract Performance Bank Guarantee, equivalent to% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we,, (hereinafter referred to as the Bank), having registered/Head office at and inter alia a branch at being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer any sum or sums upto a maximum amount of Rs --⁶ (Rupees -----) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor / Contractor / Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor / Contractor / Supplier shall have no claim against us for making such payment.

We thebank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract/satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till

all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

WeBANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Vendor / Contractor / Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor / Contractor / Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor / Contractor / Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor / Contractor / Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor / Contractor / Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor / Contractor / Supplier 's liabilities.

This Guarantee shall remain in force upto and including.....⁷ and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor / Contractor / Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the⁸we shall be discharged from all liabilities under this guarantee thereafter.

We, BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁶
- b) This Guarantee shall be valid up to⁷
- c) Unless the Bank is served a written claim or demand on or before⁸ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated.....

Place of Issue.....

¹ NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited

² NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

³ DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

⁴ CONTRACT VALUE

⁵ PROJECT/SUPPLY DETAILS

⁶ BG AMOUNT IN FIGURES AND WORDS

⁷ VALIDITY DATE

⁸ DATE OF EXPIRY OF CLAIM PERIOD

Certificate by Chartered Accountant on letterhead

This is to certify that M/s _____
(hereinafter referred to as 'enterprise') having PAN Number _____ and
UDYAM Registration Number _____, registered office at _____
_____ is falling under the category
_____ (**Micro / Small / Medium**) under MSME Act 2006. (Copy of UDYAM Registration
Certificate to be enclosed).

The said classification of _____ (**Micro / Small / Medium**) is arrived at based on the
Notifications / guidelines / clarifications issued under Micro, Small and Medium Enterprises
Development Act, 2006 including the notification S.O.2119 (E) dated 26th June 2020.

The Investment of the enterprise in Plant and Machinery or Equipment as at 31st March
2020 as per Clause 4 of the Notification is _____ (Rupees in Lakhs).

The turnover of the Enterprise for the period ending 31st March 2020 as per Clause 5
of the Notification is _____ (Rupees in Lakhs).

Date:

(Signature) Name-
Membership number-

Seal of Chartered Accountant with UDIN reference

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi - 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1- Commitments of the Principal

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions:

Section 2 - Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

Section 3 - Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

Section 4 - Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to

demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 - Equal treatment of all Bidders/ Contractors / Sub-contractors

- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors /Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 - Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality in line with Non- disclosure agreement.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

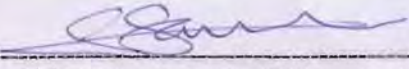
Section 9 - Pact Duration

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders / contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.


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 For & On behalf of the Principal
 SARAVANA BABU A., MANAGER/CE-MM-PR
 BHEL-EDN, MYSORE ROAD, BANGALORE-560025

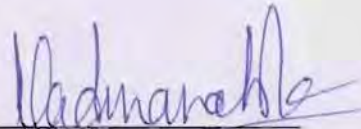
(Office Seal)

 For & On behalf of the Bidder/
 Contractor

(Office Seal)

Place Bengaluru

Date _____

Witness: 
 (Name & Address) Bengaluru
M. PADMANABHA
SDGM-EE-MM-PR
BHEL EDN, Bengaluru

Witness: _____
 (Name & Address) _____

Annexure-X

Restrictions under Rule 144(xi) of General Financial Rules, 2017 amendment dt: 23.07.2020

- I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
- II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- III. "Bidder from a country which shares a land border with India" for the purpose of this Order means :-
 - a. An entity incorporated, established or registered in such a country; or
 - b. A subsidiary of an entity incorporated, established or registered in such a country; or
 - c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
 - d. An entity whose *beneficial owner* is situated in such a country; or
 - e. An Indian (or other) agent of such an entity; or
 - f. A natural person who is a citizen of such a country; or
 - g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
- IV. The *beneficial owner* for the purpose of (iii) above will be as under:
 1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation--

 - a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company;
 - b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;
 2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
 4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
 5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.
- V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
 भारत हेवी इलेक्ट्रिकल्स लिमिटेड

**Bharat Heavy Electricals Ltd.,
 (A Government of India undertaking)
 Electronics Division**

PB 2606 , Mysore Road Bangalore , 560026 INDIA

CE: PR: 002- Rev 03

GENERAL COMMERCIAL CONDITIONS FOR CONTRACT

These 'General Commercial Conditions for Contract for Purchase' herein after referred to as GCC apply to all enquiries, tenders, requests for quotations, orders, contracts and agreements concerning the supply of goods and the rendering of related services (hereinafter referred to as "deliveries") to Bharat Heavy Electricals Limited and any of its units, regions or divisions (hereinafter referred to as "BHEL" or the Purchaser) or its projects/ customers.

Any deviations from or additions to these GCC require BHEL's express written consent. The general terms of business or sale of the vendor shall not apply to BHEL. Acceptance, receipt of shipments or services or effecting payment shall not mean that the general terms of business or sale of the vendor have been accepted.

Orders, agreements and amendments thereto shall be binding if made or confirmed by BHEL in writing. Only the Purchasing department of BHEL is authorized to issue the Purchase Order or any amendment thereof.

Definitions: Throughout these conditions and in the specifications, the following terms shall have the meanings assigned to them, unless the subject matter or the context requires otherwise.

- 'The Purchaser' means Bharat Heavy Electricals Limited, Electronics division, Mysore road, Bangalore 560 026, a Unit of Bharat Heavy Electricals Limited (A Govt. of India Undertaking) incorporated under the Companies Act having its registered office at BHEL House, Siri Fort, New Delhi-110049, India and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
- 'The vendor' means the person, firm, company or organization on whom the Purchase Order is placed and shall be deemed to include the vendor's successors, representative heirs, executors and administrator as the case may be. It may also be referred to as Seller, Contractor or Supplier.
- 'Contract' shall mean and include the Purchase Order incorporating various agreements, viz. tender/ RFQ, offer, letter of intent/acceptance/ award, the General Conditions of Contract and Special Conditions of Contract for Purchase, Specifications, Inspection/ Quality Plan, Schedule of Prices and Quantities, Drawings, if any enclosed or to be provided by BHEL or his authorized nominee and the samples or patterns if any to be provided under the provisions of the contract.
- 'Parties to the Contract' shall mean the 'The Vendor' and the Purchaser as named in the main body of the Purchase Order.

Order of Precedence:

In case of any inconsistency or contradiction between any of the documents, the order of precedence shall be Purchase Order, LOI / LOA, Special Conditions of Contract and General Conditions of Contract for commercial conditions; and specific agreement on technical conditions, RFQ/offer and specification for Technical Conditions.

Interpretation:

In the contract, except where the context requires otherwise:

- words indicating one gender include all genders;
- words indicating the singular also include the plural and words indicating the plural also include the singular;

- c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and
- d) "Written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

Applicable Conditions:

1. **Price Basis:** All prices shall be firm until the purchase order is executed / completed in all respects. No price variations / escalation shall be permitted.
2. **Ordering and confirmation of Order:** Vendor shall send the order acceptance on their company letter head/ through e-mail within a week from the date of receipt of Purchase Order or such other period as specified/ agreed by BHEL. BHEL reserves the right to revoke the order placed if the order confirmation differs from the original order placed. The acceptance of goods/services/supplies by BHEL as well as payments made in this regard shall not imply acceptance of any deviations.
The purchase order will be deemed to have been accepted if no communication to the contrary is received within one week (or the time limit as specified/agreed by BHEL) from the date of receipt of the purchase order.
3. **Documentation:** After receipt of Purchase Order, vendor should submit necessary documents (if & as applicable) like drawings specified, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report, O & M Manuals and/or any other relevant documents as per Specification/Purchase Order, as and when required by BHEL/ Customer.
At any stage within the contract period, the vendor shall notify of any error, fault or other defect found in BHEL's documents / specifications or any other items for reference. If and to the extent that (taking account of cost and time) any vendor exercising due care would have discovered the error, fault or other defect when examining the documents/specifications before submitting the tender, the time for completion shall not be extended. However if errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the vendor's documents, they shall be corrected at his cost, notwithstanding any consent or approval.
4. **Penalty:**
 - a. **For delay in documentation:** In the event of delay in submission of complete set of specified documents ((like drawings, bill of materials, datasheets, catalogues, quality plan etc. as called in tender specifications including soft copies wherever applicable) in required sets beyond two(02) weeks (or as agreed/indicated in the SCC/Purchase Order) from the date of receipt of Purchase Order (by email), penalty at 0.5% (half percent) per week or part thereof, limited to a maximum of 5% (five percent) of the basic material value of the Purchase Order will be applicable.

Penalty for delayed documentation if applicable, shall be deducted at the time of first supply payment. If penalty is applicable for duration of less than a week, penalty @ 0.5% (half percent) of the basic material value will be deducted. GST as applicable will be recovered along with penalty amount.
 - b. **For delay in delivery:** In the event of delay in agreed contractual delivery as per Purchase Order, penalty @ 0.5 % (half percent) per week or part thereof but limited to a max of 10% (ten percent) value of undelivered portion (basic material cost) will be applicable. Delivery will commence from the date of issue of Manufacturing clearance along with approved document. The date for which Inspection call is issued by vendor along with test certificates / test reports / Certificate of Conformance / calibration reports, as proof of completion of manufacturing will be treated as date of deemed delivery for penalty calculation. In the absence of furnishing such document indicated above as proof of completion of manufacturing along with inspection call, actual date of inspection will be considered as date of deemed delivery and BHEL will not be responsible for delay in actual date of inspection.

Penalty for delayed delivery if applicable, shall be deducted at the time of first supply payment. If penalty is applicable for duration of less than a week, penalty @ 0.5% (half percent) of the basic material value will be deducted. GST as applicable will be recovered along with penalty amount.

5. Contract variations (Increase or decrease in the scope of supply): BHEL may vary the contracted scope as per requirements at site. If vendor is of the opinion that the variation has an effect on the agreed price or delivery period, BHEL shall be informed of this immediately in writing along with technical details. Where unit rates are available in the Contract, the same shall be the basis for such additional work. Vendor shall not perform additional work before BHEL has issued written instructions/ amendment to the Purchase Order to that effect. The work which the vendor should have or could have anticipated in terms of delivering the service(s) and functionality (i.e.) as described in this agreement, or which is considered to be the result of an attributable error on the vendor's part, shall not be considered additional work.
6. Inspection: Prior written notice of at least 10 days shall be given along with internal test certificates/COC and applicable test certificates. Materials will be inspected by BHEL-EDN-QS/CQS or BHEL nominated Third Party Inspection Agency (TPIA) or BHEL authorized Inspection Agency or Customer / Consultant or jointly by BHEL & Customer / consultant. All tests have to be conducted as applicable in line with approved Quality plan or QA Checklist or Purchase specification and original reports shall be furnished to BHEL-EDN, Bangalore for verification/acceptance for issue of dispatch clearance. BHEL reserves the right for conducting repeat test, if required.
All costs related to inspections & re-inspections shall be borne by vendor. Whether the Contract provides for tests on the premises of the vendor or any of his Sub-contractor/s, vendor shall be responsible to provide such assistance, labour, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such other special tests shall be borne by BHEL only if specifically agreed to in the purchase order.
7. Transit Insurance: Transit insurance coverage between vendor's works and project site shall be to the account of BHEL, unless specifically agreed otherwise. However, vendor shall send intimation directly to insurance agency (as mentioned in dispatch instructions issued by BHEL) through fax/courier/e-mail, immediately on dispatch of goods for covering insurance. A copy of such intimation sent by vendor to insurance agency shall be given to BHEL along with dispatch documents. Dispatch documents will be treated as incomplete without such intimation copy. BHEL shall not be responsible for sending intimations to insurance agency on behalf of the vendor.
8. Mode of dispatch:
Indigenous Scope: By road on Door Delivery Consignee Copy attached basis through your approved transporter (unless otherwise indicated in Dispatch Instructions), only on receipt of Despatch Clearance from BHEL.
Imported Scope: By Air/Sea through BHEL approved Freight Forwarder/supplier approved Consolidator respectively as per agreed contractual terms, only on receipt of Dispatch Clearance from BHEL.
9. Changes in Statutory levies:
If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the execution of Contract, which was or will be assessed on the bidder in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to fully take into account any such change by addition to the Contract Price or deduction there from, as the case may be. However, these adjustments would be restricted to direct transactions between BHEL and the bidder /agent of foreign bidder (if applicable). These adjustments shall not be applicable on procurement of raw materials, intermediary components etc. by the bidder /agent.
10. Availing duty/tax exemption benefits by bidder, wherever applicable: BHEL shall issue the required Certificate/s, as per relevant policies of the Govt. of India, to facilitate the bidders to avail any such benefits under the Contract. In case of failure of the bidders to receive the benefits partly or fully from the Govt. of India and/or in case of any delay in receipt of such benefits, BHEL shall neither be liable nor responsible in any manner whatsoever.

11. Taxes against sub-vendor dispatches: All taxes/levies, as applicable in respect of all components, equipments and material to be despatched directly from the sub-vendor's works to Site irrespective of the fact whether such taxes and levies are assessable and chargeable on Vendor or the BHEL, shall be to the vendor's account and no separate claim in this regard will be entertained by BHEL.
12. High Sea Sales (HSS): Customs clearance of the consignment landed on Indian Sea/Air ports will be done by BHEL based on the original HSS documents provided by vendors.
Any delay in submission of complete/correct HSS documents to BHEL may incur demurrage charges. All demurrage charges on account of incomplete /incorrect HSS documents submission by vendor will be to vendor's account and all such charges will be recovered from any of the available vendor bills with BHEL.
13. Packaging and dispatch: The Seller shall package the goods safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by Sea/ Air / Rail/ Road to its destination suitably protected against loss, damage, corrosion in transit and the effect of tropical salt laden atmosphere. The packages shall be provided with fixtures/ hooks and sling marks as may be required for easy and safe handling. If any consignment needs special handling instruction, the same shall be clearly marked with standard symbols / instructions. Hazardous material should be notified as such and their packing, transportation and other protection must conform to relevant regulations.
The packing, shipping, storage and processing of the goods must comply with the prevailing legislation and regulations concerning safety, the environment and working conditions. Any Imported/Physical Exports items packed with raw/ solid wood packing material should be treated as per ISPM – 15 (fumigation) and accompanied by Phytosanitary/ Fumigation certificate. If safety information sheets (MSDS – Material Safety Data Sheet) exist for an item or the packaging, vendor must provide this information without fail along with the consignment.
Each package must be marked with Consignee name, Purchase order number, Package number, Gross weight and net weight, dimensions (LxBxH) and Seller's name. Packing list of goods inside each package with PO item number and quantity must also be fixed securely outside the box to indicate the contents of each box. Total number of packages in the consignment must also be indicated in the packing list.
Separate packing & identification of items should be as follows.
1. Main Scope - All items must be tagged with part no. & item description.
2. Commissioning accessories/spares - All items must be tagged with part no. & item description.
3. Mandatory spares - All items must be tagged with part no. & item description.
Nevertheless, vendor shall adhere to dispatch & packing instructions issued by BHEL at the time of dispatch.
14. Assignment of Rights & Obligations; Subcontracting: Vendor is not permitted to subcontract the delivery or any part thereof to third party or to assign the rights and obligations resulting from this agreement in whole or in part to third parties without prior written permission from BHEL. Any permission or approval given by the BHEL shall, however, not absolve the vendor of the responsibility of his obligations under the Contract.
15. Progress report: Vendor shall render such report as to the progress of work and in such form as may be called for by the concerned purchase officer from time to time. The submission and acceptance of such reports shall not prejudice the rights of BHEL in any manner.
16. Non-disclosure and Information Obligations: Vendor shall provide with all necessary information pertaining to the goods as it could be of importance to BHEL. Vendor shall not reveal any specified confidential information that may be divulged by BHEL to Vendor's employees not involved with the tender/ contract & its execution and delivery or to third parties, unless BHEL has agreed to this in writing beforehand. Vendor shall not be entitled to use the BHEL name in advertisements and other commercial publications without prior written permission from BHEL.
17. Cancellation /Termination of contract: BHEL shall have the right to completely or partially terminate the agreement by means of written notice to that effect. Termination of the Contract, for whatever reason, shall be without prejudice to the rights of the parties accrued under the Contract up to the time of termination.
BHEL shall have the right to cancel/foreclose the Order/ Contract, wholly or in part, in case it is constrained to do so on account of any decline, diminution, curtailment or stoppage of the business.

18. Risk Purchase Clause: In case of failure of supplier, BHEL at its discretion may make purchase of the materials / services not supplied / rendered in time at the RISK & COST of the supplier. Under such situation, the supplier who fails to supply the goods in time shall be wholly liable to make good to BHEL any loss due to risk purchase.

In case of items demanding services at site like erection and commissioning, vendor should send his servicemen/representatives within 7 days from the service call. In case a vendor fails to attend to the service call, BHEL at its discretion may also make arrangements to attend such service by other parties at the **RISK & COST** of the supplier. Under such situation the supplier who fails to attend the service shall be wholly liable to make good to BHEL any loss due to risk purchase/service including additional handling charges due to the change.

19. Shortages: In the event of shortage on receipt of goods and/or on opening of packages at site, all such shortages, caused by supplier's act or omission, shall be made good at free of cost within a reasonable time that BHEL may allow from such intimation.

Transit Damages: In the event of receipt of goods in damaged condition or having found them so upon opening of packages at site, supplier shall make good of all such damages within a reasonable time from such intimation by BHEL. In case BHEL raises an insurance claim, the cost of material limited to insurance settled amount less handling charges will be reimbursed to supplier.

20. Remedial work: Notwithstanding any previous test or certification, BHEL may instruct the vendor to remove and replace materials/goods or remove and re-execute works/services which are not in accordance with the purchase order. Similarly BHEL may ask the vendor to supply materials or to execute any services which are urgently required for any safety reasons, whether arising out of or because of an accident, unforeseeable event or otherwise. In such an event, Vendor shall provide such services within a reasonable time as specified by BHEL.

21. Indemnity Clause: Vendor shall comply with all applicable safety regulations and take care for the safety of all persons involved. Vendor is fully responsible for the safety of its personnel or that of his subcontractor's men / property, during execution of the Purchase Order and related services. All statutory payments including PF, ESI or other related charges have to be borne by the vendor. Vendor is fully responsible for ensuring that all legal compliances are followed in course of such employment. Vendor shall fully indemnify and keep indemnified BHEL against all claims of whatsoever nature arising during the course and out of execution of this Order/Contract.

22. Product Information, Drawings and Documents: All specified drawings, technical documents or other technical information received by Vendor from BHEL or vice versa shall not, without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the Disclosing party, otherwise be used or copied, reproduced, transmitted or communicated to third parties. All information and data contained in general product documentation, whether in electronic or any other form, are binding only to the extent that they are by reference expressly included in the contract.

Vendor, as per agreed date/s but not later than the date of delivery, provide free of charge information and drawings which are necessary to permit and enable BHEL to erect, commission, operate and maintain the product. Such information and drawings shall be supplied in as many numbers of copies as may be agreed upon.

All intellectual properties, including designs, drawings and product information etc. exchanged during the formation and execution of the Contract shall continue to be the property of the disclosing party.

23. Intellectual Property Rights, Licenses: If any Patent, design, Trade mark or any other intellectual property rights apply to the delivery (goods/related service) or accompanying documentation shall be the exclusive property of the Vendor and BHEL shall be entitled to the legal use thereof free of charge by means of a non-exclusive, worldwide, perpetual license. All intellectual property rights that arise during the execution of the Purchase Order/ contract for delivery by vendor and/or by its employees or third parties involved by the vendor for performance of the agreement shall belong to BHEL. Vendor shall perform everything necessary to obtain or establish the above mentioned rights. The Vendor guarantees that the delivery does not infringe on any of the intellectual property rights of third parties. The Vendor shall do everything

necessary to obtain or establish the alternate acceptable arrangement pending resolution of any (alleged) claims by third parties. The Vendor shall indemnify BHEL against any (alleged) claims by third parties in this regard and shall reimburse BHEL for any damages suffered as a result thereof.

24. Force Majeure: Notwithstanding anything contained in the purchase order or any other document relevant thereto, neither party shall be liable for any failure or delay in performance to the extent said failures or delays are caused by the "Act of God" and occurring without its fault or negligence, provided that, force majeure will apply only if the failure to perform could not be avoided by the exercise of due care and vendor doing everything reasonably possible to resume its performance.

