

**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**

**Pending works to be executed against 33KV Premier Cryogenics Feeder bay at 220KV  
Samaguri GSS**

**DEPUTY GENERAL MANAGER  
TEZPUR T&T CIRCLE  
AEGCL, TEZPUR-784001**

**Tender Cost: ₹ 1000.00  
EMD: ₹10,500.00**

For & on behalf of the **Managing Director, AEGCL, the Deputy General Manager, Tezpur T&T Circle, AEGCL, Dhanuwa Nagar, Tezpur**, 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
1	Pending works to be executed against 33KV Premier Cryogenics Feeder bay at 220KV Samaguri GSS	5,08,720.00	120 days

**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 the “Assam Electricity Grid Corporation Limited, 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, Tezpur T&T Circle, AEGCL, Tezpur on all working days upto 4<sup>th</sup> March, 2021** . For submission of bids and other clarifications if any, the address is:

**O/o the Deputy General Manager,  
Tezpur T&T Circle, AEGCL,  
Near Dhanuanagar Petrol Pump,  
Sonitpur, Tezpur, Assam-784001.  
Ph no. 03712-221794.**

**3.0 Validity of Bids and Bids Prices:**

3.1 Bids shall remain valid for the 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.

- Supply of Equipments and mounting structures.
- Supply of mounting structure
- Erection testing & commissioning including laying of cables and
- Construction of foundation including erection of mounting structure

In the Price Bid, bidders shall give the required details and a breakdown of their prices as called for in Clause 3.4.

#### **4.0 Bid Security:**

4.1 All bids must be accompanied by a bid security amounting to **Rs. 10,500.00** only in the form of Demand Draft from any Nationalised Bank payable at Guwahati in favour of the **“Assam Electricity Grid Corporation Limited, Bijulee Bhawan, Paltanbazar, Guwahati-1”, Payable at Guwahati.**

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 specified period.

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 initialled 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 initialled 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 mail or 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 Deadline for Submission of Bids vis-à-vis Bid Opening:**

6.2.1 Bids must be received by the AEGCL at the address and no later than **17.00 Hours (IST) of 4<sup>th</sup> March, 2021** .

6.2.2 Subsequently, the bids will be opened publicly at **12.00 Hours (IST) of 5<sup>th</sup> March, 2021** .

6.3 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 1,53,000.00** 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 1,53,000.00** and
- (2) the overall cash flow requirements for this contract and its current works commitment.

- 9.0 Experience:**
- 9.1 Experience on relevant work 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 **2,04,000.00.**
  - (b) Two (2) similar completed works costing not less than **2,55,000.00.**
  - (c) One (1) similar completed works costing not less than **4,07,000.00.**
- 9.3 The Bidder who is not a manufacturer of equipment as required for in this Bid for execution of the works shall submit **an undertaking using form “ Manufacturer’s Authorisation- notarized”**
- 9.4 Similar work implies the works related to **Supply of equipment, mounting structure, erection testing & commissioning including laying of cables and construction of foundation including erection of mounting structure.** 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 Clause No. 7.0, 8.0 and 9.0 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.
- 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 Nonattendance 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 GST and all other taxes (as applicable) payable on the work should be quoted jointly.
- 14.3.5 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.
- 14.3.6 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 GST and or any other taxes, levies reimbursed from the AEGCL for the supply of the materials.
- 14.3.7 Taxes like GST, income tax etc. which need to be deducted at source as per the prevailing law of the land, will be deducted at source.
- 14.3.8 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:**

- 15.1 Detailed list of tools, plants, equipment’s and machinery available with the tenderer along with their value (A copy of approved assessor’s certificate to be enclosed or affidavit), if applicable.
- 15.2 Name, qualifications of the technical supervisors and staff under the employment of the tenderer and organization on hand and proposed to be engaged for the subject work (Authenticated by a Chartered Accountant or sworn through affidavit), if applicable.
- 15.3 Other facilities available with the tenderer not covered hither to.



- 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 Copy of Contract labour license.
- 15.3.3 The Bidder shall furnish copy of their PAN Card. The card must be in the name of firm, in case the tenderer is a partnership Firm.
- 15.3.4 In case the tenderer is a partnership Firm, the work experience, solvency and turn over shall be in the name of partnership Firm only.
- 15.3.5 GST registration No. and valid labour license.
- 15.3.6 Registered Power of attorney, if any.

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 tenderer considered for award of contract directly if the rates were not unreasonably high.

17.0 **SCOPE OF WORK**

17.1 The work involves design, engineering, manufacture, assembly, inspection, testing at manufacturer's works before dispatch, packing, supply, including insurance during transit, delivery at site of various equipment and materials including substation steel structures as specified in subsequent Clauses and Sections. Erection, testing and commissioning activities are also within the scope of this bidding document including construction of foundation and other associated civil and electrical works including integration to Siemens SAS for completion of the project. It is not the intent to specify completely herein all details of design and construction of the equipment and accessories. However, the equipment and accessories shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in continuous operation up to the bidder's guarantees in a manner acceptable to the Purchaser. The Purchaser will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance therewith.

The major items of works included in the scope of this specification are listed below:-

The major scopes of works are as follows:-

- |                                                                        |                                                                                                                                                              |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a) Supply of equipments.                                               | i) 33kV motor operated isolator without earth switch<br>ii) 33KV PT including marshalling Box<br>iii) Energy meter (0.2 class)<br>iv) ACSR Panther conductor |
| b) Supply of mounting structures                                       | i) For 33KV isolator without E/S<br>ii) For 33KV PT                                                                                                          |
| c) Erection testing & commissioning including laying of cable          | i) For 33KV isolator without E/S<br>ii) For 33KV PT<br>iii) For Energy meter                                                                                 |
| d) Construction of foundation including erection of mounting structure | i) For 33KV isolator without E/S<br>ii) For 33KV PT                                                                                                          |

17.2 **Supplier to inform himself fully**

17.2.1 The Supplier 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.

17.2.2 The Purchaser shall not be responsible for any misunderstanding or incorrect information obtained by the Supplier other than information given to the Supplier in writing by the Purchaser

17.3 **Conformity with Indian Electricity rules & other local regulations:**

17.3.1 The Supplier 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.

The equipment 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.

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

17.4 **Engineering Data:**

17.4.1 The furnishing of engineering data by the Supplier shall be in accordance with the Bidding Document. The review of these data by the Purchaser will cover only general conformance of the data to the specifications and not a thorough review of all dimensions, quantities and details of the materials, or items indicated or the accuracy of the information submitted. This review by the Purchaser shall not be considered by the Supplier, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications.

17.4.2 All engineering data submitted by the Supplier after review by the Purchaser shall or part of the contract document.

17.5 **Drawings and Documents for approval:**

17.5.1 The supplier shall submit all drawings and documents of all equipment to be supplied, including drawings of foundation, steel structure and any other drawings that may be required for successful completion of the project and get it approved by the Purchaser (AEGCL).

17.5.2 In addition, the following sub clauses shall also apply in respect of Contract Drawings.

17.5.3 All drawings submitted by the Supplier including those submitted at the time of Bid shall be with sufficient detail to indicate the type, size, arrangement, dimensions, material description, Bill of Materials, weight of each component break-up for packing and shipment, fixing arrangement required, the dimensions required for installation and any other information specifically requested in these specifications.

17.5.4 Each drawing submitted by the Supplier shall be clearly marked with the name of the Purchaser, the

specification title, the specification number and the name of the Project. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be to the scale and in S.I. units.

17.5.5 The drawings submitted for approval to the Purchaser shall be in quadruplicate. One print of such drawings shall be returned to the Supplier by the Purchaser marked "approved/approved with corrections". The Supplier shall there upon furnish the Purchaser additional prints as may be required along with one reproducible in original of the drawings after incorporating all corrections.

#### 17.6 **Inspection & Inspection certificate:**

17.6.1 The Purchaser, his duly authorized representative and/or outside inspection agency acting on behalf of the Purchaser shall have, at all reasonable times, access to the premises and works of the Supplier and their sub-Supplier(s)/sub-vendors and shall have the right, at the reasonable times, to inspect and examine the materials and workmanship of the product during its manufacture.

17.6.2 All routine and acceptance tests whether at the premises or works of, the Supplier or of any Sub-Supplier, the Supplier except where otherwise specified shall carry out such tests free of charge. Items such as labour, materials, electricity, fuel, water, stores apparatus and instruments as may be reasonably demanded by the Purchaser/inspector or his authorized representative to carry out effectively such tests in accordance with the Contract shall be provided by the Supplier free of charge.

17.6.3 If desired by the Purchaser, the Supplier shall also carry out type tests as per applicable Standards for which Purchaser shall bear the expenses except in cases where such tests have to be carried out. The Supplier is required to quote unit rates of type test charges in a separate Schedule (if such schedule is provided in the Bidding Document) in pursuance to this Clause. However, these type test charges shall not be taken into account in comparing Price Bid.

17.6.4 The inspection by Purchaser and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Supplier in respect of the agreed Quality Assurance Programme forming a part of the Contract.

#### 17.7 **Tests:**

17.7.1 The type, acceptance and routine tests and tests during manufacture to be carried-out on the material and equipment shall mean as follows:

i) Type Tests shall mean those tests, which are to be carried out to prove the process of manufacture and general conformity of the material to this Specification. These tests shall be carried out on samples prior to Commencement of commercial production against the order. The Bidder shall indicate his schedule for carrying out these tests.

ii) Acceptance Tests shall mean those tests, which are to be carried out on samples taken from each lot offered for pre-dispatch inspection, for the purposes of acceptance of that lot.

iii) Routine Tests shall mean those tests, which are to be carried out on the material to check requirements, which are likely to vary during production.

iv) Tests during Manufacture shall mean those tests, which are to be carried out during the process of manufacture and end inspection by the Supplier to ensure the desired quality of the end product to be supplied by him.

v) The norms and procedure of sampling for these tests will be as per the Quality Assurance Programme to be mutually agreed to by the Supplier and the Purchaser

17.7.2 The standards and norms to which these tests will be carried out are specified in subsequent Sections of this Specification. Where a particular test is a specific requirement of this Specification, the norms

and procedure of the test shall be as specified or as mutually agreed to between the Supplier and the Purchaser in the Quality Assurance Programme.

17.7.3 For all type and acceptance tests, the acceptance values shall be the values specified in this Specification or guaranteed by the Bidder or applicable Standards, as applicable.

17.8 **Employer's supervision:**

17.8.1 To eliminate delays and avoid disputes and litigation it is agreed between the parties to the Contract that all matters and questions shall be resolved in accordance with the provisions of this document.

17.8.2 The manufacturing of the product shall be carried out in accordance with the specifications. The scope of the duties of the Employer, pursuant to the contract, will include but not be limited to the following.

- (a) Interpretation of all the terms and conditions of these Documents and Specifications.
- (b) Review and interpretation of all the Contractors drawings, engineering data etc.
- (c) Witness or authorize his representative to witness tests at the manufacturer's works or at site, or at any place where work is performed under the contract.
- (d) Inspect, accept or reject any equipment, material and work under the Contract, in accordance with the Specifications.
- (e) Issue certificate of acceptance and/or progressive payment and final payment certificate.

17.9 **Packing:**

17.9.1 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.

17.9.2 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.

