

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](http://www.aegcl.co.in)



Bidding Document

For

**Supply of Spare relays for 132 kV Srikona, 132 kV Pailapool & 132 kV
Haflong Grid Sub-Station, under Silchar T&T Division, AEGCL**

**DEPUTY GENERAL MANAGER
SILCHAR T&T CIRCLE
AEGCL, SILCHAR-788026**

Tender Cost: ₹ 1000.00
EMD: ₹ 15,400.00

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

Sl. No.	Name of work	Estimated Cost In INR	Time of Completion In Days	Bidding Address
1	Supply of Spare relays for 132 kV Srikona, 132 kV Pailapool & 132 kV Haflong Grid Sub-Station, under Silchar T&T Division, AEGCL	7,65,230.00	150 days from the date of issue of Supply order	O/o The DGM, Silchar T&T Circle, AEGCL, Silchar, Srikona, Silchar-26

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 “Managing Director, AEGCL, Paltan Bazar, Guwahati-01”**, payable at Guwahati.

2.0 Bidding Address:

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

3.0 Key Dates: -

- | | |
|--|--------------------------|
| a) Bid Document available in Website: | 12:00 hrs. of 14-08-2026 |
| b) Bid Submission Start Time & date: | 12:00 hrs. of 14-08-2026 |
| c) Bid Submission end time & date: | 14:00 hrs. of 07-09-2026 |
| d) Techno-Commercial Bid Opening time: | 11:30 hrs. of 08-09-2026 |

4.0 Bidding Procedure :

- All Tenders shall have to be submitted in prescribed forms attached herewith eventually to be drawn up in the rules of AEGCL.
- Two different envelopes to be used as follows:-
Envelope-1 (Technical Bid): Bid document signed by the bidder on all pages, Tender fee, Earnest Money, Techno-commercial data of the Bidder, GTP and other mandatory documents must be enclosed.
Envelope-2 (Price Bid): As per format of the Price Bid attach.
- All tenders shall have to be submitted under **sealed & signed** covers super-scribing the **Tender Notice No** and **Name of the Work** completely and clearly on the top of the corner.
- All tenders shall have to be submitted/drop in the concerned tender box on or before the last date and time of submission of tenders either by post or in person.
- If Bidders desire to submit their Bid by post, at their own expenses, it should be posted well in advance so as to ensure that their tenders reach the office of the tendering address on or before the specified date and time of submission of tender. AEGCL will not take any responsibility for loss, damage, tempering or delay of tenders sent by post.
- Bidder submitting Bid in person should submit their Bid in the tender box during the working hours on or before the last date and time of submission of tender.

- g) Tender will be rejected if submitted beyond the aforesaid time and date.
- h) AEGCL has the right to cancel the tender at any moment, without assigning any reason thereof. Bidder will not be entitled to claim any expenses and AEGCL will not be responsible for any costs or expenses incurred on the preparation and submission of the Bids.

5.0 Validity of Bids and Bids Prices:

- 5.1 Bids shall remain valid for a period of **180 days** after the bid submission deadline date prescribed by AEGCL. In exceptional circumstances, prior to the expiration of the bid validity period, AEGCL may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security shall also be extended for a corresponding period.
- 5.2 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.

6.0 Bid Security:

- 6.1 All bids must be accompanied by a bid security amounting to **Rs 15,400.00 (Rupees Fifteen Thousand Four Hundred)** only in the form of **Demand Draft** from any Nationalized Bank payable at Guwahati in favour “**Managing Director, AEGCL, Paltan Bazar, Guwahati-01**”, payable at Guwahati.
- 6.2 Any bid not complying with the terms and conditions then his bid shall be rejected by the Employer as non-responsive.
- 6.3 The earnest money of the successful Bidder shall be returned when the successful Bidder has signed the Contract and furnished the required performance security.
- 6.4 The earnest money of the unsuccessful Bidders shall be returned as promptly as possible when the successful Bidder has signed the Contract.
- 6.5 The earnest money 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 Sign the Contract with in the specified period.
- 6.6 The Bid Security of a JV shall be in the name of the JV that submits the bid.

