

ASSAM ELECTRICITY GRID CORPORATION LIMITED

Regd. Office:1st floor, Bijulee Bhawan, Paltanbazar, Guwahati-781001

CIN: U40101 AS2003SGC007238

Phone:0361-2739520/Fax:0361-2739513 web:www.aegcl.co.in



Bidding Document

For

**Procurement, Erection, Testing and commissioning of one (1) no. of 110V DC 300AH
Battery Bank with Charger & DCDB for 132kV Karimganj GSS, AEGCL**

**DEPUTY GENERAL MANAGER
SILCHAR T&T CIRCLE
AEGCL, SILCHAR-788015**

Tender Cost: ₹1000.00

EMD: ₹25,000.00

For & on behalf of the **Managing Director, AEGCL, the Deputy General Manager, Silchar T&T Circle, AEGCL, Silchar**, invites tenders in prescribed form, from reputed Firms/Contractors/Manufacturers with sound technical and financial capabilities for the following work. A single stage two envelope procedure (**Techno-Commercial and Price Bid**) will be adopted for this tender.

Sl. No.	Name of work	Estimated Cost In INR	Time of completion In Days	Consignee address
1	Procurement, Erection, Testing and commissioning of one (1) no. of 110V DC 300AH Battery Bank with Charger & DCDB for 132kv Karimganj GSS, AEGCL	12,32,114.00	45 days from the date of issue of work order	O/O Assistant General Manager, Silchar T&T Division, AEGCL

1.0 Cost of Bidding Document:

Bidder has to pay Non-Refundable tender document cost of **Rs.1000.00 (Rupees One Thousand) only in the form of A/C payee Demand draft (Non-refundable) pledged in favour of AEGCL, Bijulee Bhawan, Paltanbazar, Guwahati-1, payable at Guwahati.**

2.0 Bidding Address:

Tender papers can be purchased on application in plain paper from the **Deputy General Manager, Silchar T&T Circle, AEGCL, Silchar.**

2.1 Key Dates: -

- a) **Bid Document available date: 10:00 hrs. of 14-07-2022**
- b) **Bid Submission Start Time & date: 11:00 hrs. of 15-07-2022**
- c) **Bid Submission end time & date: 14:00 hrs. of 05 08--2022**
- d) **Techno-Commercial Bid Opening time: 11:30 hrs. of 06-08-2022**

3.0 Validity of Bids and Bids Prices:

- 3.1 Bids shall remain valid for a period of 180 days after the bid submission deadline date prescribed by AEGCL. In exceptional circumstances, prior to the expiration of the bid validity period, AEGCL may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security shall also be extended for a corresponding period.
- 3.2 Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid.

3.3 Bidders shall quote for the entire scope of supply and services on a “single responsibility” basis such that the total bid price covers all the Supplier’s obligations mentioned in or to be reasonably inferred from the bidding document in respect of the design, manufacture, including procurement, delivery, and completion of the entire scope.

3.4 Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules.

4.0 Bid Security:

4.1 All bids must be accompanied by a bid security amounting to **Rs. 25,000.00** only in the form of Bank Guarantee/Demand Draft from any Nationalized Bank payable at Guwahati in favour of **AEGCL, Bijulee Bhawan, Paltanbazar, Guwahati-01.**

4.2 If a bid security is specified, any bid not complying then his bid shall be rejected by the Employer as non-responsive.

4.3 The bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.

4.4 The bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder ‘s furnishing of the performance security.

4.5 The bid security may be forfeited:

- a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder.
- b) if the successful Bidder fails to:
 - (i) sign the Contract with in the specified period.
 - (ii) furnish a performance security within 15 (fifteen) days’ time.

4.6 The Bid Security of a JV shall be in the name of the JV that submits the bid. If the JV has not been legally constituted at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent.

4.7 If a bid securing declaration is not executed in accordance with the above, AEGCL will declare the Bidder ineligible to be awarded a contract by the AEGCL for the period of time stated in the Form of Bid Securing Declaration.

5.0 Format and Signing of Bid:

5.1 The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid and clearly mark it —ORIGINAL - TECHNICAL BID and —ORIGINAL - PRICE BID.

In addition, the Bidder shall submit three copies of the bid, in the number specified and clearly mark each of them —COPY. In the event of any discrepancy between the original and the copies, the original shall prevail.

5.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the Bid Document and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.

5.3 A bid submitted by a JV shall be signed so as to be legally binding on all partners.

5.4 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

6.0 Submission and Opening of Bids:

6.1 Submission, Sealing and Marking of Bids:

6.1.1 Bidders may submit their bids by mail or by hand. When so specified in the Bid Document, bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows:

Bidders submitting bids by hand shall enclose the original and each copy of the Bid, including alternative bids, if permitted in accordance with above, in separate sealed envelopes, duly marking the envelopes as —ORIGINAL and —COPY. These envelopes containing the original and the copies shall then be enclosed in one single envelope.

6.1.2 The inner and outer envelopes shall:

- (a) bear the name and address of the Bidder;
- (b) be addressed to the Bidding Authority.
- (c) bear the specific identification of this bidding process indicated in the Bid Document

6.1.3 The outer envelopes and the inner envelopes containing the Technical Bid shall bear a warning not to open before the time and date for the opening of Technical Bid.

6.1.4 The inner envelopes containing the Price Bid shall bear a warning not to open until advised by the AEGCL.

6.1.5 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

6.2 AEGCL may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document, in which case all rights and obligations of the AEGCL and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

7.0 Eligible Bidders:

7.1 A Bidder may be a private entity or a government-owned entity or any combination of such entities with the intent to enter into an agreement supported by a letter of intent or under an existing agreement in the form of a joint venture, consortium, or association (JV). In the case of a JV:

- a) all partners shall be jointly and severally liable, and
- b) the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the partners of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.

7.2 A Bidder, and all partners constituting the Bidder, shall have Indian nationality. A Bidder shall be deemed to have the nationality of a country if the Bidder is a national or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of Republic Of India. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.

7.3 AEGCL considers a **conflict of interest** to be a situation in which a party has interests that could improperly influence that party's performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations, and that such conflict of interest may contribute to or constitute a prohibited practice under Anticorruption Policy of Government of India and Government Of Assam. In pursuance Anticorruption Policy's requirement that Employer

as well as bidders, suppliers, and contractors observe the highest standard of ethics. AEGCL will take appropriate actions if it determines that a conflict of interest has flawed the integrity of any procurement process.

Consequently, all Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in this bidding process if, including but not limited to:

- (a). they have controlling partners in common; or
- (b). they receive or have received any direct or indirect subsidy from any of them;
or
- (c). they have the same legal representative for purposes of this bid; or
- (d). they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
- (e). a Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which it is involved. However, this does not limit the inclusion of the same subcontractor, not otherwise participating as a Bidder, in more than one bid; or
- (f). a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the plant and services that are the subject of the bid.

7.4 A firm that is under a declaration of ineligibility by the AEGCL or any Government Entity or PSU at the date of the deadline for bid submission or thereafter i.e. on or before contract signing date shall be disqualified.

7.5 Bidders shall provide such evidence of their continued eligibility satisfactory to the AEGCL, as the Employer shall reasonably request.

7.6 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.

8.0 Financial Capability:

8.1 Bidder will require to submit along with the bid the audited balance sheets and other legal financial statements acceptable to AEGCL, for the last 3 (three) years to demonstrate the current soundness of the Bidders financial position and its prospective long-term profitability. As a minimum, an Applicant 's net worth calculated as the difference between total assets and total liabilities should be positive.

8.2 **Average Annual Turnover:** Minimum average annual turnover **INR 369634.20** calculated as total certified payments received for contracts in progress or completed, within the last 3 (Three) Years.

8.3 **Financial Resources:** Bidder need to demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet:

- (1) the following cash-flow requirement, **INR 369634.20 and**
- (2) the overall cash flow requirements for this contract and its current works commitment.

9.0 Experience:

9.1 Experience on similar nature of works under contracts in the role of manufacturers, contractor, subcontractor, or management contractor for at least the last 7(Seven) years prior to the bid submission deadline.

9.2 Participation as manufacturer, contractor Experience having successfully completed similar works during last 7 years ending last day of the month previous to the one in which applications are invited should be either of the following:

- (a) Three (3) similar completed works costing not less than Rs. **492845.60**
- (b) Two (2) similar completed works costing not less than Rs. **616057.00**
- (c) One (1) similar completed works costing not less than Rs. **985691.20**

9.3 The Bidder must have experience of executing work of similar nature previously. The bidder must submit experience and completion certificate for scrutiny by AEGCL. Each of such project/ works should consist of completion certificate as per Clause 9.1.

