

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

**Supply of SAS compatible 33KV R&C Panel with Energy meter for Mazbat Feeder &
Integration into existing SAS**

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

**Tender Cost: ₹ 1000.00
EMD: ₹33000.00**

BID NO: AEGCL/DGM/TTC/TEZ/T-20/2020/109

Date:03/11/2020

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	Bid Security In INR	Time of completion In Days
1	Supply of SAS compatible 33KV R&C Panel with Energy meter for Mazbat Feeder & Integration in to existing SAS	33,000.00	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 12th October, 2020** . 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. The total amount from each Schedule 1, 2 3 and 4 to be entered in the Bid Form

- Schedule No. 1: Supply of Goods
- Schedule No. 2: Freight & Insurance
- Schedule No. 3: SAS Integration with SIEMENS with existing SAS
- Schedule No. 4: Grand Total

In the Schedules, bidders shall give the required details and a breakdown of their prices as called for in these Schedules.

4.0 Bid Security:

4.1 All bids must be accompanied by a bid security amounting to **Rs. 33,000.00** 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 23th November, 2020** .

6.2.2 Subsequently, the bids will be opened publicly at **12.00 Hours (IST) of 25th November, 2020** .

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 4,90,000.00** 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 4,90,000.00** 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 **6,51,000.00.**
 - (b) Two (2) similar completed works costing not less than **8,14,000.00.**
 - (c) One (1) similar completed works costing not less than **13,02,000.00.**
- 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 SAS compatible 33KV R&C Panel with Energy meter for Mazbat Feeder & Integration in to existing SAS.** 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 The price of the work shall be quoted as the Base Price or EXW Price
- 14.3.5 GST and all other taxes (as applicable) payable on the work should be indicated separately. In case of failure to indicate so AEGCL will consider such taxes are included in the Offered Price.
- 14.3.6 Whenever forest produces like sand, stone, timbers etc are used in the work the contractor have to furnish documentary proof that requisite royalty on such produces has been paid to the concerned Department.
- 14.3.7 When the work being "work contract" which is one and individual and which involves no separate contract for the sale of materials, the contractor shall have not be entitled to get any GST and or any other taxes, levies reimbursed from the AEGCL for the supply of the materials.
- 14.3.8 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.
- 14.3.9 The Prices shall be FIXED and FIRM:** The Bided Price should on Fixed Price basis, prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.

15.0 Additional Requirements:

- 15.1 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 **Technical Specifications for Control and Relay Panel (With Automation)**

- 17.1.1 This Section is intended to cover the design, manufacture, assembly, testing at manufacturer's works of Indoor Relay and Control Panels.
- 17.1.1 The Control and Relay Panels required are for control and protection of the Power Transformers, Feeders and for others according to requirements. The supply shall include all accessories, special tools, relevant software, supporting steels, spare parts, drawings, instruction manuals etc. The panels shall be supplied complete with all accessories as specified and completely assembled and all internal wiring completed.
- 17.1.2 The sub-stations will have automation as per guidelines of IEC 61850. The contractor has to supply the C&R panels to match the requirement of Sub-station Automation System (SAS) as specified in the subsequent chapter

17.2.0 **STANDARDS**

- 17.2.1 All equipment and all component parts supplied under this specification shall conform in all respects to the latest issue of relevant Indian Standard Specifications except where specified otherwise in this specification. Equipment meeting any other authoritative standards which ensure an equal or better quality may also be acceptable.

17.3.0 **TYPE OF PANEL**

- 17.3.1 All panels shall be simplex type. Panel shall be used for feeders.
- 17.3.2 Swing type Simplex Control and Relay Panels shall consist of vertical swing front panels with equipment mounted thereon and having front glass door. As there will be no rear door, manufacturer

shall have to keep suitable swing angle, for maintenance & testing of equipment, circuitry inspection etc. Panel front shall have lockable glass door.

These panels shall be of the following approximate dimensions:

Height: 2250mm + 15mm anti-vibration pad + 50 mm (base)

Depth: 800 mm to 1000 mm

Width: 800 mm to 1000 mm

17.4.0 **CONSTRUCTIONAL FEATURES**

17.4.1 The panels shall be completely metal enclosed to ensure a dust, moisture and vermin proof atmosphere. The enclosure shall provide a degree of protection not less than IP 31 in accordance with IS-2147

17.4.2 Panels shall be rigid free standing and floor mounting type and comprise of structural frames enclosed completely with specially selected texture finished, cold rolled sheet steel of thickness not less than 3mm for weight bearing members of the panels such as base frame, front sheet and door frames and not less than 2.0 mm for sides, door top and bottom portions. There shall be sufficient reinforcement to provide level surfaces, resistance to vibration and rigidity during transportation and installation.

17.4.3 All joints shall be made flush and all edges shall be bent at right angles and rounded. All structural members shall be bolted or welded together. Necessary arrangement shall be provided for bolting together the adjacent panels as well as for fastening them to the floor. The opening required for mounting the equipment shall be punched or cut and filed smooth.

17.4.4 All doors, removable covers and panels shall be sealed all around with synthetic rubber gaskets Neoprene/EPDM generally conforming to provision of IS 11149. However, XLPE gaskets can also be used for fixing protective toughened glass doors. Ventilating louvers, if provided shall have screens and filters. The screens shall be made of either brass or GI wire mesh.

17.4.5 Panels shall have additional rolled channel plinth at the bottom with smooth bearing surface. The panels shall be fixed on the embedded foundation channels with intervening layers of anti-vibration strips made of shock absorbing materials which shall be supplied by the contractor.

17.5.0 **MOUNTING OF EQUIPMENT**

17.5.1 All equipment on and in the panels shall be mounted and completely wired to the terminal blocks ready for external connection. All equipment on the front panels shall be mounted flush. Terminal markings shall be clearly visible.

17.6.0 **INTERNAL WIRING**

17.6.1 Panels shall be supplied completely with interconnecting wiring provided between all electrical devices mounted and wired in the panels and between the devices and terminal blocks for the devices to be connected to equipment outside the panels. When panels are located adjacent to each other all inter panel wiring and connections between the panels shall be furnished and wiring shall be carried out internally. These adjacent inter panel wiring shall be clearly indicated in the drawing furnished by the CONTRACTOR. The panel should have interconnectivity with the adjacent panels.