7.0 Format and Signing of Bid:

- 7.1 The Bidder shall prepare one original copy of the Technical Bid and one original copy 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.
- 7.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the Bid Document and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries or amendments have been made shall be signed or initialed by the person signing the bid.
- 7.3 A bid submitted by a JV shall be signed so as to be legally binding on all partners.
- 7.4 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.

8.0 Eligible Bidders:

- 8.1 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.
- 8.2 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.
- 8.3 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.
- 8.4 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.
- 8.5 Bidders shall provide such evidence of their continued eligibility satisfactory to the AEGCL, as the Employer shall reasonably request.

9.0 Financial Capability:

- 9.1 Bidder will require to submit along with the bid the **audited balance sheets, IT return 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.
- 9.2 **Average Annual Turnover:** Minimum average annual turnover **Rs.2,29,569.00** calculated as total certified payments received for contracts in progress or completed, within the last 3 (Three) Years.

10.0 Work Experience:

10.1 The Bidder should have successfully completed similar works within last 5 (Five) Financial years. Documentary evidence such as Work Order, Completion Certificate, etc. should be submitted as per below mentioned criteria:

- (a) **Three (3) similar** completed works costing not less than **Rs.3,06,092.00**
- (b) **Two (2) similar** completed works costing not less than **Rs. 3,82,615.00**
- (c) **One (1) similar** completed works costing not less than **Rs. 6,12,184.00**

10.2 The Bidder must have experience of executing work of similar nature previously. The bidder must submit experience and completion certificate for scrutiny by AEGCL.

11.0 Evaluation Criteria:

11.1 **Evaluation will be done on the basis of *Bid Clause No. 8.0 : Eligible Bidders*, *Cl. No. 9.0 : Financial Capability*, *Cl. No. 10.0 : Work Experience* and in accordance with the Annexure I to be duly filled in, signed and submitted by the bidder.**

11.2 Price Bid of only **Responsive and Qualified Techno-Commercial Bidders** will be opened.

11.3 **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.

12.0 Correction of Errors in the Price Bid:

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

12.2 Arithmetic Errors in the Price Bid will be rectified on the following basis:

- (a) If there is a discrepancy between the unit rate and the total cost that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total cost will be corrected unless in the opinion of AEGCL there is an obvious misplacement of the decimal point in the unit rate, in which case the total cost as quoted will govern and the unit rate corrected. If there is a discrepancy between the total bid amount and the sum of total costs, the sum of total costs shall prevail and the total bid amount will be corrected.
- (b) The amount stated in the Price Bid will be adjusted by AEGCL in accordance with the above procedure for the correctness of errors and shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, its bid will be rejected, and the bid security may be forfeited.

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

13.0 Bid Evaluation Process for Abnormally Low Bids (ALB):

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

(a) **Identification:** For the Identification of the Abnormally Low Bids, two approaches as applicable shall be adopted :-

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

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

In this approach first the Average Bid Price is determined and then by deducting the standard deviation from the average bid price, potentially ALB may be determined

(b) In case of an ALB, the tender evaluation committee of the respective tenders shall undertake the following three stage review process which are as below:

- i. Identify ALB as per the steps mentioned in Clause No. (a). (i) and (a). (ii), whichever is applicable.
- ii. To seek and analyses the clarifications from the abnormally low Bidder in terms of resource inputs and pricing, including overheads, contingencies and profit margins. In that respect, the committee may refer to guideline of World Bank, AIIB, ADB etc. prescribed for ALB.
- iii. To decide whether to accept or reject the bid.

(c) Additional Performance Security In case of acceptance of ALB:

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

14.0 Late Bid:

- 14.1 Any bid submitted ***after the due date and time*** will be rejected without any prejudice.
- 14.2 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.
- 14.3 Bidding through **EMAIL WILL NOT BE ACCEPTED.**

15.0 Clarification on Bid Documents and Contacting AEGCL:

- 15.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the AEGCL in writing at the AEGCL's address **(O/o the Deputy General Manager, Silchar T&T Circle, AEGCL, Silchar-788026)** and 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.
- 15.2 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.
- 15.3 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.

16.0 Amendment of Bidding Document:

- 16.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addenda.
- 16.2 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.
- 16.3 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.