17.9.3 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.

17.9.4 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.

17.9.5 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.

17.10 **Construction Tools, Equipments etc.:**

17.10.1 The Contractor shall provide all the construction equipment, tools, tackle and scaffoldings required for construction, erection, testing and commissioning of the works covered under the Contract including construction power water supply etc. He shall submit a list of all such materials to the Employer before the commencement of work at site. These tools and tackle shall not be removed from the site without the written permission of the Employer.

17.11 **Materials handling and storage:**

- 17.11.1 (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. The materials from the store shall be moved to the actual location at the appropriate time to avoid damage of such materials at Site.
- (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 Contractor shall be responsible for making suitable indoor storage facilities, to store all items/materials, which require indoor storage.
- (g) The Contractor shall have total responsibility for all equipment and materials in his custody, stored, loose, semi-assembled and/or erected by him at site. The contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss.
- (h) The Employer will verify the storage facilities arranged by the contractor and despatch clearance will be provided only after Employer is satisfied.

17.12 **Contractor's material brought on to site:**

- 17.12.1 The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the work under intimation to the Engineer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Engineer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage there to.
- 17.12.2 The Employers shall have a lien on such goods for any sum or sums, which may at any time, be due or owing to him by the Contractor, under in respect of or by reasons of the Contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose of any such goods, in such manner, as he shall think fit including public auction or private treaty.
- 17.12.3 After the completion of the Works, the Contractor shall remove from the Site under the direction of the Engineer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Engineer.

17.13 **Commissioning Spares:**

- 17.13.1 It will be the responsibility of the Contractor to provide all commissioning spares required for initial operation till the Employer declares the equipment as ready for commissioning. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.
- 17.13.2 These spares shall be received and stored by the Contractor at least 3 months prior to the schedule

date of commencement of commissioning of the respective equipment and utilized as and when required. The unutilised spares and replaced parts, if any, at the end of successful completion of performance and guarantee test shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer's Representative.

## 18.0 **TECHNICAL SPECIFICATION**

Technical specification deals with the general technical information & criteria for design, manufacture and delivery of equipment/material.

The provisions of this section shall supplement all the detailed Technical Specifications and requirements brought out herein. The Supplier's proposal shall be based on the use of materials complying fully with the requirements specified herein.

### 18.0.1 **TECHNICAL SPECIFICATION OF ISOLATOR**

#### 18.0.1.1 **SCOPE**

18.0.1.2 This section of the specification is intended to cover design specifications for manufacture and testing of 132 KV and 33 KV gang operated switch (Isolators) with all fittings and accessories.

18.0.1.3 The Isolators are for outdoor installation suitable for horizontally mounting on mounting structures and for use at sub-stations.

18.0.1.4 Isolators shall be supplied with Earth Switch as and where specified.

18.0.1.5 The bidder shall offer ac motor operated Isolators.

#### 18.0.2 **GENERAL**

18.0.2.1 The Isolators and accessories shall conform in general to IS 9921 (or IEC: 62271-102) except to the extent explicitly modified in specification.

18.0.2.2 All isolating switches and earthing switches shall have rotating blades and pressure releasing contacts. All isolating and earth switches shall operate through 90° angle from closed position to fully open position.

18.0.2.3 Complete isolator with all the necessary items for successful operation shall be supplied including but not limited to the following:

- 18.0.2.4
- i) Isolator assembled with complete base frame, linkages, operating mechanism, control cabinet, interlocks etc.
  - ii) All necessary parts to provide a complete and operable isolator installation, control parts and other devices whether specifically called for herein or not.
  - (iii) The isolator shall be designed for use in the geographic and meteorological conditions as given in Section 1.

### 18.0.3 **DUTY REQUIREMENTS**

18.0.3.1 Isolators and earth switches shall be capable of withstanding the dynamic and thermal effects of the maximum possible short circuit current of the systems in their closed position. They shall be constructed such that they do not open under influence of short circuit current.

18.0.3.2 The earth switches, wherever provided, shall be constructionally interlocked so that the earth switches can be operated

only when the isolator is open and vice versa. The constructional interlocks shall be built in construction of isolator and shall be in addition to the electrical and mechanical interlocks provided in the operating mechanism.

18.0.3.3 In addition to the constructional interlock, isolator and earth switches shall have provision to prevent their electrical and manual operation unless the associated and other interlocking conditions are met. All these interlocks shall be of failsafe type. Suitable individual interlocking coil arrangements shall be provided. The interlocking coil shall be suitable for continuous operation from DC supply and within a variation range as stipulated elsewhere in this specification.

18.0.3.4 The earthing switches shall be capable of discharging trapped charges of the associated lines.

18.0.3.5 The isolator shall be capable of making/breaking normal currents when no significant change in voltage occurs across the terminals of each pole of isolator on account of make/break operation.

18.0.3.6 The isolator shall be capable of making/breaking magnetising current of 0.7A at 0.15 power factor and capacitive current of 0.7A at 0.15 power factor at rated voltage.

#### 18.0.4 **CONSTRUCTIONAL DETAILS**

18.0.4.1 All isolating switches shall have rotating blades and pressure releasing contacts. All isolating switches shall operate through 90° angle from closed position to fully open position.

##### 18.0.4.2 **Contacts:**

18.0.4.3 The contacts shall be self-aligning and self-cleaning and so designed that binding cannot occur after remaining closed for prolonged periods of time in a heavily polluted atmosphere.

18.0.4.4 No undue wear or scuffing shall be evident during the mechanical endurance tests. Contacts and spring shall be designed so that readjustments in contact pressure shall not be necessary throughout the life of the isolator or earthing switch. Each contact or pair of contacts shall be independently sprung so that full pressure is maintained on all contacts at all time.

18.0.4.5 Contact springs shall not carry any current and shall not lose their characteristics due to heating effects.

18.0.4.6 The moving contact of double break isolator shall have turn-and-twist type or other suitable type of locking arrangement to ensure adequate contact pressure.

##### 18.0.4.7 **Blades:**

18.0.4.8 All metal parts shall be of non-rusting and non-corroding material. All current carrying parts shall be made from high conductivity electrolytic copper/aluminium. Bolts, screws and pins shall be provided with lock washers. Keys or equivalent locking facilities if provided on current carrying parts, shall be made of copper silicon alloy or stainless steel or equivalent. The bolts or pins used in current carrying parts shall be made of non-corroding material. All ferrous castings except current carrying parts shall be made of malleable cast iron or cast-steel. No grey iron shall be used in the manufacture of any part of the isolator.

18.0.4.9 The live parts shall be designed to eliminate sharp joints, edges and other corona producing surfaces, where this is impracticable adequate corona shield shall be provided. Corona shields/rings etc., shall be made up of aluminium/aluminium alloy.

18.0.4.10 Isolators switches including their operating parts shall be such that they cannot be dislodged from their open or closed positions by short circuit forces, gravity, wind pressure, vibrations, shocks, or accidental touching of the connecting



rods of the operating mechanism.

18.0.4.11 The switch shall be designed such that no lubrication of any part is required except at very infrequent intervals i.e. after every 1000 operations or after 5 years whichever is earlier.

18.0.4.12 **Insulators:**

18.0.4.13 The insulator shall conform to IS: 2544 and/or IEC-60168. The insulators shall have a minimum cantilever strength of 600/400 Kg. for 145/33 kV insulators respectively.

18.0.4.14 Pressure due to the contact shall not be transferred to the insulators after the main blades are fully closed.

18.0.4.15 **Base:**

18.0.4.16 Each isolator shall be provided with a complete galvanised steel base provided with holes and designed for mounting on a supporting structure

18.0.5 **OPERATING MECHANISM:**

18.0.5.1 The bidder shall offer motor operated Isolators.

18.0.5.2 Control cabinet/operating mechanism box shall be made of aluminium sheet of adequate thickness (minimum 3 mm).

18.0.5.3 A "Local/Remote" selector switch and a set of open/ close push buttons shall be provided on the control cabinet of the isolator to permit its operation through local or remote push buttons.

18.0.5.4 Provision shall be made in the control cabinet to disconnect power supply to prevent local/remote power operation.

18.0.5.5 Suitable reduction gearing shall be provided between the motor and the drive shaft of the isolator. The mechanism shall stop immediately when motor supply is switched off. If necessary a quick electromechanical brake shall be fitted on the higher speed shaft to effect rapid braking.

18.0.5.6 Manual operation facility (with handle) should be provided with necessary interlock to disconnect motor.

18.0.5.7 Gear should be of forged material suitably chosen to avoid bending/jamming on operation after a prolonged period of non-operation. Also all gear and connected material should be so chosen/surface treated to avoid rusting.

18.0.6 **OPERATION:**

18.0.6.1 The main Isolator shall be gang operated.

18.0.6.2 The design shall be such as to provide maximum reliability under all service conditions. All operating linkages carrying mechanical loads shall be designed for negligible deflection. The length of inter insulator and inter pole operating rods shall be capable of adjustments, by means of screw thread which can be locked with a lock nut after an adjustment has been made. The isolator and earth switches shall be provided with "over center" device in the operating mechanism to prevent accidental opening by wind, vibration, short circuit forces or movement of the support structures.

18.0.6.3 Each isolator shall be provided with a manual operating handle enabling one man to open or close the isolator with ease in one movement while standing at ground level. Detachable type manual operating handle shall be provided. Suitable provision shall be made inside the operating mechanism box for parking the detached handles. The provision of manual operations shall be located at a height of 1000 mm from the base of isolator support structure.



- 18.0.6.4 The isolator shall be provided with positive continuous control throughout the entire cycle of operation. The operating pipes and rods shall be sufficiently rigid to maintain positive control under the most adverse conditions and when operated in tension or compression for isolator closing. They shall also be capable of withstanding all torsion and bending stresses due to operation of the isolator. Wherever supported the operating rods shall be provided with bearings on either ends. The operating rods/ pipes shall be provided with suitable universal couplings to account for any angular misalignment.
- 18.0.6.5 All rotating parts shall be provided with grease packed roller or ball bearings in sealed housings designed to prevent the ingress of moisture, dirt or other foreign matter. Bearings pressure shall be kept low to ensure long life and ease of operation. Locking pins wherever used shall be rustproof.
- 18.0.6.6 Signalling of closed position shall not take place unless it is certain that the movable contacts, have reached a position in which rated normal current, peak withstand current and short time withstand current can be carried safely. Signalling of open position shall not take place unless movable contacts have reached a position such that clearance between contacts is at least 80% of the isolating distance.
- 18.0.6.7 The position of movable contact system (main blades) of each of the Isolators shall be indicated by a mechanical indicator at the lower end of the vertical rod of shaft for the Isolators. The indicator shall be of metal and shall be visible from operating level.
- 18.0.6.8 The Suppliers shall furnish the following details along with quality norms, during detailed engineering stage.
- I) Current transfer arrangement from main blades of isolator along with milivolt drop immediately across transfer point.
  - II) Details to demonstrate smooth transfer of rotary motion from motor shaft to the insulator along with stoppers to prevent over travel.