A party affected by an event of force majeure which may include fire, tempest, floods, earthquake, riot, war, damage by aircraft etc., shall give the other party written notice, with full details as soon as possible and in any event not later than seven (7) calendar days of the occurrence of the cause relied upon. If force majeure applies, dates by which performance obligations are scheduled to be met will be extended for a period of time equal to the time lost due to any delay so caused.

Notwithstanding above provisions, in an event of Force Majeure, BHEL reserves for itself the right to cancel the order/ contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of deliveries and other schedules.

25. Warranty:

Wherever required, and so provided in the specifications/ Purchaser Order, the Seller shall ensure that the goods supplied shall comply with the specifications laid down, for materials, workmanship and performance.

Unless otherwise specified in SCC, warranty period shall be applicable for a period of 24 months from the date of delivery of goods or 18 months from the date of commissioning of goods, whichever is earlier.

The warranty period as described above shall apply afresh to replaced, repaired or re-executed parts of a delivery. Unless otherwise specifically provided in the Purchase Order, Vendor's liability shall be co terminus with the expiration of the applicable warranty period.

26. Limitation of Liability: Vendor's liability towards this contract is limited to a maximum of 100% of the contract value and consequential damages are excluded. However the limits of liability will have no effect in cases of criminal negligence or wilful misconduct.

The total liability of Vendor for all claims arising out of or relating to the performance or breach of the Contract or use of any Products or Services or any order shall not exceed the total Contract price.

27. Liability during warranty: Vendor shall arrange replacement / repair of all the defective materials / services under its obligation during the warranty period. The rejected goods shall be taken away by vendor and replaced / repaired. In the event of the vendor's failure to comply, BHEL may take appropriate action including disposal of rejections and replenishment by any other sources at the cost and risk of the vendor. In case, defects attributable to vendor are detected during Warranty period or where the commissioning call is issued within the warranty period, vendor shall be responsible for replacement/ repair of the goods as required by BHEL at vendor's cost even after expiry of warranty period.

Further if the equipment or any part thereof cannot be used by reason of such defect and/or making good of such defect, the warranty period of the equipment or such part, as the case may be, shall be extended by a period equal to the period during which the equipment or such part cannot be used by BHEL because of any of the aforesaid reasons. Upon correction of the defects in the facilities or any part thereof by repair/replacement, such repair/replacement shall have the warranty period for a period of twelve (12) months from the time such replacement/repair of the equipment or any part thereof has been completed.

28. Liability after warranty period: At the end of the warranty, the Vendor's liability ceases except for latent defects. For the purpose of this clause, latent defects shall be the defects inherently lying within the material or arising out of design deficiency which do not manifest themselves during the warranty Period, but later. The Contractor's liability for latent defects warranty for the equipment including spares shall be limited to a period of six months from the end of the warranty period of the respective equipment including spares or first time commissioning, whichever is later but not later than one (01) year from the date of expiry of warranty period.

29. Compliance with Laws: Vendor shall, in performing the contract, comply with all applicable laws. The vendor shall make all remittances, give all notices, pay all taxes, duties and fees, and obtain all permits, licences and approvals, as required by the laws in relation to the execution and completion of the contract and for remedying of any defects; and the Contractor shall indemnify and hold BHEL harmless against and from the consequences of any failure to do so.
30. Settlement of Disputes: Except as otherwise specifically provided in the Purchase Order, decision of BHEL shall be binding on the vendor with respect to all questions relating to the interpretation or meaning of the terms and conditions and instructions herein before mentioned and as to the completion of supplies/work/services, other questions, claim, right, matter or things whatsoever in any way arising out of or relating to the contract, instructions, orders or these conditions or otherwise concerning the supply or the execution or failure to execute the order, whether arising during the schedule of supply/work or after the completion or abandonment thereof. Any disputes or differences among the parties shall to the extent possible be settled amicably between the parties thereto, failing which the disputed issues shall be settled through arbitration. Vendor shall continue to perform the contract, pending settlement of dispute(s).
31. Arbitration Clause in case of Contract with vendors other than Public Sector Enterprise (PSE) or a Government Department:

Arbitration & Conciliation:

The parties shall attempt to settle any disputes or difference arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract, or in connection with this contract through friendly discussions. In case no amicable settlement can be reached between the parties through such discussions, in respect of any dispute; then, either Party may, by a notice in writing to the other Party refer such dispute or difference to the sole arbitration of an arbitrator appointed by Head of the BHEL–EDN. Such Sole Arbitrator appointed, shall conduct the arbitration in English language.

The Arbitrator shall pass a reasoned award and the award of the Arbitration shall be final and binding upon the Parties.

Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be Bangalore.

The cost of arbitration shall be borne as decided by the Arbitrator upon him entering the reference.

Subject to the Arbitration Clause as above, the Courts at Bangalore alone shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract.

Notwithstanding the existence or any dispute or differences and/or reference for the arbitration, the parties shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and efficiency in a professional manner except where the Contract has been terminated by either Party in terms of this Contract.

Arbitration Clause in case of Contract with a Public Sector Enterprise (PSE) or a Government Department:

In the event of any dispute or difference relating to the interpretation and application of the provisions of the Contract, such dispute or difference shall be referred by either party for Arbitration to the Sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any Party aggrieved by such Award may make further reference for setting aside or revision of the Award to the Law Secretary, Department of Legal Affairs, Ministry of Law and Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary or Additional Secretary when so authorized by the Law Secretary, whose decision shall bind the Parties hereto finally and conclusively. The Parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator.'

32. Applicable Laws and Jurisdiction of Courts: Prevailing Indian laws both substantive and procedural, including modifications thereto, shall govern the Contract. Subject to the conditions as aforesaid, the competent courts in Bangalore alone shall have jurisdiction to consider over any matters touching upon this contract.
33. General Terms: That any non-exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents.

That the headings used in this agreement are for convenience of reference only.

That all notices etc., to be given under the Purchase order shall be in writing, type script or printed and if sent by registered post or by courier service to the address given in this document shall be deemed to have been served on the date when in the ordinary course, they would have been delivered to the addressee.



ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
भारत हेवी इलेक्ट्रिकल्स लिमिटेड

Page 1 of 4

Bharat Heavy Electricals Ltd.,
(A Government of India undertaking)
Electronics Division

CE: PR: 003- Rev 02

PB 2606 , Mysore Road Bangalore , 560026 INDIA

SPECIAL COMMERCIAL CONDITIONS OF CONTRACT

Reference is brought to BHEL's Instructions to Bidders (Document Ref: CE: PR: 001- Rev 04) and General Commercial Conditions for Contract (Document Ref: CE: PR: 002- Rev 03).

These two documents along with Special Conditions of Contract annexed to this RFQ will form an integral part of the contract as and when the RFQ culminates into a Purchase Order / Contract.

RFQ No. : **SBA0000581**
RFQ Date : As per E-procurement website
RFQ Due Date : As per E-procurement website
Customer/Project : **Ennore**
Scope Description : **UPS**

Kindly submit your quotation as **two part bid** (Pre-Qualification Criteria & Techno-Commercial bid-1st part & Price bid-2nd Part) in E-Procurement System portal: <https://eprocurebhel.co.in> within the Due- Date of ___ As per E-procurement website ___ before ___ As per E-procurement website ___ hours IST and note that tenders will be opened on the same day at ___ As per E-procurement website ___ hours IST.

Purchase Executives: Clarifications with regard to the tender shall be addressed to purchase officers whose e-mail IDs are given below:

saravanababu@bhel.in or padmanabha@bhel.in

Splitting of tendered quantity to MSE vendors for Purchase preference: Non-Splittable

Destination: For Indigenous scope of supply, items are to be directly despatched to BHEL site office/stores located at ___ Chennai ___ TPP in ___ Tamil Nadu state , India. Detailed Consignee details will be issued by BHEL along with Despatch Clearance.

Imported scope of supply: Project Imports: Eligible for Concessional Basic Custom Duty.

Terms of Delivery:

- **Indigenous scope of supply:** Ex-works, <indicate station of dispatch> (including Packing & Forwarding charges but excluding Taxes).
- **Imported scope of supply:**
C.I.F. (for sea consignments) < ICD, Bangalore > (including Packing, Forwarding, Handling, Ancillary charges like processing of Sight Draft/ Letter of Credit, negotiation of bank documents, Export declaration, Country of Origin etc.).
Kindly indicate the approximate weight of the total imported consignment, which is required for calculating air-freight/Inland freight charges:_____

Under-mentioned details shall be provided against indigenous supplies & services:

a. GeM Seller ID mandatorily required for PO placement: _____

b. MSE vendor : Yes-MSE supporting documents enclosed/No
(If MSE, supporting documents such as Udyam certificate to be enclosed)**I. Bidders to mandatorily provide confirmation/compliance for the under-mentioned terms:**

SL NO	TERMS	BHEL ACCEPTABLE TERM	BIDDER'S CONFIRMATION	REMARKS,if any
01	Reverse Auction (RA)	Not applicable		
03	Delivery Period	Within <u>12</u> weeks from the date of issue of Manufacturing clearance along with approved document. Delay in contractual delivery will attract Penalty as per GCC Clause no.:04.b. Staggered manufacturing clearance for below spares will be provide later as per site delivery schedule. Present delivery schedule is Mar'24.	AGREE weeks	
04	Terms of Payment at the time of material supply	Refer Clause "F" of Instructions to Bidder for BHEL standard Payment terms and loading factors applicable for non-compliance against payment terms: Indigenous Scope : a)Supply with Service(s) Imported Scope : c)Supply with Service(s) High-Sea sales : e)Supply with Service(s) Spares : b) and/or d)/f) depending upon the scope	AGREE	
05	Declaration of local content : The 'Class-I local supplier' shall be required to indicate percentage of local content and provide certification that the item offered meets the local content requirement	'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent. {'Class-I local supplier' means a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%, as defined under Public procurement order no.P-45021/2/2017-PP (BE-II) dt: 16.09.2020. In the event of any Nodal Ministry prescribing higher or lower margin of purchase preference and/or higher or lower percentage of local content	Percentage of local content : _____% Details of the Location(s) at which the local value addition is made : _____	

	for 'Class-I local supplier'.	in respect of this procurement, same shall be applicable}.' (Refer Clause 'A' Sl. No. 12 of Instructions to Bidders). Note: Non Local suppliers are eligible to participate in the tender		
06	Declaration as a compliance to Rule 144(xi) of GFR, 2017 amendment dt 23.07.2020 issued by Ministry of Finance, Govt. of India.	The below declaration is to be submitted on Company Letter head duly signed and sealed by authorised signatory, for ascertaining the eligibility of offer in the tender. "I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that our firm is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that our firm fulfils all requirements in this regard and is eligible to be considered." (Refer Clause 'A' Sl. No. 13 of Instructions to Bidders).		

II. Bidder to note that Deviations shall not be permitted for the below mentioned terms and are deemed to be complied. In case of non-compliance/deviation, offer shall be liable for rejection:

- (1) **Submission of documents post PO viz., drawings /data sheet etc. as indicated in Cl: 04 of GCC:** Within _03_ weeks from the date of receipt of Purchase Order. Delay in submission of complete set of specified documents in NIT, will attract Penalty as per GCC Clause no.:04.a.
- (2) **Validity:** The offer will be valid for a period of _90_ days from the date of part-I bid opening and in case of Negotiation/ Counter-offer/RA, price validity will apply afresh for a period of _30_ days from the date of according final price by bidder (or) up to original validity period, whichever is later.
- (3) **Warranty:** _24_ months from the date of dispatch of goods (or) _18_ months from the date of commissioning, whichever is earlier.
- (4) **Performance Bank Guarantee (PBG):** PBG will be applicable for a period of _24_ months from the date of dispatch of goods + claim period of 03 months, for a value equal to 10% of the basic value of purchase order. It shall however be noted that PBG is not applicable against supply of Mandatory Spares.

Refer Clause "H" of Instructions to Bidders. Also note that PBG should be in the format specified in Annexure VII of ITB and no deviation to this format will be allowed.

Note: In case PBG is not furnished, the 10% basic amount will be withheld from the supply invoice. This withheld amount will be paid either against submission of supplementary invoice & Original PBG (or) against supplementary invoice without PBG after expiry of Warranty period.

- (5) **Despatch Documents:** Complete set of despatch documents (original + 1 photocopy set) as per Purchase Order shall be forwarded to Purchase Executive/BHEL directly. Depending upon the project/customer demands, Despatch documents may include one (or) more documents from the following:

Invoice (01 original and 01 copy with original sign & seal / digitally signed invoice), Lorry Receipt (L/R),

Packing List, NIL Short-Shipment Certificate, insurance intimation letter, E-way bill, original Performance Bank Guarantee (directly from issuing bank to BHEL), Country of Origin certificate and original POD (Proof of Delivery) on L/R.

The precise list of despatch documents needed for the project will be specified in the Purchase Order.

One set of Invoice, Packing List, Lorry Receipt (or) AWB/BOL shall be e-mailed immediately to BHEL-EDN at the time of despatch.

Note: Detailed Packing List should indicate package-wise content details and also Net & Gross weight of each package.

- (6) **Freight Charges (for indigenous scope of supply)**: Freight charges shall be to vendor's account. Bidder to quote reasonable Freight charges along with applicable tax, in price bid.
- (7) **Evaluation criteria to determine L1 bidder**: Items will not be split on item-wise lowest offer. Evaluation of the lowest bidder will be done as a combined package basis.
- (8) **Erection and Commissioning charges**: Not applicable
- (9) **Erection Supervision and Commissioning charges**:
In case the quoted total Erection Supervision & Commissioning value is less than 5% of the main supply value, BHEL shall evaluate & order, Bidders Price deducting differential amount from main supply price and apportioning towards Erection Supervision & Commissioning charges.
Refer Sl. no. 'h' under Clause 'F' of Instructions to Bidders for Payment terms of Erection Supervision & Commissioning charges.
Note: Wherever bidders doesn't agree for such apportioning, the differential charges shall be retained from main supply price and retention amount will be paid after successful completion of Erection & Commissioning.
- (10) **Comprehensive Annual Maintenance Contract**: Not applicable
- (11) **Integrity Pact**: Not applicable

With this, we hereby confirm that all the terms & conditions as indicated in Instructions to Bidders (Document Ref: CE: PR: 001- Rev 04) & General Commercial Conditions for Contract (Document Ref: CE: PR: 002- Rev 03) are accepted without any deviation.

Vendor's Signature with Seal

Tender Inviting Authority: BHEL EDN BANGALORE

Name of Work: UPS for Ennore Project

Contract No: SBA0000581

Name of the Bidder/ Bidding Firm / Company :	
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PRICE SCHEDULE

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)

NUMBER #	TEXT #	NUMBER #	TEXT #	TEXT #	NUMBER #	NUMBER	NUMBER	NUMBER #	NUMBER #	NUMBER #	TEXT #
Sl. No.	Item Description	Quantity	Units	Quoted Currency in INR / Other Currency	BASIC RATE In Figures To be entered by the Bidder in Rs. P	GST (in Percentage)	Total GST Amount in Rs. P	HSN / SAC Code	TOTAL AMOUNT, It will be convert	TOTAL TAXES It will be convert only If you choose Full Conversion, Until it will be treated as INR	TOTAL AMOUNT In Words
1	2	4	5	12	7	8	9	10	11	12	13
2	1 x 200 kVA UPS, 240V AC 1 Ph Output	2	SETS	INR			0.00		0.000	0.000	INR Zero Only
3	Non - Compartmentalized ACDB-I & ACDB-II (123 feeders each)	2	SETS	INR			0.00		0.000	0.000	INR Zero Only
4	PDB-I & PDB-II (36 feeders each)	2	SETS	INR			0.00		0.000	0.000	INR Zero Only
5	BHMS (for 2 x 295 cells, 1045 AH)	4	SETS	INR			0.00		0.000	0.000	INR Zero Only
6	DISCHARGE RESISTOR BANK FOR 1x200 kVA UPS (Ni-Cd Battery)	1	SET	INR			0.00		0.000	0.000	INR Zero Only
7	INTERCONNECTING CABLES (UPS TO BATTERY, UPS TO ACDB)	1280	MTRS	INR			0.00		0.000	0.000	INR Zero Only
8	MODBUS CABLES	300	MTRS	INR			0.00		0.000	0.000	INR Zero Only
9	MANDATORY SPARES	1	LOT	INR			0.00		0.000	0.000	INR Zero Only
10	ERECTION, SUPERVISION & COMMISSIONING	2	SETS	INR			0.00		0.000	0.000	INR Zero Only
11	Freight Charge for Main Supply	1	AU	INR			0.00		0.000	0.000	INR Zero Only
12	Freight Charge for Mandatory spares	1	AU	INR			0.00		0.000	0.000	INR Zero Only
Total in Figures									0.000	0.000	INR,USD,EUR Zero Only
Quoted Rate in Words			INR,USD,EUR Zero Only								



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CE/416/ENNORE/UPS

REV 00

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PROJECT : ENNORE SEZ (2x660 MW)

CUSTOMER : M/s TANGEDCO

CONSULTANT : M/s DESEIN, NEW DELHI

SPECIFICATION

FOR

UNINTERRUPTIBLE POWER SUPPLY SYSTEM(UPS)

PQR:

The equipment make/model must have proven performance of working in the power plant more than 1x500 MW capacity, at least two sets of such equipment installed in a power plant of minimum capacity 150 kVA rating parallel redundant float cum boost chargers UPS system and have been running successfully for at least two years prior to the date of technical bid opening.

Satisfactory Performance Certificate from End-user shall be submitted for verification. In absence of satisfactory performance certificate, technical offer submitted by bidder will not be evaluated further.

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REVISION:01

APPROVED

AMIT KUMAR SHARMA

PREPARED

ISSUED

DATE

SATHISH

416

28/11/2022



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Sl. No.	Description	Reference.
1.	Scope of Supply	CE/416/ENNORE/UPS/SOS, Rev.00 Sheets 04
2.	Technical Requirements	CE/416/ENNORE/UPS/TR, Rev.00 Sheets 14
3.	Feeder List	CE/416/ENNORE/UPS/FL, Rev.00 Sheets 07
4.	Battery Sizing Calculation	CE/416/ENNORE/UPS/BSC, Rev.00 Sheets 02
5.	Single Line Diagram	CE/416/ENNORE/UPS/SLD, Rev 00 Sheets 03

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CE/416/ENNORE/UPS/SOS

REV 00

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PROJECT : ENNORE SEZ (2x660 MW)

CUSTOMER : M/s TANGEDCO

CONSULTANT : M/s DESEIN, NEW DELHI

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SCOPE OF SUPPLY

REVISION:01

APPROVED

AMIT KUMAR SHARMA

PREPARED

ISSUED

DATE

SATHISH

416

28/11/2022



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CE/416/ENNORE/UPS/SOS

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SCOPE OF SUPPLY

Following UPS shall be as per Technical Requirement Ref: CE/416/ENNORE/UPS/TR and detailed Scope of Supply.

A. To be offered by UPS Manufacturer

S.NO	LOCATION	UPS RATING	ACDB-1 FEEDERS	ACDB-2 FEEDERS	QTY	E&C QTY
1	MAIN PLANT U-1	2 x 200 kVA	123 Nos	123 Nos	1 Set	1 Set
2	MAIN PLANT U-2	2 x 200 kVA	123 Nos	123 Nos	1 Set	1 Set
3	PDB for Switches U-1 #	-	36 Nos	36 Nos	1 Set	-
4	PDB for Switches U-2 #	-	36 Nos	36 Nos	1 Set	-

PDB's shall be provided by UPS Manufacturer

B. "1 Set" of UPS system in Sl.No A. 1) & 2) comprises of the following:-

01. 100% capacity of IGBT based PWM Inverter with Output Voltage, Current, frequency, kVA & kW digital display/meter 2 Nos
02. 100% capacity static switches with input voltage, current, frequency digital display/meter at bypass line 2 Nos
03. Manual Bypass Switch. 1 No
04. 100% capacity of 12 pulse controlled float cum boost chargers 2 Nos
05. 100% Battery set each for 2-hour back-up 2 Sets *
06. Step down transformer 415V, 3 Ph. to 240V, 1 Ph of reqd. capacity 1 No.
07. Static Voltage Stabilizer with input & output ON Red indication and input & output voltage, current, frequency digital display/meter 1 Set
08. Input isolation transformer with input & output ON Red indication and input voltage, current, frequency digital display/meter & Output isolation transformer 1 No. each
09. AC power Distribution panels and digital type Ammeter, Voltmeter, Frequency meter, PF Meter, Watt meter & VA meter 2 Sets
10. Interconnecting Armoured FRLS ST2 (inner & outer sheath), PVC Type C insulated stranded Copper conductor power cable between UPS equipment & battery, UPS & ACDB As required.
11. Online Battery Health Monitoring System 2 Sets **
12. MCCB (at input, output, battery side, Bypass side, ACDB side, etc.) and normally open tie breaker with ON, OFF & Trip indication. 1 No. each
13. Battery Junction Boxes with MCCB, Voltmeter & Current Meter 2 Sets
14. Any other equipment necessary for completion of the system shall be provided by Bidder including suitable cable glands, lugs (for interconnection cables between UPS, Battery, ACDB and at UPS incomer), Base Frame, Anti-Vibration Pad, etc.