17.0 Preparation of Bids by the Bidders:

- 17.1 **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.
- 17.2 **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.

18.0 Bid Prices and Discounts:

- 18.1 Bidders shall quote price inclusive of GST and all other applicable taxes. No extra calculation for discounts or other taxes will be done during evaluation.
- 18.2 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.
- 18.3 Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the bidding document.
- 18.4 Sales Tax, GST and all other taxes (as applicable) payable on the work should be indicated separately. In case of failure to indicate so AEGCL will consider such taxes are included in the Offered Price.
- 18.5 Since the work being "work contract" which is one and individual and which involves no separate contract for the sale of materials, the contractor shall have not be entitled to get any VAT and or any other taxes, levies reimbursed from the AEGCL for the supply of the materials.
- 18.6 Taxes like work contract, income tax etc. which need to be deducted at source as per the prevailing law of the land, will be deducted at source.
- 18.7 **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.

19.0 Mandatory Documents:

- (i) Bidders(s) knowledge from actual personal investigation of the resources of the region or District (S) in which he/they offers the work.
- (ii) The Bidder shall furnish copy of their **PAN Card**. In case the bidder is a partnership Firm, the **PAN** card must be in the name of firm.
- (iii) In case the bidder is a partnership Firm, the **work experience, solvency and turn over** shall be in the name of **partnership Firm** only.
- (iv) **GST registration No.**
- (v) **Registered Power of attorney, if any.**
- (vi) **IT Return for last three Years.**
- (vii) **Audited Balance Sheet for last three years.**
- (viii) **Bank Solvency certificate.**
- (ix) **GTP of the equipment to be supplied.**
- (x) **Manufacturer's authorization.**

20.0 TECHNICAL REQUIREMENTS

20.1 Intent of specification

This section of the specification deals with the technical information & criteria for “**Supply of Spare relays for 132 kV Srikona, 132 kV Pailapool & 132 kV Haflong Grid Sub-Station, under Silchar T&T Division, AEGCL**”.

- a) The Contractor's proposal shall be based on the use of materials complying fully with the requirements specified herein.

20.2 Scope of Works :-

- a) The scope of work involves “**Supply of Spare relays for 132 kV Srikona, 132 kV Pailapool & 132 kV Haflong Grid Sub-Station, under Silchar T&T Division, AEGCL**”.
- b) Freight and Transit insurance, storage at site and site insurance of all materials at site shall be in the scope of the contractor.

20.3 Supplier to Inform himself fully:-

- The supplier should ensure that he has examined the specifications and schedules as brought out in this section as well as other sections of the Bidding Document and has satisfied himself as to all the conditions and circumstances affecting the contract price and fixed his price according to his own views on these matters and acknowledge that no additional allowances except as otherwise provided therein will be levied.
- The Purchaser shall not be responsible for any misunderstanding or incorrect information obtained by the contractor other than information given in writing by the Purchaser.

20.4 Service Conditions:-

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

Peak ambient day temperature in still air	: 45⁰C
Minimum night temperatures	: 0⁰C
Reference ambient day temperature	: 45⁰C
Maximum Relative Humidity	: 100%
Minimum Relative Humidity	: 10%
Altitude	: Below 1000 M above MSL
Maximum Wind Pressure	: As per IS:802 latest code
Seismic Intensity	: ZONE-V as per IS 1893

20.5 Conformity with Indian Electricity Rules & Other Local Regulations:-

- The Supplier shall note that all substation works shall comply with the latest provisions of Indian Electricity Rules and with any other regulations. Local authorities concerned in the administration of the rules and regulations relating to such works shall be consulted, if necessary, about the rules and regulations that may be applicable.
- All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the contractor.

20.6 Standards:-

- The equipment covered under this Bidding Document shall, unless otherwise stated be designed, constructed and tested in accordance with the latest revisions of relevant Indian Standards and shall conform to the regulations of local statutory authorities.
- In case of any conflict between the standards and this specification, this specification shall govern.
- Equipment conforming to other International or authoritative Standards which ensure equivalent or better performance than that specified above shall be accepted. In that case relevant extracts of the same shall be forwarded with the bid.