10.0 Evaluation Criteria:

10.1 Evaluation will be done on the basis of *Bid Clause* No. **7.0**, Eligible Bidders, Cl. No. **8.0**, Financial Capability, Cl. No. **9.0.**, Experience and in accordance with the **Annexure I** to be duly filled in, signed and submitted by the bidder.

10.2 Price Bid of only **Responsive Techno-Commercial Bidders** will be opened.

10.3 **Arithmetical Error**, if observed while in Price Bid evaluation, same will only be corrected.

10.4 **Any post bid correction request will NOT BE ENTERTAINED.**

10.5 **Price Bid Envelope of the Non-responsive Techno Commercial Bidders will be returned** to the respective bidders against submission of a written request by the bidder.

10.6 The following methodology will be practiced for identification and treatment of the Abnormally Low Bids (ALB) in this tender process of AEGCL:

(i) Absolute Approach is to be considered when there is fewer than five substantially responsive bidders and if the bid price is 20% or more below AEGCL's cost estimate then AEGCL's tender evaluation committee should clarify the Bid price with the bidder to determine whether the Bid is Abnormally low.

(ii) Relative approach is to be considered when there are at least 5(five) nos. of substantially responsive bids and the lowest bid price is 20% or more below AEGCL's cost estimate. In this approach, first the Average bid price is determined and then by deducting the standard deviation from the Average bid price, potentially ALB may be determined.

(iii) In case of an ALB, the tender evaluation committee/appropriate authority of the respective tenders shall undertake the following three stage review process which is as below:

- To identify ALB as per the steps mentioned in SI no. 10.6.(i) and 10.6.(ii), whichever is applicable.
- To seek and analyses the clarifications from the abnormally low Bidder in terms of resource inputs and pricing, including overheads, contingencies and profit margins. In that respect, the committee may refer to guideline of World Bank, AIIB, ADB etc. prescribed for ALB.
- To decide whether to accept or reject the bid.
- On acceptance of the bid, whether Additional Performance Security is to be imposed on the bidder supplemented by adequate justification.

(iv) In case of acceptance of ALB with Additional Performance Security:

- If any abnormally low bid is accepted with additional performance security, it is to be noted that the total performance security should not exceed 20% of the total contract value.
- The additional performance security shall be treated as part of the original performance security and shall be valid for a period similar to that applicable for defect liability period of the contract.
- Non submission of the additional performance security shall constitute sufficient ground for rejection of the bid and similar assessment shall then be initiated for next ranked bidder if that bidder is also identified as ALB.

11.0 Late Bid:

- 11.1 Any bid submitted *after the due date and time* will be rejected without any prejudice.
- 11.2 AEGCL will not be responsible for any Postal and/or Courier Delay in delivering the bid. The same received after the scheduled closing date and time will be rejected without any prejudice.
- 11.3 Bidding through EMAIL WILL NOT BE ACCEPTED.

12.0 Clarification:

- 12.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the AEGCL in writing at the AEGCL's address indicated in the BDS or raise his enquiries prior to 7 (seven) days of closing of the bid. The Employer will respond to any request for clarification, provided that such request is received no later than seven (7) days prior to the deadline for submission of bids. The AEGCL's response shall be in writing with copies to all Bidders who have acquired the Bidding Document including a description of the inquiry but without identifying its source. Should AEGCL deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so.
- 12.2 The Bidder is advised to visit and examine the site where the work is to be Carried out and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the provision of plant and services. The costs of visiting the site shall be at the Bidder's own expense.
- 12.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 12.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 12.5 The Bidder is requested, as far as possible, to submit any questions in writing, to reach the AEGCL not later than one week before the pre-bid meeting if there is provision of Pre Bid Meeting.
- 12.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by AEGCL exclusively through the issue of an Addendum but not through the minutes of the pre-bid meeting.
- 12.7 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

13.0 Amendment of Bidding Document:

- 13.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addenda.

- 13.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from AEGCL.
- 13.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, AEGCL may, at its discretion, extend the deadline for the submission of bids.
- 14.0 Preparation of Bids by the Bidders:**
- 14.1 **Cost of bidding:** The Bidder shall bear all costs associated with the preparation and submission of its Bid, and AEGCL shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 14.2 **Language of Bid:** The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and AEGCL, shall be written in the English language.
- 14.3 Bid Prices and Discounts:**
- 14.3.1 Unless otherwise specified in the Bid Document and/or AEGCL's Requirements, bidders shall quote for the entire plant and services on a —single responsibility basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding document in respect of the including procurement and subcontracting (if any), delivery, construction, installation and completion of the Work. This includes all requirements under the Contractor's responsibilities for completing the work and where so required by the bidding document, the acquisition of all permits, approvals and licenses, etc.; the operation, maintenance and training services and such other items and services as may be specified in the Bidding Document, all in accordance with the requirements of the General Conditions. Items against which no price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed to be covered by the prices for other items.
- 14.3.2 Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the bidding document. If a Bidder wishes to make a deviation, such deviation shall be listed. The Bidder shall also provide the additional price if any, for withdrawal of the deviation.
- 14.3.3 Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules. Where no different Price Schedules are included in the Bidding Document, bidders shall present their prices in the following manner:
(a) Separate numbered Schedules shall be used for each of the following elements.
(i) The total amount from each Schedule shall be summarized in a Grand Summary giving the total bid price(s) to be considered.
- 14.3.4 The price of the work shall be quoted as the Base Price or EXW Price
- 14.3.5 Sales Tax, GST and all other taxes (as applicable) payable on the work should be indicated separately. In case of failure to indicate so AEGCL will consider such taxes are included in the Offered Price.
- 14.3.6 Whenever forest produces like sand, stone, timbers etc are used in the work the contractor have to furnish documentary proof that requisite royalty on such produces has been paid to the concerned Department.
- 14.3.7 When the work being "work contract" which is one and individual and which involves no separate contract for the sale of materials, the contractor shall have not be entitled to get any VAT and or any other taxes, levies reimbursed from the AEGCL for the supply of the materials.

- 14.3.8 Taxes like work contract, income tax etc. which need to be deducted at source as per the prevailing law of the land, will be deducted at source.
- 14.3.9 **The Prices shall be FIXED and FIRM:**
The Bided Price should on Fixed Price basis, prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.
- 15.0 Additional Requirements:**
- 15.3.1 Bidders(s) knowledge from actual personal investigation of the resources of the region or District (S) in which he/they offers the work.
- 15.3.2 The Bidder shall furnish copy of their PAN Card. The card must be in the name of firm, in case the bidder is a partnership Firm.
- 15.3.3 In case the bidder is a partnership Firm, the work experience, solvency and turn over shall be in the name of partnership Firm only.
- 15.3.4 GST registration No.
- 15.3.5 Registered Power of attorney, if any.
- 15.3.6 I T Return for last three Years
- 15.3.7 Audited Balance Sheet for last three years
- 15.3.8 Labour License (Valid).
- 15.3.9 Electrical License/supervisory license above 33kV Voltage level in case of electrical work
- 16.0 Negotiation with successful bidder:**
The AEGCL reserve the right to hold negotiations with lowest who should be lowest, valid, eligible and technically acceptable bidder considered for award of contract directly if the rates were not unreasonably high.
- 17.0 TECHNICAL REQUIREMENTS**
- 17.1 **Intent of specification**
This section of the specification deals with the technical information & criteria for **“Procurement, Erection, Testing and commissioning of one (1) no. of 110V DC 300AH Battery Bank with Charger & DCDB for 132kV Karimganj GSS, AEGCL”**. The Contractor's proposal shall be based on the use of materials complying fully with the requirements specified herein.
- 18.0 Scope:**
The major scopes of work are as follows: -
a) Design, Supply, delivery of Battery Bank, Charger & DC Distribution Board (DCDB).
b) Erection, Testing and commissioning of Battery Bank, Charger & DCDB to AEGCL site.
c) Transportation and movement of supplied materials unto the site and arrangements of any permits required for transportation of supplied materials. However, AEGCL shall assist as far as practicable in the process.
d) Transit insurance and insurance during storage at site till commissioning shall be in the scope of the contractor.
The works to be executed shall be as per the items mentioned in the BOQ and as per the directions of the site engineer.
- 19.0 Contractor to inform himself fully**
- 19.1 The Contractor should ensure that he has examined the General Conditions, qualifying criteria, Specifications and Schedules and has satisfied himself as to all the conditions and circumstances affecting the contract price and fixed his price according to his own views on these matters and acknowledge that no additional allowances except as otherwise provided therein will be levied.

19.2 AEGCL shall not be responsible for any misunderstanding or incorrect information obtained by the Contractor other than information given to the Contractor in writing by AEGCL.