- 17.6.2 Wiring shall be carried out with 1100-Volt grade, single core, stranded copper conductor wires with PVC insulation. The minimum size of stranded copper conductor used for internal wiring shall be as follows:
All circuits except instrument transformers circuits: 1.5sq. mm per lead
Instrument transformers circuit: 2.5sq.mm per lead
- 17.6.3 Auxiliary bus wiring for AC and DC supplies, voltage transformer circuits, annunciation circuits and other common services shall be provided near the top of the panel running throughout the entire length of the panels.
- 17.6.4 Wire terminals shall be made with solder less clamping type of tinned copper lugs, which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations. Engraved core identification plastic ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wires and shall not fall off when the wire is disconnected from blocks.
- 17.6.5 Interconnections to adjacent panels shall be brought out to a separate set of terminals blocks located near the slots or holes meant for taking the interconnecting wires. Arrangement shall permit easy inter connection to adjacent panels at site and wires for this purpose shall be provided by the CONTRACTOR looped and bunched properly inside the panel. Marking of ferrules should be as per relevant standard against each items
- 17.6.6 A laminated copy of total schematics is to be fixed on the inside of door.
- 17.7.0 **Bay Control Units (BCU)**
- 17.7.1 **The BCU must be type tested at KEMA laboratory for IEC 61850 and other tests as per relevant IEC standards. The bidder is to submit type test reports along with the bid. The type test report shall not be more than 5 years old at the time of bid opening.**
- 17.7.2 The bay unit shall use industrial grade components. The bay level unit, based on microprocessor technology, shall use numerical techniques for the calculation and evaluation of externally input analogue signals. These shall incorporate select-before-operate control principles as safety measures for operation via the HMI. These shall perform all bay related functions, such as control commands, bay interlocking, data acquisition, data storage, event recording and shall provide inputs for status indication and outputs for commands. These shall be directly connected to the switchgear. The bay unit shall acquire and process all data for the bay (Equipment status, fault indications, measured values, alarms etc.) and transmit these to the other devices in sub-station automation system. In addition, these shall receive the operation commands from station HMI and SLDC. The bay unit shall have the capability to store all the data for at least 24 hours even if there is any power off conditions during the day.
- 17.7.3 The BCU must have metering functions like phase current, phase voltages, active & apparent power, power factor, frequency etc. The metering functions shall be accurate for a minimum of 1% of rated current.
- 17.7.4 BCU HMI shall display complete mimic of the respective bay, and operator shall be able to select the equipment in the mimic diagram for which operation of equipment is required. The control operation shall be password protected.
- 17.7.5 The mimic diagram shall indicate the live & dead portion of the bay

- 17.7.6 The BCU shall be capable to generate password for maintenance shutdown.
- 17.7.7 The Bay level unit shall be equipped with analogue and binary inputs/outputs for handling the control, status monitoring and analogue measurement functions. All bay level interlocks are to be incorporated in the Bay level unit so as to permit control from the Bay level unit/ local bay mimic panel, with all bay interlocks in place, during maintenance and commissioning or in case of contingencies when the Station HMI is out of service.
- 17.7.8 The Bay level unit shall meet the requirements for withstanding electromagnetic interference according to relevant parts of IEC 61850. Failure of any single component within the equipment shall neither cause unwanted operation nor lead to a complete system breakdown.
- 17.7.9 Input / Output (I/O) modules.
- 17.7.10 The I/O modules shall form a part of the bay level unit and shall provide coupling to the substation equipment. The I/O modules shall acquire all switchgear information (i.e. data coming directly from the switchgear or from switchgear interlocking devices) and transmit commands for operation of the switchgear.
- 17.7.11 The measured values of SF6 Gas Pressures, Operating Mechanism Pressures etc. are received through transducers to Bay Level Unit.
- 17.7.12 The digital inputs shall be acquired by exception with 1 ms resolution. Contact bouncing in digital inputs shall not be assumed as change of state.
- 17.7.13 **Operator Interface**

The HMI of BCU shall display the following informations:

- The bay name
- The date and time
- The Local/Remote/Maintenance bay mode
- The auto-recloser function status (on/off)
- The synchrocheck function status (on/off)
- The interlock function status (on/off)
- A list of measurements (in real value)
- The bay graphical representation
- The bay events classified in a chronological order
- The bay alarms
- The list of disturbance record available
- Bay interlock diagram

In addition it shall be possible to plug a PC Laptop on the Bay and get the full substation operator interface

17.8.0 **Switches Ethernet Communication Infrastructure**

17.8.1 The Bidder shall provide the redundant managed switched optical Ethernet communication infrastructure for SAS against PRP architecture. The necessary switches are provided for communication infrastructure as follows.

- One switch shall be provided to connect all IEDs for 1Bay in LAN-I and the second optical port

of Bay IEDs shall be connected to other Ethernet Switch in LAN-2. For 33KV, 3 numbers bay may be connected to one Ethernet Switch in this PRP architecture.

- The managed Ethernet switch shall have minimum 20% port redundancy (Both Fibre & Copper ports)
- Ethernet Switches shall have redundant power card.
- Port monitoring softwares for Ethernet Switches are to be provided.

17.9.0 **TERMINAL BLOCKS**

17.9.1 All internal wiring to be connected to the external equipment shall terminate on terminal blocks, preferably vertically mounted on the side of each panel. Terminal blocks shall be of 650 volts grade and have 10 amps continuous rating, moulded piece, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts. Terminal block designs include a white fibre-marking strip with clear plastic/silicon chip on terminal covers. Marking on the terminal strips shall correspond to block and terminal number on the wiring diagram.

17.9.2 Terminal blocks for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. Current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

17.9.3 At least 20% spare terminals shall be provided on each panel and these terminals shall be uniformly distributed on all terminal blocks.

17.9.4 There shall be a minimum clearance of 250 mm between first row of terminal blocks and associated cable gland plates. Also, the clearance between two rows of terminal blocks shall be a minimum of 150mm. A steel strip shall be connected between adjacent terminal block rows at 450-mm intervals for support of incoming cables.

17.10.0 **PAINTING**

17.10.1 All Sheet steelwork shall be phosphated in accordance with IS 6005.

17.10.2 Oil grease, dirt and warp shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

17.10.3 After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of 2(two) coats of ready mixed, stoving type zinc chromate primer. The first coat may be 'flash dried' while the second shall be stoved.

17.10.4 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after completion of tests. Exterior Paint shall be texture finishing with RAL 7032 paint shade.

17.10.5 Each coat of primer and finishing paint shall be of a slightly different shade to enable inspection of the painting.

17.10.6 The inside of the panels shall be glossy white and outside shall be Siemens Grey

17.10.7 A small quantity of finishing shall be supplied minor touching up required at site after installation.

17.11.0 **NAME PLATES AND MARKINGS**

17.11.1 All equipment mounted on front and rear side as well as equipment mounted inside the panel shall be provided with individual nameplates with equipment designation engraved. Also, on the top of the each panel on front as well as rear side large and bold name plates shall be provided for circuit /feeder designation.

17.11.2 All front mounted equipment shall be also provided at the rear with individual name plates engraved with Tag numbers corresponding to the one shown in the panel internal wiring to facilitate easy tracing of the wiring. The nameplates shall be mounted directly by the side of the respective equipment and shall not be hidden by the equipment wiring.