20.7 Engineering Data:-

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

20.8 Drawings and Documents for approval:-

- The supplier shall submit all drawings and documents of all equipment to be supplied include drawings of foundation, steel structure and any other drawings that may be required for successful completion of the project and get it approved by the Purchaser.
- In addition, the following sub clauses shall also apply in respect of Contract Drawings.
- All drawings submitted by the Supplier including those submitted at the time of Bid shall be with sufficient detail to indicate the type, size, arrangement, dimensions, material description, bill of materials, weight of each component break-up for packing and shipment, fixing arrangement required, the dimensions required for installation and any other information specifically requested in these specifications.
- Each drawing submitted by the Supplier shall be clearly marked with the name of the Purchaser, the specification title, the specification number and the name of the project. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be to the scale and in S.I. units.
- The drawing submitted for approval to the Purchaser shall be in quadruplicate. One print of such drawings shall be returned to the supplier by the Purchaser marked “approved/approved with corrections”. The Supplier shall there upon furnish the Purchaser additional prints as may be required along with one reproducible in original of the drawings after incorporating all corrections.

20.9 Final Drawings and Documents:-

The successful supplier shall require providing following documents and drawings for each bay constructed in printed form:

- a) *Instruction manuals of all equipment in 3 (Three) copies.***
This instruction manual shall generally consist of
 - ***Operation Manuals***
 - ***Maintenance Manuals and***
 - ***Spare Parts Bulletins***
- b) *Copies of routine test reports (in triplicate) of relevant equipment.***
- c) *Final guaranteed and other technical particulars of relevant equipment.***

In addition to the above, the contractor shall provide **5 (Five) sets** of all drawings and documents to Purchaser in printed form for his reference and record.

20.10 Quality assurance, Inspection & Testing:-

To ensure that the supply of manufactured equipment(s) and services under the scope of this contract whether manufactured or performed within the contractor's works or at his subcontractor's premises or at site or at any other place of work are in accordance with the specifications, the contractor shall adopt suitable quality assurance programme to control such activities at all points necessary. Such programme shall be outlined by the contractor and shall be finally accepted by the Purchaser after discussions before award of contract. A quality assurance programme of the contractor shall generally cover but not limited to the following:

- His organization structure for the management and implementation of the proposed quality assurance programme.
- Documentation control system.
- Qualification data for contractor's key personnel
- The procedure for purchase of materials, parts components and selection of subcontractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases, etc.
- System for shop manufacturing including process controls and fabrication and assembly controls.
- Control of non-conforming items and system for corrective action
- Control of calibration and testing of measuring and testing equipment
- Inspection and test procedure for manufacture
- System for indication and appraisal of inspection status
- System for quality audits
- System for authorizing release of manufactured product to the Purchaser
- System of maintenance of records
- System for handling storage and delivery
- A quality plan detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of supply. The quality plan shall be mutually discussed and approved by the Purchaser after incorporating necessary corrections by the contractor as may be required.

20.11 Quality Assurance Documents:-

- The contractor shall be required to submit all the quality assurance documents as stipulated in the quality plan at the time of Purchaser's inspection of equipment/material.
- The Purchaser or his duly authorized representatives reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the contractors/his vendors quality management and control activities.

20.12 Employer's Supervision:-

- To eliminate delays and avoid disputes and litigation it is agreed between the parties to the Contract that all matters and questions shall be resolved in accordance with the provisions of this document.
- The manufacturing of the product shall be carried out in accordance with the specifications. The scope of the duties of the Employer, pursuant to the contract, will include but not be limited to the following.
 - a) Interpretation of all the terms and conditions of these Documents and Specifications.
 - b) Review and interpretation of all the Contractors drawings, engineering data etc.
 - c) Witness or authorize his representative to witness tests at the manufacturer's works or at site, or at any place where work is performed under the contract.
 - d) Inspect, accept or reject any equipment, material and work under the Contract, in accordance with the Specifications.
 - e) Issue certificate of acceptance and/or progressive payment and final payment certificate.
 - f) Review and suggest modification and improvement in completion schedules from time to time,
 - g) Supervise the Quality Assurance Programme implementation at all stages of the works.