20.0 Conformity with Indian Electricity rules & other local regulations wherever applicable:

20.1 The Contractor shall note that all substation works shall comply with the latest provisions of Indian Electricity Rules and with any other regulations. Local authorities concerned in the administration of the rules and regulation relating to such works shall be consulted, if necessary, in regard to the rules and regulations that may be applicable.

20.2 The materials covered by this specification shall, unless otherwise stated be designed, constructed and tested in accordance with the latest revisions of relevant Indian Standards and shall conform to the regulations of local statutory authorities.

20.3 The Contractor shall also comply with the Minimum Wages Act 1948 and the payment of Wages Act (both. Of the Government of India and State of Assam) and the rules made there under in respect of any employee or workman employed or engaged by him or his Sub-Contractor.

20.4 All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully payable under the provisions of the statutory laws and its amendments from time to time during erection in respect of the Substation Works, ultimately to be owned by the Employer, shall be to the account of the Employer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or his Sub-Contractor, the additional fees to such inspection and/or registration shall be borne by the Contractor.

20.5 In case of any conflict between the standards and this specification, this specification shall govern.

21.0 Drawing and Documents

21.1 All drawings shall be provided by AEGCL during execution, wherever applicable.

22.0 Employer Supervision

22.1 The scope of the duties of the Employer, pursuant to the contract, will include but not be limited to the following.

- a) Inspect, accept or reject any material and work under the Contract.
- b) Issue certificate of acceptance and/or progressive payment and final payment certificate.

23.0 Packing:

All the materials shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. The Supplier shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.

The Supplier shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during transport by air, sea, rail and road.

All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'up' and 'down' on the sides of boxes, and handling and unpacking instructions as

considered necessary. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea.

The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols, i.e. fragile, handle with care, use no hook etc. wherever applicable.

Each package shall be legibly marked by the-Supplier at his expenses showing the details such as description and quantity of contents, the name of the consignee and address, the gross and net weights of the package, the name of the Supplier etc.

24.0 Materials handling and storage:

(a) All the supplies under the Contract as well as Employer supplied items (if any) arriving at site shall be promptly received, unloaded and transported and stored in the stores by the Contractor.

(b) Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection at site. Any demurrage, and other such charges claimed by the transporters, railways etc., shall be to the account of the Contractor.

(c) The Contractor shall maintain an accurate and exhaustive record-detailing out the list of all items received by him for the purpose of erection and keep such record open for the inspection of the Employer.

(d) All items shall be handled very carefully to prevent any damage or loss. The materials stored shall be properly protected to prevent damage.

(e) All the materials stored in the open or dusty location must be covered with suitable weatherproof and flameproof covering material wherever applicable.

(f) The Employer will verify the storage facilities arranged by the contractor and dispatch clearance will be provided only after Employer is satisfied.

25.0 TECHNICAL SPECIFICATIONS OF 110KV DC 300AH BATTERY BANK WITH CHARGER & DCDB

A brief description of scope of work covered under this Bidding Document is furnished below:

- a) Design, manufacture, supply and delivery of Battery Bank, Charger & DCDB.
- b) Erection, Testing and commissioning of Battery Bank, Charger & DCDB to AEGCL site.
- c) Arrangements of any permits required for transportation and movement of supplied materials. However, AEGCL shall assist as far as practicable in the process.
- d) Transit insurance and insurance during storage at site till commissioning shall be in the scope of the contractor.

25.1 SERVICE CONDITIONS

The plant and materials supplied shall be suitable for operation under the following climatic and other conditions:

- | | | |
|----|---|--------------------------------------|
| a) | Peak ambient day temperature in still air | :45°C |
| b) | Minimum night temperatures | :0°C |
| c) | Reference ambient day temperature | :45°C |
| d) | Relative Humidity | a) Maximum :100 %
b) Minimum :10% |
| e) | Altitude | : Below 1000M above MSL |
| f) | Maximum wind pressure | :As per IS: 802 latest code. |
| g) | Seismic Intensity | :ZONE-V as per IS 1893. |

25.2

TYPE TEST REPORTS

- (i) The Battery, Battery Charger, MCCBs & DCDB offered shall be fully type tested as per relevant Indian Standard/IEC. Equipment which has never been tested for critical performance by a NABL accredited testing laboratory shall not be accepted. In such cases, a promise agreement by a bidder to have the equipment tested after award of a contract is not acceptable.
- (ii) Test reports to be acceptable must be related directly to the equipment offered. The Bidder shall furnish type test reports with the technical bid such as relevant drawings and specification so that test reports can be linked to the offered equipment. Test reports for a similar or higher class of equipment are acceptable with a commitment to perform the type test on the particular equipment after the contract is awarded, free of any charges.
- (iii) The above said test reports submitted with the offer shall not be older than five years, prior to the date of opening of bid. ***Type Test Reports older than five (5) years on the date of technical bid opening shall not be accepted.***

25.3

GUARANTEED TECHNICAL PARTICULARS

1. All the materials/components used in Battery Chargers and Valve Regulated Lead Acid Battery (VRLA) shall be free from flaws and defects and shall conform to relevant standards and good engineering practices:
2. Bidder shall select number of cells, float and Boost voltage to achieve requirements as specified in clauses hereafter

25.4

TECHNICAL SPECIFICATION

BATTERY BANK

25.4.1 TYPE AND RATING FOR 110 V DC BATTERY BANK

- a. Stationary type, sealed, valve regulated lead acid battery tank suitable for operation on 110 Volts D.C. system to meet loads like emergency lighting, control and signaling circuits, relays, breaker operations, circuit breaker spring charging, indicating circuits, etc. shall be required. The stationary battery shall comply with the provisions of IS: 15549/IEC 60896.
- b. The Ampere-hour capacity of the battery bank at 27°C at 10 hours discharge rate shall be 300 AH
- c. The nominal voltage of the battery bank shall be 110 Volts D.C.
- d. The number of cells in a complete battery bank set shall be 55 plus 2 spares.
- e. The maximum voltage during float operation shall not be more than 242 V.
- f. Minimum voltage available when no charger is working and battery fully discharged up to 1.85 V per cell, shall not be less than 198 V.

25.4.2 PLATES

Positive plates shall be made of flat pasted type using lead-cadmium-antimony alloy for durability, high corrosion resistant, maintenance free, long life both in cyclic as well as in float applications. Negative plates shall be heavy duty, durable flat plate using lead calcium alloy pasted box grid. Negative plates shall be designed to match the life of positive plates and combination of negative and positive plates shall ensure long life, durability and trouble free operation of battery.

PLC operated equipment should be deployed for preparation of paste to ensure consistency in paste quality. Conventional / manual type of paste preparation is not allowed.

25.4.3 CONTAINER AND LID

The containers and lids shall be made of a special grade polypropylene copolymer plastic material. They shall be sufficiently robust and not liable to deformation under internal operating pressures and within the temperature range naturally encountered, leak proof, non-absorbent and resistant to the acid with low water vapour permeability.

25.4.4 VENT PLUGS

Each cell shall be equipped with one-way safety valve with opening pressure of 5 ± 1 psi and closing pressure 4 ± 1 psi. The vent plug shall be made with suitable grade of fire retardant plastic material. Each valve opening shall be covered with flame barrier capable in preventing the ingress of flame into the cell interior when the valve opens and hydrogen / oxygen gas mixture is released.

25.4.5 Flame Arrestors

Each cell shall be equipped with a Flame Arrestor to defuse the Hydrogen gas escaped during charge and discharge. Material of the flame arrestor shall not affect the performance of the cell.

25.4.6 SEPARATORS

Separator shall be made of spun glass, micro porous matrix and shall be resistant to Sulphuric Acid. It shall be capable of keeping the entire electrolyte and shall be electrically insulated. Sufficient separator overlaps and PVC shield protection to top and bottom edges of the plates is to be provided to prevent short circuit formation between the edges of adjacent plates.

25.4.7 CONNECTORS

The connectors shall be lead coated copper of suitable size to join the cells. The connectors shall be suitably designed and coated to withstand corrosion due to sulphuric acid. The coating should be adequate and tenacious. All the copper inter cell connectors shall be provided with heat shrinkable sleeves except at the connecting points.

25.4.8 ELECTROLYTE:

The electrolyte shall be prepared from the battery grade Sulphuric Acid conforming to IS: 266. The batteries shall be supplied in factory filled and charged condition.

25.4.9. WATER

Water required for preparation of electrolyte shall conform to IS: I069.

25.4.10. PLATE CONNECTION

Lugs of plates of like polarity shall be connected by lead burning to a horizontal strap having an upstanding terminal post adopted for connection to external circuit. Strap and post shall be cast with lead alloy. The positive and negative terminal posts shall be clearly marked for unmistakable identification.