17.11.3 Nameplates shall be made of non-rusting metal or 3 ply lamicord. Nameplates shall be black with white engraved lettering.

17.12.0 **MISCELLANEOUS ACCESSORIES**

17.12.1 A 240 Volts, single-phase plug points shall be provided in the interior of each cubicle with ON-OFF switch for connection of headlamp.

17.12.2 Each panel shall be provided with a LED lighting fixtures for the interior illumination of the panel complete with all fittings, i.e. lamp, switch (controlled by panel door)

17.12.3 Each control panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of D.C. and A.C. supplies of various control, AC-DC super vision, signaling, lighting and space heater circuits. MCBs of requisite capacity with fail indicators shall be used, HRC fuse is not acceptable. The main input A.C. and D.C. circuits will be protected with miniature circuit breakers.

17.13.0 **EARTHING**

17.13.1 All panels shall be equipped with an earth bus securely fixed along with inside base of the panels. The materials and the sizes of the bus bar shall be at least 25X4 mm copper. Provisions shall be made for extending the earth bus bar to adjoining panels on either side. In the earth bus provision should kept for connection of different earth Point.

17.13.2 All metallic cases of equipment shall be connected to the earth bus by independent copper wires of size not less than 2.5 sq. mm. Earthing wire shall be connected on terminals with suitable clamp connectors and soldering shall not be permitted.

17.13.3 PT and CT secondary neutrals or common lead shall be earthed at one place only at the terminal blocks, where they enter the panels.

17.14.0 **RECORDING METERS (ABT COMPLIANT TRIVECTOR METERS)**

17.14.1 **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.

17.14.2 **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 CT Secondary Current : 1A
- d) Rated PT Secondary Voltage : $110/\sqrt{3}$ Volts (phase to neutral)
- e) Auxiliary AC Supply : 230volts AC +/- 15%
- f) Auxiliary DC Supply : 110 Volts DC Volts +/- 10%
- g) System Frequency : 50 Hz +/- 5%
- h) System Earthing : Solidly Earthed.

17.14.3 **GENERAL TECHNICAL REQUIREMENTS**

17.14.3.1 **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.

17.14.3.2 **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.

17.14.3.3 **ACCURACY**

The class of accuracy of the meter shall be 0.2.

17.14.3.4 **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

17.14.3.5 **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.

17.14.3.6 **MAXIMUM CONTINUOUS CURRENT**

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

17.14.3.7 **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.

17.14.3.8 **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.

17.14.3.9 **TEST TERMINAL BLOCK**

The meters shall be provided with a test block 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.

17.14.4 **GENERAL & CONSTRUCTIONAL REQUIREMENTS**

17.14.4.1 **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.

17.14.4.2 **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.

17.14.4.3 **Sealing of Meter**

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

17.14.4.4 **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.

17.14.5 **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.

17.14.6 **Bill Point Energy**

17.14.6.1 The meter shall have the features to measure Bill point energy with automatic reset features on every last date of the month.

17.14.7 **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 ϕ 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

17.14.8 Load Survey Capability

- 17.14.8.1 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

17.14.8.2 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).

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

17.14.9 **Remote Readout Facility, Communication Capability**

17.14.9.1 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.

17.14.9.2 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.

17.14.9.3 **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.**

17.14.10 **Calibration and Test Output**

17.14.10.1 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.

17.14.10.2 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.

- 17.14.10.3 The devices shall be suitable for use with sensing probe used with test benches or reference standards.
- 17.14.11 **Display**
- 17.14.11.1 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.
- 17.14.11.2 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.
- 17.14.12 **Real Time Clock**
- 17.14.12.1 A real time quartz clock shall be used in the meter for maintaining time and calendar date. The maximum drift shall not exceed ± 180 seconds per year. The uncertainty of setting initial time shall not exceed + 30 Seconds with respect to Indian standard time.
- 17.14.12.2 Facility for adjustment of real time shall be provided through CMRI/Workstation with proper security.
- 17.14.12.3 **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.**
- 17.14.13 **Memory**
- 17.14.13.1 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.
- 17.14.14 **Harmonics Measurement**
- 17.14.14.1 THD Upto 29 th 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.
- 17.14.15 **Self-Diagnostic Feature**
- 17.14.15.1 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
- 17.14.15.2 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.

17.14.16 **Anomaly Detection Features**

17.14.16.1 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

17.14.16.2 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.

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

17.14.17 **Common Meter Reading Instruments / Laptop**

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

17.14.17.2 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.

17.14.18 **Software for Monitoring**

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

17.14.18.2 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.

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

17.15.0 **RELAYS**

17.15.1 **GENERAL**

- 17.15.1.1 All relays shall conform to the requirements of IS 3231/IEC 60255/ IEC 61000 or other relevant Standards.
- 17.15.1.2 All protective relays shall be numerical type and communication protocol shall be IEC 61850. Further, test levels of EMI as indicated IEC 61850 shall be applicable to these relays.
- 17.15.1.3 Two sets of relevant software for relay configuration & setting, maintenance etc to be supplied to each station. The numeric relay and software shall be upgradable.
- 17.15.1.4 Relays shall be suitable for flush mounting with connectors from rear.
- 17.15.1.5 All draw out cases or plug in type modular cases will have proper testing facilities. The testing facilities provided on the relays shall be specifically stated in the bid. Necessary test plug shall be in the CONTRACTOR's scope of supply and shall be supplied loose. Unless otherwise specified all auxiliary relays and timers shall be supplied either in non-draw out cases or plug in type modular cases.
- 17.15.1.6 All A.C. relays shall be suitable for operation at 50 Hz. A.C. Voltage operated relays shall be suitable for 110 volts VT secondary. DC auxiliary relays and timers shall be designed for 110 volts DC and shall operate satisfactorily between 70% and 110% of rated voltage.
- 17.15.1.7 All Protective relays, auxiliary relays and timers except the lockout relays and interlocking relays shall be provided with self-reset type contacts. All protective relays, trip relays and timers shall be provided with electrically reset positive action operation indicators provided with proper inscription. Similar separate operating indicators (auxiliary relays) shall also be provided in the trip circuits of protections located outside the board such as Buchholz relays, temperature protection etc.
- 17.15.1.8 No control relays that shall trip the circuit breaker when the relays are de-energized shall be employed in the circuits.
- 17.15.1.9 All relays shall withstand a test voltage of 2.5 kV, 50 Hz r.m.s. voltage for one second. In case of static relays the **Clause 17.15.1.11** shall be applicable.
- 17.15.1.10 Auxiliary seal-in unit provided in the protective relays shall preferably be of shunt reinforcement type. If series relays are used the following shall be strictly ensured:
- i) The operating time of the series seal-in unit shall be sufficiently shorter than that of the trip coil relay in series with which it operates to ensure definite operation of the flag indicator of the relay.
 - ii) Seal-in unit shall obtain adequate current for operation when one or more relays operate simultaneously.
 - iii) Impedance of the seal-in unit shall be small enough to permit satisfactory operation of the trip coil on trip relays when D.C. supply is minimum.