## 18.0.7 TEST AND INSPECTION

- 18.0.7.1 The switches shall be subjected to the following type test in accordance to with IS: 9920.
- i) Dielectric test (impulse and one minute) power frequency withstands voltage.
  - ii) Temperature rise test
  - iii) Rated off load breaking current capacity
  - iv) Rated active load breaking capacity
  - v) Rated line charging breaking capacity
  - vi) Rated short time current
  - vii) Rated peak withstand current
  - viii) Mechanical and Electrical Endurance

- 18.0.7.2 The equipment shall be subjected to the following routine test.
- i) Power frequency voltage dry test
  - ii) Measurement of resistance of the main circuit
  - iii) Operating test.

- 18.0.7.3 The porcelain will have pull out test for embedded component and beam strength of porcelain base.

## 18.0.8 AUXILIARY SWITCHES

- 18.0.8.1 All isolators shall be provided with 220/110 volts, 6 Ampere auxiliary switches for their remote position indication on the

control board and for electrical interlocking with other equipment. In addition to the auxiliary switches required for remote position indications and for their operation. There shall be six pairs of NO and six pairs of NC contacts for each isolating switch and three pairs of NO and three pairs of NC contacts for each earthing switch. All contacts shall be brought out to terminal blocks

## 18.0.9 CONNECTORS

18.0.9.1 Each isolator shall be provided with appropriate number of bimetallic clamping type connectors as detailed in the schedule of requirement. The maximum length of jumper that may be safely connected or any special instruction considered necessary to avoid under loads on the post isolators should be stated by the bidder.

## 18.0.10 MOUNTING STRUCTURES

18.0.10.1 All isolators shall be rigidly mounted in an upright position on their own supporting structures. Details of the supporting structures shall be furnished by the successful tenderer. The isolators should have requisite fixing details ready for mounting them on structures.

## 18.0.11 PRE-COMMISSIONING TESTS

Contractor shall carry out following tests as pre-commissioning tests. Contractor shall also perform any additional test based on specialties of the items as per the field instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests along with calibration certificates and shall furnish the list of instruments to the Employer for approval.

- a) Insulation resistance of each pole.
- b) Manual and electrical operation and interlocks.
- c) Insulation resistance of control circuits and motors.
- d) Ground connections.
- e) Contact resistance.
- f) Proper alignment so as to minimise to the extreme possible the vibration during operation.
- g) Measurement of operating Torque for isolator and Earth switch.
- h) Resistance of operating and interlocks coils.
- i) Functional check of the control schematic and electrical & mechanical interlocks.
- j) 50 operations test on isolator and earth switch.

## 18.0.12 TECHNICAL DATA SHEET FOR ISOLATORS

No	Technical Particulars	Isolators class
		33KV
1	Nominal system voltage, kV	33
2	Highest system voltage, kV	36
3	Rated frequency, Hz.	50
4	Type of Isolator	Double Break, centre pole rotating
5	Rated continuous current, A	1250
6	Rated short time current, kA	25
7	Rated duration of short time current, (second)	1
8	Rated lightning impulse withstand voltage, kV (peak)	
	i) To earth & between poles	170
	ii) Across isolating distance	180
9	Rated 1 minute power frequency withstand voltage,	

	kV(rms)	
	i) To earth & between poles	70
	ii) Across isolating distance	80
10	Minimum Creepage distance of insulators, mm	31mm/kV
11	Temperature rise	As per relevant IS

## 18.1.0 TECHNICAL SPECIFICATION OF OUTDOOR CURRENT AND POTENTIAL TRANSFORMERS

### 18.1.1 SCOPE OF CONTRACT

18.1.1.1 This Section of the Specification covers general requirements for design, engineering, manufacture, assembly and testing at manufacturer's works of 33kV outdoor Current and Potential Transformers.

### 18.1.2 STANDARDS

18.1.2.1 The equipment 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.

18.1.2.2 In case of any conflict between the Standards and this specification, this specification shall govern.

18.1.2.3 The current transformer shall comply also with the latest issue of the following Indian standard.

IS: 2705(Part-I) Current transformers: General requirement.

IS: 2705(Part-II) Current transformers : Measuring Current transformers

IS: 2705(Part-III) Current transformers : Protective Current transformers

IS: 2705(Part-IV) Current transformers: Protective Current transformers for special purpose application.

IS: 3156(Part-I) Potential transformers: General requirement.

IS: 3156(Part-II) Potential transformers : Measuring Potential transformers

IS: 3156(Part-III) Potential transformers: Protective Potential transformers

### 18.1.3 GENERAL REQUIREMENTS

18.1.3.1 The cores of the instrument transformers shall be of high grade, non-aging CRC steel of low hysteresis loss and high permeability.

18.1.3.2 Instrument transformers shall be of Dead Tank design or Live Tank design.

18.1.3.3 The instrument transformers shall be truly hermetically sealed to completely prevent the oil inside the tank coming into contact with the outside temperature. To take care of oil volume variation the tenderer are requested to quote the current transformers with stainless steel diaphragm (bellow).

18.1.3.4 The instrument transformers shall be completely filled with oil.

18.1.3.5 A complete leak proof secondary terminal arrangement shall be provided with each instrument transformers, secondary

terminal shall be brought into weather, dust and vermin proof terminal box. Secondary terminal boxes shall be provided with facilities for easy earthing, shorting, insulating and testing of secondary circuits. The terminal boxes shall be suitable for connection of control cable gland.

- 18.1.3.6 All instrument transformers shall be of single phase unit.
- 18.1.3.7 The instrument transformers shall be so designed to withstand the effects of temperature, wind load, short circuit conditions and other adverse conditions.
- 18.1.3.8 All similar parts, particularly removable ones, shall be interchangeable with one another.
- 18.1.3.9 All cable ferrules, lugs, tags, etc. required for identification and cabling shall be supplied complete for speedy erection and commissioning as per approved schematics.
- 18.1.3.10 The instrument transformers shall be designed to ensure that condensation of moisture is controlled by proper selection of organic insulating materials having low moisture absorbing characteristics.
- 18.1.3.11 All steel work shall be degreased, pickled and phosphated and then applied with two coats of Zinc Chromate primer and two coats of finishing synthetic enamel paint.

#### 18.1.4 **INSULATING OIL**

- 18.1.4.1 The quantity of insulating oil for instrument transformers and complete specification of oil shall be stated in the tender. The insulating oil shall conform to the requirement of latest edition of IS: 335

#### 18.1.5 **COMMON MARSHALLING BOXES**

- 18.1.5.1 The outdoor type common marshalling boxes shall conform to the latest edition of IS 5039 and other general requirements specified hereunder.
- 18.1.5.2 The common marshalling boxes shall be suitable for mounting on the steel mounting structures of the instrument transformers.
- 18.1.5.3 One common marshalling box shall be supplied with each set of instrument transformers. The marshalling box shall be made of sheet steel and weather proof. The thickness of sheet steel used shall be not less than 3.0 mm. It is intended to bring all the secondary terminals to the common marshalling.
- 18.1.5.4 The enclosures of the common marshalling boxes shall provide a degree of protection of not less than IP 55 (As per IS 2147).
- 18.1.5.5 The common marshalling boxes shall be provided with double hinged front doors with pad locking arrangement. All doors and removable covers and plates shall be sealed all around with neoprene gaskets or similar arrangement.
- 18.1.5.6 Each marshalling box shall be fitted with terminal blocks made out of moulded non-inflammable plastic materials and having adequate number of terminals with binding screws washers etc. Secondary terminals of the instrument transformers shall be connected to the respective common marshalling boxes. All out going terminals of each instrument transformer shall terminate on the terminal blocks of the common marshalling boxes. The terminal blocks shall be arranged to provide maximum accessibility to all conductor terminals.
- 18.1.5.7 Each terminal shall be suitably marked with identification numbers. Not more than two wires shall be connected to any one terminal. **At least 20 % spare terminals shall be provided over and above the required number.**

- 18.1.5.8 All terminal strips shall be of isolating type terminals and they will be of minimum 10A continuous current rating.
- 18.1.5.9 All cable entries shall be from bottom. Suitable removable gland plate shall be provided on the box for this purpose. Necessary number of cable glands shall be supplied fitted on to this gland plate. Cable glands shall be screw on type and made of brass.
- 18.1.5.10 Each common marshalling box shall be provided with two numbers of earthing terminals of galvanised bolt and nut type.
- 18.1.5.11 All steel, inside and outside work shall be degreased, pickled and phosphate and then applied with two coats of Zinc Chromate primer and two coats of finishing synthetic enamel paint. The colour of finishing paint shall be as follows:-
- i) Inside: Glossy White
  - iii) Outside: Light Grey (Shade No. 697 of IS: 5)

#### 18.1.6 **BUSHINGS AND INSULATORS**

- 18.1.6.1 Bushings and Insulators shall be of Porcelain, Solid core type. Porcelain used for the manufacture of bushings and insulators shall be homogeneous, free from defects, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture.
- 18.1.6.2 Glazing of the porcelain shall be of uniform brown colour, free from blisters, burns and other similar defects. Bushings shall be designed to have sufficient mechanical strength and rigidity for the conditions under which they will be used. All bushings of identical ratings shall be interchangeable.
- 18.1.6.3 Puncture strength of bushings shall be greater than the dry flashover value. When operating at normal voltage, there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action. No radio interference shall be caused by the bushings when operating at the normal rated voltage.
- 18.1.6.4 The design of bushing shall be such that the complete bushing is a self-contained unit and no audible discharge shall be detected at a voltage up to a working voltage (Phase Voltage) plus 10%. The minimum creepage distance for severely polluted atmosphere shall be 25 mm/KV.
- 18.1.6.5 Sharp contours in conducting parts should be avoided for breakdown of insulation. The insulators shall be capable to withstand the seismic acceleration of 0.5 g in horizontal direction and 0.6g in vertical direction.
- 18.1.6.6 Bushings shall satisfactorily withstand the insulation level specified in data sheet.

#### 18.1.7 **TESTS**

##### 18.1.7.1 **Routine/Acceptance Tests ( all units )**

- 18.1.7.2 All routine tests shall be carried out in accordance with relevant Standards. All routine/acceptance tests shall be witnessed by the Purchaser/his authorised representative.
- 18.1.7.3 **Type Tests:** The bidder shall furnish type test certificates and results for the all tests as per relevant Standards along with the bid for current and potential transformers of identical design.
- 18.1.7.4 Type test certificates so furnished shall not be older than 5 (five) years as on date of Bid opening.

### 18.1.8 **NAME PLATES**

18.1.8.1 All equipment shall have non-corrosive name plates fix at a suitable position indelibly mark with full particular there on in accordance with the standard adapted.

### 18.1.9 **MOUNTING STRUCTURES**

18.1.9.1 All the equipment covered under this specification shall be suitable for mounting on steel structures.

18.1.9.2 Supply of mounting structures is also in the scope of this tender.

18.1.9.3 Each equipment shall be furnished complete with base plates, clamps, and washers etc. and other hardware ready for mounting on existing steel structures.

### 18.1.10 **SAFETY EARTHING**

18.1.10.1 The non-current carrying metallic parts and equipment shall be connected to station earthing grid. For this two terminals suitable for 40mm X 10mm GI strip shall be provided on each equipment.

### 18.1.11 **TERMINAL CONNECTORS**

18.1.11.1 The equipment shall be supplied with required number of terminal connectors of approved type suitable for ACSR. The type of terminal connector, size of connector, material, and type of installation shall be approved by the Purchaser, as per installation requirement while approving the equipment drawings.