25.4.11. BOLTS AND NUTS

Nuts and Bolts for connecting the cells shall be of superior grade passivated Stainless steel.

25.4.12. TERMINALS

Terminals shall be of integral lead terminal with solid copper core with M6 threading for fastening. The junction between terminal posts and cover and between the cover and container shall be hermetically sealed.

25.4.13. BATTERY RACKS

Batteries shall be installed on MS racks to be supplied by the Contractor to fit in the battery room. Racks/Trays shall be powder coated with anti-corrosive paint. Rack shall accommodate 55 cells plus 2 spares. Racks/Tray shall be suitably treated before painting for protection against fungus growth and other harmful effects due to tropical environment. The colour of the supporting racks shall conform to shade 631 of IS: 5.

25.4.14. The permissible self-discharge rate shall be less than 3% of the obtained capacity per month at 27°C when tested as per the relevant clause of the IS 15549

25.4.15. The AH (Ampere -Hour) efficiency as measured in conformance with the relevant IS shall not be less than 90%.

25.4.16. The WH efficiency as measured in conformance to the relevant IS shall not be less than 80%.

25.4.17. The Oxygen recombination efficiency as measured in conformance with the relevant clause of IS1549 shall be not less than 95%

25.4.18. The charging instructions shall be provided along with the batteries.

25.4.19. Capacity Requirements When the battery is discharged at 10-hour rate, it shall deliver 80% of C (rated capacity, corrected at 27° Celsius) before any of the cells in the battery bank reaches 1.85V/cell. The battery shall be capable of being recharged from the fully exhausted condition (1.75V/cell) within 10 hrs. up to 90% state of charge. All the cells in a battery shall be designed for continuous float operation at the specified float voltage throughout the life. The capacity (corrected at 27°Celsius) shall also not be less than C and not more than 120% of C before any cell in the battery bank reaches 1.75V/cell. The battery voltage shall not be less than the following values, when a fully charged, battery is put to discharge at C/10 rate: a. After Six minutes of discharge: 1.98V/cell b. After Six hours of discharge: 1.92V/cell c. After 8 hours of discharge: 1.85V/cell d. After 10 hours of discharge: 1.75V/cell Loss in capacity during storage at an average ambient temperature of 35° Celsius for a period of 6 months shall not be more than 60% and the cell/battery shall achieve 85% of its rated capacity within 3 charge/discharge cycles and full rated capacity within 5 cycles, after the storage period of 6 months. Voltage of each cell in the battery set shall be within 0.05V of the average voltage throughout the storage period. Ampere hour efficiency shall be better than 90% and watt hour efficiency shall be better than 80%.

25.4.20. Expected Battery Life The battery shall be capable of giving 1200 or more charge/discharge cycles at 80% Depth of discharge (DOD) at an average temperature of 27° C. DOD (Depth of Discharge) is defined as the ratio of the quantity of electricity (in Ampere-Hour) removed from a cell or battery on discharge to its rated capacity. The battery sets shall have a minimum expected life of 20 years at float operation.

25.4.21. Accessories along with Battery System

Each battery shall be supplied with following accessories and devices: (a) Torque Wrench. (b) Cell Test Voltmeter (-3-0+ 3) Volts with least count of 0.01 Volt

25.4.22. TYPE TEST OF BATTERY

The Bidder/Supplier shall supply type tested battery per IS 15549: 2004/IEC 60896-21 & 22 over the range of at least one capacity per design and should have met requirement of Service Life test as per above stated IEC standards within last seven years. The Bidder shall submit necessary evidences enclosed along with tender documents.

Sr. No	Description
1	Gas Emission
2	High Current Tolerance
3	Short Circuit Current and DC internal resistance
4	Protection against internal ignition from external spark source
5	Protection against ground short propensity
6	Content & durability of required marking
7	Material Identification
8	Valve Operation
9	Flammability Rating of material
10	Intercell connector performance
11	Discharge Capacity
12	Charge Retention during storage
13	Float Service with daily discharge for reliable mains power
14	Recharge behavior
15	Service life at an operating temperature of 32 deg C for brief duration exposure time
16	Impact of stress temperature of 60oC for brief duration exposure time with 3 hours discharge test
17	Abusive Over discharge
18	Thermal runaway sensitivity
19	Low temperature sensitivity
20	Dimensional sensitivity at elevated internal pressure & temperature
21	Stability against mechanical abuse of units during installation

25.4.23 Routine Test of Battery

1. Physical examination test
2. Visual Inspection
3. Dimensions, Mass & Layout
4. Marking & Packing

25.4.24. Acceptance Test of Battery

1. Polarity Marking
2. Verification of Dimensions
3. Test of AH Capacity.

25.4.25. Installation and Commissioning

Contractor/Manufacturer of battery shall install Battery Bank, as recommended in O&M manual/or relevant standards. All necessary instruments, materials, tools and tackles required for installation, testing at site and commissioning are to arranged by battery Contractor/manufacturer.

25.4.26. MARKING AND PACKING:

MARKING:

The following information shall be ineligibly and durably marked on the outside of the cell.

- (a) Nominal Voltage
- (b) Manufacturer's name, type and model name.
- (c) AH capacity at 10-hour rate.
- (d) Voltage for float operation at 20 deg. C with tolerance of (+/-) 1%.
- (e) Month & year of manufacturer
- (f) Country of origin. (g) S.No. of cell/cell No.

PACKING:

The cells shall be suitably packed so as to avoid any loss or damage during transit.

25.4.27. INSTRUCTION MANUAL:

The manufacturer shall supply one copy of instructions manual for initial charging (if required)/treatment, and routine maintenance during service, with each and every battery set. The manufacturer shall supply 5 copies of instructions manual to the purchaser. The following information shall be provided on, the instruction cards. (a) Designation of cell or battery (b) Ampere hour capacity. (c) Nominal voltage (d) Manufacturer's instructions for charging (e) Voltage for float operation at 20 deg. C with tolerance (+/-) 1%. (f) Maintenance instructions (g) Environmental & safety provisions required.

25.4.28. DRAWINGS:

The tenderer will submit the detailed dimensional drawings for battery sets including stands.

25.4.29. GUARANTEED TECHNICAL PARTICULARS:

Guaranteed Technical Particulars for battery sets as per Schedule-A attached shall be furnished along with the tender.

25.4.30. ACCESSORIES:

Each battery set shall be supplied complete with all necessary accessories viz. stand, inter connections, cell no. Plates with sticker, multi meter complete with leads, spanners.

25.4.31. BILL OF MATERIAL:

The manufacturer shall also have to furnish the bill of material used in battery set.

26.0 BATTERY CHARGING EQUIPMENTS

26.1. GENERAL DESCRIPTION

The Battery Chargers as well as their automatic regulators shall be of static type and shall be Compatible with offered VRLA batteries. The battery charging equipment shall have following two separate Boost-cum Trickle Charger sections:

- a. Section-1: Float Charger Section
- b. Section-2: Float-cum-Boost Charger Section

Each section shall have its own rectifier transformer, Rectifier Bridge and other equipment so

that each section can operate independent of each other. The Charger shall regulate the float/boost voltage in case of prescribed temperature rise of battery as per manufacturer's recommendation to avoid thermal runaway. Necessary temperature sensors shall be provided in mid location of battery banks and shall be wired up to the respective charger for feedback control. The manufacturer shall demonstrate this feature during testing of each charger.

26.2. CHARGER RATING

1. Section-1: Float Charger Section (FC):
 - (i) Input Voltage : 415+/- 10% volts three phase, 4 wire, 50 Hz A.C.
 - (i) Output Voltage : 110 Volt (Nominal).
 - (ii) Output Voltage Range :2.13 to 2.27 Volt per cell (Continuously Settable)
 - (iii) Total Output DC Current : 25 Amp

2. Section-1: Float cum Boost Charger Section (FCBC):
 - (i) Input Voltage : 415+/- 10% volts three phase, 4 wire, 50 Hz A.C.
 - (ii) Output Voltage : 110 Volt (Nominal)
 - (iii) Output Voltage Range :2.13 to 2.50 Volt per cell (Continuously Settable)
 - (iv) Total Output DC Current : 85 Amp
 - (v)

26.3. OPERATION AND CONTROL

Both the Charger Sections shall be capable for charging the battery and supplying the load simultaneously. The Float-cum-Booster charger section shall be operated either in float mode or in boost-cum-standby float charger mode. Under normal operating condition, with the input AC supply present, the 'Float Charger Section' shall supply the DC load and also float the battery by trickle charging and the 'Float cum Boost Charger Section' shall be kept in hot standby mode. In the event of main AC supply failure, the Sub-station DC load shall be automatically change over to the battery without any interruption. Similarly, after restoration of AC supply the normal operating condition shall be restored automatically and without any interruption. Under normal operating condition, with the input AC supply present and battery requires boost charge, the battery shall be automatically change over to 'Float cum Boost Charger Section' automatically. Similarly, after completion of Boost Charging, the battery shall be automatically to 'Float Charger Section'. During this Boost Charging operation, 'the float charger section' shall supply the load current only while boost charger section of 'Float cum Boost Charger Section' shall boost charge the battery and the load supply shall be disconnected from the battery through a contact of a contactor. If the 'Float Charger Section' fails during this period, the battery shall maintain load through tap cell diode, connected at suitable cell (to limit the DC load voltage to 110% of the specified Nominal Voltage, even at maximum Boost Charging voltage), instantaneously without any interruption of the DC load supply. If the incoming AC supply or the boost charger fails during boost charging, all the cells shall be connected to the load bus through the contact of the same contactor mentioned above.