17.15.1.11 Whenever solid state auxiliary relays are used the following requirements shall be met with:

- a) The printed circuit cards shall be of fibreglass type and the contact shall be gold plated. All connectors with the connector pegs shall be through wire wrapping. All solder joints on the printed circuit boards shall be encapsulated or covered with varnish.
- b) The components shall be loaded by less than half of their rated values. The resistor shall be of carbon composition or metal oxide type and the capacitors shall be plastic film or tantalum type. Stringent measures including shielding of long internal wiring should be taken to make relays immune to voltage spikes. Relays must withstand 5 kW, 1x150 microsecond, 0.5 Joule source energy impulse test or 1.5 MHz damp oscillations with initial value of 2.5 kV decaying to half the initial value in 6 microseconds with internal source impedance of 150ohms.
- c) The supplier shall ensure that the terminals of the contacts of the relays are readily brought out for connectors as required in the final approved scheme.
- d) DC /DC converter shall be provided in the solid state protective relays wherever necessary in order to provide a stable auxiliary supply for relay operation. Provision of DC cell in the protective relays as relievable stand-by power supplies will however not be acceptable.

17.15.1.12 All protective relays and alarm relays shall be provided with one extra isolated pair of contacts wired terminals exclusively for Employer's use.

17.15.2 GENERAL SPECIFICATION OF NUMERICAL RELAYS

17.15.2.1 Numerical Relays shall be provided for the following applications :

- Back up non directional over current (3 O/C) and earth fault relays for 33kV lines

17.15.2.2 All Numerical Relays should have following minimum features.

- Relays shall be communicable on **IEC61850** protocol without any protocol converter. Certificate from KEMA confirming interoperability, **Goose messaging & publishing as per IEC61850** standard shall be submitted along with the tender.
- Relays shall have one no. front RJ45 or USB port for Local Relay Parameterization and **Two nos. rear FO port/** Rear RS485 for connectivity to SAS over IEC61850 protocol
- The relay shall have self-communication port monitoring feature and failure shall generate alarm.
- Relays shall have redundant power supply card i.e. in case of failure of one source fail, the redundant shall pick up instantly. Power supply card failure shall generate necessary alarm to local SCADA.
- The relay shall have sufficient battery back up to keep the internal clock running for at least 2 years in absence of auxiliary supply
- Should have minimum 16 configurable LEDs

- Should have minimum 16 Binary Inputs and 24 Binary Outputs subject to the availability of 6BI and 10BO as spares above the system requirements.
- All BI/BOs shall be site configurable
- Shall have front minimum 4 lines LCD display with Alpha numeric key pad
- Numerical relays are to be provided with built in Event / Disturbance / Fault Recorder features.
- The bidder shall bring out in the bid that the Numerical relays providing different protection features / application in a single unit if any one of the application/feature goes out of service the other feature/application (s) will remain un-effected.
- Numerical Relays should have inbuilt PRP ports. The IED shall have two fibre optic ports for connecting Ethernet Switch of each LAN i.e. (PRP architecture)
- **The relays shall be site configurable (Including logic development)**
- Configured features & set values shall be in non volatile memory.
- Must have real time clock for time stamping of events/ disturbances with time synchronization inputs (GPRS etc.), Time synchronisation through SNTP & IRIG-B compatible.
- The relays should have self-diagnostic features identifying area of fault or failure of a particular component or card.
- Shall have in built Circuit Breaker Failure protection based on undercurrent detection and/or circuit breaker auxiliary contact status. Provision shall be given to initiate the breaker fail logic using a digital input from external protection devices.

17.15.2.3 Hardware based measurement shall not be acceptable.

17.15.2.4 The relay should have high immunity to electrical and electromagnetic interference.

17.15.2.5 The same relay shall be provided with both 1A and 5A CT inputs and shall be site selectable.

17.15.2.6 It shall be possible to energise the relay from either AC or DC auxiliary supply. **Auxiliary DC supply shall be suitable for 110**

17.15.2.7 **Be capable of performing basic instrumentation functions and displaying various instantaneous parameters like Voltage, current, active power, reactive power, phase sequence etc. in primary values.** Additionally all sequence current and voltage values shall be displayed on-line. Also the direction of power flow shall be displayed.

17.15.2.8 **Extensive disturbance recording facility shall be available for at least up to 10 seconds to capture**

maximum possible information. Necessary software shall be provided for retrieving and analysing the records.

Facility for developing customised logic schemes inside the relay based on Boolean logic gates and timers should be available. Facility for renaming the menu texts as required by operating staff at site should be provided

17.15.2.9 **Must have additional feature of local breaker back up protection**

The relay shall have built in Circuit Breaker Supervision Functions

- ☐ The relay shall be able to detect any discrepancy found between NO & NC contacts of breaker
- ☐ The relay shall monitor number of breaker trip operations
- ☐ The relay shall also monitor the breaker operating time

17.15.2.10

The relays shall have the following tools for fault diagnostics-

- ☐ Fault record – The relay shall have the facility to store fault records with information on cause of trip, date, time, trip values of electrical parameters.
- ☐ Event record – The relay shall have the facility to store time stamped event records with 1ms resolution.
- ☐ Disturbance records – The relay shall have capacity to store disturbance records of at least 10 sec. duration and sampling rate per cycle shall be more than 100.
- ☐ It shall be possible to preserve stored information in the event of an auxiliary supply failure with the help of a battery backup.
- ☐ The relay settings shall be provided with password protection.
- ☐ It shall be possible to change the relay setting from the front panel using the key pads/ Work station of SAS / Laptop.

17.15.2.11 The relay shall have comprehensive self-diagnostic feature. This feature shall continuously monitor the healthiness of all the hardware and software elements of the relay. Any failure detected shall be annunciated through an output watchdog contact. The fault diagnosis information shall be displayed on the LCD. These records shall also be retrieved from local as well as remote terminal through the communication port.

17.15.2.12 The Numerical Relays shall be provided with 2 sets of common support software compatible with, Windows 7 which will allow easy settings of relays in addition to uploading of event, fault, disturbance records, and measurements. The relay settings shall also be change from local or remote using the same software.

The manufacturer shall have to provide up-graded support software if any within 10 years span.