20.13 Inspection and Inspection Certificate:-

- The Employer, his duly authorized representative and/or outside inspection agency acting on behalf of the Employer shall have, at all reasonable times, access to the premises and works of the Contractor and their sub-contractor(s)/sub-vendors and shall have the right, at the reasonable times, to inspect and examine the materials and workmanship of the product during its manufacture.
- All routine and acceptance tests whether at the premises or works of the Contractor or of any Sub Contractor, the Contractor except where otherwise specified shall carry out such tests free of charge. Items such as labours, materials, electricity, fuel, water, stores apparatus and instruments as may be reasonably demanded by the Employer/inspector or his authorized representative to carry out effectively such tests in accordance with the Contract shall be provided by the Contractor free of charge.
- If desired by the Employer, the Contractor shall also carry out type tests as per applicable Standards for which Employer shall bear the expenses except in cases where such tests have to be carried out. The Contractor is required to quote unit rates of type test charges in a separate Schedule (if such schedule is provided in the Bidding Document). However, these type test charges shall not be taken into account in comparing Price Bid.
- The inspection by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Programme forming a part of the Contract.

20.14 Tests:-

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

- a) **Type Tests:** - Type Tests shall mean those tests, which are to be carried out to prove the process of manufacture and general conformity of the material to this Specification. These tests shall be carried out on samples prior to commencement of commercial production against the order. The Bidder shall indicate his schedule for carrying out these tests.
- b) **Acceptance Tests:** - Acceptance Tests shall mean those tests, which are to be carried out on samples taken from each lot offered for pre-dispatch inspection, for the purposes of acceptance of that lot.
- c) **Routine Tests:** - Routine Tests shall mean those tests, which are to be carried out on the material to check requirements, which are likely to vary during production.
- d) **Tests during Manufacture:** - Tests during manufacture shall mean those tests, which are to be carried out during the process of manufacture and end inspection by the Contractor to ensure the desired quality of the end product to be supplied by him.

- The norms and procedure of sampling for these tests will be as per the Quality Assurance Programme to be mutually agreed to by the Contractor and the Employer.
- The standards and norms to which these tests will be carried out are specified in subsequent Sections of this Specification. Where a particular test is a specific requirement of this Specification, the norms and procedure of the test shall be as specified or as mutually agreed to between the Contractor and the Employer in the Quality Assurance Programme.
- For all type and acceptance tests, the acceptance values shall be the values specified in this Specification or guaranteed by the Bidder or applicable Standards, as applicable.

20.15 Type Test Reports:-

- Materials, which have never been tested for critical performance, shall not be accepted. In such cases, a promise or agreement by a bidder to have the equipment tested after award of a contract is not acceptable.
- All Bids must be accompanied by the Type Test Certificates of materials offered. Such type test certificates shall be acceptable only if:
 - i) Tests are conducted in an independent testing laboratory with NABL accreditation/CPRI,
 - ii) Tests are conducted in manufacturer's own laboratory.
 In this case
 - (a) The laboratory must have NABL accreditation; and
 - (b) Tests have been witnessed by technically qualified representatives of earlier clients or purchaser.
- Test reports to be acceptable must be related directly to the equipment offered i.e. it is fully identical in design, rating and construction with the equipment for which the type test certificates have been submitted. Test reports for higher class (by capacity/voltage etc.) of equipment are acceptable with commitment to perform the type tests free of any charge on the particular equipment after the award of contract.
- Type Test Reports older than five (5) years on the date of Technical bid opening shall not be accepted.

20.16 Guaranteed Technical Particulars:-

- The Guaranteed Technical Particulars of the various items shall be furnished by the Bidders with the Technical Bid in the prescribed Schedules attached in this bidding document. 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.
- 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.

20.17 Materials Handling and Storage:-

- All the supplies under the Contract as well as Employer supplied items (if any) arriving at site shall be promptly received, unloaded and transported and stored in the stores by the Contractor.
- Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection at site. Any demurrage, and other such charges claimed by the transporters, railways etc., shall be to the account of the Contractor.