### 18.1.12 **PRE-COMMISSIONING TESTS**

Contractor shall carry out following tests as pre-commissioning tests. Contractor shall also perform any additional test based on specialties of the items as per the field instructions of the equipment Supplier or Employer without any extra cost to the Employer. The Contractor shall arrange all instruments required for conducting these tests along with calibration certificates and shall furnish the list of instruments to the Employer for approval.

#### **(A) Potential Transformers**

- i) Insulation Resistance Test for primary (If applicable) and secondary winding
- ii) Polarity test
- iii) Ratio test
- iv) Dielectric test of oil (wherever applicable)
- v) Tan delta and capacitance measurement of individual capacitor stacks
- vi) Secondary winding resistance measurement

### 18.1.13 **TECHNICAL DATA SHEET FOR CURRENT AND POTENTIAL TRANSFORMERS**

18.1.13.1 For 132 & 33 kV CTs the instrument security factor at all ratios shall be less than five (5) for metering core. If any auxiliary CTs/reactor are used in the current transformers then all parameters specified shall have to be met treating auxiliary CTs as an integral part of the current transformer. The auxiliary CTs/reactor shall preferably be inbuilt construction of the CTs. In case these are to be mounted separately these shall be mounted in the central marshalling box suitably wired up to the terminal blocks.

### 18.1.13.2 TYPE AND RATING

All instrument transformer shall be outdoor type, single phase, oil immersed, self-cooled suitable for mounting on steel structure. The instrument transformer shall have the following ratings and particulars.

Item	Ratings and Particulars	
(A) Nominal system voltage	<b>132kV</b>	<b>33 kV</b>
(B) Highest system voltage, kV	145	36
(C) Rated frequency, HZ	50	50
(D) System earthing	Solidly earth	Solidly earth
<b>(E) Insulation level</b>		
(a) Impulse withstand voltage: kVp	550	170
(b) One minute p.f. Withstand voltage, kV (r.m.s.)	230	70
(F) Short time current for one second, kA	31.5	20
(G) Minimum creepage distance, mm	As per ISS	As per ISS
(H) Temperature rise		
<b>(I) Feeder/ BYPASS/ Bus Coupler CT</b>		
(i) No. of Cores	3	2
(ii) Transformation Ratio	As per schedule of requirement	
(iii) Rated Output		
(a) Core-1	30 VA	30 VA
(b) Core-2	15 VA	15 VA
(c) Core-3		N.A
(iv) Accuracy Class		
(a) Core-1	0.2	0.2
(b) Core-2	5P	5P
(c) Core-3	PS	N.A
(v) Accuracy Limit Factor		
(a) Core-1	--	-
(b) Core-2	10	10
(c) Core-3	-	-
(vi) Instrument security factor		
(a) Core-1	<5	<5
(b) Core-2	-	-
(c) Core-3	-	-
(vii) Minimum Knee point voltage, Volts		
(a) Core-1	-	-
(b) Core-2	-	-
(c) Core-3	1200	-
(viii) Maximum secondary resistance, ohm		
(a) Core-1	-	-
(b) Core-2	-	-
(c) Core-3	3	N.A
(ix) Maximum exciting current, at V <sub>k</sub> /4 mA		
(a) Core-1	-	-
(b) Core-2	-	-
(c) Core-3 (at V <sub>k</sub> /4)	30	N.A
<b>(J) Transformer CT</b>		
(i) No. of Cores	3	2

(ii) Transformation Ratio	As per schedule of requirement	
(iii) Rated Output	3	3
(b) Core-1	30 VA	30 VA
(b) Core-2	15 VA	15 VA
(c) Core-3	-	-
(iv) Accuracy Class		
(a) Core-1	0.2	0.2
(b) Core-2	5P	5P
(c) Core-3	PS	PS
(v) Accuracy Limit Factor		
(a) Core-1	--	-
(b) Core-2	10	10
(c) Core-3	-	-
(vi) Instrument security factor		
(a) Core-1	<5	<5
(b) Core-2	-	-
(c) Core-3	-	-
(vii) Minimum Knee point voltage, Volts		
(a) Core-1	-	-
(b) Core-2	-	-
(c) Core-3	1200	600
(viii) Maximum secondary resistance, ohm		
(a) Core-1	-	-
(b) Core-2	-	-
(c) Core-3	3	3
(ix) Maximum exciting current, at $V_k/4$ mA		
(a) Core-1	-	-
(b) Core-2	-	-
(c) Core-3 (at $V_k/4$ )	30	15
<b>POTENTIAL TRANSFORMER</b>		
(i) No. of secondary windings		2
(ii) Transformation ratio		
<b>(a) Winding I</b>	$132kV/\sqrt{3}$	$33kV/\sqrt{3}$
<b>(b) Winding II</b>	$/110V/\sqrt{3}$	$/110V/\sqrt{3}$
(iii) Rated out put		
(a) Winding I	500	200
(b) Winding II	200	100
(vi) Accuracy class		
(a) Winding I	0.2	0.2
(b) Winding II	3P	3P
(v) Rated voltage factor	1.2	1.2

Note: It is intended to use different ratios of the same CT at the same time for various protections and metering cores. The CTS should therefore be suitable for the above purpose by secondary tapings only. The ratio change by secondary taps is acceptable as long as the required CT specifications are achieved at all ratios.

- (i) The knee point voltage specified above shall be at higher ratio/ taps.



## 18.2.0 **SPECIFICATION FOR DESIGN AND FABRICATION OF SUBSTATION STEEL STRUCTURES:**

### 18.2.1 **Scope:**

This section covers the design parameters and specification for fabrication and galvanising, of steel structures, bolts & nuts, tower accessories etc for Substations covered under this Bid Document.

### 18.2.2 **Materials:**

#### 18.2.3 **Structural steel:**

The structures shall be of structural steel conforming to any of the grade, as appropriate, of IS 2062 (latest edition) Steel conforming IS 8500 may also be used. Medium and high strength structural steels with known properties conforming to any other national or international standards may also be used.

#### 18.2.4 **Bolts:**

Bolts used shall conform to IS12427 or bolts of property class 4.6 conforming to IS 6639 may also be used. High strength bolts, if used (only with steel conforming to IS 8500) shall conform to property class 8.8 of IS3757. Foundation Bolts shall conform to IS 5624. Step bolts shall conform to IS 10238

#### 18.2.5 **Nuts:**

Nuts shall conform to IS 1363 (Part 3). The mechanical properties shall conform to property class 4 or 5 as the case may be as specified in IS 1367 (Part 6) except that the proof stress for nuts of property class 5 shall be as given in IS 12427. Nuts to be used with high strength bolts shall conform to IS 6623.

#### 18.2.6 **Washers:**

Washers shall conform to IS 2016. Heavy washers shall conform to IS 6610. Spring washers shall conform to type B of IS 3663. Washers to be used with high strength bolts and nuts shall conform to IS 6649.

#### 18.2.7 **Galvanization:**

Structural members, plain and heavy washers shall be galvanized in accordance with the provisions of IS 4759. Spring washers shall be hot dip galvanized as per service grade 4 of IS 4759 or IS 1537.

#### 18.2.8 **Other materials:**

Other materials used in the construction of the supporting structures shall conform to appropriate Indian Standards wherever available.

#### 18.2.9 **Design materials:**

Switchyard structures such as columns, beams and equipment mounting structures shall be designed as per actual site requirement. The drawings are to be submitted for approval prior to supply/execution.

Note: Structures with earth peak shall assume to have four earth wires for design purpose in normal condition.

#### 18.2.10 **Design Drawings:**

18.2.10.1 The relevant drawings for all the towers, beams and equipment mounting structures shall be furnished by the Supplier to the Purchaser which shall include structural/fabrication drawings, Bill of Materials including nuts and bolts.

18.2.10.2 The structural drawings, Bill of materials and shop fabrication drawings for all the structures shall be submitted in four copies and will be finally approved by the Purchaser. The fabrication shall be taken up from the approved shop drawings. The overall responsibility of fabricating structure members correctly lies with the Supplier only and the Supplier shall ensure that all the members can be fitted while erecting without any undue strain on them.

#### 18.2.11 **Fabrication:**

The fabrication of substation steel structures shall be in conformity with the following:

a. Except where hereinafter modified, details of fabrication shall conform to IS: 802 (Part-II) or the relevant international standards.

b. The tower structures shall be accurately fabricated to connect together easily at site without any undue strain on the bolts.

c. No angle member shall have the two leg flanges brought together by closing the angle.

d. The diameter of the hole shall be equal to the diameter of bolt plus 1.5mm.

e. The structure shall be designed so that all parts shall be accessible for inspection and cleaning. Drain holes shall be provided at all points where pockets of depression are likely to hold water.

f. All identical parts shall be made strictly inter-changeable. All steel sections before any work are done on them shall be carefully levelled, straightened and made true to detailed drawings by methods which will not injure the materials so that when assembled, the adjacent matching surfaces are in close contact throughout. No rough edges shall be permitted in the entire structure.

#### 18.2.12 **Drilling and Punching:**

18.2.12.1 Before any cutting work is started, all steel sections shall be carefully strengthened and trued by pressure and not by hammering. They shall again be trued after being punched and drilled.

18.2.12.2 Before any cutting work is started, all steel sections shall be carefully strengthened and trued by pressure and not by hammering. They shall again be trued after being punched and drilled.

18.2.12.3 Holes for bolts shall be drilled or punched with a jig but drilled holes shall be preferred. The punching may be adopted for thickness up to 16mm. Tolerances regarding punch holes are as follows:

a) Holes must be perfectly circular and no tolerances in this respect are permissible.

b) The maximum allowable difference in diameter of the holes on the two sides of plates or angle is 0.8mm. I.e. the allowable taper in a punched holes should not exceed 0.8 mm on diameter.

c) Holes must be square with the plates or angles and have their walls parallel.

18.2.12.4 All burrs left by drills or punch shall be removed completely. When the tower members are in position the holes shall be truly opposite to each other. Drilling or reaming to enlarge holes shall not be permitted.

#### 18.2.13 **Erection mark:**

Each individual member shall have erection mark conforming to the component number given to it in the fabrication drawings. The mark shall be marked with marking dies of 16mm size before galvanizing and shall be legible after galvanizing.

#### 18.2.14 **Galvanizing and Painting:**

18.2.14.1 Galvanising of the various members of the structures shall be done only after all works of sawing, shearing, drilling, filling, bending and matching are completed. Galvanising shall be done by the hot dip process as recommended in IIS: 2629 or other such authoritative international standards and shall produce a smooth,

clean and uniform coating of not less than 61.0 gm per square meter. The preparation for galvanising and the galvanising process itself must not affect adversely the mechanical properties of the treated materials. No manual Galvanization process will be accepted.

18.2.14.2 The outside surface shall be galvanised. Sample of galvanised materials shall be supplied to the galvanised test set out in IIS 729 or other such authoritative international standards.

18.2.14.3 All assembly bolts shall be thoroughly hot dip galvanised after threading. Threads shall be of a depth sufficient to allow for the galvanised coating, which must not be excessive at the root of the threads, so that the nut shall turn easily on the completed bolts without excessive looseness. The nut threads shall not be galvanised, but oiled only.