17.15.3 **OVER CURRENT AND EARTH FAULT RELAYS**

These relays shall be of numeric, single/multi pole, directional /non-directional type with or without

high set element as specified. These relays shall have the following features/characteristics:

- (i) IDMT characteristic with definite minimum time of 3 second at 10 times setting.
- (ii) Other operating curves such as inverse, very inverse shall be selectable
- (iii) Adjustable setting range of 50-200 % and 20-80% of rated current for over current and earth fault relays respectively.
- (iv) The directional relays shall have a Maximum torque angle of 45° current leading for directional over current unit & 30 lag for directional earth fault. Other MTAs should be settable
- (v) Voltage polarizing coil: 110 volt
- (vi) Must have faulty phase, type of fault identification
- (vii) The directional relays shall have over voltage/ under voltage & under frequency built in protection
- (viii) Shall be draw out type

17.15.4 **TRIP CIRCUIT SUPERVISION RELAY**

- 17.15.4.1 The relay shall be capable of monitoring the healthiness of each 'phase' trip-coil and associated circuit of circuit breaker during 'ON' and 'OFF' conditions.
- 17.15.4.2 The relay shall have adequate contacts for providing connection to alarm and event logger.
- 17.15.4.3 The relay shall have time delay on drop-off of not less than 200 milli seconds and be provided with operation indications for each phase.

17.15.5 **MASTER TRIP RELAY**

- 17.15.5.1 High Speed Tripping Relay shall be instantaneous (operating time not to exceed 10 milli-seconds).
- 17.15.5.2 The relays shall reset within 20 milli seconds
- 17.15.5.3 The relay shall be re-settable/configurable from local SCADA.
- 17.15.5.4 The relays shall be D.C. operated
- 17.15.5.5 The relays shall have adequate contacts to meet the requirement of scheme, other functions like auto-reclose relay, LBB relay as well as cater to associated equipment like event logger, Disturbance recorder, fault Locator, etc
- 17.15.5.6 The relays shall be provided with operation indicators for each element/coil.

17.15.6 DC SUPPLY SUPERVISION RELAY

17.15.6.1 The relay shall be capable of monitoring the failure of D.C. supply to which, it is connected.

17.15.6.2 It shall have adequate potential free contacts to meet the scheme requirement.

17.15.6.3 It shall have adequate potential free contacts to meet the scheme requirement.

17.15.6.4 The relays shall be provided with operation indicator/flag.

17.16.0 TIME SYNCHRONISATION EQUIPMENT

17.16.1 The Time synchronisation equipment shall receive the coordinated Universal Time (UTC) transmitted through Geo Positioning Satellite System (GPS) and synchronise equipment to the Indian Standard Time in a substation.

17.16.2 Time synchronisation equipment shall include antenna, all special cables and processing equipment etc.

17.16.3 It shall be compatible for synchronisation of Event Loggers, Disturbance recorders and SCADA at a substation through individual port or through Ethernet realised through optic fibre bus.

17.16.4 Equipment shall operate up to the ambient temperature of 50 degree centigrade and 100% humidity.

17.16.5 The synchronisation equipment shall have 2 micro second accuracy. Equipment shall give real time corresponding to IST (taking into consideration all factors like voltage, & temperature variations, propagation & processing delays etc.) including communication time for satellite link to achieve real time signal.

17.16.6 Equipment shall meet the requirement of IEC 60255 for storage & operation.

17.16.7 The system shall be able to track the satellites to ensure no interruption of synchronisation signal.

17.16.8 The output signal from each port shall be programmable at site for either one hour, half hour, minute or second pulse, as per requirement.

17.16.9 The equipment offered shall have six (6) output ports. Various combinations of output ports shall be selected by the customer, during detailed engineering, from the following :

- 1) Voltage signal: Normally 0-5V with 50 milli Seconds minimum pulse duration. In case any other voltage signal required, it shall be decided during detailed engineering.
- 2) Potential free contact (Minimum pulse duration of 50 milli Seconds.)
- 3) IRIG-B
- 4) RS232C

17.16.10 The equipment shall have a periodic time correction facility of one-second periodicity.

17.16.11 Time synchronisation equipment shall be suitable to operate from 80V-250V DC supply available at the sub-station with voltage variation of + 10% and -15%.

17.16.12 Equipment shall have real time digital display in hour, minute, second (24 hour mode) & have a separate time display unit to be mounted on the top of control panels having display size of approx. 100 mm height.

17.16.13 The cable connecting Antenna and Time Synchronising unit should be run through HDPE pipe or GI pipe from the location of Antenna fixing to Time Synchronising panel with suitable fixtures and no provision to enter rainwater and should not be affected by atmospheric conditions.

17.16.14 The equipment shall also have real time display in hour, minute, second, mili seconds. (24 hours mode) and shall have a separate time display unit to be mounted on the top of control panels having display size of approximately 144 mm height. The equipment shall have periodic time correction facility of one- second periodicity

17.17.0 **PROTECTION SCHEME FOR PANELS**

The 33 kV Feeder Panels shall be provided non directional single/ multi pole relays as specified in Bid. One triple pole over current relays for phase faults and one Earth Fault Relay for Earth Faults with high set elements shall be provided.

17.18.0 **MAINTENANCE TOOL KIT**

17.18.1. The bidder shall supply (if specified in the Schedule of Quantity) a complete maintenance tool kit. The tool kit shall have currentjack, card extender, card puller, required crimping tool, screw drivers, pliers etc.

17.18.1.1 The tool kit shall contain test plugs, test leads, clips for maintenance and testing of relays supplied.

17.19.0 **TESTS**

17.19.1 The supplier shall carry out all tests as per relevant standards as all associated equipment including relays, meters, instruments etc. The supplier shall submit all that reports to Employer for approval before despatching the control and relay panels. The Bidder shall also submit along with the bid type test reports for relays instruments, meters and other devices of the type and class being offered. Bidder has to submit KEMA test certificate for Numeric relay on interoperability compliance of IEC 61850 in general and GOOSE messaging and publishing in particular along with the bid.

17.19.2 Control and relay panels shall be subjected to the following tests:

- a. Mechanical operation test.
- b. Verification of degree of protection.
- c. High voltage test (2000 volts for 1 minute)
- d. Electrical control interlock and sequential operation test.
- e. Verification of wiring as per approved schematic.
- f. Interoperability test as per IEC 61850 (interoperability with ABB, AREVA, SIEMENS, GE and SEL)

17.20.0 **PRE-COMMISSIONING TESTS**

17.20.1 The contractor shall have to perform following minimum Pre-commissioning tests, as applicable, for commissioning of the C&R panels. For this purpose, the contractor shall arrange all required tools and testing equipment at site.