All Battery Chargers shall be provided with facility for both automatic and manual control of output voltage and current. A selector switch shall be provided for selecting the mode of output voltage/current control, whether automatic or manual. When on automatic control mode during Float charging, the Charger output voltage shall remain within +1% of the set value, for AC input voltage variation of +10%, frequency variation of +5%, a combined voltage and frequency variation of +10%, and a DC load variation from zero to full load. All battery chargers shall have a constant voltage characteristic throughout the range (from zero to full load) at the floating value of the voltage so as to keep the battery fully charged but without harmful overcharge.

All chargers shall have load limiters having drooping characteristic, which shall cause, when

the voltage control is in automatic mode, a gradual lowering of the output voltage when the DC load current exceeds the Load limiter setting of the Charger. The Load-limiter characteristics shall be such that any sustained overload or short circuit in DC System shall not damage the Charger, nor shall it cause blowing of any of the Charger fuses. The Charger shall not trip on overload or external short circuit.

Uniform and step less adjustments of voltage setting (in both manual and automatic modes) shall be provided on the front of the Charger panel (FC) covering the entire float charging output range specified. Step less adjustments of the Load limiter setting shall also be possible from 80% to 100% of the rated output current for charging mode.

During Boost Charging, the Battery Charger (FCBC in Boost Mode) shall operate on constant current mode (when automatic regulator is in service). It shall be possible to adjust the Boost charging current continuously over a range of 50% to 100% of the rated output current for Boost charging mode.

The Charger output voltage shall automatically go on rising, when it is operating on Boost mode (FCBC), as the Battery charges up. For limiting the output voltage of the Charger, a potentiometer shall be provided on the front of the panel, whereby it shall be possible to set the upper limit of this voltage anywhere in the output range specified for Boost Charging mode.

The Charger manufacturer may offer an arrangement in which the voltage setting device for Float charging mode is also used as output voltage limit setting device for Boost charging mode and the Load-limiter of Float charging mode is used as current setting device in boost charging mode. Suitable filter circuits shall be provided in all the chargers to limit the ripple content (Peak to Peak) in the output voltage to 1%, irrespective of the DC load level, when they are not connected to a Battery.

An indicative logic of operation of FC & FCBC is furnished below:

System Condition	Battery Status	Charger Mode	FC	FCBC	Battery	Load
AC Mains Available	Battery full charged	FCBC on AUTO	ON	OFF	Supplied by FC	Supplied by FC
AC Mains Available	Battery requires boost	FCBC on AUTO	ON	ON	Supplied by FCBC in Boost mode	Supplied by FC
AC Mains Available	Battery requires boost	FCBC on AUTO	FAIL or OFF	ON	Supplied by FCBC in Float mode	Supplied by FCBC
AC Mains Available	Irrespective of battery condition	FCBC on Manual Float	ON	OFF	Supplied by FC	Supplied by FC
AC Mains Available	Irrespective of battery condition	FCBC on Manual Float	FAIL or OFF	ON	Supplied by FCBC in FLOAT mode	Supplied by FCBC
AC Mains Available Boost	Irrespective of battery condition	FCBC on Manual Boost	ON	ON	charged by FCBC	Supplied by FC
AC Mains Available	Irrespective of battery condition	FCBC on Manual Boost	FAIL or OFF	ON	Supplied by FCBC in FLOAT mode	Supplied by FCBC
AC Mains Available		FCBC on any Boost	OFF	OFF	On discharge	Battery will supply to load

26.4 MCCB

All Battery Chargers shall have 2 Nos. MCCBs on the input side to receive cables for two charger sections. It shall be of P2 duty and suitable for continuous duty. MCCB's should have auxiliary contacts for annunciation, status for Substation Automation System.

26.5 Rectifier Transformer

The rectifier transformers shall be continuously rated, dry air cooled (A.N) and of class F insulation type. The rating of the rectifier transformer shall have 10% overload capacity.

26.6 Rectifier Assembly

The rectifier assembly shall be fully/half-controlled bridge type and shall be designed to meet the duty as required by the respective Charger. The rectifiers shall be provided with heat sink having their own heat dissipation arrangements with natural air cooling. Necessary surge protection devices and rectifier type fast acting HRC fuses shall be provided in each arm of the rectifier connections. Rectifier fuse fail shall come into annunciation.

26.7 Instruments One AC voltmeter and one AC ammeter along with selector switches shall be provided for each charger sections. One DC voltmeter and DC ammeter (with shunt) shall be provided for all Charger sections. The instruments shall be flush type, dust proof and moisture resistant. The instruments shall have easily accessible means for zero adjustment. The instruments shall be of 1.5 accuracy class. In addition to the above a centre zero voltmeter with selector switch shall also be provided for each charger sections for testing purpose. All instruments shall be with digital displays.

26.8 AIR BREAK SWITCHES

Each circuit breaker shall be equipped with auxiliary switches with sufficient number of contacts for control, indication and interlocking purposes. Ten normally open and ten normally closed contacts shall be provided as spares. All contacts shall be rated for the DC voltage specified in data sheet.

26.9 Fuses

Fuses wherever specified shall be HRC Link type. Fuses shall be mounted on fuse carriers which are in turn mounted on fuse bases. Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug-in type base. In such case one insulated fuse pulling handle shall be supplied for each charger. Fuse rating shall be chosen by the Bidder depending on the circuit requirement. All fuses in the chargers shall be monitored. Fuse failure annunciation shall be provided on the failure of any fuse.

26.10 Blocking Diode

Blocking diode shall be provided in the positive pole of the output circuit of each charger to prevent current flow from the DC Battery into the Charger.

26.11 Annunciation System

Audio-visual indications through bright LEDs shall be provided in each Charger sections for the following abnormalities: a) AC power failure, Charger –I/Charger-II b) Rectifier/chargers fuse blown.(For Charger-I & Charger-II) c) Over voltage across the battery when boost charging. d) Abnormal voltage (High/Low) e) DC earth fault relay f) Charger –I/Charger-II in Float/Boost mode g) DC over load relay. g) Any other annunciation if required. Potential free NO Contacts of above abnormal conditions shall also be provided for common remote indication "CHARGER TROUBLE" in Purchaser's Control System. Indication for charger in float mode and boost mode through indication lamps as well as for control room indication shall be provided for chargers. A potential free contact for float/boost mode shall be provided for external interlocks.

26.12 Analogue and Digital Inputs

Following Analogue and Digital Inputs shall be provided for Purchaser's substation automation/SCADA purposes in the Charger. The analogue inputs shall be generated by distinct transducers. These inputs shall be wired up to respective terminal blocks. The Digital Inputs shall be potential free:

Analogue Inputs

- (i) Voltage of Battery
- (ii) Current of Battery from Charger

Digital Inputs

- (i) Charger Fails
- (ii) Charger Float/Boost Mode
- (iii)

26.13 Charger Construction

The Chargers shall be indoor, floor-mounted, self-supporting sheet metal enclosed cubicle type. The Contractor shall supply all necessary base frames, anchor bolts and hardware. The Chargers shall be fabricated from 2.0mm cold rolled sheet steel and shall have folded type of construction. Removable gland plates for all cables and lugs for power cables shall be supplied by the Contractor. The lugs for power cables shall be made of electrolytic copper with tin coat. Power cable sizes shall be advised to the Contractor at a later date for provision of suitable lugs and drilling of gland plates. The Charger shall be tropicalized and vermin proof. Ventilation shall be of forced type by providing minimum 2 numbers fans, so that there shall be continuous expulsion of hot air in the charger cabinet. For inlet air Ventilation louvers, shall be provided and be backed with screens. All doors and covers shall be fitted with synthetic rubber gaskets. The chargers shall have hinged double leaf doors provided on front and on backside for adequate access to the Charger's internals. All the charger cubicle doors shall be properly earthed. The degree of protection of Charger enclosure shall be at least IP-43 as per IS: 13947 Part I. All indicating instruments, control switches and indicating lamps shall be mounted on the front side of the Charger. Each Charger shall be furnished completely wired upto power cable lugs and terminal blocks and ready for external connections. The control wiring shall be carried out with PVC insulated, 1100V grade 1.5 sq.mm stranded copper wires. Control terminals shall be suitable for connecting two wires, with 2.5 sq.mm stranded copper conductors. All terminals shall be numbered for ease of connections and identification. Each wire shall bear a ferrule or tag on each end for identification. At least 20% spare terminals shall be provided for control circuits. The insulation of all circuits, except the low voltage electronic circuits shall withstand test voltage of 3 KV AC for one minute. An air clearance of at least ten (10) mm shall be maintained throughout for such circuits, right up to the terminal lugs. Whenever this clearance is not available, the live parts shall be insulated or shrouded.