## 18.2.15 EARTHING SYSTEM

### 18.2.15.1 General

- (a) The main earth mat of the entire switchyard is already in place.
- (b) All conductors buried in earth and concrete shall be GI. All conductors above ground level and earthing leads, cable trench earthing shall be of galvanised steel.
- (c) Light poles, junction boxes on the poles, cable and cable boxes/glands, lockout switches etc. shall be connected to the earthing conductor running along with the supply cable which in turn shall be connected to earthing grid conductor at a minimum two points
- (d) The metallic switchyard security fencing may not be connected to the substation main earth grid. The security fencing shall be earthed by running a separate 40 mm dia MS rod earthing conductor along the fence along with 40 mm dia rod electrodes of 3000 mm long at regular intervals and at each corner
- (e) For transformer earthing, two electrodes are to be connected to treated earth pits and the same shall be connected to the existing earth mat. Also, LAs on HV and LV side of transformers are to be earthed using one electrode which shall be connected to the earth mat.
- (f) Ineffective/damaged Equipment/Structure earthing identified for the substation equipments in coordination with the concerned Resident Engineer shall be properly earthed using electrodes and GI flats as required.
- (g) Placing of electrodes should be such that if the length of earth electrode is "l", the next electrode should be placed at "2l" distance from the 1st.
- (h) Security fencing should be separately earthed. At max, 4 no. of 40 mm dia rod electrodes of 3000 mm long electrodes may be used for the earthing of the fencing on each side.
- (i) Parts of the switchyard where earthing mat (main mesh) does not exist at present (if any) as identified by the concerned Resident Engineer or as per BoQ and necessary earthing activities to be undertaken.
- (j) Also, the proper earthing of Kiosks as per direction of the concerned Resident Engineer in the switchyard and depending on availability of earth-mat in that area of the switchyard, necessary earthing activities are to be carried out.
- (k) One number 40 mm dia, 3000 mm long earth electrode with test link, CI frame and cover shall be provided to connect each down conductor of surge arresters, capacitive voltage transformers, lightning masts and towers with peak.
- (l) For substation equipments, the connection between existing earthing pads and the earthing grid shall be made by two short earthing leads (one direct and another through the support structure) free from kinks and splices. In case earthing pads are not provided on the item to be earthed, same shall be provided in consultation with Purchaser.
- (m) All lighting panels, junction boxes, receptacles fixtures, conduits etc. shall be grounded in compliance with the provision of I.E. rules
- (n) Each earthing lead from the neutral of the power transformer/Reactor shall be directly connected to two pipe electrodes in treated earth pit (as per IS) which in turn, shall be buried in Cement Concrete pit with a cast iron cover hinged to a cast iron frame to have an access to the joints. All

accessories associated with transformer/reactor like cooling banks, radiators etc. shall be connected to the earthing grid at minimum two points

- (o) Neutral points of systems of metallic enclosures and frame works associated with all current carrying equipment and extraneous metal works associated with electric system shall be connected to the existing earth mat.
- (p) Earthing connections with equipment earthing pads shall be bolted type. Contact surfaces shall be free from scale, paint, enamel, grease, rust or dirt. Two bolts shall be provided for making each connection. Equipment bolted connections, after being checked and tested, shall be painted with anti-corrosive paint/compound.
- (q) The 75x12mm GI flat shall be clamped with the equipment support structures at 1000mm interval.
- (r) Connection between equipment earthing lead and main earthing conductors and between main earthing conductors shall be welded type. For rust protections, the welds should be treated with red lead and afterwards coated with two layers bitumen compound to prevent corrosion.
- (s) All ground connections shall be made by electric arc welding. All welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any load on it. Artificial cooling shall not be allowed.
- (t) All earthing activities shall conform to the Code of practice for Earthing IS: 3043 and as directed by the site-incharge.
- (u) Installation of Ground wire is to be done as instructed by Engineer-in-Charge.

18.2.16

SI No.	Item	Size	Materials
1	Main Earthing Conductor to be buried in ground	65 mm x 12 mm	GI Flat
2	Conductor above ground & earthing leads (for equipment), Risers.	65 mm x 12 mm	GI Flat
3	Conductor above ground & earthing leads (for columns & aux. structures), Risers	65 mm x 12 mm	GI Flat
4	Earthing of indoor LT panels, Control panels and outdoor marshalling boxes, MOM boxes, Junction boxes & Lighting Panels etc.	50 mm x 6 mm	GI Flat
5	Rod Earth Electrode	40mm dia, 3000 mm long	Mild Steel
6	Pipe Earth Electrode (in treated earth pit) as per IS 3043.	40mm dia, 3000 mm long	GI Pipe
7	Earthing conductor along outdoor cable trenches	50mm x 6 mm	GS Flat

### 18.3.0 TECHNICAL SPECIFICATIONS FOR GI FLAT

#### 18.3.1 Scope

The specification provides for design, manufacturing, testing before dispatch for dip Galvanized flats of size 65x12 and 50x10 mm

MS flat shall conform to IS 2062 & its latest amendments for steel & Galvanization as per IS 4759 & its latest amendments

The flat shall be coated with Zn 98 Zinc grade

The minimum Zinc coating shall be 610 gm/sqm

### 18.3.2 **Inspection & Rejection**

The representative of AEGCL shall pick up samples at random from the GI Flat offered for carrying out routine tests as per specified IS

The Representative of AEGCL shall make visual inspection on each & every GI Flats

The purchaser reserves the right to reject on inspection after the same is received at destination.

## 18.4.0 **TECHNICAL SPECIFICATION RECORDING METERS (ABT COMPLIANT TRIVECTOR METERS)**

### 18.4.1 **GENERAL**

All meters shall be housed in dust proof, moisture resistant, black finished cases and shall be suitable for tropical use. They shall be accurately adjusted and calibrated at works and shall have means of calibration, check and adjustment at site. Necessary software for base computer for downloading and analysis of requisite parameter shall be made available with minimum 3 copies of software.

All these instruments and meters shall be flush mounted type and back connected, suitable for panel mounting.

### 18.4.2 **Principal Technical Parameters**

The ABT compliant trivector meters shall be microprocessor based. The energy meters shall be indoor type connected with secondary side of outdoor CT and PT and shall be 3 phase 4 Wire type. The meters shall have the following parameters.

- |                              |                                                                      |
|------------------------------|----------------------------------------------------------------------|
| a) Type of Installation      | : Flush /Rack mounted on Indoor Panel with back-connected terminals. |
| b) Accuracy                  | : 0.2 class                                                          |
| c) Rated CTSecondary Current | : 1A                                                                 |
| d) Rated PTSecondary Voltage | : $110/\sqrt{3}$ Volts (phase to neutral)                            |
| e) Auxiliary AC Supply       | : 230voltsAC +/-15%                                                  |
| f) Auxiliary DC Supply       | : 110 Volts DC Volts +/-10%                                          |
| g) System Frequency          | : 50 Hz +/-5%                                                        |
| h) System Earthing           | : Solidly Earthed.                                                   |

### 18.4.3 **GENERAL TECHNICAL REQUIREMENTS**

#### 18.4.3.1 **POWER FACTOR RANGE**

The meter shall be suitable for full power factor range from Zero (lag) to Unity to Zero (lead). The meters should work as an active energy import and export and reactive (lag and lead) energy measurement should be true four quadrants.

#### 18.4.3.2 **POWER SUPPLY VARIATION**

The extreme power supply variation (which an operating meter should withstand without damage and without degradation of its meteorological characteristics when it is subsequently operated under its operating conditions) is as follows.

Voltage : 60% to 120 % of V ref

Frequency : 50 Hz  $\pm$ 5%

The bidder can also offer meters which can withstand higher variations.

#### 18.4.3.3 **ACCURACY**

The class of accuracy of the meter shall be 0.2.

#### 18.4.3.4 **POWER CONSUMPTION**

The active and apparent power consumption on each voltage circuit including power supply of the meter at ref. Voltage, temperature and frequency shall not exceed the limits as per IS: 14697

The apparent power drawn by each current circuit of the meter shall not exceed as per IS 146971 of basic current, reference frequency and reference temperature

#### 18.4.3.5 **STARTING CURRENT**

The meter shall start registering energy at 0.1% of basic current at unity power factor.

When the voltage is applied with no current flowing in the current circuit, the meter shall not register any energy and the test output of the meter shall not be more than 1 pulse per count on no load.

#### 18.4.3.6 **MAXIMUM CONTINUOUS CURRENT**

The maximum continuous current in meters shall be 120% of rated basic current (I<sub>b</sub>) at which the meter purports to meet the accuracy requirements as per the relevant standards.

#### 18.4.3.7 **CONNECTIONS**

The meters shall be suitable for being connected directly through its terminal block to

- A) Single phase AC auxiliary power supply or DC supply,
- B) Secondary of Voltage Transformers, and
- C) Secondary of Current Transformers.

#### 18.4.3.8 **AUXILIARY POWER SUPPLY**

The meters shall be capable of being powered up with standard 230 volts, 50 Hz AC and 110 volts DC auxiliary power supplies of the substations so that metering core of PT is not loaded.

#### 18.4.3.9 **TEST TERMINAL BLOCK**

The meter shall be provided with a test blocks for testing without disturbing the CT and PT secondary connections. Meter shall have digital display. Location of Test Terminal Block should be on the front Panel.

#### 18.4.4 **GENERAL & CONSTRUCTIONAL REQUIREMENTS**

##### 18.4.4.1 General

Meter should be mounted on the front panel.

The meters should be housed in a safe, high grade engineering plastic/polycarbonate casing, and is dust/moisture proof, conforming to IP-51 of BIS 12063 / IEC 529, vermin proof and sturdy.

##### 18.4.4.2 **Terminal Block**

The terminal block shall be made out of high grade non-hygroscopic, low tracking, properly fire resistant, reinforced high grade engineering plastic and designed according to adequate rating requirement conforming to relevant standards and having provision for sealing.

##### 18.4.4.3 **Sealing of Meter**

Reliable sealing arrangement should be provided to make the meter tamper proof and avoid fiddling or tampering by unauthorized persons.

##### 18.4.4.4 **Name-Plate Marking of the Meter**

Meters shall have a name plate clearly visible and effectively secured against removal, indelibly and distinctly marked with all essential particulars as per relevant Standards.

#### 18.4.5 **Quantities to be Measured**

The meter shall be capable of measuring and displaying the below mentioned electrical quantities within specified accuracy limits for poly-phase balanced or unbalanced loads at all power factors.

The measurements shall be carried out on 3 phase, 4 wire principle within an accuracy as per 0.2 class of IS: 14697.

- (i) Active energy measurement in all four quadrants (import / export at all power factors). The meter shall compute the active energy and load import, active energy and load export during each successive 15 minutes block and store it in its memory.
- (ii) The meter shall display on demand the 15 minutes Active Energy (import and export shall be displayed in separate register) for the previous 15 minutes block.
- (iii) The meter shall continuously display the average of the RMS values of the three line to neutral PT secondary voltages as a percentage of 63.5 volts, and display the same on demand.
- (iv) The meters shall be able to measure & display the instantaneous voltages and currents for all three phases instantaneous average three phase power, instantaneous and average frequency & power factor. The meter shall be suitable for working under balanced / unbalanced loads at all power factor (i.e. zero lag-unity-zero lead).
- (v) The meter shall count the number of cycles in PT output during each successive 15 minute block, and divide the same by 900 to arrive at the average frequency. This shall be stored in the meter's memory. The average frequency of the previous 15 minutes block shall also be displayed, on demand in Hz.