- The Contractor shall maintain an accurate and exhaustive record-detailing out the list of all items received by him for the purpose of erection and keep such record open for the inspection of the Employer.
- All items shall be handled very carefully to prevent any damage or loss. The materials stored shall be properly protected to prevent damage. The materials from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such materials at Site.
- All the materials stored in the open or dusty location must be covered with suitable weather-proof and flameproof covering material wherever applicable.
- The Contractor shall be responsible for making suitable indoor storage facilities, to store all items/materials, which require indoor storage.
- The Contractor shall have total responsibility for all equipment and materials in his custody, stored, loose, semi-assembled and/or erected by him at site. The contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss.
- **The Make/model of the relays to be supplied should be as per the items specifically described in the price bid to be compatible in the existing Siemens make panels available at 132 kV Srikona, Pailapool & Haflong GSS.**

21.0 TECHNICAL SPECIFICATION OF CONTROL AND RELAY PANEL

21.1 TECHNICAL SPECIFICATIONS FOR CONTROL & RELAY PANELS:

- a) This Section is intended to cover the design, manufacture, assembly, testing at manufacturer's works and erection, testing & commissioning of Indoor Relay and Control Panels.
- b) The Control and Relay Panels required are for control and protection of the Power Transformers and Feeders according to requirements. The supply shall include all accessories, special tools, supporting steels, spare parts, drawings, relevant software, instruction manuals etc. The panels shall be supplied complete with all accessories as specified and completely assembled and all internal wiring completed.
- c) The sub-stations shall have automation as per IEC 61850 protocol in Bay & Station level. The bidder has to supply the C&R panels to match the requirement of Sub-station Automation System (SAS) as specified in the subsequent chapter, **from the same manufacturer.**
- d) **The manufacturer/supplier of Control and Relay Panels shall necessarily be an OEM (Original Equipment Manufacturer) of Numerical Protective Relays, Bay Control Units and Sub Station Automation System (SAS), having registered servicing unit in India.**
- e) Design and fabrication of Control & Protection Panels for mounting the relay and relay assemblies along with all necessary accessories like switches, indicating lamps etc. and wiring up of the same to provide self contained and ready to use protection as per this specification.
- f) Complete testing at manufacturer's works of the relays and protection schemes **including SAS** after mounting and fully wiring up in the Control & Protection Panels.

21.2 STANDARDS:

All equipment and all component parts supplied under this specification shall conform in all respects to the latest issue of relevant IEC and 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.

21.3 SERVICE CONDITIONS:

The plant and materials supplied shall be suitable for operation under the following climatic and other conditions as mentioned in chapter 2 of this Bid document:

21.4 TYPE TEST REPORTS.

21.4.1 Equipment, which have never been tested for critical performance, shall not be accepted. In such cases, a promise or agreement by a bidder to have the equipment tested after award of a contract is not acceptable.

21.4.2 All Bids must be accompanied by the full Type Test Certificates of equipment offered. Such type test certificates shall be acceptable only if:

- i) Tests are conducted in KEMA/NABL accredited laboratory, *for GOOSE messaging etc as per relevant IEC 61850 Standards.*
- ii) Inter-operability Tests are conducted in manufacturer's own laboratory. In this case (i) the laboratory must have ISO 9000 (or its equivalent) series certification; and (ii) tests have been witnessed by technically qualified representatives of earlier Indian clients of Central/State Transmission Utilities.
- iii) The Validity of the Type Test Reports of CRP, Relays, BCUs and Energy Meters shall be as per CEA's "Guidelines for the Validity Period of Type Tests Conducted on Major Electrical Equipment in Power Transmission System", File No CEA-PS-14-80/1/2019-PSETD Division-Part (2).

21.5 TYPE OF PANEL

21.5.1 All simplex panels shall be swing type with front glass door with locking arrangement. The **Minimum number** of Panels shall be as per Table 1 below:

Table -1

	400kV	220kV	132kV	33kV
Feeder Panel	4 Nos if SWLR	2 Nos	2 Nos	1 No
Bus Coupler/Tie Breaker/Sectionalizer Panel	2 No	1 No	1 No	1 No
Reactor Panel	2 No			
Bus Bar Protection panel	4 Nos	2 Nos		
Transformer Panel	400/220/33kV AT	220/132kV AT	132/33kV PT	
	3Nos (Minimum)	2Nos (Minimum)	2 Nos (Minimum)	

21.5.2 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.