26.14 Painting

All sheet steel work shall be pre-treated, in tanks, in accordance with IS:6005. Degreasing shall be done by alkaline cleaning. Rust and scale shall be removed by pickling with acid. After pickling, the parts shall be washed in running water. Then these shall be rinsed in slightly alkaline hot water and dried. The phosphate coating shall be 'Class-C' as specified in IS:6005. Welding shall not be done after phosphating. The phosphating surfaces shall be rinsed and passivated prior to application of stoved lead oxide primer coating. After primer application, two coats of finishing synthetic enamel paint of shade-692 (smoke grey) of IS:5 shall be applied, unless required otherwise by the Purchaser. The inside of the chargers shall be glossy white. Each coat of finishing synthetic enamel paint shall be properly staved. The paint thickness shall not be less than fifty (50) microns.

26.15 TESTS AND INSPECTION

Battery Chargers shall conform to all type tests as per relevant Indian Standard Performance test on the Chargers as per Specification shall also be carried out on each charger as per specification. Rectifier transformer shall conform to all type tests in IS: 4540 and short circuit test as per IS: 2026. Following type tests shall be carried out for compliance of specification

Requirements: -

- i) Voltage regulation test.
- ii) Load limiter characteristics test
- iii) Efficiency tests
- iv) High voltage tests
- v) Temperature rise test
- vi) Short- circuit test at no load and full load at rated voltage for sustained short-circuit.
- vii) Degree of protection test
- viii) Measurement of ripple by oscilloscope.
- ix) Temperature compensation feature demonstration

The battery charger and all the components of the charger shall be routine tested accordingly to their relevant standard. This shall include the following:

- (a) Operational check for boost cum float charger.
- (b) Input / Output test of the chargers.
- (c) Performance test of the charger.
- (d) Temperature rise test of the rectifier transformer.
- (e) Power frequency H.V. test / Insulation tests.
- (f) Output quality of DC i.e. ripples to be measured at factory and during commissioning test.

NB: Charger will be rejected during testing, if the ripples are not within the guaranteed limit.

The Contractor shall be required to demonstrate to the Purchaser that the Chargers conform to the specification particularly regarding continuous rating, ripple free output, voltage regulation and load limiting characteristic, before despatch as well as after installation at site. At site the following tests shall be carried out:

- i) Insulation resistance test
- ii) Checking of proper annunciation system operation
- iii) Testing for ripple.

The Contractor shall present for inspection, the type and routine test certificates for the following components whenever required by the Purchaser.

- (i) Switches.
- (ii) Relays/ MCCBs
- (iii) Instruments.
- (iv) DC fuses.
- (v) SCR.
- (vi) Diodes.
- (vii) Condensers.
- (viii) Potentiometers.
- (ix) Semiconductor
- (x) Enunciators.
- (xi) Control wiring
- (xii) Push buttons and contactors. Makes of above equipment shall be subject to Purchaser's approval.

27.0 DC Distribution Board (DCDB)

27.1 General Features

The D.C. distribution boards shall be indoor, floor mounting of self-supporting, sheet metal clad, and cubicle type. The panels should be totally enclosed, dust tight and vermin proof and shall be made of 2.0 mm cold rolled sheet steel. The boards shall be provided with double leaf hinged doors at the back. All doors and covers shall be fitted with rubber gaskets. The doors shall be provided with locks and duplicated covers.

27.2 Bus Bar

The bus bars shall be of electrolytic copper of ample cross-section. The bus bars shall be insulated from the structure by means of durable, non-hygroscopic, non-combustible and non-tracking materials.

27.3 Detail Requirements

110 Volts D.C. distribution boards shall be provided with the following:

1. Mains failure alarm relay.
2. Earth fault alarm relay.
3. 110 Volts D.C. bell to be operated by the mains failure alarm relay.
4. 110 Volts D.C. buzzer to be operated by the earth failure alarm relay.
5. 3 Nos. Double pole air-break circuit breaker/MCCB of 400 amp capacity with thermal overload tripping arrangement to act as follows:
 - (i) One for DC Source-1 (incomer-1)
 - (ii) One for DC Source-2 (incomer-2)
 - (iii) One for Bus Section
6. 0-150 volts D.C. moving coil voltmeter to measure the bus-bar voltage. The display is to be in digital.
7. Pilot lamp to indicate D.C. on conditions.
8. 110 volts, double pole MCBs of following ratings for outgoing feeders.
For 110 V DCDB
 - (i) 32 Amp, 6 Nos.
 - (ii) 63 Amp, 4 Nos.
9. One terminal Board/block for all feeder outlets including cable glands.

27.4 Automatic Supply Changeover

Outlets including outlets including Automatic changeover between **Incomer-1 and Incomer-2** is to be carried out during the failure of supply in any of one the incomers. After the restoration of the supply, system shall be restored to normal condition automatically. The requirement of changeover under various conditions are as below:

Under normal conditions i.e., when supply is available in both the incomers, incomers 1 & 2 of DCDB shall be in closed condition and Bus couplers breaker shall be in open condition.

In case of failure of either of the sources, the incomer of that source shall trip and Bus coupler shall get closed. On restoration of supply, normal conditions described above are to be established.

27.5 Analogue and Digital Inputs

Following Analogue and Digital Inputs for Purchase's substation automation/SCADA purposes shall be provided. The analogue inputs shall be generated by distinct transducers. These inputs shall be wired up to respective terminal blocks. The Digital Inputs shall be potential free:

Analogue Inputs

- (i) Voltage of Bus Section-I
- (ii) Voltage of Bus Section-II
- (iii) Current from Source-I
- (iv) Current from Source-II

Digital Inputs

- (i) Incomer-I breaker On/Off
- (ii) Incomer-II breaker On/Off
- (iii) Bus Section Breaker On/Off
- (iv) 110 Volt DC earth fault

27.6 SUPERVISION IN ERECTION, TESTING AND COMMISSIONING

Bidders should note that, the equipment covered under this bidding document shall be used as backups to the already existing similar equipment in existing substations. The scope includes installation of battery banks, chargers and DCDB. Erection, testing and commissioning shall also inclusive of all costs for inter connections between charger to battery, Charger to DCDB, Charger to Purchaser's AC sources etc. However, necessary cables required will be supplied by the Purchaser.

28. DOCUMENTATION

The successful bidder shall submit **four sets** of drawings for AEGCL approval. The following drawing shall be supplied with the tender: -

- (i) Outline drawings of all apparatus showing sufficient details to enable the purchaser to determine whether the design proposed can be installed satisfactorily or not.
- (ii) Wiring diagram of battery charger.

29.0 Contract Agreement:

An agreement shall have to be drawn on non-judicial stamp of appropriate value with the Department by the selected Contractor in AEGCL's General Conditions of Supply and Erection 2009 of contract within 15 (fifteen) days from the date of issue of the LOI/Work Order.

Wherever there is any variation in between the conditions of the AEGCL's General Conditions of Supply and Erection 2009 and the above terms & conditions, this bid conditions will supersede the conditions of the AEGCL's General Conditions of Supply and Erection 2009.

30.0 Liquidated Damage:

The date of completion of work shall be deemed to be the essence of the contract and shall not be completed no later than the date specified in the contract. In case of failure to complete the work within the stipulated period AEGCL shall be entitled to:

30.1 Recover an amount at the rate of 1% (One percent) of the Contract Price per week or part thereof of delay, subject to maximum of 10% (Ten percent) of the contract price as liquidated damage to AEGCL.

However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the works or from any other obligations and liabilities of the Contractor under the Contract.

30.2 To complete the balance work giving notice to the Contractor/Firm and to recover any extra expenditure incurred thereby for having to complete the work at a higher price at the risk and responsibility of the Contractor/Firm.