* Battery being procured by BHEL separately.

**BHMS shall be provided by UPS Manufacturer including interconnecting cables and other accessories. Cable Route length from each individual cells to BHMS Module shall be min 30 meters.

All equipment, enclosures and accessories for UPS System shall be designed, arranged, assembled and connected in accordance with the requirements of this specification.

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C. INTERCONNECTION CABLE DETAILS:

S. N O	LOCATION	CABLE ROUTING DISTANCE PER RUN		TOTAL MODBUS CABLE QTY (mtrs)*
		UPS to BATTERY	UPS to ACDB	
1	MAIN PLANT U-1	100	30	150
2	MAIN PLANT U-2	100	30	150

* UPS Manufacturer has to calculate the cable cross-section of FRLS ST2 PVC Type C cable considering 4V drop UPS & Battery, 2V drop between UPS & ACDB considering above mentioned cable routing distance. Please note that above mentioned BOQ of FRLS ST2 PVC Type C cable and MODBUS cable shall be supplied in a roll/drum (without cutting) as per maximum length required above & available with Cable Manufacturer

D. MANDATORY SPARES for UPS System:

S.NO	ITEM	QUANTITY
01)	Fuses/Semiconductor Fuses	300% of installed of each type, current rating with each panel/board (in Nos)
02)	Miscellaneous parts for the power supplies such as SCRs, transistors, diodes, light bulbs, static switches, blocking diodes, etc.	Minimum of 10% or atleast two (whichever is more) of each type.
03)	Electronic Modules like Rectifier Control Card, Inverter Control Card, IGBT Module, DC-DC converter card or any other card.	1 Set of each type & rating
04)	Miniature Circuit breakers	20% of installed of 10 Nos of each type (which ever is more)
05)	Digital/analog panel meters/indicators	5% or 2 no. of each type (whichever is more)
06)	CT's, CVT's, VT's, Chokes, AC/DC isolators, contactors, timers, relays	10% or 2 Nos of each type and rating (whichever is more)
07)	Cooling Fans	10% or 2 Nos of each type and rating (whichever is more)
08)	Electronic Modules of each type & rating	One set of electronic modules with each set consisting of atleast one number of each type of electronic module for inverters, chargers, static switch, stabilizer, etc.
09)	MCCB for UPS, ACDB	20% of installed or 5 Nos of each type (whichever is more)

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1.0 GENERAL TECHNICAL REQUIREMENTS

- 1.1 Only the site-proven & type tested (in the last 4 years), electronic modules (in case of UPS System) & cell plates (in case of UPS Battery) will be acceptable unless otherwise decided by the purchaser in special circumstances.
- 1.2 For UPS, the type test shall be as per IEC-146, Degree of Protection test as per IS-2147 and the same are not to be specifically conducted for the projects if conducted on similar type/rating or similar type/higher rating UPS. If type tests are not available with supplier, then type tests has to be conducted and reports has to be submitted without any price implication to BHEL.
- 1.3 Erection supervision & commissioning of Battery with overall integration of complete system is responsibility of UPS vendor.
- 1.4 In case, there is any contradiction in any parameter/specification, the most stringent shall be considered as final and shall be offered accordingly.
- 1.5 In UPS System, the voltage window of inverter shall be suitably designed for 1.1V End Cell Voltage, 1.68V Boost Voltage considering 295 cells for Fiber Plated Ni-Cd Battery.

2.0 DOCUMENTS TO BE FURNISHED

- 2.1.1. **After Inspection but 1 week before dispatch:** For BHEL/CUSTOMER approval, vendor must send following documents in soft copy.
 01. Preliminary Instruction /O&M Manual
- 2.1.2. **Along with the materials being dispatched:** Vendor must send five (5) sets of the following “As Built & Approved” status documents four (4) in hard copies & one (1) in soft copy.
 - (a) Instruction/O&M Manual
 - (b) Bill of Material
 - (c) Data Sheets
 - (d) Technical literatures/Catalogs
 - (e) Drawings GA/layout/wiring/interconnection/schematic, etc.)
- 2.1.3. **After despatch of material within 1 week :** Vendor must send the following documents in soft copy directly to Site.
 - (a) Instruction/O&M Manual
 - (b) “As built & Approved drawings”.

NOTE: One (01) set soft copy of Final document shall also be provided to BHEL. The soft copy shall be in CD-ROM media and shall be in Acrobat (pdf) formats.



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PROJECT : ENNORE SEZ (2x660 MW)

CUSTOMER : M/s TANGEDCO

CONSULTANT : M/s DESEIN, NEW DELHI

TECHNICAL REQUIREMENTS

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REVISION:01

APPROVED

AMIT KUMAR SHARMA

PREPARED

ISSUED

DATE

SATHISH

416

28/11/2022



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1.01.00 GENERAL REQUIREMENTS

- 1.01.01** This subsection covers design, construction and performance requirements of parallel redundant industrial grade Uninterruptible Power Supply (UPS) System to be furnished by the Bidder for BTG, Station C & I Package The Bidder shall furnish separate parallel redundant industrial grade UPS System for each unit including static inverters, static switches, manual bypass switch, chargers, A.C. Power distribution panels with all required isolating and protecting devices and all other equipment and accessories required for completeness of this system. Bidder to note that there will be no common component like in phase transformer (IPT), common power supply to any redundant component and common point of failure in the UPS system.
- 1.01.02** The requirements of UPS system are specified herein on system basis. The Bidder shall be responsible for engineering and furnishing a complete and operational system fully meeting the intent and requirements of this specification and Owner approved drawings.
- 1.01.03** The equipment furnished under this subsection shall meet the requirements of all applicable codes and standards including ANSI, NEMA, TEEE, NEC and IS.
- 1.01.04** **The UPS System hardware shall be from the latest established product range of a qualified manufacturer. The Bidder shall furnish documents to satisfy the owner that the design, performance and high availability of the proposed UPS System and all system components have been established by a considerable record of successful operation in utility power station for similar application.** All UPS system cabinets, enclosures and distribution boards shall be manufactured, assembled, wired and fully tested as a complete assembly as per the requirements of this specification in the manufacturing works of a qualified manufacturer prior to shipment to the project site. Class of insulation of wound components (All transformers, chokes/inductances etc.) shall be class H with temp rating up to class B.
- 1.01.05** The UPS system equipment and the complete system shall have surge withstanding capability (SWC) to meet the requirements of ANSI C 37.90a – IEEE Standard 472 –1974. UPS system should be provided with Class C type surge protection device. The Class C type surge arrester should be single MOV type , pluggable, should have fault indication and should be tested as per IEC 61643-1 to withstand 40KA 8/20 μ s pulse. The arresters should have potential free contact to ensure maintainability.
- 1.01.06** All non-interrupting components of UPS system shall be capable of withstanding all available short circuit current without damage. Additionally, all circuit interrupting components shall be capable of withstanding and interrupting all encountered short circuit currents without damage.
- 1.01.07** All control and instrument circuits shall be fused. Fuses shall be mounted inside the enclosures and shall have easy accessibility. Fuses shall be Buss man low-peak type or Owner approved equivalent. All load fuses shall be to Owner's approval equal. The Bidder shall co-ordinate all load and line fuses applications to ensure that load fuses operate properly.



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1.01.08 The bidder shall be responsible for ensuring that UPS System and the downstream power distribution system for equipment to be serviced by are coordinated such that UPS loads continue to operate without interruption and in accordance with the power supply tolerance requirements (both voltage and frequency) for these UPS loads as long as at least one source is within the limits of voltage and frequency as specified herein. The Bidder shall furnish single line diagrams with his proposal to demonstrate how this requirement is met for all equipment and system covered under Bidders scope.

1.01.09 The UPS system will be installed in AC room.

1.01.10 Acoustic noise at rated linear load shall be < 75 dBA at 1 meter distance from UPS as per ISO 3746.

1.02.00 FUNCTIONAL REQUIREMENTS OF UPS

1.02.01 CAPACITY OF UPS SYSTEM FOR main plant PACKAGE, remote I/O panels and BOP/OFF-SITE PACKAGES

Parallel redundant UPS shall be sized by the bidder to cater to power for the bidder furnished loads such as plant control, monitoring system. Min. capacity shall be considered as per capacity mentioned in scope of supply at 50 deg. C ambient. All microprocessor based system, I/o cards, digital equipment's, operating stations, printers, peripherals, receiver instruments, SWAS, CEMS, LVS, HMS, TSI, VMS, PADO, C&I Lab, Operator training Simulator system and other devices mounted in supervisory control desk, control panels and other microprocessor based system for BTG shall be operated on UPS power.

This base capacity shall be guaranteed at 240 V AC, 50 Hz single phase output at 50 deg. C & 95 % RH – non condensing at ambient conditions. Ratings other than standard ratings of the manufacturer shall not be acceptable.

1.02.02 The parallel redundant Uninterruptible Power Supply (UPS) system of continuous duty shall supply, regulated, filtered and uninterrupted 240 V, 50 Hz, single phase power, within specified tolerances, to system AC loads, UCB mounted monitoring system, and other critical loads. Each of these critical loads shall receive one feeder from the AC Distribution Board of Inverter-"A" and another feeder from the AC Distribution Board of Inverter-"B". However, each inverter shall supply only 50% loads under normal conditions as indicated below. SLD of UPS shall also be referred by bidder.

1.02.03 All necessary equipment required for protecting UPS equipment and connected inputs and outputs shall be furnished by the Bidder as an integral part of this system. Complete UPS system shall be automatic without any manual interference at any time of operation.

1.02.04 True, 100% parallel redundant configuration also means availability of "Criss-Cross Redundancy". Hence The UPS system design shall ensure that in case of one of the charger failure, the other healthy charger, shall feed to one of or both the invertors as the case may be and continue to charge the common/individual DC battery banks at all load conditions. UPS system shall work in "Criss-Cross Redundancy" configuration to safeguard the battery bank from unnecessary drainage. The bidder should note that this situation should not in any way lead to the discharge of the DC battery and maintain the UPS power supply to all loads.



1.02.05 NORMAL OPERATION

Two inverters each of 100% capacity, two battery packs of 100% capacity and two 100% battery chargers are used for main plant UPS.

1. During normal operation, UPS loads shall be supplied by both 100% capacity inverters each working at 50% load. The inverters shall receive power from DC source (Charger / Battery), their static switches shall be in the respective "Inverter" position and the manual by-pass switch shall be in "Position-2". In this mode the two inverters shall act as standby for each other.
2. Necessary paralleling networks shall be included to ensure equal load sharing by both inverters. Load sharing network details shall be detailed to establish all functionalities including fuse clearance. Capabilities of the UPS System as well as each 100% rated inverters are fully satisfied. In addition to UPS output paralleling, Rectifier DC outputs shall also be properly paralleled.
3. One inverter will act as "Master", working on its internal oscillator and the other inverter will follow by using the synchronizing signal from master inverter for automatic control of its output frequency.

1.02.06 EMERGENCY OPERATION

The static transfer switches and the manual by-pass switch shall provide switching means during emergency operation as follows:

1. In case of failure of any inverter the static switch shall automatically transfer the UPS Loads of faulty inverter (say Inverter – "A") to the healthy Inverter-"B" which will start working at 100% capacity. Thus the feeding of UPS power is continued automatically to all load connected to both inverters despite power supply to all UPS loads connected to both inverters shall be maintained without interruption. Isolation of faulty inverter shall be automatic and achieved in less than 4 milli seconds.
2. Based on inverter failure alarm, the operator will transfer manual by-pass switch to "Position-1" bringing in the plant AC source as the standby source to healthy Inverter – "B" now working at 100% capacity. In this mode the healthy Inverter-"B" shall get the synchronizing signal from the stand by-AC source and automatic synchronization, operation on internal oscillator and transfer / retransfer to standby source shall be as follows:
 - i) The output frequency of the concerned inverter shall be automatically synchronized with the plant stand-by source by using synchronizing signal from the standby source. The frequency limits for this synchronism are specified in clause 7.03.05. If the frequency of the standby source is beyond these limits, the Inverter frequency control shall be automatically disconnected from stand-by synchronizing signal and the inverter shall maintain the output frequency at 50 Hz within + 0.1 percent under all conditions of load and input voltage by working on their own internal oscillators.
 - ii) During operation on its own internal oscillator, the inverters shall continuously monitor the frequency of standby source. Upon restoration of proper frequency conditions of stand-by source, the inverter shall automatically start using stand-by source frequency as the synchronizing signal for inverter output frequency control.



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- iii) During the operation of any inverter on its internal oscillator due to synchronising frequency being beyond the specified limits, the transfer of static switch from "Inverter" to "Standby" shall be inhibited.
3. During any fault in the branch circuit feeders or inverter output bus, the inverter shall be capable of clearing a fast acting fuse of largest rating in 4 milliseconds and simultaneously provide UPS power to all connected loads (i.e. 50% capacity). In view of the above fault clearing capability of each inverter and due to availability of plant AC source as standby source for inverters the static switches shall not transfer the loads to the other inverter for fault clearing purposes.
4. Retransfer of static switch shall be manual in all cases and shall be accomplished only after synchronism of the inverter output with the stand-by source has been automatically accomplished.
5. The manual bypass switch shall have the provision (position -4) for fully by-passing the UPS system and connecting all UPS loads to the standby AC source. This provision may be used during start up to limit the inrush current and at other occasions at the option of the operator.

1.03.00 STATIC INVERTERS AND AUXILIARY EQUIPMENT

1.03.01 The static inverters shall be solid state type using proven IGBT based pulse width modulation (PWM) to convert direct current power to essentially sinusoidal alternating current power as per this specification. The inverter equipment shall include all necessary circuitry and devices to conform to requirements like voltage regulation, current limiting, wave shaping, transient recovery, surge suppression network, automatic synchronization etc. as specified herein.

1.03.02 INVERTER CAPACITY

Each static inverter shall have the following minimum capabilities without causing any damage to the components and with current limit not operation :-

- 1) Continuous full load rating
- 2) Over load capacity: 125% of full load rating as above for 10 minutes, 150% for 1 minute, 200% for 10 seconds minimum & 300% for 4 msec for all specified input voltages.
- 3) Fuse clearing capacity : Upon a fault in any branch circuit lateral feeder, the inverter shall have the capacity to carry a load equal to one half of its full load rating plus it shall clear the largest rated fast acting fuse in 4 milliseconds or less. All fuses used in inverter power and control circuit shall be fast acting type operating in less than 5 millisecond and each of these fuses shall be provided with kick fuse and alarm contact. Indication and alarm shall be provided to enable fault location.
- 4) Step load pick up: Upon transfer of full load, the inverter output voltage shall not drop below 85% of nominal voltage during the first half cycle after transfer and 90% of nominal voltage in the next half cycle. The recovery to within + 1% of voltage shall be in less than 50 milliseconds.



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- 5) The inverter shall have sufficient I²t capacity to clear a slow acting semiconductor fuse having a continuous current rating equal to at least 20% of the continuous full load current rating of the inverter, while feeding 100% rated loads of the inverter.

1.03.03 INPUT VOLTAGE

The inverters shall be fed from a DC Battery and chargers which do not feed any other loads. Input voltage shall be nominal DC output voltage of battery and charger of range from final voltage after discharge of battery to maximum DC bus voltage during equalize charging of battery. The inverter shall also be capable of working satisfactorily meeting the specification requirements with only the chargers connected to its input without battery in circuit. Filtering on the input of the inverters shall be furnished is required to operate within the output ripple of the chargers furnished by the Bidder. Each inverter shall include equipment necessary to protect itself from damage resulting from excursions, loss, or restoration of DC input voltage and synchronizing voltage. The inverter output voltage shall be 230 V AC , 50 Hz, Single phase.

1.03.04 OVER LOADS, SHORT CIRCUITS AND LOAD LOSS PROECTION

1. The inverters shall be provided with suitable fuses at the input and output which will permit proper co-ordination with other protective devices and at the same time protect the inverter against damage due to internal faults. All necessary equipment shall be provided to protect the inverters against over loads, short circuits and 100% loss of load. The inverter shall be self-protecting against damage if energized with full load connected.
2. The inverter shall be provided with current limiting circuitry which will limit the output current to a value which will not damage the inverter or blow its fuses.
3. The inverter shall have sufficient I²t capability to prevent damage to itself until short circuit conditions on the output are cleared.
4. Each inverter shall be capable of operation with non-linear loads. For loads provided by owner, bidder may assure a non-linear wave form with a current crest factor of 3.0 occurring coincident with voltage peak. With non-linearity consisting of third, fifth and seventh order harmonics. Output waveform of the inverter(s) shall remain within specified limits when operating with non-linear loads at 100 percent rated load.
5. The inverters shall be self-protecting against all AC and DC transients, voltage surges and steady state abnormal voltages and current likely to be encountered in utility power station.

1.03.05 Automatic Synchronisation

Inverter equipment shall include stable solid state oscillator devices designed to automatically maintain the inverter output in phase and in synchronization with the standby AC source. The frequency regulation shall be automatic within + 0.1 Hz of all conditions of inputs, loads and temperature occurring simultaneously or in any combination.

Facility shall be provided for automatic transfer to internal oscillator operation when the standby source frequency is not within the synchronization limits.

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Provision shall be made for step less adjustment of synch disconnect frequency range from 50 Hz +/- 0.5 Hz to 50 Hz +/- 2 Hz.

Automatic adjustment of phase relationship between inverter output and standby AC source shall be gradual, at a controlled slew rate, which shall not exceed 0.1 Hz per second.

The inverter shall normally work on the internal oscillator with either of the two inverters as master synchronizer and the other following it. Suitable selector facility shall be provided to select the master. When any one inverter fails the healthy inverter gets the synchronizing signal from the standby AC source.

The DC input current shall never exceed the full load current except for a short circuit within the inverter. The limitation applies to transient as well as steady state currents and includes in rush currents upto initial energisation of the UPS, load energisation, short circuits external to the inverter etc. For any value of the load and load power factor drawn by the equipment served, the inverter shall not impose on DC source any voltage oscillations in excess of 5 volts (RMS total, all frequencies) or any current oscillations in excess of 3% (RMS total, all frequencies) of the DC current at full load.

1.03.06 The inverter shall meet the following specifications in addition to other requirements stated herein :-

1. Voltage input : As per system (Battery output) requirement
2. Nominal voltage output : 240V, 50Hz, single phase
3. Inverter capacity (output KVA) : As per clause 7.03.02
4. Voltage regulation :
 - a) Steady state : + 1 %
(0-100% load at all input voltages & all power factors)
 - b) Transient voltage regulation : + 5%
(on application or removal of 100% load)
 - c) Time to recover : <50 milli second
from transient to normal voltage with +/- 1% of steady state (on application or removal of 100% load)
5. Wave Form
 - a) Nominal Frequency : 50 Hz
 - b) Frequency regulation : +/- 0.1Hz
for all conditions of input supplies, loads and temperature occurring simultaneously or in any combination (automatically controlled)



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- c) Synchronization limits : 48 Hz to 52 Hz (factory test)
(for maintenance & synchronism between the inverter and standby AC source).
- d) Field adjustment range for (c) above : 50 +/- 0.5 Hz to 50 +/- 2 Hz
- e) Total harmonic content : <4% max.
- f) Harmonic content : <2.5%
max.for any single harmonic
- 6. Rated output current at rated output voltage with current limit not operating :
 - a) Current : 200%
 - b) Duration : 10 seconds
- 7. Overload capacity at 100% voltage :
 - a) For 4 ms (fuse clearing) : App. 300%
 - b) For 10 seconds : 200%
 - c) For 10 minutes : 125%
 - d) The proposed inverter has : ---
the capacity to clear largest acting fuse in 5 milli second & without entering into current limiting mode
- 8. Efficiency (watt output/watt input)
 - a) at 100% load 1.0 P.F. / 0.8 P.F. : > 91% / 91%
 - b) at 75% load 1.0. P.F. / 0.8 P.F. : > 90% / 90%
 - c) at 50% load 1.0 P.F. / 0.8 P.F. : > 89% / 89 %
- 9. Duty : Continuous
- 10. Cooling : Natural convection or forced cooling using redundant fans.