- (i). IR values of all circuits.
- (ii). Measurement of burden in CT & PT circuits.
- (iii). Primary current injection of CT circuits with connected burden
- (iv). Energisation of PTs at suitable low voltage and measurement of PT inputs at all measuring points
- (v). Secondary AC current injection of relays, dynamic testing of all numeric relays. Tracing of zone curves, limits. Checking of relay timings, inherent or set values. For this testing, the contractor shall bring 'Omicron' or equivalent test kit.
- (vi). Checking of Boolean logic gates, BI/BO points of the numeric relays, checking conformity to specification and checking of set logics
- (vii) Checking registration of event and disturbance records in the numeric relays and downloading.
- (viii) Checking of healthiness of each DC circuit of panels
- (ix) Operation of master trip relays, tripping of breaker through each trip coil and checking of inter locks
- (x) Simulation of faults like low gas, air pressure and checking operation of inter locks. Checking antiumping scheme of CB.
- (xi). Simulation to Check Checking of PT selection schemes
- (xii) Simulation to Check interlocks of all CB and isolator inter locks
- (xiii) Simulation to Check annunciation of all events in BCU (Bay control unit) as well as SAS (Substation automation System)
- (ivx) Simulation to Check of logic of BCU.
- (xv) Operation of tap changing of transformer through SAS

17.21.0 **TECHNICAL DATA SHEET FOR THE RELAY AND CONTROL PANELS**

17.21.1 Features to be provided in various Relay and Control panels are indicated below. Description below are only indicative; the Contractor shall ensure that all items are included in their off to complete the schemes described in the Specification whether such items are specifically mentioned or not.

17.21.2

SL NO	Item	Ratings & particulars
1	Protection and Relays	
	a) Back up non directional over current and earth fault scheme	1 set
	b) LBB protection Scheme.	Can be function of BCU/IED's
	c) Trip Circuit supervision Relay for pre and post closing	Supervision for 02 trip coils
	d) DC Supply healthy monitoring scheme	1 No
	e) AC Supply healthy monitoring scheme	1 No
	f) High Speed Trip relay	2 Nos.
	g) Auxiliary relay, timer relay for healthiness of relays, trip transfer, auto reclose communication link etc. As required	As required (Can be function of BCU)
	h) Bus PT selection scheme	1 No
2	Control / Status indication /annunciation	
	a) Bay Control Unit (IED with HMI)	1 No (Function of BCU/SAS)
	b) Ethernet switch for connecting to existing ring LAN of SAS	1 No

17.22.0 **Service Conditions:**

17.22.1 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.

17.23.0 **Guaranteed Technical Particulars: (Annexure-II)**

17.23.1 This specification covers the minimum requirements for the design, engineering, manufacturing, inspection, testing and supply of SAS compatible 33KV R&C Panel with Energy meter & Integration into existing SAS. 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.**

17.23.2 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.

17.23.3 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.

18.0 **Scope of Work:**

Supply of SAS compatible 33KV R&C Panel with Energy meter for Mazbat Feeder & to complete the work of integration of the new bay into the existing SAS at 132 KV Rowta GSS under Type-1 GSS AEGCL, Depota

19.0 **Contract Agreement:**

19.1 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.

19.2 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.

20.0 **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:

20.1 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.

20.2 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.

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

21.0 **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.

22.0 **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.

23.0 **Warranty:**

23.1 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.

23.2 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.

23.3 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.

23.4 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.

23.5 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.

24.0 **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.

25.0 **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.

26.0 **Payment terms:**

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

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

26.2.1 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.

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

- 26.2.3 Remaining 40% (Forty percent) **Retention Amount** would be released subject to fulfillment of the following conditions-
- 26.2.4 a) 50% of balance supply amount would be paid on completion of 50% of the total erection works of the project
- 26.2.5 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.
- 26.3 **(B) Progressive payments for erection works**
- 26.3.1 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.
- 26.3.2 2. Maximum 8(eight) Nos. of progressive erection Invoice/ Bill would be entertained during entire erection work.
- 26.3.3 3. The 1st Progressive erection Invoice/Bill would be entertained on completion of 30% of total erection cost of the Project.
- 26.3.4 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.
- 26.3.5 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.
- 26.4 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
- 27.0 **Performance security deposit:**
- 27.1 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.
- 27.2 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 .

27.3 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.

27.4 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.

27.5 No interest shall be payable on such deposits.

28.0 Retention Money:

28.1 In addition to above performance security deposit, retention money will be retained by the Engineer/Purchaser as per Bid Clause 26. The amount will be held by the Purchaser (AEGCL) till the work under the contract is completed and the completion certificate is issued.

28.2 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.

28.3 No interest shall be payable on such deposit.

29.0 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 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.

30.0 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.

31.0 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 under Acts, Rules and Policies Tab.

32.0 ERECTION TESTING AND COMMISSIONING

- 32.1 **The erection, testing and commissioning of all 33 kV equipments including control and relay panel along with integration to the Siemens SAS should be done in the presence of authorized representative of AEGCL.**
- 32.2 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.

PRICE BID

Schedule – I (Supply)

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

Sl no	Description	Unit	Qty	Unit Price exclusive of Taxes (Rs.)	Total Price exclusive of Taxes (Rs.)
1	2	3	4	5	6
01	Supply of SIEMENS make 33KV Control & Relay Panel Simplex Type	No	1		
02	Supply of 3Ph-4W 110V (P-P) Class 0.2s -/1A DLMS Complaint Trivector HTCT meter	No	1		
				Total	
				SGST 9%	
				CGST 9%	
				Total	

To be carried forward to Schedule-IV (Grand Total)

Name of the Bidder:-

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.

PRICE BID

Schedule – II (Freight and Insurance)

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

Sl no	Description	Unit	Qty	Unit Price exclusive of Taxes (Rs.)	Total Price exclusive of Taxes (Rs.)
1	2	3	4	5	6
01	Supply of SIEMENS make 33KV Control & Relay Panel Simplex Type	No	1		
02	Supply of 3Ph-4W 110V (P-P) Class 0.2s -/1A DLMS Complaint Trivector HTCT meter	NO	1		
				Total	
				SGST 9%	
				CGST 9%	
				Total	

To be carried forward to Schedule-IV (Grand Total)

Name of the Bidder:-

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.

PRICE BID

Schedule – III (Integration into existing SAS)
(To be submitted in the Part-II, 'Price bid' in sealed envelope in quadruplicate)

Sl no	Description	Unit	Qty	Unit Price exclusive of Taxes (Rs.)	Total Price exclusive of Taxes (Rs.)
1	2	3	4	5	6
01	Commissioning of 33KV R&C Panel with energy meter for Mazbat Feeder & Integration into existing SAS	No	1		
				Total	
				SGST 9%	
				CGST 9%	
				Total	

To be carried forward to Schedule-IV (Grand Total)

Name of the Bidder:-

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.

PRICE BID

Schedule –IV (Grand Total)

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

SI no	Description	Total Price Inclusive of Taxes (Rs.)
<i>1</i>	<i>2</i>	<i>3</i>
01	Schedule-I , Supply	
02	Schedule-II , Freight and Insurance	
03	Schedule-III , Commissioning of 33KV R&C Panel with energy meter for Mazbat Feeder & Integration into existing SAS	
Grand Total in figures		
Grand Total in words		

Name of the Bidder:-

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.