30.3 Contractual failure: - Refer **clause No.30.1** of AEGCL's General Conditions of supply and erection 2009.

31. PERT Chart and/or BAR Chart:

The successful bidder within 10 (ten) days before the contract is awarded will make out a detailed PERT Chart covering all activities along with detailed program chart on accepted scheme indicating various stages of execution, method of execution and completion of work in different stages keeping the period of completion in view and submit the same to the Engineer for the consideration and approval.

32. Insurance:

The bidder shall arrange for any pay/cost of personnel accident insurance, medical treatment etc. in respect of their employees assigned to the works for all time and shall govern by Law of land.

33. Warranty:

33.1 The Supplier/Manufacturer warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

33.2 The Supplier/Manufacturer further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in the country of final destination. The supplier will provide warranty for the works executed by them.

33.3 If during the Period Warranty any defect is found, the Purchaser shall give Notice to the Supplier/Manufacturer stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier/Manufacturer to inspect such defects.

33.4 If having been notified, the Supplier/Manufacturer fails to remedy the defect within a period of 15 (fifteen) days, the Purchaser may, following notice to the Supplier/Manufacturer, proceed to do such work, and the reasonable costs incurred by the Purchaser in connection therewith shall be paid to the Purchaser by the Supplier or may be deducted by the Purchaser from any amount due the Supplier or claimed under the Performance Security.

33.5 The term period of warranty shall mean the period of **18 months from the date of completion of work**. The successful bidder should warrant the free replacement of any damaged/malfunctioning equipment and its accessories during the warranty period.

34. Safety:

34.1 Each and every safety measures for MAN and MACHINE will be the sole responsibility of the Contractor without any prejudice. Compensation claim if any will also be the responsibility of the contractor without any prejudice. As the contract is Turnkey in nature hence AEGCL will not bear any responsibility towards such claim.

34.2 COVID-19 rules must be strictly followed during the working period.

35. Pollution:

Each and every measure should be taken to adhere to the standard norms to avert any occasion of Air Pollution, Water Pollution, Soil Pollution and Sound Pollution. In case of any deviation leading to any legal action the Contractor will be solely responsible without any prejudice.

36.0 Payment terms:

- 36.1 No advance/Mobilization advance shall be made in this contract.
- 36.2 First & Final bill for supply & Erection will be entertained only after 100% completion of the works.
- 36.3 Payment will be made by DGM, Silchar (T&T) Circle, AEGCL, Meherpur, Silchar. The Bidder / Firm will have to be submitted the following Net Banking details.
 - (a) Banker's Name & Branch
 - (b) Account No
 - (c) Banker's address
 - (d) Banker's IFSC Code

37. Performance security deposit:

- 37.1 The successful bidder shall have to deposit through a Bank Guarantee from a Nationalized or scheduled Bank of RBI in AEGCL's standard proforma on non-judicial stamp of appropriate value for an amount equivalent to 10% (ten percent) of the total value of the order as performance security, immediately within 10 (ten) days from the issue of the letter of intent/detailed orders (as the case may be), duly pledged in favour of AEGCL, Bijulee Bhawan, Paltanbazar, Guwahati-1, and such security deposit shall be valid up to 60 (Sixty) days beyond the warranty period of 18 (Eighteen) months. The Bank Guarantee (BG) should be submitted to the O/O the Deputy General Manager, Silchar T&T Circle, AEGCL, Silchar-788015 by the successful Bidder.
- 37.2 Please note that, if the selected Bidder / Firm fails to furnish the requisite performance security as stated above and signs the contract within the stipulated period, 10 percent security money will be deducted from the total Bill value.
- 37.3 If the bidder / firm fails or neglects to observe and perform any of his obligations under the contract, Purchaser (AEGCL) shall have the right to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the Contractor/Firm.
- 37.4 No interest shall be payable on such deposits.

38. Retention Money:

- 38.1 In addition to above performance security deposit, retention money @ 20% of the total value of the order will be retained by the Engineer/Purchaser as per Bid Clause 33. The amount will be held by the Purchaser (AEGCL) till the work under the contract is completed and the completion certificate is issued.
- 38.2 If the Firm/Bidder fails or neglects to observe and perform any of his obligations under the contract, the Purchaser (AEGCL) shall have the right to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the supplier/contractor.
- 38.3 No interest shall be payable on such deposit.

39. Force Majeure Condition:

Force Majeure condition shall be considered as any circumstances beyond reasonable control of the party claiming relief, including but not limited to strikes, lockout, civil commotion, riot, insurrection, hostilities, mobilization, war, fire, flood, earthquake, malicious damage or accidents could entitle contractor to extension time. Any such delay should be intimated within 10 (ten) days from the beginning of such delay to consider/approved, any claim without prior information may not be considered under force Majeure.

40. Settlement of Dispute and Arbitration:

Any dispute arising out of the contract will be first settled bilaterally between AEGCL and Contractor. In case, dispute cannot be settled bilaterally, it will be referred to arbitration to be by an arbitrator appointed by AEGCL. The contractor shall not stop the work during settlement of any dispute. All disputes shall be subjected to the jurisdiction of District Court of Karimganj District.

41. Right to Reject:

AEGCL reserves the right to reject any or all the bids without assigning any reason thereof and the AEGCL further reserves the right to split up the work order in favour of more than one Contractor. The AEGCL also reserves the right to reject the lowest or any other price without assigning any reason.

The clauses which are not appearing in this document (bid) will be as per The General Condition of Supply and Erection 2009 of AEGCL. The General Condition of Supply and Erection 2009 of AEGCL is available in the AEGCL's website www.aegcl.co.in under Acts, Rules and Policies Tab.

Letter of Technical Bid

[Bidder's Letterhead]

Date: _____

Tender No.: _____

Invitation for Bid No: _____

To: _____

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Document, including Addenda No.: _____.

- (b) We offer to supply in conformity with the Bidding Document and in accordance with the completion/delivery schedule specified in the bid document, the following Goods and Related Services: _____.

- (c) Our Bid shall be valid for a period of _____ days from the date fixed for the bid submission deadline in accordance with the Bidding Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) If our Bid is accepted, we commit to obtain a Performance Security in the amount of _____ percent of the Contract Price for the due performance of the Contract;

- (e) We are not participating, as Bidders, in more than one Bid in this bidding process;

- (f) We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed.
- (g) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by AEGCL, APDCL or APGCL under the Employer's country laws or official regulations
- (h) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Name _____

In the capacity of _____

Signed _____

Duly authorized to sign the Bid for and on behalf of _____

Date _____

Price Proposal Submission Sheet

Date: _____

Tender No.: _____

Invitation for Bid No: _____

To: _____

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Document, including Addenda No.:

(b) We offer to supply in conformity with the Bidding Document and in accordance with the completion/delivery schedule specified Schedule of Supply & Erection, the following Goods and Related Services: _____

(c) The total price of our Bid, excluding any discounts offered in item (d) below is:

(d) The discounts offered and the methodology for their application are:

(e) The following commissions, gratuities, or fees have been paid or are to be paid with respect to the bidding process or execution of the Contract:

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate "none.")

Name _____

In the capacity of _____

Signed _____

Duly authorized to sign the Bid for and on behalf of _____

Date _____

Bidding Forms

Name of work: _____

Bid Identification No: _____

General

- (i) Name of the Firm/Contractor:
- (ii) Full Address:
- (iii) Constitution of the Firm:
 - a) Whether Partnership or any type:

A) Experience

- (i) No of years the Firm/Contractor has been in operation under its present name.
- (ii) Details of work executed/being executed by the tenderer in the last three years.
- (iii) Testimonials from Clients Company on various works executed for the last three years.
(Details of works executed/under execution in the last three years including another department)

Sl. No.	Name of work & W/O No.	Worked Done Under	Value of Work	Specified date of completion	Present status/completed on

B) Financial Position

(i) Financial Turnover during the last three years (copies of Audited Annual report, Accounts or a statement duly certified by a chartered accountant and Income Tax return.

Year	Turn over

Any other details that the tenderer may like to furnish to substantiate their financial and technical ability to undertake this work and complete the same within stipulated period of completion.

Name of the Bidder: -
Signature of the Bidder/Firm
Full Name
Postal Address
Phone/Mobile No.