Equipment to be designed for operation with full load even without cooling availability.
- 11. Ambient temperature : 50 deg C, maximum
- 12. SCR de-rating from peak voltage and peak ratings : 50%



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1.03.07 STATIC INVERTER AUXILIARY EQUIPMENT

In addition to the inverter equipment specified above, auxiliary equipment shall be furnished with each static inverter as follows:

- 1) Equipment and material furnished, mounted and wired on the front panel of the inverter enclosures :

ITEM	QUANTITY
Output ammeter, AC, indicating, Scale-0 to 150 percent of rated continuous full load inverter output current, 1 percent accuracy.	1
Output voltmeter, AC, indicating 0-300 volt scale, 1 percent accuracy.	1
Output KVA, AC indicating scale 0-150 percent of Rated capacity, 1 percent accuracy.	1
Input voltmeter DC, indicating 0-300 volts scale, 1 percent accuracy.	1
Frequency meter, 45-55 hertz, 1 percent accuracy.	1
Power factor meter, (0-1. 0-0), 1 percent accuracy	1
Inverter ON-OFF switch	1
Alarm Reset Push Button	1

- 2) Indicating lights listed below with proper actuating devices, circuitry and legend shall be furnished on front of the Ups panels. For these abnormal conditions which could be of a momentary nature, the indicating lights shall remain energized and the contract remain closed until cleared by a reset push button furnished on the panel. The indicating lights shall be of make subject to Owner's approval.

The following indications shall be provided as a minimum :

- a) DC voltage to the Inverter - Low
- b) DC voltage to the Inverter - High
- c) Loss of DC input to the inverter
- d) Inverter output voltage - High
- e) Inverter output voltage - Low (after a time delay to avoid unnecessary alarm due to low voltage on load in rush etc.)
- f) Inverter A failure / Inverter B failure
- g) Standby AC source failure
- h) Inverter A / Inverter B not synchronized with AC source
- i) Automatic transfer to AC source. Blown Fuse or Tripped Breaker.
- j) Inverter A/ Inverter B feeding 100% UPS Load
- k) Standby source feeding 100% UPS loads
- l) Redundant fan failure and temperature high (if provided)

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1.04.00 STATIC TRANSFER SWITCHES AND AUXILIARY EQUIPMENT

1.04.01 The static transfer switches shall be provided to perform the following functions

1) To transfer the load automatically without any break between the inverter to the standby inverter as required to maintain the continuity of power supply to UPS connection loads. The load shall be automatically transferred from "Inverter" to the inverter source upon any malfunction of one inverter.

2) To transfer UPS load under manual control from standby AC source to inverter when placing the UPS System in service and from inverter to standby AC source when taking the UPS out of service.

1.04.02 The static transfer switches shall have two modes of operation namely automatic and manual.

1.04.03 The static transfer switches shall use silicon controlled rectifiers and other static devices required for automatic transfer of load from "Inverter" to Standby" source and vice versa. The static switches shall conform to the requirements specified herein including the following:

1. Capacity (continuous) : Equal to the continuous full load capacity of the inverter.
2. Capacity (overload) : 200% for 10 seconds, 150% of continuous for 60 seconds and 125% of continuous rating for 10 minutes and 300% of continuous rating for 4 msec.
3. Capacity (Peak) : 1000 % of continuous rating for 5 cycles.
4. Transfer Time : < 4 msec. The transition shall be "make before break", voltage failure shall be sensed at the output of the static switch.
5. Voltage Rating (Nominal) : 240 Volts, 50 Hz. Single phase.
6. Transient Voltage Tolerance : 340 Volts peak above the normal line voltage.
7. Ambient temperature : 50 deg C max.
8. Cooling : Natural or forced circulation, using redundant fans.
9. Duty : Continuous

1.04.05 TRANSFER INITIATION

1) The transfer of static switch from normal "Inverter" position to "Stand-by" position shall be initiated by one of the following causes :

- a) Inverter failure and UPS System trouble
- b) Inverter output voltage failure
- c) Over current
- d) Manual push button operation
- e) Static Output voltage failure.

2) The UPS bus shall be monitored by two voltage detectors. One fast acting circuit shall be used for detecting a complete and instantaneous, voltage loss while the other slower acting averaging circuit with adjustable trip level shall be employed to detect voltage deviation beyond selected limits. Both voltage detector circuits shall automatically initiate operation of static transfer switch.



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3) The static switch shall automatically transfer the load from inverter to stand-by AC source when the maximum I²t capability of the inverter is reached when the inverter output voltage drops below 90%.

4) UPS bus current shall be continuously monitored by a current monitoring detector. This detector shall operate the static transfer switch when the load current exceeds the overload rating of any inverter. The detector shall rest when the load current falls below the rated current of the inverter resulting in retransfer of static switch with inverter position.

5) Over current transfer limit shall be continuously adjustable from inverter continuous rating to inverter current limit rating.

1.04.06 TRANSFER INHIBIT

The transfer of static switch shall be inhibited under the following conditions:

1) Automatic or manual transfer of load from inverter to stand-by AC source or vice versa, shall be inhibited when the inverter frequency is not synchronized to the alternative source.

2) Transfer resulting from overload shall be inhibited when the standby AC source is not available. In this case the load fed by the inverter shall be automatically disconnected

1.04.07 RETRANSFER TO NORMAL

1) The retransfer to normal shall be manual in all cases.

2) Manual transfers shall be initiated by push button actuation.

1.04.08 Static transfer switches shall be provided with necessary protective devices (circuit breakers / current limiting fuses) both in "Normal" as well as "Stand-by" position.

1.04.09 The static transfer switches shall be provided duly mounted and wired in enclosures furnished by the bidder.

1.04.10 The static switches shall be furnished with contacts to alarm failure of the alternate source or opening of any fuse protecting the static switches.

1.05.00 MANUAL BY-PASS SWITCH

1.05.01 The manual by-pass switch will be used to isolate any static switch from its load and stand-by power supply and to take the static switch out of service without power interruption to the load. In doing so the manual by-pass switch shall connect both load buses to a single inverter. The manual by-pass switch shall also provide the facility for by-passing the entire UPS system during start up at the option of the operator.

1.05.02 The manual bypass switch shall have make before break contacts to ensure continuous supply to UPS loads during the operation of this by-pass switch.



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1.05.03 The manual by-pass switch shall be rated for 600 Volts, 50 Hz and single phase operation. It shall have continuous load carrying capacity equal to full load inverter current and necessary short term load carrying and interrupting capacity to meet the requirements of the UPS system.

1.05.04 All other by-pass and disconnect devices shall be provided by the Bidder as required for orderly start up and shut down and maintenance of UPS system and system components.

1.05.05 The Bidder shall provide potential free contacts, one closed in each position, for use in DDCMIS.

1.05.06 The manual by-pass switch and required disconnect devices shall be furnished duly mounted and wired in enclosure, furnished by the Bidder.

1.06.00 FLOAT-CUM-BOOST CHARGERS AND AUXILIARY EQUIPMENT

Two no. 100% capacity SCR based fully controlled 12 pulse float cum boost chargers shall be furnished for main BTG UPS system. Each charger shall conform to the following requirements.

1.06.01 CHARGER CAPACITY

Each charger furnished for UPS system shall be adequately rated to ensure that any one shall meet full DC load of UPS system operating at 100% rating plus recharge the fully discharged UPS battery within 8 hours.

The Bidder shall furnish the charger rating calculations to the Owner to satisfy that this requirement is met. The charger shall be furnished as per rating approved by the Owner during engineering stage.

1.06.02 The chargers shall be supplied from a 415 volt, 50 Hz. 3 phase system. The chargers shall maintain the output voltage within plus and minus 0.5 percent from no load to full load with an input power supply deviation in voltage level of plus or minus 10 percent and input power supply deviation in frequency of plus or minus 5 percent and with both deviations present in any combination.

1.06.03 In addition to supplying DC power for inverters, the chargers shall be designed to charge a fully discharged battery without over loading or causing over voltage or without causing interrupting operation of AC or DC circuit breakers for the entire range of intended operating regimes. Suitable solid state electronic circuits shall be provided to ensure that the charging current is voltage regulated and current limited. After the battery is recharged the charger shall maintain the battery at full charge until the next emergency operation when the UPS battery is again required to provide DC power.

1.06.04 Float and equalizing controls shall have an adjustment range of + 5% continuous (without steps).



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1.06.05 The chargers shall be self-regulating, solid state, silicon controlled, full-wave rectifier type designed for single and parallel operation with the battery specified under clause 1.07.00. The chargers shall be designed for automatic load sharing during parallel operation.

1.06.06 The charger shall be current limited at 125% of full load to reduce output voltage for charger circuit protection and for protection of battery from overcharge. The current limit shall be continuously adjustable from 80% to 125%.

1.06.07 All necessary equipment and devices shall be provided to protect the charger from short circuits, transient voltage surges, load and supply fluctuation including sudden loss of input or load.

1.06.08 The charger shall have a slow walk-in circuit which shall prevent application of full load DC current in less than 10 seconds after AC power is energized.

1.06.09 The minimum full load efficiency at nominal input and float output shall be 96 %.The output regulation, ripple content and power factor shall meet the requirements of UPS system as well as the inverters furnished by the Bidder as per clause 1.03.00.

1.06.10 Chargers and auxiliary equipment shall be mounted in free standing cabinets furnished by the Bidder. Charger cabinets shall be folded steel construction with top, front, back and sides fabricated from not less than 3 mm thick sheet steel. The cabinet front, back, end sides shall extend to the floor to present a finished appearance. Cabinet door shall be provided to permit easy access to all components for maintenance or replacement. Doors shall have concealed hinges and three-point latches. Louvers shall be provided for ventilation as required for operation at the specified ambient but the cabinet top shall be solid. All louver openings shall be covered with corrosion resistant fine screen coverings.

1.06.11 GROUND DETECTOR SYSTEM

Each charger shall be furnished with a ground detector system consisting of a relay and a center tapped resistor. The resistor shall be connected between the positive bus and the negative bus.

The relay coil shall be connected between the centre tap of the resistor and ground. The relay shall be furnished with one normally open and one normally closed contact wired to terminal blocks for connection to external circuits.

1.06.12 UPS Signal interfacing with DDCMIS/DCS & PLC

a) The bidder shall provide alarms and status indications, current, voltage, frequency, PF, etc. through serial link with MODBUS or another compatible protocol.

b) The Bidder shall furnish 4-20 mA signals to DDCMIS/PLC for the following:

- i) Inverter A & B output voltages
- ii) Inverter A & B output currents
- iii) Inverter A & B output frequency



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c) List of alarms (min.) to DDCMIS through potential free contacts shall be as follows:-

- i. Rectifier – 1 Trip.
- ii. Inverter – 1 Trip.
- iii. UPS battery-1 low.
- iv. UPS battery-2 low
- v. Rectifier – 2 Trip.
- vi. Inverter – 2 Trip.
- vii. Load on static Bypass.
- viii. Static Bypass failure
- ix. ACDB – 1 Incomer Tripped.
- x. ACDB – 2 Incomer Tripped.
- xi. UPS – 1 Fan Tripped.
- xii. UPS – 2 Fan Tripped.

1.07.00 VOLTAGE STATIC STABILISER

1.07.01 One 415 Volt, 3 phase to 240 Volt, single phase transformer along with associated static voltage stabilizer shall be furnished with each UPS set.

This transformer and stabilizer combination shall convert 415 Volt + 10% plant auxiliary AC supply to 240V + 1% single phase standby AC Power which will serve as UPS system back up supply source.

1.07.02 The transformer and stabilizer shall be sized for 100 percent UPS load and shall coordinate with the largest branch circuit protection device for feeder short circuit current without sacrificing voltage regulation. The voltage stabilizer shall employ silicon solid state circuitry and shall maintain the specified output voltage for 0-100% load with input voltage variations as indicated above. Class of insulation of wound components like transformers, etc. shall be class H with temp rating up to class B.

1.07.03 The stabilizer shall meet the following characteristics as a minimum

- Fast rate of correction - within 5 cycles
- Output distortion - less than 5% under worst conditions
- Efficiency - better than 95%
- Overload Capacity – 300% for 200 msec.

1.08.00 CONSTRUCTIONAL FEATURES FOR CABINETS/ENCLOSURES

The Construction details for UPS system cabinets/enclosure shall conform to the requirements indicated in Next Page

1.08.01 Grounding

Normal, AC power supply will be grounded at the source. For grounding other than this, I/P and O/P isolation transformers shall be furnished with the UPS.

1.08.02 All the transformers used anywhere in UPS circuitry shall be copper wire winded with class H insulation.



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CONSTRUCTIONAL FEATURES OF PANELS, CUBICLES & ENCLOSURES

All panels, cubicles and enclosures furnished as per this specification shall be of free standing type and shall be constructed of specified gauge of steel plates. The panel sheet thickness shall be not less than 2 mm unless otherwise specified herein.

The panels, shall be reinforced as required to ensure true surfaces and adequate support for instruments mounted thereon. All instrument cutouts, mounting studs, and support brackets shall be accurately located. All welds on the exposed panel surfaces shall be ground smooth. Finished panel surfaces shall be free from waves, bellies, or other imperfections. Unless specified, otherwise, panel doors shall be 4 points hinged and shall have turned back edges and additional bracing where required to ensure rigidity. Door hinges shall be of the concealed type. Door latches shall be of the three-point type to ensure tight closing. Door locks shall be furnished which will allow actuation of all locks by a single master key. All panels shall have removable lifting eyebolts for safe lifting from top during storage and installation handling.

Cabinet doors shall be hinged and shall have turned back edges and additional bracing where required ensuring rigidity. Hinges shall be of concealed type. Door latches shall be of three/four-point type to assure tight closing. Detachable lifting eyes or angles shall be furnished at the top of each separately shipped section and all necessary provisions shall be made to facilitate handling without damage. Front and rear doors shall be provided with locking arrangements with a master key for all cabinets. If width of a cabinet is equal or more than 800 mm, double doors shall be provided.

All panels shall be mounted on vibration dampers, which are secured to channels mounted on the floor. The channels shall be field welded to steel plates set into the concrete flooring. The steel plates shall be located such as to approximate the outline of panel bases. The exact mounting details shall be as approved by the owner during detailed engineering stage. All panels shall be provided with adequate ventilation and packaging density of components shall be restricted so as to limit the temperature rise above ambient to 10°C under the worst conditions. All panels shall have auto on/off switch for internal lighting. All the power supply circuit for control panels shall be provided with auto changeover circuitry.

In each panel/cabinet, a 24V DC Voltmeter digital type shall be provided to check the Field Interrogation voltage.

Exhaust Fans with louvers & filters shall be provided on door's (front & Rear) upper side to remove hot air in all panels.

UPS, Feeder failure/ healthy indication shall be provided in each cabinet & remote indication shall be hooked up to DDCMIS/ annunciation & suitably grouped.

All the panels shall be equipped with Anti vibration pad of min. 15 mm size. Cable gland plate thickness shall be 3 mm

Doors shall be provided with neoprene/polyurethane gasket only.

All the cable entries shall be at the bottom of panels.

Protection class of panels shall be IP42 (min)

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1.09.00 AC DISTRIBUTION BOARDS PANEL

1.09.01 Panel boards for distribution of continuous AC power to essential loads shall be dead-front type panel boards rated for 600/1100 V, AC service. The hinged panel board front shall cover the fuses and wiring gutter but not the switch handles. The hinged front and switch handles shall be covered by the enclosure door.

1.09.02 Each panel board shall be constructed for 2 wire, single- phase distribution with a solid neutral bar. Phase and neutral bars shall be of copper. Rating of the main lugs shall be equal to the rated continuous full load current of each inverter.

1.09.03 Each panel board shall have one fused disconnect switch & MCCB of adequate rating for incoming feeder for A C Bus and requisite double pole, suitably rated ampere fused, disconnect switch branch circuit devices (MCB). Fused switches shall be equipped with arc quenchers, visible blades, and quick-make quick-break operating mechanisms. Maximum size fuse which branch circuit fuse holders will accept shall be rated at 60 amperes. As each UPS fed load will be provided with two hot redundant 100% rated feeders. Main feeders to ACDB shall be provided with digital type Ammeter, Voltmeter, Frequency meter, PF meter, Watt meter & VA meter. One from ACDB-A and other from ACDB-B, boards with feeders shall be constructed in line. The number of feeders (WITH 20% spare feeders) and rating of each feeder shall be to suit the individual load keeping in view the fuse clearance capability of UPS system already stipulated and shall be as finalized during engineering. Each feeder shall have fast acting semi-conductor fuse, MCB & LED indication for ON status.

1.10.00 FACTORY TESTS

1.10.01 The UPS system shall be factory tested under various stages of manufacture and upon full completion as per Owner approved quality Assurance plan, the tests shall include, but shall not be limited to the following:

1.10.02 Type and Routine Tests

Type and routine tests for various components and sub-assemblies in accordance with IS and/or NEMA, TEE Test Standards.

1.10.03 Functional Tests

Functional tests to demonstrate compliance with all specified requirements and published specifications, such as frequency regulation, voltage regulation, current limiting, fuse clearing capability of inverters, demonstration of phase and frequency control of inverters for synchronization with range of adjustments; transfer and retransfer of static switches under influence of under voltage and over current, tests on chargers and other system components to confirm compliance with specification.



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1.10.03.1 UPS (Factory Acceptance Test)

- i) Power Efficiency (IEC 146-2, IEC 146) at 100% load, 50% load.
- ii) Load test (Approved Procedure)- load regulation test
- iii) Audible noise test (IEC 146-2)
- iv) Fuse clearing capability (Approved Procedure)
- v) Relative harmonic content (IEC 146-2)
- vi) Synchronous transfer & synchronization test (IEC 146-4)
- vii) Temperature rise test without redundant fans (IEC 146-2)
- viii) Input voltage variation test (Approved Procedure)
- ix) Overload test on inverter & charger (Approved Procedure)
- x) Insulation test (IEC 146)
- xi) Restart test (IEC 146-2)
- xii) Short circuit current capability (IEC 146-2 clause 5.10)
- xiii) Output voltage & frequency tolerance (IEC 146-2)
- xiv) Voltage current division (IEC 146-2)
- xv) Relative harmonic content (IEC 146-2)
- xvi) Parallel redundancy (* Simulation of Parallel redundant fault (IEC 146-4)
- xvii) Overload test (final acceptance test)
- xviii) Any other required as per national international standard or QAP

1.10.03.2 Battery Charger for UPS & 24 V DC System

- i. Short circuit current capability (IEC 146-2).
- ii. Temperature rise test without redundant fans (Approved Procedure)
- iii. SWC test (Approved Procedure)
- iv. Efficiency / PF (IEC 146-2, IEC 146)
- v. Audible noise test (IEC 146-2)
- vi. Fuse clearing capability (Approved Procedure)
- vii. Relative harmonic content (Approved Procedure)
- viii. Temperature rise test without redundant fans (IEC 146-2)
- ix. Overload test on charger (Approved Procedure)
- x Restart test (IEC 146-2)
- xi. Output voltage tolerance (Approved Procedure)
- xii. Output voltage harmonic content (Approved Procedure)

The above test shall be witness by owner/owner's representative.

1.10.04 Burn-in Tests and Temperature Rise Tests

Each component of UPS system shall undergo burn-in test for 50 hours continuously.

All equipment provided under this specification shall be operated under rated conditions and maximum ambient temperature for not less than 120 hours prior to release for shipment. In addition, static switches shall be subjected to not less than 1000 "Transfer/retransfer" cycles at full load.



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During temperature rise test final rise in temperature of semiconductor and devices will be measured at rated conditions and the temperature shall be within stipulated limits for components. After manufacture, the system shall be subjected to routine tests as per standards. The bidder shall indicate all these routine tests in their offer. These shall include insulation resistance test, die-electric with stand test (by applying voltage of 2000 V for one minute) noise test, interference noise test, surge with stand capability.

1.10.05 Type test

Bidder shall submit following type test report along with final acceptance report.