Form of Bid Security (Bank Guarantee)

(To be stamped in accordance with Stamp Act)

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

Date: _____

Bid Reference No.: _____

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

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

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

THE CONDITIONS of this obligation are:

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

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

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

DATE _____ SIGNATURE OF THE BANK _____

WITNESS _____ SEAL _____

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- 20)	: Yes/No
7)	'Performance Security & Retention Money' (Whether agreeable to accept as specified in Clause no-27 & 28)	: 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.

GUARANTEED TECHNICAL PARTICULARS REQUIRED BY AEGCL FOR 33KV RELAY & CONTROL PANEL

1	(A) PANEL CONSTRUCTION	
1.1	Type of Panel	
	a) Type of Panel	Simplex
	b) Type of construction	Swing front panel
	c) Front Door	Lockable glass door
	d) Rear Door	Not applicable
	e) Type of Sheet Of Panel	CRCA Sheets
	f) Sheet Steel Thickness	Load Bearing - 3mm
1.2	Panel Dimensions	
	a) Panel Width in mm	800-1000
	b) Total height(inc)Ant Pad and Base Frame) in mm	2315
	c) Panel Depth in mm	800-1000
	d) Anti vibration Pad thickness in mm	15
	e) Base Frame Height in mm	50
	f) Sheet Steel Thickness	Non-Load Bearing - 2mm
1.3	CABLE ENTRY	Bottom
1.4	Degree of Protection	IP 54
2	Powder Coating	
	a) External Colour Shade	RAL 7032 Gray
	b) Internal Colour Shade	White RAL 9003
	c) Base Frame External Colour Shade	Black
3	EARTHING AND EARTH BUS	
3.1	Materials	Tinned Copper
3.2	Connection between Panels	Panel shall be equipped with an earth bus securely fixed along with inside base of the panel. Provisions shall be made for extending the earth bus bar to adjoining panels on either side. In the earth bus provision should kept for connection of different earth points.

3.3	Size	25 X 6 mm
4	(B) PANEL WIRING	
4.1	Equipment Identification Name Plate / Labelling Details	
	a) External Equipments	Name Plate
	b) Name Plate Materials	Black colour anodized Aluminium with white letters
	c) Internal equipments	Yellow Stickers with black letters
5	WIRING	
5.1	Type of Wires	1100 Volt grade multistands PVC
5.2	Type of Wires Application	
	a) CT/PT Circuits	Wire Size: 2.5 Sq mm, Colour : Red, Yellow, Blue
	b) CT/PT Neutral connections	Wire Size: 2.5 Sq mm, Colour : Black
	c) AC control/ heater/lighting	Wire Size: 1.5 Sq mm, Colour : White
	d) Earthing Wires	Wire Size: 2.5 Sq mm, Colour : Green
	e) Incoming AC Circuits	Wire Size: 4 Sq mm, Colour : Black
	f) Incoming DC Circuits	Wire Size: 4 Sq mm, Colour : Grey
	g) DC Control Circuits	Wire Size: 1.5 Sq mm, Colour : Grey
	h) Automation	Digital / Analog Signals, Colour : Black
	i) DC Control Voltage	110 V
	j) Special Instruction for Equipments wiring	All wiring associated with ABB make auxiliary relays to be carried out with 1.5 Sq mm wire sizes only. All wires associated with tripping Ckts to be provided with addition of Red coloured unlettered ferrule. AC Bus wiring wire size should be 4Sq mm.
	k) Ferrules	Marking of ferrules should be as per relevant standard against each items
6	TERMINAL BLOCKS	
6.1	TYPE OF MATERIALS	Melamine Type
6.2	Application	
	a) Incoming CT/PT Circuits	Terminal Block Type : Disconnecting Stud type
		Terminal Block Size : Suitable for 2*2.5 Sq mm
	b) DC & AC Auxiliary / Control	Terminal Block Type : Non Disconnecting Stud type

		Terminal Block Size : Suitable for 2*1.5 Sq mm
	c) Incoming AC & DC Circuits	Terminal Block Type : Non Disconnecting Stud type
		Terminal Block Size : Suitable for 2*6 Sq mm
	d) Automation :Digital/Analog signals	Terminal Block Type : Non Disconnecting Screw type
		Terminal Block Size : Suitable for 2*1.5 Sq mm
7	Bay Control Unit	Case 1/2 19" : 36BI : 23BO + Live Status
		Flush mounting with Screw type terminals
		Current Transformer : 1A, 50Hz
		PTR sec : 110V AC, Aux Voltage : 110V – 250 V DC
		Port B: System/Service Interface With 61850
		With IRIG Port
8	Non-Dir O/C & E/F Protection Relay	Case : 1/3 19" : 16BI : 7 BO & 1 Live Status
		Current Transformer :1A, 50Hz,
		Aux Voltage: 110 – 250V DC
		With IEC 61850 Interface
9	Case & Base for ABB Relays	Type RHGX20 (Case & Base)
10	Contact Multiplication relay for CB	Auxiliary supply 110V DC, (Double Element)
	Tripping & Closing	Contacts: 6N/O S/R IN EACH ELEMENT
		Mounting Flush, Size: (2S 6C)
11	AC Circuit Supervision Relay	Aux Volt 230V AC
		Size: (2S 6C)
		Mounting: Flush, 2N/O +2 N/C Contacts
12	DC Circuit Supervision Relay	Aux Supply: U1(11) : 110V DC /U2(12):110V DC
		Size: (2S 6C)
		Mounting Flush: 2 N/C + 1N/O contacts
13	Trip Circuit Supervision Relay	Aux Supply 110V DC
	CB- Trip Coil-1	Size:(2S 6C)

	CB- Trip Coil-2	Contacts: 1N/O+ 1N/C +2C/O SR
14	High Speed Relay	Aux Supply 110V DC Contacts: 6 N/O +2 N/C, E/R Flag Yes Mounting: Flush Size: (2S 12C)
15	Resistance unit for 86A Trip Relay	4X 820 ohms, 5W Resistor
	Resistance unit for 86B Trip Relay	Size: (2S 6C)
16	Emergency Bkr Contact switch	TYPE: SPRING RETURN TO NEUTRAL MOUNTING: SUITABLE PANEL MOUNTING HANDLE: PISTOL GRIP (NON LOCKABLE) NO OF POSITIONS: 3(TRIP-NEUTRAL-CLOSE) RATING: 25A NO OF WAYS: 6WAY(TRIP-3,NEUTRAL-0,CLOSE-3)
17	Push Buttons for	
	DC Fail Test	Normal Actuator with Plastic Front Ring and Holder Of Black Colour Type:
	DC Fail Alarm Accept	
	Trip Relay Reset	Normal Actuator with Plastic Front Ring and Holder of Black Colour Type
18	Lamps For	
	DC Fail Lamp	White indicating lamp LED Type 230V AC
	DC Healthy Lamp	White indicating lamp LED Type 230V DC
19	Test Block for O/C & E/F Protection Relay	Test Terminal Block
20	Test Terminal Block	Back connected 3PH 4W TTB Standard Block with rear connection
21	Ethernet Switches	Name of Manufacturer: Ruggedcom/ Hirschmann or any other reputed make Type of Switches: Managed (6FOLC +2RJ45)