- (vi) The meters shall measure and display cumulative active energy, apparent energy, reactive (lag) energy, reactive (lead) energy in both import and export mode.
- (vii) The meters shall also compute the reactive power on 3-phase, 4-wire principle, with an accuracy one class lower as per IS: 14697 and integrate the reactive energy into 8 separate registers, as given below. One set for the period for which the average RMS voltage is 103% or higher, and the other for the period for which the average RMS voltage is below 97%.
  - Import Reactive Energy (lag) for Voltage <97%
  - Import Reactive Energy (lead) for Voltage <97%
  - Import Reactive Energy (lag) for Voltage >103%
  - Import Reactive Energy (lead) for Voltage >103%
  - Export Reactive Energy (lag) for Voltage <97%
  - Export Reactive Energy (lead) for Voltage <97%
  - Export Reactive Energy (lag) for Voltage >103%
  - Export Reactive Energy (lead) for Voltage >103%
- (viii) Lagging and leading reactive power flow in event of active energy import and export events will be recorded as separate cumulative registers. These registers shall be –(a) Reactive lag while active import, (b) Reactive lead while active import, (c) Reactive lag while active export and (d) Reactive lead while active export.
- (ix) The meter shall also store the apparent energy (import & export) and cumulative energy registers of the same shall be made available on display.
- (x) The three line to neutral voltages shall be continuously monitored and an indication shall be provided on the display for healthiness of the same. In case any of these falls below about 60%, the same shall be indicated on the display. The time blocks in which such a voltage failure occurs / persists shall also be recorded in the meter's memory. The reactive energy registers specified in Para (viii) above shall remain stay put while PT supply is unhealthy.
- (xi) The meters shall compute the maximum demand of Apparent Power with integration period of 15 minutes for both import and export.
- (xii) The meters shall also compute power-on hours based on the duration for which at least one phase supply was available to the meter.
- (xiii) The meter shall be compatible with Availability Based Tariff, two part as well as TOD tariff. For TOD tariff, the meter shall have the provision to define maximum 3 TOD registers for different energies.)
  - TOD Timing should be
    - i) 06-00Hrs to 17-00Hrs
    - ii) 17-00Hrs to 22-00Hrs
    - iii) 22-00Hrs to 06-00Hrs
- (xiv) The meters should measure fundamental energy.

#### 18.4.6 **Bill Point Energy**

18.4.6.1 The meter shall have the features to measure Bill point energy with automatic reset features on every



last date of the month.

#### 18.4.7 Quantities to be Displayed

The meter shall display the required parameters in two different modes as follows:

##### a) Auto Display Mode

- Meter Identification Code
- Display test (LCD/LED Segment check)
- Real time and date
- Cumulative Active Energy Import
- **Last 15 minutes block active Energy Import (Wh)**
- Cumulative Active Energy Export
- **Last 15 minutes block active Energy Export (Wh)**
- **Cumulative Wh**
- **Average frequency for previous 15 minute block, 96 blocks a day**
- Percentage of average of three RMS voltage with respect to normal system voltage
- Cumulative Reactive Energy for the voltage high condition.(i.e. KVARh when RMS voltage is higher than 103% of normal for both import and export and lead and lag)
- Cumulative Reactive Energy for the voltage low condition. ( i.e. KVARh when RMS voltage is less than 97% of normal for both import and export and lead and lag)
- Instantaneous average 3  $\phi$  PF
- Instantaneous frequency
- Instantaneous Phase voltages R,Y,B
- Instantaneous Phase currents R,Y,B
- Instantaneous Active Power
- Instantaneous Reactive Power
- Instantaneous Apparent Power
- Current month Maximum Demand kVA Import
- Current month Maximum Demand kVA Export
- Previous month Maximum Demand kVA Import
- Previous month Maximum Demand kVA Export
- Power-ON Hours

##### b) Manual Display Mode

- Cumulative Active Energy Import

- Cumulative Active Energy Export
- Cumulative Reactive Energy (lag) Import
- Cumulative Reactive Energy (lead) Import
- Cumulative Reactive Energy (lag) Export
- Cumulative Reactive Energy (lead) Export
- Cumulative Apparent Energy Import
- Cumulative Apparent Energy Export
- Cumulative Maximum Demand kVA Import
- Cumulative Maximum Demand kVA Export
- Monthly average Power factor
- Phase-Sequence-Voltage

#### 18.4.8 **Load Survey Capability**

18.4.8.1 Load survey shall be available for at least **45** days with 15 minutes block wise load survey integration period. Load Survey shall be run time configurable and shall be able to choose any of the below mentioned parameters.

a) Daily values (0 to 24 hours data) for last **45** days

- i) kWh exported
- ii) kWh Imported
- iii) kVAh Exported
- iv) kVAh Imported
- v) Voltage Profile
- vi) Average Frequency**

b) Daily peak and lows of last 45 days as:

- i) Voltage ( average of 15 minutes period phase wise)
- ii) Current ( average of 15 minutes period phase wise)

**c) Daily maximum demand 15 minutes block wise periods**

18.4.8.2 The load survey data, abnormality event information and instantaneous parameters data shall all be retrievable through the meter's communication port from a common meter-reading instrument (CMRI).

18.4.8.3 The meter shall have sufficient non-volatile memory for recording history of energy parameters for at least last 45 days.

#### 18.4.9 **Remote Readout Facility, Communication Capability**

- 18.4.9.1 The meter shall be provided with a galvanically isolated optical communication port as per IEC 1107, PACT, ANSI with removable cover and with hardware locking arrangement so that it can be easily connected to a CMRI (Common Meter Reading Instrument)/laptop for data. The optical communication port shall also have sealing provision.
- 18.4.9.2 The meter shall have a communication port for transferring the data online to the local HMI (part of SAS). The metering system port/ports should also support on-demand local /remote data acquisition of load survey and parameters from the ABT meters. These ports should support OFC for data transfer with time synchronization. Simultaneous transfer of on-line and on-demand metering data should be possible.
- 18.4.9.3 **The meter shall be capable of data transmission to Gateway as well. It shall be responsibility of the bidder to ensure that meters shall be compatible to the Gateways.**
- 18.4.10 **Calibration and Test Output**
- 18.4.10.1 The meter should have test output accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. Test output device shall be provided in the form of one common LED for KWh, KVARh and KVAh with provision of selecting the parameter being tested.
- 18.4.10.2 The test output device should have constant pulse rate in terms of pulse/unit energy and its value should be indelibly printed on the rating plate.
- 18.4.10.3 The devices shall be suitable for use with sensing probe used with test benches or reference standards.
- 18.4.11 **Display**
- 18.4.11.1 The meter shall have a minimum 7 digit backlit liquid crystal display (LCD) with another digit for legend. The minimum character height shall be 5 mm.
- 18.4.11.2 The meter should have facility of auto display mode where all parameters automatically scroll within the specified time and a manual mode where the parameters can be read by push button operation. In auto display mode each parameter shall on display for 10 seconds.
- 18.4.12 **Real Time Clock**
- 18.4.12.1 A real time quartz clock shall be used in the meter for maintaining time and calendar date. The maximum drift shall not exceed  $\pm 180$  seconds per year. The uncertainty of setting initial time shall not exceed + 30 Seconds with respect to Indian standard time.
- 18.4.12.2 Facility for adjustment of real time shall be provided through CMRI/Workstation with proper security.
- 18.4.12.3 **Meter shall be time synchronised through GPS clock. All necessary equipment shall be provided to run the auto time synchronization of all ABT meters through a centrally located GPS clock available in each sub-station. Off-line time synchronisation will not be accepted.**
- 18.4.13 **Memory**
- 18.4.13.1 The meter shall have non-volatile memory, so that the registered parameters will not be affected by loss of power. The non-volatile memory should have a minimum retention time of 10 years.
- 18.4.14 **Harmonics Measurement**

18.4.14.1 THD Upto 29th Harmonic shall be measurable that is a sampling rate of 3000/sec. The meter should be capable of measuring fundamental energy as well as total energy. Fundamental energy shall be made available on meter-display and the same only shall be used for billing purpose.

#### 18.4.15 **Self-Diagnostic Feature**

18.4.15.1 The meter shall be capable of performing complete self-diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data memory location at all times. The meter shall have indications for unsatisfactory/non-functioning/malfunctioning of the following:

- a) Real Time and Date
- b) All Display Segments as per the requirement
- c) Non-volatile memory (NVM) failure indication at SAS
- d) Low battery indication at SAS
- e) Each type of communications failure indication

18.4.15.2 While installing the meter, it should be possible to check the correctness of Current Transformer, Voltage connections to the meter and their polarity from the functioning of the meter for different voltage injections with the help of vector/phasor diagrams. For this purpose suitable software for field diagnosis of meter connections with the help of Meter Reading Instrument should be supplied.

#### 18.4.16 **Anomaly Detection Features**

18.4.16.1 There shall be an appropriate display system by which any attempt of tampering the meter is promptly displayed with date and time tagging. It shall be able to display the following information about tampering events that have occurred since demand reset

18.4.16.2 The meters shall have features to detect the occurrence and restoration of, at least, the following common temper / anomaly

- a) **Missing Potential:** The meter shall be capable of detecting and recording occurrence and restoration with date and time the cases of Potential failure which could happen due to accidental/ intentional disconnection of potential leads (one or two).
- b) **CT Polarity Reversal:** The meter shall be capable of detecting and recording occurrences and restoration of CT polarity reversal of one or more phases.
- c) **Current and Potential Imbalance:** The meter shall be capable of detecting and recording occurrences and restoration of unbalance of voltage and current.

Snapshots of voltage, current, power factor and energy (active) readings as well as date and time of occurrences and restoration of all anomaly events shall be logged into the meter memory and available for retrieving through the meter's optical port and down loading to SAS

- d) **Power on/off:** The meter shall be capable to record power on/off events in the meter memory. All potential failure should be record as power off event.

18.4.16.3 Last 200 such events in total with date and time shall be stored in the meter memory on first in first out basis.

#### 18.4.17 **Common Meter Reading Instruments / Laptop**

18.4.17.1 Up loading and down loading of meter data through optical port should be possible by Common Meter Reading Instruments (CMRI) as well as Laptop

18.4.17.2 Supply of Common Meter Reading Instruments (CMRI) or Laptop is not in the scope of the bidder. These will be made available at site by the Employer. However, any inter face cable/ converter is required, the bidder shall supply the same free of charge.

#### 18.4.18 **Software for Monitoring**

18.4.18.1 The online monitoring software of sub-station automation system (SAS) shall acquire the real time data of the **ABT meters**.

18.4.18.2 In the SAS, provision will be made to read all ABT meter data of a sub-station in a separate window on demand. These ABT meter data should be stored in HMIs with separate identity without mixing metering data received from other IEDs, such as BCU, BPU.