- a) UPS Charger
 - i. IP degree
 - ii. Surge withstand capability (SWC)
 - iii. Dry heat test (IEC-68.2.2)
 - iv. Dump heat test (IEC-68.2.3)
 - v. Vibration test (IEC-68.2.8)
 - vi. EMC test (IEC-61000.4.2)

The above all type test shall be conducted at National / international laboratories only.

1.10.06 Bidder shall submit following documents along with Factory Acceptance Test (FAT) report:

- 1. Internal test report along with heat run test report.
- 2. Calibration certificate of measuring instruments

7.14.07 Testing at site

Full load test shall be demonstrated after commissioning of UPS & 24 V DC charger with batteries at site for 72 Hrs.

7.15.00 AVAILABILITY REQUIREMENTS

A high degree of reliability & availability is required.

Following reliability targets are specified: -

S.No.	Equipment	MTBF in years
1)	Charger	10
2)	Inverter	3
3)	Static Switch	15

Kindly refer M/s TANGEDCO specs attached. In case of any contradictions between M/s BHEL and M/s TANGEDCO specs, the most stringent specs has to be considered by vendor in offer.

CHAPTER-7**UNINTERRUPTIBLE POWER SUPPLY SYSTEM & 24 V DC SYSTEMS****7.01.00 GENERAL REQUIREMENTS**

- 7.01.01** This subsection covers design, construction and performance requirements of parallel redundant industrial grade Uninterruptible Power Supply (UPS) System & parallel redundant 24 V DC System to be furnished by the Bidder for BTG, Station C & I Package & BOP/offsite packages & any other control system/sub system specified elsewhere in the specification. The Bidder shall furnish separate parallel redundant industrial grade UPS System for each unit DDCMIS/DCS Package and separate parallel redundant industrial grade UPS System for each BOP package including static inverters, static switches, manual bypass switch, chargers, A.C. Power distribution panels and Batteries with all required isolating and protecting devices and all other equipment and accessories required for completeness of this system. Bidder to note that there will be no common component like in phase transformer (IPT), common power supply to any redundant component and common point of failure in the UPS & 24 V DC system.
- 7.01.02** The requirements of UPS system & 24 V DC system are specified herein on system basis. The Bidder shall be responsible for engineering and furnishing a complete and operational system fully meeting the intent and requirements of this specification and Owner approved drawings.
- 7.01.03** The equipment furnished under this subsection shall meet the requirements of all applicable codes and standards including ANSI, NEMA, TEEE, NEC and IS.
- 7.01.04** The UPS System & 24 V DC system hardware shall be from the latest established product range of a qualified manufacturer. The Bidder shall furnish documents to satisfy the owner that the design, performance and high availability of the proposed UPS System, 24 V DC system and all system components have been established by a considerable record of successful operation in utility power station for similar application. All UPS system & 24 V DC system cabinets, enclosures and distribution boards shall be manufactured, assembled, wired and fully tested as a complete assembly as per the requirements of this specification in the manufacturing works of a qualified manufacturer prior to shipment to the project site. Class of insulation of wound components (All transformers, chokes/inductances etc.) shall be class H with temp rating up to class B.
- 7.01.05** The UPS, 24 V DC system equipment and the complete system shall have surge withstanding capability (SWC) to meet the requirements of ANSI C 37.90a – IEEE Standard 472 –1974. UPS & 24 V DC charger system should be provided with Class C type surge protection device. The Class C type surge arrester should be single MOV type , pluggable, should have fault indication and should be tested as per IEC 61643-1 to withstand 40KA 8/20 μ s pulse. The arresters should have potential free contact to ensure maintainability.
- 7.01.06** All non-interrupting components of UPS system & 24 V DC systems shall be capable of withstanding all available short circuit current without damage. Additionally, all circuit interrupting components shall be capable of withstanding and interrupting all encountered short circuit currents without damage.



- 7.01.07** All control and instrument circuits shall be fused. Fuses shall be mounted inside the enclosures and shall have easy accessibility. Fuses shall be Buss man low-peak type or Owner approved equivalent. All load fuses shall be to Owner's approval equal. The Bidder shall co-ordinate all load and line fuses applications to ensure that load fuses operate properly.
- 7.01.08** The bidder shall be responsible for ensuring that UPS System, 24 V DC system and the downstream power distribution system for equipment to be serviced by are coordinated such that UPS loads continue to operate without interruption and in accordance with the power supply tolerance requirements (both voltage and frequency) for these UPS loads as long as at least one source is within the limits of voltage and frequency as specified herein. The Bidder shall furnish single line diagrams with his proposal to demonstrate how this requirement is met for all equipment and system covered under Bidders scope.
- 7.01.09 The UPS system & 24 V DC System shall be installed in AC room.
- 7.01.10 Acoustic noise at rated linear load shall be < 75 dBA at 1 meter distance from UPS as per ISO 3746.

7.02.00 FUNCTIONAL REQUIREMENTS OF UPS

7.02.01 CAPACITY OF UPS SYSTEM FOR main plant PACKAGE, remote I/O panels and BOP/OFF-SITE PACKAGES

Parallel redundant UPS shall be sized by the bidder to cater to power for the bidder furnished loads such as plant control, monitoring system. Min. capacity shall be considered as 150 KVA (or as per system requirement in case capacity is higher than 150 KVA) at 50 deg. C ambient. All microprocessor based system, I/o cards, digital equipments, operating stations, printers, peripherals, receiver instruments, SWAS, CEMS, LVS, HMS, TSI, VMS, PADO, C&I Lab, Operator training Simulator system and other devices mounted in supervisory control desk, control panels and other microprocessor based system for BTG shall be operated on UPS power.

Each Individual parallel redundant UPS shall be designed considering 20% design margin over and above any capacity mentioned in specification; UPS sizing calculation shall be submitted for approval. While computing the base capacity of the UPS, inrush requirements of connected loads shall be duly considered. The inrush shall be taken as 300% of steady state load lasting for 100 milli seconds. The base capacity shall be computed by bidder on above basis and to provide for at least 10% variation to cater to changed load requirements during detailed engineering stage. Bidder shall detail in the technical bid, the steady state as well as inrush requirements of each of the loads furnished by him and justify the selection of UPS capacity duly satisfying the requirement of 20% design margin.

This base capacity shall be guaranteed at 240 V AC, 50 Hz single phase output at 50 deg. C & 95 % RH – non condensing at ambient conditions. Ratings other than standard ratings of the manufacture shall not be acceptable. Number of distribution feeders in completely redundant configuration shall be offered to suit the load distribution as decided during engineering. Spare feeders of at least 20% of the total number of feeders with 2 nos. minimum spare feeder of each rating shall be built in.



Separate industrial grade parallel redundant UPS system for each set of Remote I/Os cum processor panel of DDCMIS and each BOP/Offsite package & any other control system/sub system specified elsewhere in the specification, shall be provided of suitable capacity with similar features as of main plant UPS by the bidder. UPS system for remote I/Os panels and BOP/Offsite package & any other control system/sub system specified elsewhere in the specification shall be kept in the respective package UPS rooms.

UPS sizing calculation shall also be submitted for approval for each system/package. Diversity factor shall be considered as 1 for calculating the UPS capacity.

7.02.02 The parallel redundant Uninterruptible Power Supply (UPS) system of continuous duty shall supply, regulated, filtered and uninterrupted 240 V, 50 Hz, single phase power, within specified tolerances, to system AC loads, UCB mounted monitoring system, and other critical loads. Each of these critical loads shall receive one feeder from the AC Distribution Board of Inverter-“A” and another feeder from the AC Distribution Board of Inverter-“B”. However, each inverter shall supply only 50% loads under normal conditions as indicated below. SLD of UPS as per NIT drawing # 114-17-0100 shall also be referred by bidder.

7.02.03 All necessary equipment required for protecting UPS equipment and connected inputs and outputs shall be furnished by the Bidder as an integral part of this system. Complete UPS system shall be automatic without any manual interference at any time of operation.

7.02.04 True, 100% parallel redundant configuration also means availability of “Criss-Cross Redundancy”. Hence The UPS system design shall ensure that in case of one of the charger failure, the other healthy charger, shall feed to one of or both the invertors as the case may be and continue to charge the common/individual DC battery banks at all load conditions. UPS system shall work in “Criss-Cross Redundancy” configuration to safeguard the battery bank from unnecessary drainage. The bidder should note that this situation should not in any way lead to the discharge of the DC battery and maintain the UPS power supply to all loads.

7.02.05 The industrial grade UPS system for BTG & for each individual BOP package shall include the following equipment:

Sr. No.	Descriptions	Quantities for UPS of main plant Package	Quantities for UPS for each remote I/O panel & BOP package
1.	100% capacity of IGBT based PWM Inverter with output Voltage, current, frequency, KVA & KW digital display/meter.	2 nos.	2 nos.
2.	100% capacity static switches with input Voltage, current, frequency digital display/meter at bypass line.	(As required) 2 no. (Min)	(As required) 2 no.(Min)
3.	Manual by-pass switch	1 no.	1no.
4.	100% capacity of 12	2 nos.	-



	pulse controlled floats-cum-boast Chargers		
5.	100% capacity of 6 pulse controlled floats-cum-boast Chargers	-	2 nos.
6.	100% Battery Set each	2 set (each For 2 hour back-up)	1 set (For 1 hour back-up) in case of UPS rating less than 15 KVA. 2 sets (For 1 hour back-up) in case of UPS rating more than 15 KVA.
7.	Step-down transformer (415 V, three phase , to 240V, single phase) of required capacity)	1 no.	1 no.
8.	Static Voltage Stabilizer with input & output ON Red indication and input & output Voltage, current, frequency digital display/meter.	1 set	1set
9.	Input isolation transformer with input & output ON red indication and input Voltage, current, frequency digital display/meter. Out put isolation transformer	1 no. each	1 no. each
10.	A.C. Power Distribution Panels (including 20 % spare feeders on each panel with 2 nos. minimum spare feeder of each rating) and digital type Ammeter, Voltmeter, Frequency meter, PF meter, Watt meter & VA meter	2 sets (Quantities of feeders shall be as on required basis).	2 sets (Quantities of feeders shall be as on required basis).
11.	Interconnecting Armored FRLS ST2 (inner & outer sheath), PVC type C insulated stranded Copper conductor power Cable between UPS equipment & battery, UPS & ACDB, ACDB & loads. For emergency trip push	As required	As required



	buttons, Fire alarm system, safety critical circuit, trip protection circuit and for other services specified elsewhere in the specification shall be fire survival power cable conforming to IEC 60331, BS6387 (CWZ), BS6207 standard and this specification.		
12.	MCCB (At input, output, battery side, Bypass side, ACDB side etc) and tie breaker with ON, OFF & Trip indication.	1 no. each	1 no. each
13.	Online Battery Health Monitoring System	1 set	1 set
14.	Battery Junction Boxes with MCCB, Voltmeter & Current meter.	1 set each	1 set each
Any other equipment necessary for completion of the system shall be provided by bidder.			

All equipment, enclosures and accessories for UPS system shall be designed, arranged assembled and connected in accordance with the requirements of this specification.

7.02.06

NORMAL OPERATION

Two inverters each of 100% capacity, two battery packs of 100% capacity and two 100% battery chargers are used for main plant UPS. Two inverters each of 100% capacity, one battery packs of 100% capacity and two 100% battery chargers are used for BOP packages UPS.

1. During normal operation, UPS loads shall be supplied by both 100% capacity inverters each working at 50% load. The inverters shall receive power from DC source (Charger / Battery), their static switches shall be in the respective "Inverter" position and the manual by-pass switch shall be in "Position-2". In this mode the two inverters shall act as standby for each other.

Necessary paralleling networks shall be included to ensure equal load sharing by both inverters. Load sharing network details shall be detailed to establish all functionalities including fuse clearance. Capabilities of the UPS System as well as each 100% rated inverters are fully satisfied. In addition to UPS output paralleling, Rectifier DC outputs shall also be properly paralleled.

2. One inverter will act as "Master", working on its internal oscillator and the other inverter will follow by using the synchronizing signal from master inverter for automatic control of its output frequency.



7.02.07

EMERGENCY OPERATION

The static transfer switches and the manual by-pass switch shall provide switching means during emergency operation as follows:

1. In case of failure of any inverter the static switch shall automatically transfer the UPS Loads of faulty inverter (say Inverter – “A”) to the healthy Inverter-“B” which will start working at 100% capacity. Thus the feeding of UPS power is continued automatically to all load connected to both inverters despite power supply to all UPS loads connected to both inverters shall be maintained without interruption. Isolation of faulty inverter shall be automatic and achieved in less than 4 milli seconds.
2. Based on inverter failure alarm, the operator will transfer manual by-pass switch to “Position-1” bringing in the plant AC source as the standby source to healthy Inverter –“B” now working at 100% capacity. In this mode the healthy Inverter-“B” shall get the synchronizing signal from the stand by-AC source and automatic synchronization, operation on internal oscillator and transfer / retransfer to standby source shall be as follows:
 - i) The output frequency of the concerned inverter shall be automatically synchronized with the plant stand-by source by using synchronizing signal from the standby source. The frequency limits for this synchronism are specified in clause 7.03.05. If the frequency of the standby source is beyond these limits, the Inverter frequency control shall be automatically disconnected from stand-by synchronizing signal and the inverter shall maintain the output frequency at 50 Hz within ± 0.1 percent under all conditions of load and input voltage by working on their own internal oscillators.
 - ii) During operation on its own internal oscillator, the inverters shall continuously monitor the frequency of standby source. Upon restoration of proper frequency conditions of stand-by source, the inverter shall automatically start using stand-by source frequency as the synchronizing signal for inverter output frequency control.
 - iii) During the operation of any inverter on its internal oscillator due to synchronising frequency being beyond the specified limits, the transfer of static switch from “Inverter” to “Standby” shall be inhibited.
3. During any fault in the branch circuit feeders or inverter output bus, the inverter shall be capable of clearing a fast acting fuse of largest rating in 4 milliseconds and simultaneously provide UPS power to all connected loads (i.e. 50% capacity). In view of the above fault clearing capability of each inverter and due to availability of plant AC source as standby source for inverters the static switches shall not transfer the loads to the other inverter for fault clearing purposes.
4. Retransfer of static switch shall be manual in all cases and shall be accomplished only after synchronism of the inverter output with the stand-by source has been automatically accomplished.



5. The manual bypass switch shall have the provision (position –4) for fully bypassing the UPS system and connecting all UPS loads to the standby AC source. This provision may be used during start up to limit the inrush current and at other occasions at the option of the operator.

7.03.00 STATIC INVERTERS AND AUXILIARY EQUIPMENT

7.03.01 The static inverters shall be solid state type using proven IGBT based pulse width modulation (PWM) to convert direct current power to essentially sinusoidal alternating current power as per this specification. The inverter equipment shall include all necessary circuitry and devices to conform to requirements like voltage regulation, current limiting, wave shaping, transient recovery, surge suppression network, automatic synchronization etc. as specified herein.

7.03.02 INVERTER CAPACITY

Each static inverter shall have the following minimum capabilities without causing any damage to the components and with current limit not operation :-

- 1) Continuous full load rating
- 2) Over load capacity: 125% of full load rating as above for 10 minutes, 150% for 1 minute, 200% for 10 seconds minimum & 300% for 4 msec for all specified input voltages.
- 3) Fuse clearing capacity : Upon a fault in any branch circuit lateral feeder, the inverter shall have the capacity to carry a load equal to one half of its full load rating plus it shall clear the largest rated fast acting fuse in 4 milliseconds or less. All fuses used in inverter power and control circuit shall be fast acting type operating in less than 5 millisecond and each of these fuses shall be provided with kick fuse and alarm contact. Indication and alarm shall be provided to enable fault location.
- 4) Step load pick up: Upon transfer of full load, the inverter output voltage shall not drop below 85% of nominal voltage during the first half cycle after transfer and 90% of nominal voltage in the next half cycle. The recovery to within $\pm 1\%$ of voltage shall be in less than 50 milliseconds.
- 5) The inverter shall have sufficient I²t capacity to clear a slow acting HRC fuse having a continuous current rating equal to at least 20% of the continuous full load current rating of the inveter, while feeding 100% rated loads of the inverter.

7.03.03 INPUT VOLTAGE

The inverters shall be fed from a DC Battery and chargers which do not feed any other loads. Input voltage shall be nominal DC output voltage of battery and charger of range from final voltage after discharge of battery to maximum DC bus voltage during equalize charging of battery. The inverter shall also be capable of working satisfactorily meeting the specification requirements with only the chargers connected to its input without battery in circuit. DC input window of each inverter shall be either 315-434 or 320-450 V



DC. Filtering on the input of the inverters shall be furnished is required to operate within the output ripple of the chargers furnished by the Bidder. Each inverter shall include equipment necessary to protect itself from damage resulting from excursions, loss, or restoration of DC input voltage and synchronising voltage. The inverter output voltage shall be 230 V AC , 50 Hz, Single phase.

7.03.04**OVER LOADS, SHORT CIRCUITS AND LOAD LOSS PROECTION**

1. The inverters shall be provided with suitable fuses at the input and output which will permit proper co-ordination with other protective devices and at the same time protect the inverter against damage due to internal faults. All necessary equipment shall be provided to protect the inverters against over loads, short circuits and 100% loss of load. The inverter shall be self protecting against damage if energized with full load connected.
2. The inverter shall be provided with current limiting circuitry which will limit the output current to a value which will not damage the inverter or blow its fuses.
3. The inverter shall have sufficient $I^2 t$ capability to prevent damage to itself until short circuit conditions on the output are cleared.
4. Each inverter shall be capable of operation with nonlinear loads. For bidders loads bidder shall detail the nature of non linearity. For loads provided by owner, bidder may assure a non linear wave form with a current crest factor of 3.0 occuring coincident with voltage peak. With nonlinearity consisting of third, fifth and seventh order harmonics. Output waveform of the inverter(s) shall remain within specified limits when operating with nonlinear loads at 100 percent rated load.
5. The inverters shall be self protecting against all AC and DC transients, voltage surges and steady state abnormal voltages and current likely to be encountered in utility power station.

7.03.05**Automatic Synchronisation**

Inverter equipment shall include stable solid state oscillator devices designed to automatically maintain the inverter output in phase and in synchronization with the standby AC source. The frequency regulation shall be automatic within ± 0.1 Hz of all conditions of inputs, loads and temperature occurring simultaneously or in any combination.

Facility shall be provided for automatic transfer to internal oscillator operation when the standby source frequency is not within the synchronization limits.

Provision shall be made for step less adjustment of synch disconnect frequency range from 50 Hz +/- 0.5 Hz to 50 Hz +/- 2 Hz.

Automatic adjustment of phase relationship between inverter output and standby AC source shall be gradual, at a controlled slew rate, which shall not exceed 0.1 Hz per second.



The inverter shall normally work on the internal oscillator with either of the two inverters as master synchronizer and the other following it. Suitable selector facility shall be provided to select the master. When any one inverter fails the healthy inverter gets the synchronizing signal from the standby AC source.

The DC input current shall never exceed the full load current except for a short circuit within the inverter. The limitation applies to transient as well as steady state currents and includes inrush currents upto initial energisation of the UPS, load energisation, short circuits external to the inverter etc. For any value of the load and load power factor drawn by the equipment served, the inverter shall not impose on DC source any voltage oscillations in excess of 5 volts (RMS total, all frequencies) or any current oscillations in excess of 3 % (RMS total, all frequencies) of the DC current at full load.