		Mounting Arrangement: Rack/Panel Mounted
		Redundant Power Supply Provided: No, VLANs-255
		Switching Methods: Store & Forward
		Switching latency-7us, Frame Buffer Memory-2Mbit
		Priority Queues- 4 Power Consumption (28W max)
		Protocol Supported: IEC 61850
22	Space Heater	100W, 240V AC
23	ON/OFF Switch	6A, 240V AC
24	Thermostat	30 ⁰ - 90 ⁰ Celsius, 240V AC
25	Cubicle Door Operated Switch	Limit switch(1NO+2NC) – 3SE30230A
26	Cubicle illumination Lamp	240V AC, 23W
27	DC MCB	32A, 110V DC, Double Pole
28	DC MCB	16A, 110V DC, Double Pole
29	DC MCB	4A, 110V DC, Double Pole
30	AC MCB	Single Pole and Neutral: 16A, 230V AC
31	Control Fuses with Fuse carrier And holder	4A 3NW32NNSF+ 3NWNS4
32	Link with Fuse carrier and Holder	Link with base 3NW32NNSF
33	Trivector Meter	Apex half 10inch Rock 3Phase 4 wire
		3 Phase 4 wire Aux Supply-110V DC
		RS 485 (RJ 11) with Modbus
		CT Ratio : -/1A
		PT Ratio : 33KV/V3/110V/V3

	Category : A
	Accuracy: Class: 0.2s

ANNEXURE -II

GURANTED TECHNICAL AND OTHER PARTICULARS

(To be filled in by Bidder)

CONTROL AND RELAY PANELS, BAY CONTROL UNIT, MANAGED ETHERNET SWITCH

A. Control & Relay Panel

SI No.	Technical Particulars	Unit	To be filled by the Tenderer
1.0	GENERAL		
1.1	Panel sheet thickness		
1.2	Over all dimensions		
	i) Width		
	ii) Depth		
	iii) Height		
	Total weight of the panel		
1.3	Whether panel type is simplex with swing front door		
1.4	Whether lockable glass cover provided		
1.5	Whether Rear side of panel is blocked		
1.6	Internal finish		
1.7	External Finish		
1.8	Control wiring		
	Material and Size of wiring For CT & PT Circuit For other Circuit		
1.9	Number of stranded in conductor		
1.10	Tinned /untinned		
1.11	Material of insulation and sheath		
1.12	Voltage grade of control wiring		
1.13	Numbered ferrules at both ends		
1.14	Terminals		
	a) Make		
	b) Current rating		
	c) Clamp type or bolt type		
	d) Maximum conductor size and number of conductor which it can receive		

	e) Disconnecting type of CT circuit		
	f) Terminal making facility provided		
	g) Crimp type connectors provided at the terminals		
	h) Spare terminals		
2.0	PROTECTIVE RELAYS		
2.1	Numeric over current / Earth fault relays		
	a) Type		
	b) Current coil range		
	c) Tap range		
	d) Power consumption		
	i) Highest tap		
	ii) Lowest tap		
	e) Time of operation at maximum time dial setting		
	f) Type of characteristic		
	g) Whether draw out type or not		
	h) Trip contact rating Amps		
	i) Whether seal in contact provided or not		
	j) Is the slope setting variable?		
	k) Disturbance recorder capacity in time duration		
	l) Number of event recording		
	m) Does it have LBB protection		
	n) Does it have frequency protection, describe		
	o) Does it have voltage protection, describe		
	p) Compliance with IEC 61850 protocol (Yes / No)		
	q) Numbers of Analogue inputs		
	r) Numbers of Binary inputs		
	s) Numbers of Binary outputs		
2.2	Auxiliary Relays		
	a. Manufacturer's Name & address		
	b. Type		
	c. Rated current / voltage and permissible variation		
	d. Rated burden		
	e. No. and type of contacts (whether 'NO' or 'NC')		

	f. Rating of contacts		
	g. Total operating time of relays		
	h. One minute power frequency withstand voltage		
	i. Detailed literature furnished with reference (Yes / No)		
	j. Details of testing facilities provided		
B. BAY CONTROL UNIT			
Sl. No.	Technical particulars	Unit	To be filled by the Tenderer
1	a) Manufacturer's Name & address		
	b) Size of the BCU		
	c) Disturbance recorder capacity in time duration		
	d) Whether the BCU has the capability to control two or more bays		
	e) Size of HMI window		
	f) Number of Analogue input		
	g) Numbers of BI		
	h) Numbers of BO		
	i) Numbers of input / output modules		
	j) Whether BCU has Synchronization features, (Yes / No)		
	k) Whether BCU has Auto Reclose features, (Yes / No)		
	l) Whether BCU has OC & EF protection function (Yes / No)		
	m) Whether BCU has Trip Ckt Supervision facilities (Yes / No)		
	n) Number of event recording		
	o) Compliance with IEC 61850 protocol (Yes / No)		
	p) Number of equipment it can handle		
	q) Speed of operation		

	r) Describe inherent protection functions, if any		
	s) Metering (Phase Current / Voltage, MW, MVAR, Freq, Phase angle etc)		
	t) Monitoring		
	u) Disturbance Recorder		
	v) Card extension provisions, BI & BO (Yes / No)		
	w) Whether site configurable		
	x) Nos of front configurable LED		
	y) Whether self Supervision features provided (Yes / No)		
	z) Whether communication port is in front (Yes / No)		
	aa) Power card redundancy (Yes / No)		
	ab) Min & Maximum range of auxiliary voltage		
	ac) Numbers of FO ports		
	ad) % Accuracy at 1% of In for metering		
	ae) Whether Bay mimic can distinguish the live & dead section of the bay (Yes / No)		

C . Managed Ethernet Switch

Sl. No	Technical Particulars	Unit	To be filled in by Tenderer
1.0	a) Manufacturer's Name & address		
	b). Size of the Switch		
	c) Redundant Power Card (Yes / No)		
	d) Number of FO ports for Bay Level switches		
	e) Number of FO & Copper ports for Station Level switches		
	f) Whether self-diagnostic features is available (Yes / No)		

	g) Whether Port Monitoring Software for Ethernet Switches will be provided (Yes / No)		
	h) Whether active port availability indication is available (Yes / No)		
	i) Name the Protocol used		
	j) Standards followed (List to be provided)		
	k) Auxiliary Power Supply (mention range & type of auxiliary voltage)		

Name of the Bidder:-

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.