21.5.3 These panels shall be of the **Simplex type** with the following approximate dimensions:

- i. Height: 2250mm + 15mm anti-vibration pad + 50 mm (base)
- ii. Depth: 800mm to 1000 mm
- iii. Width: 800 mm to 1000 mm
- iv. Operating Height: 1800 mm

21.5.4 For 33kV feeder, panel shall be of simplex type and it should accommodate one 33kV feeder in a single cubicle and one BCU will control single 33kV feeder.

21.6 CONSTRUCTIONAL FEATURES:

- a) 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 54 in accordance with IS-2147/IEC-60529.
- b) 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 3.15 mm 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.
- c) 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.
- d) 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.
- e) 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.

21.7 MOUNTING OF EQUIPMENTS:

- a) 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.
- b) Bay level intelligent electronic devices (IED) BPU for protection and control (BCU) and the Managed Ethernet Switch shall be housed in the C&R panels installed in the local control room.

21.8 INTERNAL WIRING:

- a) 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 supplier.
- b) Bay level intelligent electronic devices (IED) for protection, control (BCU) and the Managed Ethernet Switch shall be housed in the C&R panels installed in the local control room.
 - i) All Circuits except instrument transformers **and incoming AC/DC Supply** circuits: 1.5 sq. mm. per lead.
 - ii) Instrument transformers circuit: 2.5 sq. mm. per lead.

- c) 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.
- d) 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.
- e) 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 interconnection to adjacent panels at site and wires for this purpose shall be provided by the supplier looped and bunched properly inside the panel.
- f) A laminated copy of total schematics is to be fixed on the inside of door.

21.9 TERMINAL BLOCKS:

- a) 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 1100 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.
- b) 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.
- c) At least 20% spare terminals shall be provided on each panel and these terminals shall be uniformly distributed on all terminal blocks.
- d) 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 150 mm. A steel strip shall be connected between adjacent terminal block rows at 450-mm intervals for support of incoming cables.

21.10 PAINTING:

- a) All Sheet steelwork shall be phosphated in accordance with IS 6005.
- b) 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.
- c) 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.
- d) 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.
- e) Each coat of primer and finishing paint shall be of a slightly different shade to enable inspection of the painting.
- f) The inside of the panels shall be glossy white.

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

21.11 NAME PLATES AND MARKINGS:

- a) 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 each panel on front as well as rear side large and bold name plates shall be provided for circuit /feeder designation.
- b) 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.
- c) Nameplates shall be made of non-rusting metal or 3 ply lamicord. Nameplates shall be black with white engraved lettering.

21.12 MISCELLANEOUS ACCESSORIES:

- a) A 240 Volts, single-phase plug points shall be provided in the interior of each cubicle with ON-OFF switch for connection of headlamp.
- b) 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)
- c) 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 supervision, signalling, 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.
- d) Pistol Grip Trip Switch shall be provided.

21.13 EARTHING:

- a) 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 **25X6 mm copper**. When several panels are mounted joining each other, the earth bus shall be made continuous and necessary connectors and clamps for this purpose shall be included in the scope of supply. Provisions shall be made for extending the earth bus bar to future adjoining panels on either side.
- b) 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.
- c) PT and CT secondary neutrals or common lead shall be earthed at one place only at the terminal blocks, where they enter the panels.

21.14 RECORDING METERS (ABT TRIVECTOR METERS):

21.14.1 General

- a) 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.
- b) All these instruments and meters shall be flush mounted type and back connected, suitable for front panel mounting.
- c) The ABT meters shall be SAMAST compatible as per specification given in subsequent chapter.

- d) The meters should be compatible to IEC62052-11 and IEC62053-22, IEC62053-24, IS14697, IS15959.
- e) The manufacturer shall provide Performance Certificate from CTU/STU of successful operation of minimum 3 years as on BID Opening.