18.4.18.3 ABT meter off line communication software (for CMRI and Laptop interface) shall be compatible with Vista/ Windows XP

#### 18.5.0 **TECHNICAL SPECIFICATIONS FOR ACSR PANTHER CONDUCTORS**

18.5.1 a) The Conductor shall conform to IS: 398 (latest edition) except where otherwise specified herein.  
The details of the ACSR Panther conductors are tabulated below:

Sl. No.	DESCRIPTION	ACSR 'PANTHER'
1	Code name	PANTHER
2	Number of strands & size	Al: 30/ 3.00 mm St: 7/ 3.00 mm
3	Overall diameter	21.00 mm
4	Breaking load	130.32 kN
5	Weight of conductor	974 kg / km
6	Co-efficient of linear expansion	$19.35 \times 10^{-6} / ^\circ\text{C}$
7	Number of strand	
	Steel centre	1
	1st Steel Layer	6
	1st Aluminium Layer	12
	2nd Aluminium Layer	18
	3rd Aluminium Layer	-
8	Sectional area of Aluminium	212.10 mm <sup>2</sup>
9	Total sectional area	261.50 mm <sup>2</sup>

10	Calculated d.c. resistance at 20 <sup>0</sup> C	0.1400 ohm/km
11	Ultimate tensile strength	89.67

**b)** For protection against direct lightning G.I. wires of size 7/3.66 mm conforming to IS 2241 shall be considered for all switchyards.

## 18.5.2 ELECTRICAL CLEARANCE

Following minimum electrical clearances (outdoor) shall be maintained in the switchyard:

SL No	Clearance	220 KV	132 KV	33 KV
1.	Phase to Phase	2400 mm	1300 mm	320 mm
2.	Phase to Earth	2400 mm	1300 mm	320 mm
3.	Sectional Clearance	5000 mm	4000 mm	2800 mm
4.	Live part to ground	5500 mm	4600 mm	3700 mm
5.	Base of insulator (supporting live part) to ground	2500 mm	2500 mm	2500 mm

## 19.0 Service Conditions:

19.0.1 The 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) Ground temperatures: 40 °C
- d) Reference ambient day temperature : 45 °C
- e) Relative Humidity
- i). Maximum : 100 %
- ii). Minimum : 10 %
- f) Altitude : Below 1000 M above MSL
- g) Maximum wind pressure : As per IS: 802
- h) Seismic Intensity: ZONE-V as per IS 1893.

## 20.0 Guaranteed Technical Particulars: (Annexure-II)

20.0.1 This specification covers the minimum requirements for the design, engineering, manufacturing, inspection, testing and supply of equipments and mounting structures and energy meter. In addition to concurrence to this specification following consideration to be taken:

**Compliance with applicable IS codes & standards as well as any statutory regulation in existence for a specific item.**

20.0.2 The Guaranteed Technical Particulars of the equipment shall be furnished by the Bidders in the prescribed Schedules of this Section with the Technical Bid. The Bidder shall also furnish any other information's as in their opinion is needed to give full description and details to judge the item(s) offered by them.

20.0.3 The data furnished in Guaranteed Technical Particulars should be the minimum or maximum value (as

per the requirement of the specification) required. A Bidder may guarantee a value more stringent than the specification requirement. However, for testing purpose or from performance point of view, the material shall be considered performed successfully if it achieves the minimum/maximum value required as per the technical specification. No preference whatsoever shall be given to the bidder offering better/more stringent values than those required as per specification except where stated otherwise.

## 21.0. **CIVIL WORKS**

The civil works include construction of switchyard equipment foundations. The work should be done as per the directives and supervision of AEGCL. The foundation work includes:

- (i) Earthwork in excavation for foundation trenches of walls, footings of column, steps etc. including refilling (return filling) the quantity as necessary after completion of work, breaking clods in return filling, dressing, watering and ramming etc. and removal of surplus earth with all lead and lifts as directed and specified in the following classification of soils including bailing out water where necessary as directed and specified.
- (ii) Providing brick soling in foundation and under floor with stone/ best quality picked jhama brick, sand packed and laid to level and in panel after preparing the subgrade.
- (iii) Plain cement concrete works with coarse aggregate of sizes 13mm to 32mm in foundation bed for footing steps, walls, brick works etc as directed and specified.
- (iv) Supplying, fitting and fixing in position reinforcement bars conforming to relevant IS code for R.C.C. work/ R.B. walling including straightening, cleaning, cutting and bending to proper shapes and placing in position with proper blocks, supports, chairs, spacers etc. complete. (up to 1st floor level).
- (v) Providing form work of ordinary timber planking so as to give a rough finish including centering, shuttering, strutting and propping etc., and removal of the same for in-situ reinforced concrete and plain concrete work.
- (vi) Providing and laying Plain/Reinforced cement concrete works in prop 1:2:4 including dewatering if necessary, and curing complete but excluding cost of form work and reinforcement for reinforced cement concrete works (shuttering where necessary shall be measured and paid separately).
- (vii) 15mm thick cement plaster in single coat on rough side of single or half brick wall for interior plastering up to 1st floor level including arises, internal rounded angles, not exceeding 80mm in girth and finished even and smooth including curing complete as directed.
- (viii) Supplying fitting and fixing M.S. angles, M.S. flat, M.S. bolts and nuts including painting with red lead paint one coat complete as directed.

## 22.0 **Contract Agreement:**

22.1 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.

22.2 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.

## 23.0 **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:

23.1 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.

23.2 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.

23.3 Contractual failure:- Refer clause No.27.1 of AEGCL's General Conditions of supply and erection 2009.

24.0 **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.

25.0 **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.

26.0 **Warranty:**

26.1 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.

26.2 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.

26.3 The warranty shall remain valid for a period of **sixty (60) months** from the date of supply (the Goods having been delivered to and accepted at the final destination indicated in the Purchaser's requirement). A Taking over Certificate (TOC) will be issued by the appropriate authority.

26.4 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.

26.5 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.

27.0 **Safety:**



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.

28.0 **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.

29.0 **Payment terms:**

29.1 No advance/Mobilization advance shall be made in this contract.

29.2 **(A) Progressive payment for supply items within the Country**

29.2.1 Within 60 (sixty) days from the date of submission of the invoice against supply, not more than 60% ( sixty Percent) payment of the total supply Invoice value would be made, on receipt and acceptance of materials in full and good condition. However GST amount on invoice would be paid 100% or as per Govt. Rules.

29.2.2 Maximum 10 (ten) Nos. of progressive supply invoices would be entertained.

29.2.3 Remaining 40% (Forty percent) **Retention Amount** would be released subject to fulfillment of the following conditions-

29.2.4 a) 50% of balance supply amount would be paid on completion of 50% of the total erection works of the project

29.2.5 b) Remaining 50% of the supply amount would be paid on completion of 100% erection. testing and commissioning activities of the project, which should be certified by the Project Manager.

29.3 **(B) Progressive payments for erection works**

29.3.1 1. Within 60 (sixty) days from the date of submission of invoice against foundation, erection & civil works, not more than 80% (eighty percent) of the total verified invoice would be made. However, GST amount on Invoice would be paid 100% or as per Govt. Rules.

29.3.2 2. Maximum 8(eight) Nos. of progressive erection Invoice/ Bill would be entertained during entire erection work.

29.3.3 3. The 1<sup>st</sup> Progressive erection Invoice/Bill would be entertained on completion of 30% of total erection cost of the Project.

29.3.4 4. Maximum 6 Nos. of additional progressive erection Invoice/Bill would be entertained. Minimum value of each Invoice should be 10% of the total ordered value for foundation erection and civil works.

29.3.5 5. Remaining 20% of the erection value would be paid on successful completion of 100% erection, testing and commissioning activities of the project, which should be certified by the Project Manager.

29.4 Payment will be made by DGM, Tezpur (T&T) Circle, AEGCL, Dhanuwa Nagar, Tezpur. 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

(e) Banker's RTGS Code

### 30.0 **Performance security deposit:**

30.1 Further Performance Guarantee of 10% of total Contract value for turnkey execution of the project in the form of Bank Guarantee (BG) / Demand Draft (DD) / Fixed Deposit (FD) from a nationalized or scheduled Bank of RBI for a period of 60 (sixty) months from the date of supply or 54(fifty four) months from the date of commissioning of the project, whichever is later is to be submitted with acceptance of LOI and before signing of the Contract Agreement. However BG period may be split up subject to the condition that BG would be extended from time to time to cover the warranty period. Moreover, before one month (i.e. 30 days) of expiry of the BG, renewal is to be done by the contractor if required, otherwise revocation would be done by AEGCL within claim period. BG is to be submitted as per prescribed format of AEGCL. BG should remain valid up to 60 (sixty) days beyond warranty / Performance Guarantee Period.

30.2 The Bank Guarantee (BG) should be duly pledged in favour of the **AEGCL, Bijulee Bhawan, Paltanbazar, Guwahati-1**, and should be submitted to the **O/O the Deputy General Manager, Tezpur T&T Circle, AEGCL, Tezpur-784001**.

30.3 Please note that, if the selected Bidder / Firm fails to furnish the requisite performance security as stated above and sign the contract within the stipulated period, LOI/work order issued in favour of the Bidder/ Firm will automatically be Null & void.

30.4 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.

30.5 No interest shall be payable on such deposits.

### 31.0 **Retention Money:**

31.1 In addition to above performance security deposit, retention money will be retained by the Engineer/Purchaser as per Bid Clause 29. The amount will be held by the Purchaser (AEGCL) till the work under the contract is completed and the completion certificate is issued.

31.2 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.

31.3 No interest shall be payable on such deposit.

### 32.0 **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.

### 33.0 **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 Kamrup District.

### 34.0 **Right to Reject:**

The 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](http://www.aegcl.co.in) under Acts, Rules and Policies Tab.

### 35.0 **ERECTION TESTING AND COMMISSIONING**

#### 35.1 **The erection, testing and commissioning of all 33 kV equipments including Energy meter should be done in the presence of authorized representative of AEGCL.**

35.2 The pre-commissioning checklist will be further developed by the contractor and will seek approval prior to commencement of pre-commissioning tests from the DGM, MRT Circle, AEGCL. The tests will be witnessed and approved by him or by his authorized officers

**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 other 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. ....

**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 \_\_\_\_\_

\_\_\_\_\_

Form "Manufacturer's Authorization"

***[The Bidder, in pursuant to Evaluation and Qualification Criteria (if applicable) shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. Please refer to notes at bottom]***

**(Manufacturer's Letterhead)**

Date: *[insert date (as day, month and year) of Bid Submission]*

Bid No.: *[insert number of bidding process]*

**To: *[Insert: full name of Purchaser]***

WE *[insert: name of Manufacturer]* who are established and reputable manufacturers of *[insert: name and/or description of the Goods]* having production facilities at *[insert: address of factory]* do hereby authorize *[insert: name & address of Bidder]* (hereinafter, the "Bidder") to submit a bid the purpose of which is to provide the following goods, manufactured by us, and to subsequently negotiate and sign the Contract:

1. -----
2. -----
- 

We hereby extend our full guarantee and warranty in accordance with **Clause 23.0** of the Special Conditions of Contract, for the above specified Goods supporting the Supply of specified Goods and fulfilling the Related Services by the Bidder against this Bidding Documents, and duly authorize said Bidder to act on our behalf in fulfilling these guarantee and warranty obligations. We also hereby declare that, we will furnish the Performance Guarantee in accordance with **Clause OF BID**. Further, we also hereby declare that we and ....., *[insert: name of the Bidder]* have entered into a formal relationship in which, during the duration of the Contract (**including related services and warranty / defects liability**) we, the Manufacturer or Producer, will make our technical and engineering staff fully available to the technical and engineering staff of the successful Bidder to assist that Bidder, on a reasonable and best effort basis, in the performance of all its obligations to the Purchaser under the Contract.