PRICE BID

(To be submitted in the Part-II, 'Price bid' in sealed envelope in quadruplicate)

Sl no	Item description	Unit	Qty	Unit Price (Rs.)	Unit F&I (Rs.)	Total	Remarks
1	Supply of 110V VRLA battery bank (300 AMP-HOUR) with battery stand and all other fittings and accessories as per specification at 132KV Karimganj GSS	Set	1				
2	Supply of 110V battery charger with all fittings and accessories as per specification at 132KV Karimganj GSS	Set	1				
3	Erection, Testing and Commissioning of 110V VRLA battery bank (300 AMP-HOUR) at 132KV Karimganj GSS	Set	1				
4	Erection, Testing and Commissioning of 110V battery charger at 132KV Karimganj GSS	Set	1				
5	Supply of DCDB suitable for 110V, 300AH Battery Bank with all other fittings and accessories as per specification at 132KV Karimganj GSS	Set	1				
6	Erection, Testing and Commissioning of DCDB at 132KV Karimganj GSS	Set	1				
Total=							
GST @28% on item no. 1=							
GST @18% on item nos. 2 to 4=							
Grand total=							

Rupees in words

Name of the Bidder: -

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.

Form of Bid Security (Bank Guarantee)

(To be stamped in accordance with Stamp Act)

(The non-Judicial Stamp Paper should be in the name of issuing Bank)

Date: _____

Bid Reference No.: _____

WHEREAS, _____ [Name of Bidder] (hereinafter called "the Bidder")
has submitted his bid dated _____ [Date] for the supply of
_____ [Name of Contract] (hereinafter called "the Bid").

KNOW ALL MEN by these presents that We _____ [Name of Bank] of
_____ [Name of Place] having our registered office at
_____ (hereinafter called "the Bank) are bound unto
_____ [Name of Purchaser] (hereinafter called "the Purchaser ") in
the sum of _____ 1 for which payment well and truly to be made to the said Purchaser
the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this ___ day of _____ 20___.

THE CONDITIONS of this obligation are:

- 1) If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder in the Bid Submission Sheet, except as provided in the relevant Bid **Clause; Or**
- 2) If the Bidder refuses to accept the correction of errors in his Bid; **Or**
- 3) if the Bidder, having been notified of the acceptance of his Bid by the Employer during the period of Bid validity;
 - a) fails or refuses to execute the Form of Contract Agreement in accordance with the Instructions to Bidders, if required; or
 - b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders;

We undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it owing to the occurrence of one or all of the three conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date ___ days after the deadline for submission of bids as such deadline is stated in the Instructions to Bidders or as it may be extended by the Purchaser, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

(Signature, Name, and Address

ANNEXURE: I

Following information is to be furnished in the 'Technical and Commercial bid' as first page.

(Please tick mark where necessary.)

1)	Earnest money (EMD)	:Submitted/Not submitted
	a) Amount of EMD	:Rs.
	b) Submitted in the form of	
	Bank Guarantee /Demand Draft	: Yes/No.
2)	Validity of the offer	: days from the date of opening of 'Technical & Commercial Bid' & 'Price bid'.
3)	Nature of price offered	
	i) 'FIRM' Price	: Yes/No
4)	Terms of payment (Whether agreeable to accept payment as specified in clause-34)	: Yes/No
5)	Date of completion of supply/Erection. (Please specify the date of completion of supply/Erection as per specification)	: Yes/No
6)	'Security and performance guarantee' (Whether agreeable to accept as specified in Clause no-35)	: Yes/No
7)	List of orders executed for similar works furnished	: Yes/No
8)	Performance certificate from the Govt/Govt undertaking furnished	: Yes/No
9)	Deviation from the specifications	
	a) Technical	: Yes/No
	b) Commercial	: Yes/No

10)	Information in respect of technical capability is furnished	: Yes/No
11)	Information in respect of Financial capability certificate from the Banker is furnished	: Yes/No
13)	PAN card as per Cl. No. 15.3.2	: Yes/No
14)	GST registration no. as per Cl. No. 15.3.4	: Yes/No
15)	Registered Power of Attorney as per Cl.no. 15.3.5 enclosed.	: Yes/No

Name of the Bidder: -

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.

SCHEDULE - A

GUARENTED TECHNICAL AND OTHER PARTICULARS

(To be filled in by Bidder and shall be furnished with the Technical Bid)

1.0 BATTERY:

Sl no.	Description	Particulars
		220Volt
(a)	Name & Address of Supplier & Manufacturer	
(b)	Manufacturer's type designation	
(c)	Capacity in ampere hour (at 27°C, C 10 to 1.75 ECV)	
(d)	Nominal Cell Voltage (volts)	
(e)	No. of cells	
(f)	Capacity at different rates of discharge	
	(a) 1 hour	
	(b) 2 hour	
	(c) 3 hour	
	(d) 5 hour	
	(e) 8 hour	
(g)	Ah efficiency	
(h)	Wh efficiency	
(i)	Maximum short circuit current capacity	
(j)	Self-discharge per week	
(k)	Cycle life of the battery @ 27 °C	
(l)	Service life expectancy	
(m)	Recommended Maximum period of storage	
(n)	Positive Plates	
	(a) No of plate per cell	
	(b) Type of plate	
	(c) Total surface area of plate	
	(d) Grid material	
(o)	Negative Plates	
	(a) No of plate per cell	
	(b) Type of plate	

	(c) Total surface area of plate	
	(d) Grid material	
(p)	Material of container	
(q)	Type of Separator	
(r)	Terminal	
(s)	Safety Valve	Opening Pressure- Closing Pressure-
(t)	Painting Battery racks	
(u)	Type of material	
(v)	Insulators material (for racks and cells)	
(w)	Complete weight of the cell	
(x)	Net weight of each battery bank	
(y)	Overall dimensions of each battery-bank	
(z)	Method of connection between cells	
(aa)	Protection for terminals	
(bb)	Recommended Charging	
	a) Float Mode Charging	(i) Voltage (ii) Current
	b) Boost Mode Charging	(i) Voltage (ii) Current
(cc)	Time required to charge the battery from fully discharged condition to 90% SOC in boost mode at 27 °C	
(dd)	Amount and specific gravity of electrolyte per cell required for first filling at 27 °C	
(ee)	Specific gravity of electrolyte when fully charged at 27 °C	
(ff)	Maximum Electrolyte temperature that cell can withstand continuously without injurious effects.	
(gg)	Short Circuit current at battery terminals	
(hh)	Time for which the battery can withstand short circuit at terminals	
(ii)	Internal resistance of each cell	
	(i) Full charged condition	
	(ii) Fully discharged condition	

2.0 BATTERY CHARGER

SI no.	Description	Particulars
		220 Volt System
1.0	Name & Address of Manufacturer	
2.0	Standard Applicable	
3.0	Current rating of Charger	
4.0	Type of transformer used for Charger	
5.0	Rating of the transformer	
6.0	Voltage ratio of the transformer	
7.0	Phase	
8.0	Frequency	
9.0	Winding connection	
10.0	Class of insulation	
11.0	Impedance of the transformer	
12.0	Reference standard	
13.0	Type of charger control	
14.0	Whether over current/over voltage features provided?	
15.0	Facilities for boost charging	
16.0	Types of alarms	
17.0	Type of protection against short circuit and overloads	
18.0	Type of protection at charger's output terminals	
19.0	Protection for thyristor if installed	
20.0	Output voltage range under (preset values)	
	(a) Float Charger Section	
	(b) Boost Charger Section	
21.0	The output controllable current range	
22.0	Max. current and voltage output of the charger	

23.0	Protection against overcharging	
24.0	Details of automatic Voltage Regulator	
25.0	Manual Suitable pots for controlling maximum current and voltage at charger's output	
26.0	Kind of indicating meters provided on the charger's panel	
27.0	Blocking diode installed	
28.0	Whether necessary annunciations and functional status are provided for microscada/SAS?	
29.0	% of Ripple of Output voltage	
30.0	Whether forced ventilations provided.	

3.0 DC Distribution Board (DCDB)

S No.	Description	Particulars	
		220 Volt System	110 Volt System
1.0	Name & Address of Manufacturer		
2.0	Detail dimensions of D.C.D.B		
3.0	Thickness of steel sheets proposed to be used		
4.0	Thickness of steel sheets proposed to be used Busbars: a. Standard applicable: b. Material and cross section: c. Current rating d. Type of insulator		
5.0	Details of wiring: a. Cross-section: b. Voltage grade : c. Solid or stranded: d. Material		
6.0	Details of Instruments: a. Standards Applicable: b. Manufacturer's name and type: c. Range: d. Accuracy class		
7.0	Details of air break switches and fuses (manufacturer's name, type, rating, capacity etc.)		
8.0	D.C. Air Circuit Breakers: a. Manufacturer's name: b. Type : c. Standard Applicable: d. Rated Voltage:		

	<p>e. Rated continuous current:</p> <p>f. Rated making/breaking current:</p> <p>g. Overload/short circuit current release setting range:</p>		
9.0	Details of relays, if used		