7.03.06

The inverter shall meet the following specifications in addition to other requirements stated herein :-

1. Voltage input (Battery output) : As per system requirement
2. Nominal voltage output: 240V, 50Hz, single phase
3. Inverter capacity (output KVA) : As per clause 7.03.02
4. Voltage regulation :
 - a) Steady state (0-100% load at all input voltages & all power factors) : $\pm 1\%$
 - b) Transient voltage regulation (on application or removal of 100% load) : $\pm 5\%$
 - c) Time to recover from transient to normal voltage with $\pm 1\%$ of steady state (on application or removal of 100% load) : <50 milli second
5. Wave Form
 - a) Nominal Frequency : 50 Hz
 - b) Frequency regulation for all conditions of input supplies, loads and temperature occurring simultaneously or in any combination (automatically controlled) : $\pm 0.1\text{Hz}$



- c) Synchronization : 48 Hz to 52 Hz (factory test) limits (for maintenance & synchronism between the inverter and standby AC source).
 - d) Field adjustment : 50 ± 0.5 Hz to 50 ± 2 Hz range for (c) above
 - e) Total harmonic content : <4% max.
 - f) Harmonic content : <2.5% max.for any single harmonic
6. Rated output current at rated output voltage with current limit not operating :
- a) Current : 200%
 - b) Duration : 10 seconds
7. Overload capacity at 100% voltage :
- a) For 4 ms (fuse clearing): App. 300%
 - b) For 10 seconds : 200%
 - c) For 10 minutes : 125%
 - d) The proposed inverter has : --- the capacity to clear largest acting fuse in 5 milli second & without entering into current limiting mode
8. Efficiency (watt output/watt input)
- a) at 100% load 1.0 P.F. / 0.8 P.F: >91%/ 91%
 - b) at 75% load 1.0. P.F. / 0.8 P.F. : >90% / 90%
 - c) at 50% load 1.0 P.F. / 0.8 P.F. : >89% /89 %
9. Duty : Continuous
10. Cooling : Natural convection or forced cooling using redundant fans.
- Equipment to be designed for operation with full load even without cooling availability.
11. Ambient temperature : 50 deg C, maximum
12. SCR derating from : 50%



peak voltage and peak ratings.

7.03.06 STATIC INVERTER AUXILIARY EQUIPMENT

In addition to the inverter equipment specified above, auxiliary equipment shall be furnished with each static inverter as follows:

- 1) Equipment and material furnished, mounted and wired on the front panel of the inverter enclosures :

<u>ITEM</u>	<u>QUANTITY</u>
Output ammeter, AC, indicating, Scale-0 to 150 percent of rated continuous full load inverter output current, 1 percent accuracy.	1
Output voltmeter, AC, indicating 0-300 volt scale, 1 percent accuracy.	1
Output KVA, AC indicating scale 0-150 percent of Rated capacity, 1 percent accuracy.	1
Input voltmeter DC, indicating 0-300 volts scale, 1 percent accuracy.	1
Frequency meter, 45-55 hertz, 1 percent accuracy.	1
Power factor meter, (0-1. 0-0), 1 percent accuracy	1
Inverter ON-OFF switch	1
Alarm Reset Push Button	1

- 2) Indicating lights listed below with proper actuating devices, circuitry and legend shall be furnished on front of the Ups panels. For these abnormal conditions which could be of a momentary nature, the indicating lights shall remain energized and the contract remain closed until cleared by a reset push button furnished on the panel. The indicating lights shall be of make subject to Owner's approval.

The following indications shall be provided as a minimum :

- a) DC voltage to the Inverter - Low
- b) DC voltage to the Inverter - High
- c) Loss of DC input to the inverter
- d) Inverter output voltage - High
- e) Inverter output voltage - Low (after a time delay to avoid unnecessary alarm due to low voltage on load in rush etc.)
- f) Inverter A failure / Inverter B failure
- g) Standby AC source failure
- h) Inverter A / Inverter B not synchronized with AC source
- i) Automatic transfer to AC source. Blown Fuse or Tripped Breaker.
- j) Inverter A/ Inverter B feeding 100% UPS Load
- k) Standby source feeding 100% UPS loads
- l) Redundant fan failure and temperature high (if provided)

7.04.00 STATIC TRANSFER SWITCHES AND AUXILIARY EQUIPMENT



2 x 660 MW ENNORE SEZ Supercritical Thermal Power
 Project at Ash Dyke of NCTPS
 Spec. No. CE/C/P&E/EE/E/OT.No.03/2013-14



7.04.01 The static transfer switches shall be provided to perform the following functions

- 1) To transfer the load automatically without any break between the inverter to the standby inverter as required to maintain the continuity of power supply to UPS connection loads. The load shall be automatically transferred from "Inverter" to the inverter source upon any malfunction of one inverter.
- 2) To transfer UPS load under manual control from standby AC source to inverter when placing the UPS System in service and from inverter to standby AC source when taking the UPS out of service.

7.04.02 The static transfer switches shall have two modes of operation namely automatic and manual.

7.04.03 The static transfer switches shall use silicon controlled rectifiers and other static devices required for automatic transfer of load from "Inverter" to Standby" source and vice versa.

The static switches shall conform to the requirements specified herein including the following:

1. Capacity (continuous) : Equal to the continuous full load capacity of the inverter.
2. Capacity (overload) : 200% for 10 seconds, 150% of continuous for 60 seconds and 125% of continuous rating for 10 minutes and 300% of continuous rating for 4 msec.
3. Capacity (Peak) : 1000 % of continuous rating for 5 cycles.
4. Transfer Time : < 4 msec. The transition shall be "make before break", voltage failure shall be sensed at the output of the static switch.
5. Voltage Rating (Nominal) : 240 Volts, 50 Hz. Single phase.
6. Transient Voltage Tolerance : 340 Volts peak above the normal line voltage.
7. Ambient temperature : 50 deg C max.
8. Cooling : Natural or forced circulation , using redundant fans.
9. Duty : Continuous

7.04.05 **TRANSFER INITIATION**

- 1) The transfer of static switch from normal "Inverter" position to "Stand-by" position shall be initiated by one of the following causes :
 - a) Inverter failure and UPS System trouble
 - b) Inverter output voltage failure
 - c) Over current
 - d) Manual push button operation
 - e) Static Output voltage failure.
- 2) The UPS bus shall be monitored by two voltage detectors. One fast acting circuit shall be used for detecting a complete and instantaneous, voltage loss while the other slower acting averaging circuit with adjustable trip level shall be employed to detect voltage deviation beyond selected limits. Both voltage detector circuits shall automatically initiate operation of static transfer switch.



- 3) The static switch shall automatically transfer the load from inverter to stand-by AC source when the maximum I^2t capability of the inverter is reached when the inverter output voltage drops below 90%.
- 4) UPS bus current shall be continuously monitored by a current monitoring detector. This detector shall operate the static transfer switch when the load current exceeds the overload rating of any inverter. The detector shall rest when the load current falls below the rated current of the inverter resulting in retransfer of static switch with inverter position.
- 5) Over current transfer limit shall be continuously adjustable from inverter continuous rating to inverter current limit rating.

7.04.06 TRANSFER INHIBIT

The transfer of static switch shall be inhibited under the following conditions:

- 1) Automatic or manual transfer of load from inverter to stand-by AC source or vice versa, shall be inhibited when the inverter frequency is not synchronized to the alternative source.
- 2) Transfer resulting from overload shall be inhibited when the standby AC source is not available. In this case the load fed by the inverter shall be automatically disconnected

7.04.07 RETRANSFER TO NORMAL

- 1) The retransfer to normal shall be manual in all cases.
- 2) Manual transfers shall be initiated by push button actuation.

7.04.08 Static transfer switches shall be provided with necessary protective devices (circuit breakers / current limiting fuses) both in "Normal" as well as "Stand-by" position.

7.04.09 The static transfer switches shall be provided duly mounted and wired in enclosures furnished by the bidder.

7.04.10 The static switches shall be furnished with contacts to alarm failure of the alternate source or opening of any fuse protecting the static switches.

7.05.00 MANUAL BY-PASS SWITCH

7.05.01 The manual by-pass switch will be used to isolate any static switch from its load and stand-by power supply and to take the static switch out of service without power interruption to the load. In doing so the manual by-pass switch shall connect both load buses to a single inverter. The manual by-pass switch shall also provide the facility for by-passing the entire UPS system during start up at the option of the operator.

7.05.02 The manual bypass switch shall have make before break contacts to ensure continuous supply to UPS loads during the operation of this by-pass switch.



- 7.05.03** The manual by-pass switch shall be rated for 600 Volts, 50 Hz, single phase operation. It shall have continuous load carrying capacity equal to full load inverter current and necessary short term load carrying and interrupting capacity to meet the requirements of the UPS system.
- 7.05.04** All other by-pass and disconnect devices shall be provided by the Bidder as required for orderly start up and shut down and maintenance of UPS system and system components.
- 7.05.05** The Bidder shall provide potential free contacts, one closed in each position, for use in DDCMIS & PLC system.
- 7.05.06** The manual by-pass switch and required disconnect devices shall be furnished duly mounted and wired in enclosure, furnished by the Bidder.
- 7.06.00** **FLOAT-CUM-BOOST CHARGERS AND AUXILIARY EQUIPMENT**
- Two no. 100% capacity SCR based fully controlled 12 pulse float cum boost chargers shall be furnished for main BTG UPS system and Two no. 100% capacity SCR based fully controlled 6 pulse float cum boost chargers shall be furnished for BOP packages UPS system. Each charger shall conform to the following requirements.
- 7.06.01** **CHARGER CAPACITY**
- Each charger furnished for UPS system shall be adequately rated to ensure that any one shall meet full DC load of UP system operating at 100% rating plus recharge the fully discharged UPS battery within 8 hours.
- The Bidder shall furnish the charger rating calculations to the Owner to satisfy that this requirement is met. The charger shall be furnished as per rating approved by the Owner during engineering stage.
- 7.06.02** The chargers shall be supplied from a 415 volt, 50 Hz. 3 phase system. The chargers shall maintain the output voltage within plus and minus 0.5 percent from no load to full load with an input power supply deviation in voltage level of plus or minus 10 percent and input power supply deviation in frequency of plus or minus 5 percent and with both deviations present in any combination.
- 7.06.03** In addition to supplying DC power for inverters, the chargers shall be designed to charge a fully discharged battery without over loading or causing over voltage or without causing interrupting operation of AC or DC circuit breakers for the entire range of intended operating regimes. Suitable solid state electronic circuits shall be provided to ensure that the charging current is voltage regulated and current limited. After the battery is recharged the charger shall maintain the battery at full charge until the next emergency operation when the UPS battery is again required to provide DC power.
- 7.06.04** Float and equalizing controls shall have an adjustment range of $\pm 5\%$ continuous (without steps).



- 7.06.05** The chargers shall be self-regulating, solid state, silicon controlled, full-wave rectifier type designed for single and parallel operation with the battery specified under clause 7.07.00. The chargers shall be designed for automatic load sharing during parallel operation.
- 7.06.06** The charger shall be current limited at 125% of full load to reduce output voltage for charger circuit protection and for protection of battery from overcharge. The current limit shall be continuously adjustable from 80% to 125%.
- 7.06.07** All necessary equipment and devices shall be provided to protect the charger from short circuits, transient voltage surges, load and supply fluctuation including sudden loss of input or load.
- 7.06.08** The charger shall have a slow walk-in circuit which shall prevent application of full load DC current in less than 10 seconds after AC power is energized.
- 7.06.09** The minimum full load efficiency at nominal input and float output shall be 96 %.The output regulation, ripple content and power factor shall meet the requirements of UPS system as well as the inverters furnished by the Bidder as per clause 7.03.00.
- 7.06.10** Chargers and auxiliary equipment shall be mounted in free standing cabinets furnished by the Bidder. Charger cabinets shall be folded steel construction with top, front, back and sides fabricated from not less than 3 mm thick sheet steel. The cabinet front, back, end sides shall extend to the floor to present a finished appearance. Cabinet door shall be provided to permit easy access to all components for maintenance or replacement. Doors shall have concealed hinges and three-point latches. Louvers shall be provided for ventilation as required for operation at the specified ambient but the cabinet top shall be solid. All louver openings shall be covered with corrosion resistant fine screen coverings.

7.06.11 **GROUND DETECTOR SYSTEM**

- a) Each charger shall be furnished with a ground detector system consisting of a relay and a center tapped resistor. The resistor shall be connected between the positive bus and the negative bus.

The relay coil shall be connected between the centre tap of the resistor and ground. The relay shall be furnished with one normally open and one normally closed contact wired to terminal blocks for connection to external circuits.

7.06.12 **UPS Signal interfacing with DDCMIS/DCS & PLC**

- a) The bidder shall provide alarms and status indications, current, voltage ,frequency, PF etc through serial link with MODBUS or another compatible protocol .
- b) The Bidder shall furnish 4-20 mA signals to DDCMIS/PLC for the following:
- i) Inverter A & B output voltages
 - ii) Inverter A & B output currents
 - iii) Inverter A&B output frequency



- c) List of alarms (min.) to DDCMIS through potential free contacts shall be as follows:-
- i. Rectifier – 1 Trip.
 - ii. Inverter – 1 Trip.
 - iii. UPS battery low.
 - iv. Rectifier – 2 Trip.
 - v. Inverter – 2 Trip.
 - vi. Load on static Bypass.
 - vii. Static Bypass failure
 - viii. ACDB – 1 Incomer Tripped.
 - ix. ACDB – 2 Incomer Tripped.
 - x. UPS – 1 Fan Tripped.
 - xi. UPS – 2 Fan Tripped.

7.07.00 UPS/24 V DC System BATTERY AND ACCESSORIES

The UPS/24 V DC system batteries shall be heavy duty *Ni-Cd type* as specified below:

- i. Expected service life is greater than 20 years when operated on float or trickle charge.
- ii. Low maintenance – minimal topping up frequency and self - discharge.
- iii. Capable of rapid recharging.
- iv. Transparent containers for ease of inspection and maintenance.
- v. Battery racks provided for battery shall be 2 tier made from heavy teak wood to bear 150% over load, anti acid paint etc.
- vi. One no. 2 sided Folding Aluminium ladder (height 180 cm) for maintenance & removal of battery cells and mounting bracket for ladder shall be provided by bidder with each battery set.

The batteries shall be **heavy duty Nickel-cadmium Fiber plated type** and shall be sized for an hour of full load operation during non-availability of AC supply / chargers. The Ni-Cd batteries shall conform to IS:10918. For sizing calculation, design margin of 120%, an aging factor of 0.8 and a temperature correction factor (Based on temperature characteristics curve to be submitted by the Bidder and at a temperature of 4 deg. C). Capacity factor shall be taken into consideration, and ambient temperature shall be considered as the electrolytic temperature. The sizing of the battery shall be as approved by Owner during detailed engineering. However, Bidder shall consider a suitable voltage drop from battery room to UPS and UPS to load, while sizing the battery. The system shall also be suitably designed to overcome any over voltage that may arise during low-load operation of the charger. The bidder shall clearly bring out in his offer how the same is being implemented.

The battery size shall be calculated taking UPS/24 V DC system capacities as base load. Bidder shall also consider voltage drop from battery room to UPS/24 V DC systems, while sizing the battery. For Plant UPS & plant 24 V DC system, battery backup time shall be 2 hours and for BOP packages UPS & BOP 24 V DC system, the back up time shall be for 1 hour.

For Fire alarm panels, batteries shall be provided with min. 10 hours backup.



7.07.01 In order to monitor the batteries, **online battery health monitoring system** shall be employed. It is a battery management system based on monitoring the voltage of individual battery cell, which provide the information/details about battery health status to end user/owner. Complete hardware like detector units, Battery clips, cables, monitor (power control unit) and other accessories etc as required to complete the system shall be provided by bidder. LED indication shall be provided on detector units for power, alarm and RUN indication etc. Data from Online Battery Health Monitoring System shall be communicate/transferred to DDCMIS for Monitoring and analysis using different protocol like RS485 Modbus/OPC etc.

7.07.02 One complete set of all accessories and devices required for maintenance and testing of batteries shall be supplied for each set of the batteries of each unit/plant auxiliary system. Each set include at least the following:

a)	Hydrometer	5 Nos
b)	Set of hydrometer syringes suitable for the vent holes in different cells	5 Nos
c)	Thermometer for measuring electrolyte temperature	5 Nos
d)	Specific gravity correction chart	5 Nos
e)	Wall mounting type holder made of teak woodfor hydrometer & thermometer	5 Nos
f)	cell testing voltmeter(3-0-3 V)	5 Nos
g)	Alkali mixing jar	5 Nos
h)	Rubber aprons	5 Nos
i)	Pair of rubber gloves	5 Nos
j)	Set of spanners	5 Nos
k)	No smoking notice for each battery room	2 Nos
l)	Goggles (industrial)	5 Nos
m)	Instruction card	10 Nos
n)	Minimum and maximum temperature indicator for battery room	1 No.
o)	Cell lifting facility	1 Set
p)	Vent Caps	2 set
q)	Terminal Bolts & Washers	1 Set
r)	Plastic Filling Bottles	10 Nos.
s)	Alkali resistant funnel & Mugs	10 Nos.

7.07.03 Cell booster charger shall be provided with main plant UPS & 24 V DC batteries set to charge the new & sick cell for revival of cell. The cell booster shall be built in separate portable panel. Resistive load discharge bank shall also be provided with main plant UPS & 24 V DC batteries set to discharge the batteries in case of over charged batteries.

7.08.00 VOLTAGE STATIC STABILISER

7.08.01 One 415 Volt, 3 phase to 240 Volt, single phase transformer along with associated static voltage stabilizer shall be furnished with each UPS set.

This transformer and stabilizer combination shall convert 415 Volt \pm 10% plant auxiliary AC supply to 240V \pm 1% single phase standby AC Power which will serve as UPS system back up supply source.



7.08.02 The transformer and stabilizer shall be sized for 100 percent UPS load and shall coordinate with the largest branch circuit protection device for feeder short circuit current without sacrificing voltage regulation. The voltage stabilizer shall employ silicon solid state circuitry and shall maintain the specified output voltage for 0-100% load with input voltage variations as indicated above. Class of insulation of wound components like transformers etc shall be class H with temp rating up to class B.

7.08.03 The stabilizer shall meet the following characteristics as a minimum

- Fast rate of correction - within 5 cycles
- Output distortion - less than 5% under worst conditions
- Efficiency - better than 95%
- Overload Capacity – 300% for 200 mSec.

The make and rating shall be subjected to Owners approval.

7.09.00 24 V DC CONTROL POWER SUPPLY SYSTEM FOR MAIN PLANT

7.09.01 The bidder shall offer a completely separate parallel redundant system with 50 % load sharing on each charger to cater to 24 V DC requirements for control, protection interlock & sequencing systems for BTG (Turbine protection, MFT & solenoid valves etc.). 24V DC system shall consist of

1.	100% capacity 12 Pulse float cum booster charger	2 nos. charger in parallel redundant configuration
2.	Battery Bank for 100 % load	2 Bank (100% capacity) each for 120 minutes back up
3.	DCDB (including 20 % spare feeders on each panel with 2 nos. minimum spare feeder of each rating)	2 set, (Quantities of feeders shall be as on required basis).
4.	Armored FRLS ST2 (inner & outer sheath), PVC type C insulated stranded copper conductor Cables. For emergency trip push buttons, Fire alarm system, safety critical circuit, trip protection circuit and for other services specified elsewhere in the specification shall be fire survival power cable conforming to IEC 60331, BS6387 (CWZ), BS6207 standard and this specification.	Complete power cables for 24 V DC system with battery, DCDB and loads.
5.	MCCB (At input, output, battery side, & DCDB side etc) with ON, OFF & Trip indication.	1 no. each

Input for 24 V DC systems shall be from 3 phase MCC system. 24VDC power supply to load will be through MCCB, MCB, and redundant feeders DCDB - 1 and DCDB – 2. Grounding cubicle for 24 V DC system shall be included in scope of supply.

SLD of 24 V DC charger system as per NIT drawing # 114-17-0200 shall also be referred by bidder.