For and on behalf of the Manufacturer

Signed: \_\_\_\_\_



Date: \_\_\_\_\_

In the capacity of [*insert: title of position or other appropriate designation*] (*and this should be signed by a person having the power of attorney to legally bind the manufacturer*).

Date:.....

Place:.....

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....

**Notes:**

1. The letter of Undertaking should be on the letterhead of the Manufacturer and should be signed by a person competent and having **Power of Attorney to sign on behalf of the Manufacturer** (to be attached with this MANUFACTURER'S AUTHORIZATION) to legally bind the Manufacturer. It shall be included by the bidder in its bid.

2. Above undertaking shall be registered or notarized so as to be legally enforceable.

## 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- 26)	: Yes/No
5)	Date of completion of supply/Erection. (Please specify the date of completion of supply/Erection as per specification)	: Yes/No
6)	Delay in Supply/Construction (Whether agreeable to accept AEGCL's terms as specified in Clause no- 23)	: Yes/No
7)	'Performance Security & Retention Money' (Whether agreeable to accept as specified in Clause no-30 & 31)	: Yes/No
8)	Sales tax clearance certificate of the current year furnished	: Yes/No
9)	Whether drawing etc. as per specification are furnished	: Yes/No
10)	List of orders executed for similar works furnished	: Yes/No
11)	Performance certificate from the Govt/Govt undertaking furnished	: Yes/No
12)	Deviation from the specifications	
	a) Technical	: Yes/No
	b) Commercial	: Yes/No

13)	Information in respect of technical capability is furnished	: Yes/No
14)	Information in respect of Financial capability certificate from the Banker is furnished	: Yes/No
15)	Certificate as per Cl.no. 15.1 enclosed	: Yes/No
16)	Certificate as per Cl.no. 15.2 enclosed	: Yes/No
17)	Copy of Contract Labour License, Cl. No. 15.3.2	: Yes/No
18)	PAN card as per Cl. No. 15.3.3	: Yes/No
19)	GST registration no. and valid labour license as per Cl. No. 15.3.5 enclosed.	: Yes/No
20)	Registered Power of Attorney as per Cl.no. 15.3.6 enclosed.	: Yes/No

*It is certified that the rates have been quoted as per terms and conditions laid down in the tender specification and without any deviation.*

Name of the Bidder:-

Signature of the Bidder/Firm .....

Full Name .....

Postal Address .....

Phone/Mobile No. ....

## ANNEXURE -II

### GURANTED TECHNICAL AND OTHER PARTICULARS

( To be filled in by Bidder)

#### 33KV ISOLATORS, POTENTIAL TRANSFORMER, TRIVECTOR METER, ACSR CONDUCTOR

##### A. 33KV ISOLATORS

SI No.	DESCRIPTION	Unit	PARTICULARS	
1.0	Name of manufacturer and Address			
2.0	Manufacturer's type			
3.0	Standards to which the equipment conforms			
4.0	Frequency (Hz)			
5.0	Rated voltage KV rms)			
6.0	Maximum design voltage at which the isolator can operate (KV rms)			
7.0	Continuous current rating (Amp. Rms)			
8.0	Rated short time current			
	i) for 3 sec. (KV rms)			
	ii) rated peak short time current (KA peak)			
9.0	Current density at the min. cross section of (Amp./Sq.mm)			
	i) Moving blades			
	ii) Terminal pad			
	iii) Contacts			
	iv) Terminal connector			
10.0	Derating factor for specified site conditions			
11.0	Insulation levels			
	i) Dry impulse withstand voltage (KV peak)			
	a) Phase to earth			
	b) Isolating distance			
	ii) Wet power freq. Withstand voltage (KV ms)			
	a) Phase to earth			
	b) Isolating distance			
12.0	Min. clearance in air (mm)			

	i) Center to center distance between poles			
	ii) Between live parts & earth			
	iii) Between poles on one phase			
13.0	Design & construction			
	i) No. of insulators per pole			
	ii) No. of break per pole			
	a) Main switch			
	b) Earth switch			
	iii) Type of opening /closing mechanism			
	iv) Contacts			
	a) Materials & grade			
	b) Thickness of silver plating on contact surface			
	c) Effective cross sectional area (Sq.mm)			
	1) Main switch			
	2) Earth switch			
	d) No. of operations the isolator can make without deterioration of contacts			

## **B. POTENTIAL TRANSFORMER**

<b>Sl. No.</b>	<b>DESCRIPTION</b>	<b>Unit</b>	<b>PARTICULARS</b>		
1.0	Name of the Manufacturer				
2.0	Country of Origin				
3.0	Manufacture's type and Designation				
4.0	Standards Applicable				
5.0	Type of installation (outdoor)				
6.0	Mounting of tank (Bottom)				
7.0	Rated primary voltage	KV			
8.0	Secondary Winding Details		Wdg-1	Wdg-2	Wdg-1
	(i) No of Secondary Winding				
	(ii) Rated secondary voltage	V			
	(iii) Rated burden	VA			
	(iv) Class of accuracy				
9.0	Maximum ratio error with % rated burden and 5% normal primary voltage.				

10.0	Maximum phase angle error % with rated burden and 5% normal primary voltage.			
11.0	Temperature rise at 1.1 times rated voltage with rated burden	°C		
12.0	Rated voltage factor and time.			
13.0	Impulse withstand test voltage.	kV (peak)		
14.0	One minute power frequency withstand test voltage on primary	kV rms		
15.0	One minute power frequency withstand test voltage on secondary	KV rms		
16.0	Total creepage distance of the bushing	mm		
17.0	Protected creepage distance of the bushing	mm		
18.0	Sealing (Metal Bellow) provided			
19.0	Quantity of insulating oil	Litres		
20.0	Weight of oil	Kg.		
21.0	Total weight including oil	Kg		
22.0	Mounting details			
23.0	Overall dimensions			

### **C. TRIVECTOR METER**

<b>SI. No.</b>	<b>DESCRIPTION</b>	<b>Unit</b>	<b>PARTICULARS</b>		
1	Manufacture's Name and Address				
2	Make/Type/Model No				
3	Range				
4	Detailed literature furnished				
5	Standard to which it conform to				
6	Rated current				
7	Rated voltage and frequency				
8	Maximum Continuous Current				
9	Whether the meter measures Harmonic current generated due to nonlinear loads. (Yes/NO)				

10.	Whether the meter records power due to Harmonic Current (Yes/No)				
11.	Short time current rating				
12.	Minimum starting current in % of Base current				
13.	Loss in Potential circuit				
14.	Loss in current circuit				
15.	Change in error due to a) Variation in frequency b) Variation in Temperature c) Variation in voltage				
16.	Current rating of the terminal				
17.	One minute power withstand voltage				
18.	Maximum size of cable which can be connected at terminals				
19.	Working range a) Voltage b) Current				
20.	Auxiliary supply				
21.	Type of load (linear, non-linear, balanced/unbalanced at any pf)				
22.	Sensitivity				
23.	Memory Details				
24.	Tamper & anomaly detection & alarm				
25.	Class of accuracy				
26.	Rated VA burden				
27.	- Current coil                      VA				
28.	- Voltage coil                      VA				
29.	Test plug/test blocks/testing terminals with links				

**D. ACSR CONDUCTOR**

SI. No.	DESCRIPTION	Unit	PARTICULARS
1.0	Maker's Name, Address		
2.0	Particulars of Raw Materials		

2.1	Aluminium		
a)	Minimum Purity of aluminum	%	
b)	Maximum Copper Content	%	
2.2	Steel Wires/Rods		
a)	Carbon	%	
b)	Manganese	%	
c)	Phosphorus	%	
d)	Sulphur	%	
e)	Silicon	%	
2.3	Zinc		
a)	Minimum Purity of Zinc	%	
3.0	Aluminum Strands after stranding		
3.1	Diameter		
a)	Nominal	mm	
b)	Maximum	mm	
c)	Minimum	mm	
3.2	Minimum Breaking Load of Strand	kN	
3.3	Maximum Resistance of 1m length of	Ohm	
4.0	Steel Strands after stranding		
4.1	Diameter		
a)	Nominal	mm	
b)	Maximum	mm	
c)	Minimum	mm	
5.0	Galvanizing		
a)	Minimum weight of zinc coating per Uncoated wire surface	gm/m <sup>2</sup>	



b)	Minimum number of one minute dips galvanized strand can withstand in the preece test	Nos.	
c)	Minimum number of twists in a gauge length times dia of wire which the strand can in the torsion test (after stranding)	Nos.	
6.0	ACSR Stranded Conductor		
6.1	UTS of Conductor	kN	
6.2	Lay ratio of Conductor	Max.	
a)	Outer Steel Layer		
b)	12 wire aluminum layer		
c)	18 wire aluminum layer		
d)	24 wire aluminum layer		
6.3	D.C. resistance of conductor at 20°C	Ohm/ Km	
6.4	Standard length of conductor	M	
6.5	Maximum length of conductor that can be	Meter	
6.6	Tolerance on standard length of conductor	%	
7.0	Direction of lay for outside layer		
7.1	Linear mass of the Conductor		
a)	Standard	Kg/Km	
b)	Minimum	Kg/Km	
c)	Maximum	Kg/Km	
8.0	No. of Cold pressure butt welding available at works	Nos.	

Name of the Bidder:-

Signature of the Bidder/Firm .....

Full Name .....

Postal Address .....

Phone/Mobile No. ....

## PRICE BID

**(Supply, Erection, Testing and Commissioning including construction of foundation.)**  
*(To be submitted in the Part-II, 'Price bid' in sealed envelope in quadruplicate)*

Sl no	Description	Unit	Qty	Unit Price inclusive of Taxes (Rs.)	Total Price inclusive of Taxes (Rs.)
1	2	3	4	5	6
<b>01</b>	<b>Supply of equipments</b>				
	(i) 33kV motor operated Isolator without Earth Switch	Set	1		
	(ii) 33kV PT including marshaling box	nos	3		
	(iii) Energy meter(0.2 class)	Nos	1		
	(iv) ACSR Panther conductor	mtr	200		
<b>02</b>	<b>Supply of mounting structures</b>				
	(i) For 33kV isolator without Earth Switch.	Set	1		
	(ii) For 33 kV PT.	Nos	3		
<b>03</b>	<b>Erection, testing and commissioning including laying of cable</b>				
	(i) For 33kV isolator without Earth Switch.	Set	1		
	(ii) For 33 kV PT.	nos	3		
	(iii) Energy meter(0.2 class)	Nos	1		
<b>04</b>	<b>Construction of foundation including erection of mounting structures</b>				
	(i) For 33kV isolator without Earth Switch.	Set	1		
	(ii) For 33 kV PT.	Nos	3		
<b>Total in figures:</b>					
<b>Total in words:</b>					

Name of the Bidder:-

Signature of the Bidder/Firm .....