- 7.09.02 Other than above mentioned services for main plant packages, Parallel redundant 240 V AC to 24 V DC convertor with 50% sharing & 125 % capacity shall be provided for 24 V DC power supply in each cubicle separately as per requirements for main plant BTG packages control system, and BTG's microprocessor based control system.
The UPS power supply shall be extended to Parallel redundant 240 V AC to 24 V DC convertor thru redundant UPS feeders.
- AC to DC convertor shall be SMPS based and shall have wide range of AC/DC input voltage (85-264 V AC & 90-350 VDC). It shall have the necessary diagnostic functions like indications for DC OK, automatic overload monitoring etc. The MTBF for the power supplies shall not be less than 500,000 hours (in Accordance with (IEC – 1709) with operating temp. from –25deg. C to 70 deg. C.
- 7.09.03 **Float cum boost chargers:**
- 7.09.03.01 Each of the redundant chargers shall be sized to meet connected load requirements and keep the connected battery full charged (Float mode). In Boost mode, each of the chargers shall be able to re-charge the fully discharged battery within 8 hours. However, each charger shall be able to supply full load current requirements plus the battery charging current in boost mode. Complete operation shall be in auto mode. Operator intervention shall not be required for 24 V DC system operations
- 7.09.03.02 The chargers shall be self regulating, SCR controller, full wave 12 Pulse type designed for single and parallel operation with battery and shall have automatic voltage regulators for a close voltage stability even when AC supply voltage and DC load fluctuates, effective current limiting features and filters on both input and output to minimize harmonics. The charger output regulation shall be $\pm 1\%$ from no load to full load with an input power supply variation of $\pm 10\%$ in voltage and $\pm 5\%$ in frequency. In addition to indications on charger panel, potential free contacts for alarms like charger O/P voltage high, battery isolated, charger failed etc., shall also be provided and the same shall be further connected to DDCMIS for indication. Further isolated 4-20 mA signals shall be provided for important parameters like charger voltage, etc. Bidder shall provide list of alarm outputs & 4-20 mA signals for owner's approval during detailed engineering.
- 7.09.03.03 A auto/manual selector switch and "FLOAT/BOOST" mode selector switch in case of manual mode selection shall be provided for either trickle charging the battery (while supplying the load) or boost charge the battery (isolated from load) respectively. In boost charging mode, the chargers shall operate in constant current mode building up the voltage across the battery to 1.2 V/ cell.
- 7.09.03.04 Each of the two 100% capacity chargers shall be adequately rated to ensure that 50% load sharing shall be ensured during normal conditions and in case any one of these chargers fails, the other charger shall work at 100% load.
- 7.09.03.05 The charger circuitry shall be of fail-safe design and failure of any component should not result in any charger output voltage to increase beyond acceptable limits of the C&I system being fed from it.



- 7.09.03.06 The charger shall be current limited at 125% of full load to reduce output voltage for charger circuit protection and for protection of battery from overcharge. The current limit shall be continuously adjustable from 80% to 125%.
- 7.09.03.07 The chargers shall have a slow walk-in circuit which shall prevent application of full load DC current in less than 10 seconds after AC power is energised.
- 7.09.03.08 The chargers shall be fed from 415V AC, 50 HZ, 3 phase. The Bidder shall provide all required power cables from 415 V AC power supply system to his power supply system.
- 7.09.03.09 The minimum full load efficiency at nominal input and output shall be 70%.
- 7.09.03.10 Charger design shall ensure that there is no component failure due to fluctuations of input supply or loss of supply and restoration. This feature shall be demonstrated during factory testing at various loads.
- 7.09.03.11 Bidder shall furnish the equipment complete in all respects along with charger rating & voltage drop calculations, supporting curves/data etc.
- 7.09.03.12 24 V DC Charger sizing calculation shall be submitted for approval) at 50 deg. C ambient. Each Individual parallel redundant 24 V DC charger system shall be designed considering 20% design margin.

7.09.04 Batteries And Accessories

The 24 V DC system batteries shall be Two (2) set of **heavy duty Nickel-cadmium Fiber plated type** as specified at clause no. 7.07.00. Battery sizing calculation shall also be submitted for approval as per factors specified at clause no. 7.07.00. All other items shall also be furnished by bidder as specified at clause no. 7.07.01 & 7.07.02, 7.07.03.

In order to monitor the batteries, **online battery health monitoring system** shall be employed.

7.10.00 AC & DC Power supply for BOP packages

- 7.10.01 The UPS system shall be separate for each BoP/offsite package. The UPS shall be designed as specified at clause no. 7.02.00 to 7.08.00.

- 7.10.02** Parallel redundant 240 V AC to 24 V DC convertor with 50% sharing & 125 % capacity shall be provided for 24 V DC power supply in each cubicle separately as per requirements for BOP/Offsite package's PLC control system and microprocessor based control system.
The UPS power supply shall be extended to Parallel redundant 240 V AC to 24 V DC convertor thru redundant UPS feeders.

AC to DC convertor shall be SMPS based and shall have wide range of AC/DC input voltage (85-264 V AC & 90-350 VDC). It shall have the necessary diagnostic functions like indications for DC OK, automatic overload monitoring etc. The MTBF for the power supplies shall not be less than 500,000 hours (in Accordance with (IEC – 1709) with operating temp. from –25deg. C to 70 deg. C.



7.11.00 CONSTRUCTIONAL FEATURES FOR CABINETS/ENCLOSURES

The Construction details for UPS & 24 V DC charger system cabinets/enclosure shall conform to the requirements indicated in chapter 6.

7.11.01 Grounding

Normal, AC power supply will be grounded at the source. For grounding other than this, I/P and O/P isolation transformers shall be furnished with the UPS.

7.11.02 All the transformers used any where in UPS & 24 V DC charger circuitry shall be copper wire wound with class H insulation.

7.12.00 DC DISTRIBUTION BOARD PANEL

7.12.01 Distribution board shall be furnished with components, devices and materials meeting the requirements specified herein.

7.12.02 Each DC distribution board shall be constructed for 2 wire DC distribution .All bus bars shall be of solid copper. Each panel shall have four double pole 800 amps MCCB and properly sized fuses for three incoming feeders (two from chargers and one from battery) and two double pole 800 amps Moulded case circuit breakers with thermal over current relays and electromagnetic over current relays for two out going feeders to inverters. Isolators and circuit breakers shall open and close with snap action. Fuses of appropriate capacity shall be provided for incoming feeder from battery. All switches, fuses, circuit breakers and buses shall be rated for D C system fault level, which shall be indicated by the bidder in his proposal. Circuit identification cards mounted in card holders shall be provided on the hinged panel board front. The number of feeders (WITH 20% spare feeders) and rating of each feeder shall be to suit the individual load keeping in view the fuse clearance capability of UPS system already stipulated and shall be as finalised during engineering. No price implication is admissible for the number ratings of feeders as decided during engineering and owners decision in this shall be final. Each feeder shall have fast acting semi conductor fuse, MCB & LED indication for ON status.

7.13.00 AC DISTRIBUTION BOARDS PANEL

7.13.01 Panel boards for distribution of continuous AC power to essential loads shall be dead-front type panel boards rated for 600/1100 V, AC service. The hinged panel board front shall cover the fuses and wiring gutter but not the switch handles. The hinged front and switch handles shall be covered by the enclosure door.

7.13.02 Each panel board shall be constructed for 2 wire, single- phase distribution with a solid neutral bar. Phase and neutral bars shall be of copper. Rating of the main lugs shall be equal to the rated continuous full load current of each inverter.

7.13.03 Each panel board shall have one fused disconnect switch & MCCB of adequate rating for incoming feeder for A C Bus and requisite double pole, suitably rated ampere fused, disconnect switch branch circuit devices (MCB). Fused switches shall be equipped with arc quenchers, visible blades, and quick-make quick-break operating mechanisms. Maximum size fuse which branch circuit fuse holders will accept shall be rated at 60 amperes. As each UPS fed load will be provided with two hot



redundant 100% rated feeders. Main feeders to ACDB shall be provided with digital type Ammeter, Voltmeter, Frequency meter, PF meter, Watt meter & VA meter. One from ACDB-A and other from ACDB-B, boards with feeders shall be constructed in line. The number of feeders (WITH 20% spare feeders) and rating of each feeder shall be to suit the individual load keeping in view the fuse clearance capability of UPS system already stipulated and shall be as finalised during engineering. No price implication is admissible for the number ratings of feeders as decided during engineering and owners decision in this shall be final. Each feeder shall have fast acting semi conductor fuse, MCB & LED indication for ON status.

7.14.00 **FACTORY TESTS**

7.14.01 The UPS system & 24 V DC system shall be factory tested under various stages of manufacture and upon full completion as per Owner approved quality Assurance plan, the tests shall include, but shall not be limited to the following:

7.14.02 **Type and Routine Tests**

Type and routine tests for various components and sub assemblies in accordance with IS and/or NEMA, TEE Test Standards.

7.14.03 **Functional Tests**

Functional tests to demonstrate compliance with all specified requirements and published specifications, such as frequency regulation, voltage regulation, current limiting, fuse clearing capability of inverters, demonstration of phase and frequency control of inverters for synchronisation with range of adjustments; transfer and retransfer of static switches under influence of under voltage and over current, tests on charges, batteries and other system components to confirm compliance with specification.

7.14.03.1 **UPS (Factory Acceptance Test)**

- i) Power Efficiency (IEC 146-2, IEC 146) at 100% load, 50% load.
- ii) Load test (Approved Procedure)- load regulation test
- iii) Audible noise test (IEC 146-2)
- iv) Fuse clearing capability (Approved Procedure)
- v) Relative harmonic content (IEC 146-2)
- vi) Synchronous transfer & synchronization test (IEC 146-4)
- vii) Temperature rise test without redundant fans (IEC 146-2)
- viii) Input voltage variation test (Approved Procedure)
- ix) Overload test on inverter & charger (Approved Procedure)
- x) Insulation test (IEC 146)
- xi) Restart test (IEC 146-2)
- xii) Short circuit current capability (IEC 146-2 clause 5.10)
- xiii) Output voltage & frequency tolerance (IEC 146-2)
- xiv) Voltage current division (IEC 146-2)
- xv) Relative harmonic content (IEC 146-2)
- xvi) Parallel redundancy (* Simulation of Parallel redundant fault (IEC 146-4)
- xvii) Overload test (final acceptance test)
- xviii) Any other required as per national international standard or QAP



7.14.03.2 Battery Charger for UPS & 24 V DC System

- i. Short circuit current capability (IEC 146-2).
- ii. Temperature rise test without redundant fans (Approved Procedure)
- iii. SWC test (Approved Procedure)
- iv. Efficiency / PF (IEC 146-2, IEC 146)
- v. Audible noise test (IEC 146-2)
- vi. Fuse clearing capability (Approved Procedure)
- vii. Relative harmonic content (Approved Procedure)
- viii. Temperature rise test without redundant fans (IEC 146-2)
- ix. Overload test on charger (Approved Procedure)
- x. Restart test (IEC 146-2)
- xi. Output voltage tolerance (Approved Procedure)
- xii. Output voltage harmonic content (Approved Procedure)

The above test shall be witness by owner/owner's representative.

7.14.04 Burn-in Tests and Temperature Rise Tests

Each component of UPS & 24 V DC system shall undergo burn-in test for 50 hours continuously.

All equipment provided under this specification shall be operated under rated conditions and maximum ambient temperature for not less than 120 hours prior to release for shipment. In addition, static switches shall be subjected to not less than 1000 "Transfer/retransfer" cycles at full load.

During temperature rise test final rise in temperature of semiconductor and devices will be measured at rated conditions and the temperature shall be within stipulated limits for components. After manufacture, the system shall be subjected to routine tests as per standards. The bidder shall indicate all these routine tests in their offer. These shall include insulation resistance test, dielectric with stand test (by applying voltage of 2000 V for one minute) noise test, interference noise test, surge with stand capability.

7.14.05 Type test

Bidder shall submit following type test report along with final acceptance report.

- a) Battery as per IS-1652, IS 10918 & IEC 62259 – latest version.
- b) UPS/Charger/24 V DC Charger
 - i. IP degree
 - ii. Surge withstand capability (SWC)
 - iii. Dry heat test (IEC-68.2.2)
 - iv. Dump heat test (IEC-68.2.3)
 - v. Vibration test (IEC-68.2.8)
 - vi. EMC test (IEC-61000.4.2)

The above all type test shall be conducted at National / international laboratories only.



7.14.06 Bidder shall submit following documents along with Factory Acceptance Test (FAT) report:

1. Internal test report along with heat run test report.
2. Calibration certificate of measuring instruments

7.14.08 Copies of all test reports shall be submitted to the Owner as per procedure to be finalised during contract award. The owner reserves the right to witness all tests.

7.14.09 Testing at site

Full load test shall be demonstrated after commissioning of UPS & 24 V DC charger with batteries at site for 72 Hrs.

7.15.00 AVAILABILITY REQUIREMENTS

A high degree of reliability & availability is required.

Following reliability targets are specified:-

S.No.	Equipment	MTBF in years
1)	Charger	10
2)	Inverter	3
3)	Static Switch	15





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CE/416/ ENNORE /UPS/BSC

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PROJECT : ENNORE SEZ (2x660 MW)

CUSTOMER : M/s TANGEDCO

CONSULTANT : M/s DESEIN, NEW DELHI

FEEDER LIST

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APPROVED

AMIT KUMAR SHARMA

PREPARED

ISSUED

DATE

SATHISH

416

28/11/2022

2X660 MW ENNORE SEZ TANGEDCO, 240V AC UPS FEEDER/LOAD LIST

UNIT-1&2 - MAIN PLANT UPS SYSTEM

A. SG PACKAGE

Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	FLAME SCANNER - 1 (CJF 49) (FLAME SCANNERS)	2	2	1	0.48	0.96	6A	10A
2	FLAME SCANNER - 2 (CJF 50) (SOLENOIDS & HEA IGNITORS)	2	2	1	1.44	2.88	10A	16A
SUB TOTAL		4	4			3.84		

B. TG PACKAGE

Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	TSI FOR BFPDT A&B (CWW01)	1	1	1	1.44	1.44	10A	16A
2	TSI FOR MAIN TURBINE (CJJ41)	1	1	1	2.4	2.4	16A	20A
SUB TOTAL		2	2			3.84		

C. BOP C&I PACKAGE

Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	INTERPOSING RELAY PANELS (CTE01)	1	1	1	2.4	2.4	16A	20A
2	T&AVT PANEL (CFA01)	1	1	1	1.44	1.44	10A	16A
SUB TOTAL		2	2			3.84		

D. HMI PACKAGE **R2**

Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	FEEDERS FOR CENTRAL CONTROL DESK	2	2	1	2.4	4.8	16A	20A
2	POWER DISTRIBUTION PANEL (CNP 33)	1	0	1	7.68	7.68	50A	63A
		0	1	1	7.68	7.68	50A	63A
3	NETWORK PANEL-A & B (CNP 11 & CNP 12) R3	1	1	1	6.96	6.96	40A	50A
4	NETWORK PANEL STATION LAN-A & B (CNP 51 & 52) R3	1	1	1	7.68	7.68	50A	63A
5	NETWORK PANEL COMMON-1 & 2 MIS (CNP 31 & 32) R3	1	0	1	7.68	7.68	50A	63A
SUB TOTAL		6	5			42.48		

E. MISCELLANEOUS

Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	OXYGEN ANALYSER - LOW TEMPERATURE R1	0	4	1	0.3	1.2	4A	6A
		4	0	1	0.3	1.2	4A	6A
2	OXYGEN ANALYSER - HIGH TEMPERATURE	2	0	1	0.3	0.6	4A	6A
		0	2	1	0.3	0.6	4A	6A
3	OXYGEN ANALYSER (AUX BOILER)	0	1	1	0.3	0.3	4A	6A
4	CO AT APH INLET	1	0	1	0.5	0.5	4A	6A
		0	1	1	0.5	0.5	4A	6A
5	SWAS	1	1	1	3.275	3.275	20A	25A
6	FLUE GAS ANALYSER SOx/ NOx/CO2 at CHIMNEY R1	1	1	1	0.5	0.5	4A	6A
7	CO AT CHIMNEY R1	1	1	1	0.5	0.5	4A	6A
8	OPACITY MONITOR AT CHIMNEY R1	1	1	1	1.3	1.3	10A	16A
9	CONDUCTIVITY TYPE LEVEL SWITCH	2	2	1	0.015	0.03	4A	6A
10	CAPACITANCE TYPE LEVEL SWITCH	2	0	1	0.015	0.03	4A	6A
		0	2	1	0.015	0.03	4A	6A
11	COAL BUNKER LEVEL MONITORING SYSTEM	1	0	1	0.5	0.5	4A	6A
		0	1	1	0.5	0.5	4A	6A
12	ELECTRONIC WATER LEVEL INDICATOR	3	3	1	0.25	0.5	4A	6A
13	VIBRATION MONITORING SYSTEM Panel at Main unit EER	1	1	1	3.2	3.2	20A	25A
14	VIBRATION MONITORING SYSTEM Panel at Main unit EER (for common loads)	1	1	1	0.4	0.4	4A	6A
15	C&I LAB R1	2	2	1	1	2	6A	10A
16	MERCURY ANALYSER R3	1	1	1	10	10	63A	80A
17	VMS Analysis server at CCR R1	1	1	1	0.3	0.3	4A	6A
18	HART MANAGEMENT SYSTEM	1	1	1	1.2	1.2	10A	16A
19	MASTER SLAVE CLOCK SYSTEM	1	1	1	0.96	0.96	6A	10A
20	UCP	1	1	1	1.44	1.44	10A	16A
21	CCTV PANEL	1	1	1	4.8	4.8	32A	36A
22	SCADA EDMS Panel R2	1	1	1	1.92	1.92	16A	20A
23	SCADA IEMS Panel R2	1	1	1	1.92	1.92	16A	20A
24	PADO	1	1	1	3	3	16A	20A
25	OPERATOR TRAINING SIMULATOR SYSTEM R1	1	1	1	15.3	15.3	80A MCCB R1	
26	DAVR	1	1	1	1	1	6A	10A
SUB TOTAL		34	35			59.505		

F. BHEL HARIDWAR R1								
Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	GEN EWVMS (CXW01E)	1	1	1	1.25	1.25	10A	16A
2	H2 GAS ANALYSER-1 (MKG31CQ001)	1	1	1	0.625	0.625	4A	6A
3	H2 GAS ANALYSER-2 (MKG32CQ001)	1	1	1	0.625	0.625	4A	6A
4	MOISTURE MEASURING EQUIPMENT (MKG69CM001)	1	1	1	0.0625	0.0625	4A	6A
5	ALKALISER DOSING PUMP	1	1	1	0.125	0.125	4A	6A
6	GROUND BRUSH MON (CXW01F)	1	1	1	1.25	1.25	10A	16A
7	LAN CAB PWR SUP (CRY01GW021,22)	1	1	1	7.5	7.5	40A	50A
8	WIN TS PC R2	1	0	1	0.65625	0.65625	4A	6A
9	WIN TS MON R2	0	1	1	0.15	0.15	4A	6A
10	WIN TS PRTR R2	1	0	1	0.8	0.8	6A	10A
11	SWAP OUT PC R2	0	1	1	0.65625	0.65625	4A	6A
12	SWAP OUT MON R2	1	0	1	0.15	0.15	4A	6A
SUB TOTAL		10	9			13.85		
G. BHEL TRICHY								
Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	BURNER TILT SHEAR PIN FAILURE ALARM	0	1	1	0.01	0.01	4A	6A
2	GRAVI. FEEDER REMOTE CONTROL CABINET R3	7	7	1	0.5	3.5	4A	6A
3	STEAM TUBE LEAK DETECTION SYSTEM R1	1	1	1	0.5	0.5	4A	6A
4	STEAM TUBE LEAK DETECTION SYSTEM - PC	0	1	1	0.3	0.3	4A	6A
5	ONLINE COAL FLOW ANALYSER CABINET R1	1	1	1	3	3	16A	20A
6	FURNACE FLAME VIEWING SYSTEM- CAMERA LOCAL UNIT	2	0	1	0.25	0.50	4A	6A
		0	2	1	0.25	0.50	4A	6A
7	FURNACE & FLAME VIEWING SYSTEM IN UCR R1	1	1	1	0.5	0.5	4A	6A
8	MASS FLOW METER - LFO R1	1	1	1	0.05	0.05	4A	6A
9	MASS FLOW METER - HFO R3	2	2	1	0.05	0.10	4A	6A
10	AH AIR MOTOR SOLENOID VALVE	1	0	1	0.02	0.02	4A	6A
		0	1	1	0.02	0.02	4A	6A
11	AH-ROTOR STOPPAGE DEVICE	1	0	1	0.025	0.025	4A	6A
		0	1	1	0.025	0.025	4A	6A
12	MILL SEAL AIR HEADER LEVEL SWITCH	4	0	1	0.005	0.020	4A	6A
		0	3	1	0.005	0.015	4A	6A
13	MISCELLANEOUS LOADS - UPS POWER R1	2	0	1	0.5	1.0	6A	10A
		0	2	1	0.5	1.0	6A	10A
14	ONLINE CARBON IN ASH ANALYSER R1	1	0	1	0.5	0.5	4A	6A
15	HWL 1&2, MEFCV - CONTROL SUPPLY	1	0	1	2	2	16A	20A
16	PDB FOR APH AND ECONOMISER ASH LEVEL SWITCHES (32 NOS FEEDERS FOR SWITCHES+ 4 NOS SPARE FEEDERS WILL BE PROVIDED IN PDB BY UPS MANUFACTURER) R1	1	1	1	0.48	0.48	6A	10A
SUB TOTAL		26	25			14.07		
H. BHEL HYDERABAD								
Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	ELECTRONIC POWER POSITIONER OF HYD COUPLING OF MDBFP	1	1	1	0.5	0.5	4A	6A
2	REVERSE ROTATION MONITOR SYSTEM (SUPPLIED ALONG WITH HYD COUP)	1	0	1	0.025	0.025	4A	6A
3	FIRE ALARM PANEL & FIRE ALARM OWS R1	1	1	1	2	2	16A	20A
SUB TOTAL		3	2			2.525		
I. BHEL PEM								
Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	PC, PRINTER FOR ELECTRICAL SYSTEM	0	1	1	1.5	1.5	10A	16A
2	MDBFP WTR LEAKAGE DETECTOR	1	0	1	0.33	0.33	4A	6A
3	MDBFP WTR FLOW INDICATOR	0	1	1	0.33	0.33	4A	6A
4	ID FAN-A WTR LEAKAGE DETECTOR	1	0	1	0.33	0.33	4A	6A
5	ID FAN-B WTR LEAKAGE DETECTOR	0	1	1	0.33	0.33	4A	6A
6	ID FAN-A WTR FLOW INDICATOR	1	0	1	0.33	0.33	4A	6A
7	ID FAN-B WTR FLOW INDICATOR	0	1	1	0.33	0.33	4A	6A
8	LCP FOR COLTCS SYSTEM R1	1	1	1	0.5	0.5	4A	6A
9	CPU Service Vessel Area	1	1	1	2	2	16A	20A
10	LCP FOR DOSING SYSTEM (AMMONIA DOSING PANEL) R1	1	1	1	1	1	6A	10A
11	LCP FOR DOSING SYSTEM (HYDROGEN DOSING PANEL) R1	1	1	1	1	1	6A	10A
12	LCP FOR DOSING SYSTEM (NaOH DOSING PANEL) R1	1	1	1	1	1	6A	10A
13	PA System	1	1	1	7.68	7.68	50A	63A
SUB TOTAL		9	10			16.66		

J. BHEL RANIPET

Sl. No	Feeder Description	No of Feeders in ACDB-1	No of Feeders in ACDB-2	Diversity Factor R2	kVA Rating of each feeder	Total Load in kVA	MCB rating	FUSE rating
1	IOS PC & PRINTER	1	0	1	1.5	1.5	10A	16A
2	OPACITY MONITOR	2	0	1	0.25	0.5	4A	6A
		0	2	1	0.25	0.5	4A	6A
SUB TOTAL		3	2			2.5		

Total UPS Load (For items A to J)	163.11
Total UPS Load (For items A to J) + 20% Spare	195.726
UPS Rating selected	200 kVA at 50 deg C
ACDB DETAILS: - R3	

Sl. No	Feeder rating MCB/ Fuse	ACDB-1	ACDB-2	With 20% Spare	
				ACDB-1	ACDB-2
1	4A/6A	54	54	65	65
2	6A/10A	13	12	16	16
3	10A/16A	10	10	12	12
4	16A/20A	11	10	14	14
5	20A/25A	2	2	3	3
6	32A/36A	1	1	2	2
7	40A/50A	1	1	2	2
8	50A/63A	4	3	5	5
9	63A/80A	1	1	2	2
Sl. No	Feeder rating MCCB	ACDB-1	ACDB-2	With 20% Spare	
				ACDB-1	ACDB-2
9	80A	1	1	2	2
Total		98	95	123	123

Note:

- 20% spare feeders of each rating are provided in each ACDB further rounded off to 123 feeders cumulatively in ACDB-1 and ACDB-2 taking care of any exigency/contingency which may creep in later. **R2**
- UPS rating is 200 kVA at 50 deg C and each UPS System is being provided with 2 sets of Fiber Plate Ni-Cd Battery considering 200 kVA load. **R1**
- UPS catalogs, Charger sizing calculation, Battery catalogs, graphs etc. will form part of Battery vendor specific datasheets/documentation and will be sent for approval separately after placement of order.
- This Parallel redundant UPS system will meet the power requirements of reliable continuous duty regulated, filtered and uninterruptible 240V, 50 Hz single phase power within the specified tolerances on as required basis for AC loads of Control of BTG System, their Auxiliaries, HMIPIS, Analyzers, Vibration monitoring system, TSS, Simulator, PSSS, CCTV, PA system, Simulator, C&I Lab, LVS, CEMS, SWAS Analyzers, HART system, Master- Slave clock, microprocessor based control system, and any other critical load/system/sub system etc, meeting the specification requirements and taking care of the approved configurations and layouts. **R2**
- Separate industrial grade parallel redundant UPS system for each set of Remote I/Os cum processor panel of DDCMIS and each BOP/Offsite package & any other control system/sub system specified elsewhere in the specification, shall be provided of suitable capacity with similar features as of main plant UPS. UPS system for remote I/Os panels and BOP/Offsite package & any other control system/sub system specified elsewhere in the specification shall be kept in the respective package UPS rooms. UPS sizing calculation shall also be submitted for approval for each system/package. Diversity factor shall be considered as 1 for calculating the UPS capacity. **R2**
- The calculated UPS rating is the standard UPS rating of the manufacturer. UPS of manufacturer's non- standard rating is not provided. Furthermore, it may be noted that to attain the calculated UPS rating, paralleling of multiple UPS systems of lower ratings is not done. **R2**
- UPS for AAQMS will be supplied by AAQMS vendor through BHEL Haridwar. **R2**
- BHEL confirms that any other load not included in the main plant UPS shall be taken care by BHEL without affecting the spare load. **R2**
- The offered 2x200 kVA rating of UPS System is guaranteed at 50 deg C ambient temperature and load power factor of 0.8 lagging. **R2**
- Please note that BHEL will be responsible for any variation in the load data mentioned against each feeder. **R2**



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CE/416/ ENNORE /UPS/BSC

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PAGE 01 OF 02

PROJECT : ENNORE SEZ (2x660 MW)

CUSTOMER : M/s TANGEDCO

CONSULTANT : M/s DESEIN, NEW DELHI

BATTERY SIZING CALCULATION FOR UPS

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Battery sizing calculation:

IEEE Worksheet



Project: 2x660MW Ennore SEZ

Sized By: M-Nichani

Date: 15-06-2018

Nominal Temperature: 20.00°C
(Lowest: 4.00°C Highest: 50.00°C)

Minimum
Cell Voltage: 1.14 V

Cell Mfg: HOPPECKE
Cell Type: FNC 1045 L

(1) Period	(2) Load (Watt)	(3) Change in Load (Watt)	(4) Duration of Period (minutes)	(5) Time To End of Section (minutes)	(6) Kt Factor	(7) Tt Factor	(8) Required Section Size (3) x (6) x (7) = Rated Amp Hrs	
							pos. Values	neg. Values

Section 1 - First 1 Period(s) Only - if A2 is greater than A1, go to Section 2

1	W1 = 175824.18	W1-W0 = 175824.18	M1 = 120.00	t = 120.00	2.17	1.03	1333.59	0.00		
							Sec	Sub Total	1333.59	0.00
							1	Total	1333.59	0.00

Maximum Section Size (9) 1333.59 + Random Section Size (10) 0.00 = Uncorrected Size (US) (11) 1333.59
(US) (12) 1333.59 x Design Margin (13) 1.20 x Aging Factor (14) 1.25 = (15) 2000.39

When the cell size (15) is greater than a standard cell size, the next larger cell is required.

Calculated Capacity:	2000.39Ah
Recommended Battery:	2 X 295 X FNC 1045 L
Nominal Capacity:	2090.00 Ah
Utilization Factor []:	95.71%
Depth of Discharge [DOD]:	47.53%

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A4-10

CE/416/ ENNORE /UPS/SLD

REV 00

PAGE 01 OF 02

PROJECT : ENNORE SEZ (2x660 MW)

CUSTOMER : M/s TANGEDCO

CONSULTANT : M/s DESEIN, NEW DELHI

SINGLE LINE DIAGRAM

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REVISION:01

APPROVED

AMIT KUMAR SHARMA

PREPARED

ISSUED


DATE




SATHISH

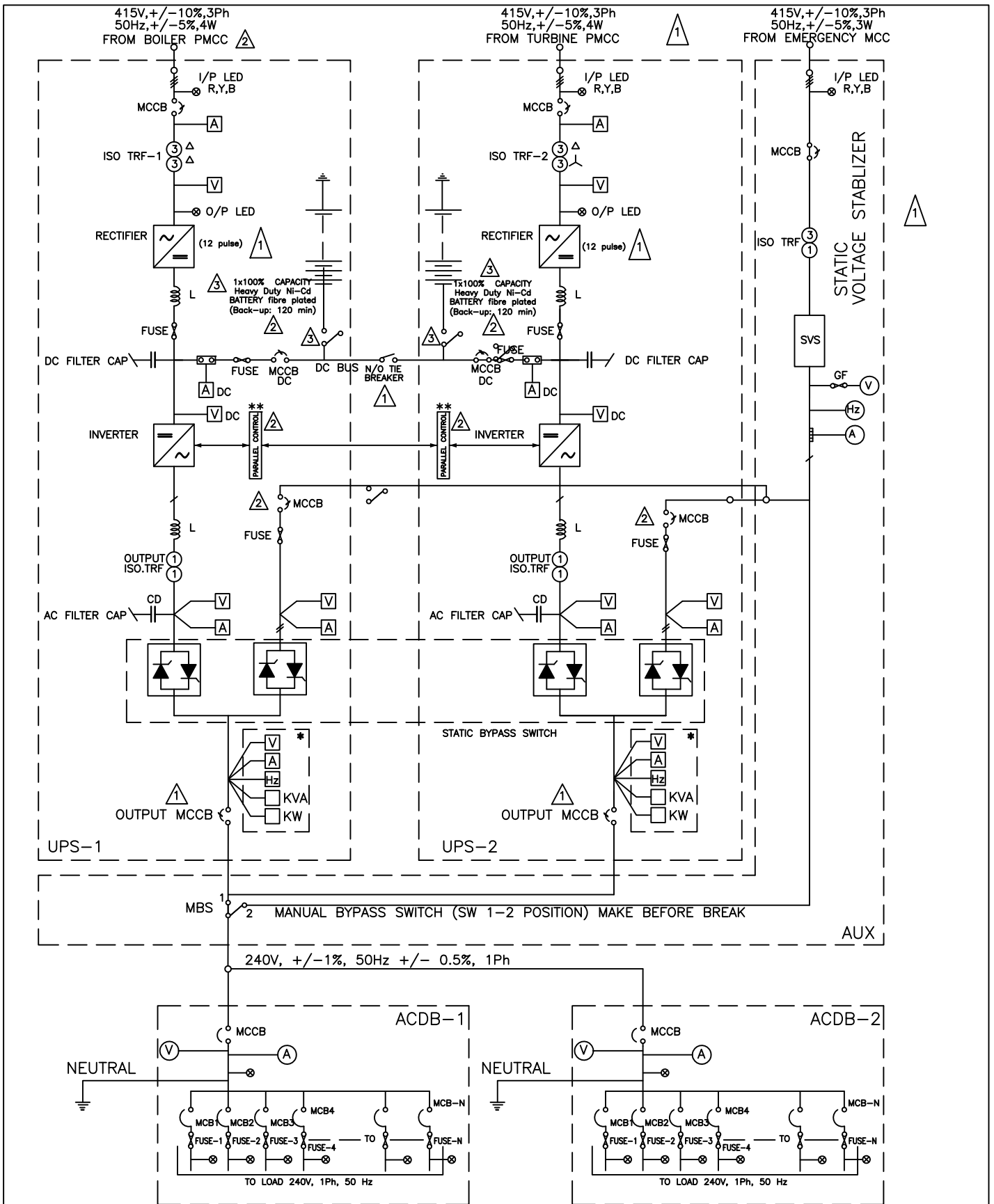
416

28/11/2022

PARALLEL REDUNDANT UPS SCHEME

REV.	DATED.	ALTD	CHD	APPD
04	14.12.16	SK	SCS	SCS
1	REVISED IN LINE WITH CUSTOMER COMMENTS			
REV.	DATED.	ALTD	CHD	APPD
03	31.07.15	SK	SCS	SCS
1	REVISED IN LINE WITH DISCUSSIONS HELD IN MEETING DATED 09.07.15 AT CHENNAI.			
JOB NO. 412				
STATUS CONTRACT				
PRINT SCALE 				
REV.	DATED.	ALTD	CHD	APPD
02	26.06.2015	SK	SCS	SCS
1	REVISED IN LINE WITH CUSTOMER COMMENTS RECVD VIDE LTR No. D71/15 DTD: 11.06.2015 & COMMENTS FROM ELECTRICAL.			
REV.	DATED.	ALTD	CHD	APPD
01	23.05.15	SK	SCS	SCS
1	REVISED IN LINE WITH CUSTOMER COMMENTS RECVD VIDE LTR No.266.			

PROJECT- 2 X 660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI									
	OWNER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED							
	OWNER'S CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI							
	EPC CONTRACTOR	BHARAT HEAVY ELECTRICALS LTD	DEPT CODE	NAME	SIGN	DATE			
		POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	I	DSGN AR	--SD--	07.02.15			
				CHD SCS	--SD--	07.02.15			
				APPD SCS	--SD--	07.02.15			
TITLE PARALLEL REDUNDANT UPS SCHEME									
					DEPT.	SCALE	DRAWING NO.		
					SIGN		PE-DG-412-145-1004		
					DATE		SHEET 1 OF 5	REV 04	













MFM SHALL BE PROVIDED FOR EACH ACDB. ⚠
 * V, A, Hz, KVA, KW READINGS/VALUES SHALL BE READY ON THE MIMIC DISPLAY PROVIDED ON THE UPS PANEL FRONT DOOR.
 ** DETAILED PARALLELING CIRCUIT FOR UPS WILL BE PROVIDED AS PART OF UPS DATA SHEET. ⚠

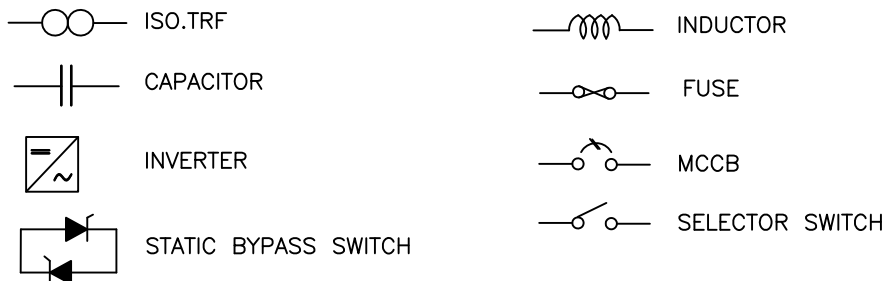



PROJECT:-	2 X 660 MW ENNORE SEZ STPP		DRG. No.	PE-DG-412-145-1004		
TITLE:-	UPS SCHEME FOR MAIN PLANT		REV. No.	04	DATE	14.12.2016
			SHEET	2	OF	5

GENERAL NOTES:


1. ACDB-1&2 NEUTRAL TO BE GROUNDED TO A DEDICATED GROUND.
2. ALL OUTPUT FEEDERS OF ACDB SHALL BE PROVIDED WITH AN LED AFTER THE FUSE FOR 'FEEDER ON' INDICATION WITH FEEDER DESCRIPTION.
3. REDUNDANT FEEDERS SHALL BE PROVIDED FOR EACH LOAD. 
-  4. ONLINE BATTERY HEALTH MONITORING SYSTEM SHALL BE PROVIDED FOR MAIN PLANT & OFFSITE UPS.
5. SINCE, THIS DIAGRAM IS AN SLD FOR UPS, DETAILS REGARDING SIZING HAVE NOT BEEN SHOWN. BHEL-EDN SHALL DO THE SIZING AND PREPARE TECHNICAL SPECIFICATION FOR PROCURING THE UPS.
6. FILTER CIRCUITS SHALL BE PROVIDED ON AC & DC SIDE AS REQUIRED.
7. UPS DB SHALL HAVE 1Ø240V MCB OUTGOING FEEDER.
8. RECTIFIER SHALL HAVE FACILITY FOR BOOST CHARGING THE BATTERY.
-  9. TRANSDUCERS SHALL BE PROVIDED FOR GIVING 4-20mA ISOLATED SIGNALS FOR DDCMIS & PLC.
10. POTENTIAL FREE CONTACTS FOR ALARMS/FAULTS SHALL BE PROVIDED FOR USE IN DDCMIS & PLC.
11. BOTH STATIC TRANSFER SWITCHES SHALL BE SELECTED ON AUTO MODE FOR AUTOMATIC TRANSFER TO BACKUP SUPPLY.
-  12. UPS SYSTEM SHALL WORK IN "CRISS -CROSS REDUNDANCY" CONFIGURATION. HENCE THE UPS SYSTEM DESIGN SHALL ENSURE THAT IN CASE OF ONE OF THE CHARGER FAILURE, THE OTHER HEALTHY CHARGER, SHALL FEED TO ONE OF OR BOTH THE INVERTORS AS THE CASE MAY BE AND CONTINUE TO CHARGE THE COMMON/INDIVIDUAL DC BATTERY BANKS AT ALL LOAD CONDITIONS.
-  13. SURGE PROTECTION DEVICE (SPD) SHALL BE PROVIDED AT INPUT SIDE OF EACH UPS & STATIC VOLTAGE STABILIZER.
-  14. BATTERY JUNCTION BOXES SHALL BE AS PER CUSTOMER SPECIFICATION REQUIREMENT.
-  15. THE REQUIREMENT OF INDICATION OF ON, OFF & TRIP SHALL BE AS PER CUSTOMER SPECIFICATION.
-  16. FOR A.C. POWER DISTRIBUTION PANELS(INCLUDING 20% SPARE FEEDERS ON EACH PANEL WITH 2 Nos. MINIMUM SPARE FEEDER OF EACH RATING) AND DIGITAL TYPE AMMETER, VOLTMETER, FREQUENCY METER, PF METER, WATT METER & VA METER QTY OF UPS FOR BTG & FOR EACH INDIVIDUAL BOP PKG IS 2 SETS QTY OF FEEDERS SHALL BE AS ON REQUIRED BASIS.
-  15. REQUIREMENT OF DISPLAY OF VARIOUS PARAMETERS SHALL BE AS PER SPECIFICATION AND SHALL BE REFLECTED IN FINAL UPS DOCUMENT.
-  16. EACH FEEDER SHALL HAVE FAST ACTING SEMICONDUCTOR FUSE, MCB & LED INDICATION FOR ON STATUS.

LEGEND:



	PROJECT:-	2 X 660 MW ENNORE SEZ STPP	DRG. No.	PE-DG-412-145-1004		
	TITLE:-	UPS SCHEME	REV. No.	04	DATE	14.12.2016
		NOTES & LEGEND	SHEET	4	OF	5

△ UPS SIGNAL INTERFACING WITH DDCMIS/DCS & PLC

1. ALARMS AND STATUS INDICATIONS, CURRENT, VOLTAGE ,FREQUENCY, PF ETC SHALL BE PROVIDED THROUGH SERIAL LINK WITH MODBUS OR ANOTHER COMPATIBLE PROTOCOL .
2. LIST OF 4-20 mA SIGNALS TO DDCMIS/PLC :
 - I) INVERTER A & B OUTPUT VOLTAGES
 - II) INVERTER A & B OUTPUT CURRENTS
 - III) INVERTER A&B OUTPUT FREQUENCY
3. LIST OF ALARMS (MIN.) TO DDCMIS THROUGH POTENTIAL FREE CONTACTS :-
 - I) RECTIFIER - 1 TRIP.
 - II) INVERTER - 1 TRIP.
 - III) UPS BATTERY-1 LOW. 
 - IV) UPS BATTERY-2 LOW.
 - V) RECTIFIER - 2 TRIP.
 - VI) INVERTER - 2 TRIP.
 - VII) LOAD ON STATIC BYPASS.
 - VIII) STATIC BYPASS FAILURE
 - IX) ACDB - 1 INCOMER TRIPPED.
 - X) ACDB - 2 INCOMER TRIPPED.
 - XI) UPS - 1 FAN TRIPPED.
 - XII) UPS - 2 FAN TRIPPED.



PROJECT:- 2 X 660 MW ENNORE SEZ STPP

TITLE:- UPS SCHEME

DRG.
No.

PE-DG-412-145-I004

REV.
No.

04

DATE

14.12.2016

SHEET

5

OF

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