21.15 RELAYS:

21.15.1 General

- a) All relays shall conform to the requirements of IS 3231/ IEC 60255/ IEC 61000 or other relevant standards. The relay firmware/software shall be of the latest version.
- b) 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.
- c) Two sets of relevant software (latest version) for relay configuration & setting, maintenance etc to be supplied to each station. The numeric relay and software shall be upgradable.
- d) The protective relays shall be suitable for efficient and reliable operation of the protection scheme described in the specification. Necessary auxiliary relays and timers required for interlocking schemes for multiplying of contacts suiting contact duties of protective relays and monitoring of control supplies and circuits etc. also required for the complete protection schemes described in the specification shall be provided. All protective relays shall be provided with at least two pairs of potential free isolated output contacts. Auxiliary relays and timers shall have pairs of contacts as required to complete the scheme contacts shall be silver faced with spring action. Relay case shall have adequate number of terminals for making potential free external connections to the relay's coils and contacts, including spare contacts.
- e) Relays shall be suitable for flush or semi-flush mounting with connectors from rear.
- f) 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. All protective relays shall be with proper online testing facilities without isolation from TB where inputs viz CT/ PT and DC are wired. All main relays shall be provided with test plug to test the relay online & required test handle may be invariably indicated. Necessary test plug shall be in the supplier'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.
- g) 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 and current operated relays for 1Amp. CT secondary. DC auxiliary relays and timers shall be designed for 110 volts/ 220 volts DC and shall operate satisfactorily between 70% and 110% of rated voltage. Voltage operated relays shall have adequate thermal capacity for continuous operation.
- h) 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 externally/ electrically reset positive action operation indicators provided with proper inscription. All protective relays which do not have built-in hand reset operation indicators shall have additional auxiliary relays with operating indicators for this purpose. 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.
- i) No control relays that shall trip the circuit breaker when the relays are de-energized shall be employed in the circuits.
- j) All relays shall withstand a test voltage of 2.5 kV, 50 Hz rms. voltage for one second. In case of static relays, the Clause 14.28.1.I shall be applicable.

- k) 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.
 - (iv) Trip-circuit seal-in is required for all trip outputs, irrespective of the magnitude of the interrupted current. The trip-circuit seal-in logic shall not only seal-in the trip output(s), but also the relevant initiation signals to other scheme functions, (e.g. initiate signals to the circuit-breaker failure function, reclosing function etc.), and the alarm output signals.
 - (v) Two methods of seal-in are required, one based on the measurement of AC current, catering for those circumstances for which the interrupted current is above a set threshold, and one based on a fixed time duration, catering for those circumstances for which the interrupted current is small (below the set threshold).
 - (vi) For the current seal-in method, the seal-in shall be maintained until the circuit-breaker opens, at which time the seal-in shall reset and the seal in method shall not now revert to the fixed time duration method. For this seal-in method, the seal-in shall be maintained for the set time duration. For the line protection schemes, this time duration shall be independently settable for single- and three-pole tripping.
 - (vii) Seal-in by way of current or by way of the fixed duration timer shall occur irrespective of whether the trip command originates from within the main protection device itself (from any of the internal protection functions), or from an external device with its trip output routed through the main protection device for tripping. Trip-circuit seal-in shall not take place under sub-harmonic conditions (e.g. reactor ring down).
- l) Whenever solid state auxiliary relays are used the following requirements shall be met with:
- i) The printed circuit cards shall be of fibre glass 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.
 - ii) 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 5kW, 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 150 ohms.
 - iii) 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.
 - iv) 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.

- m) Provision shall be made for easy isolation of trip circuits of each relay for the purpose of testing and maintenance.
- n) All Spare pair of contacts of all IEDs and Alarm Relays shall be wired to Terminal Blocks exclusively for Employer's use.
- o) All relays and their drawings shall have phase indications as R-Red, Y-Yellow, B-Blue.
- p) The bidder shall include in his bid a list of installations where the relays quoted have been in satisfactory operation.

21.15.2 General Specification of Numerical Relays

- a) Numerical Relays shall be provided for the following applications:
 - i) Distance Protection (Main I & Main II) of different make and model for 400KV and 220 kV lines.
 - ii) Distance protection for 132 kV lines.
 - iii) Back up directional over current and earth fault relays for 132 kV Lines.
 - iv) Back up non directional over current (3 O/C) and earth fault relays for 33kV lines
 - v) Bus Bar Protection.
 - vi) Integrated Numerical Transformer Differential Protection as Main –I & Main-II of different make **and model** with non-directional overcurrent and earth fault function with high set units for power and autotransformers/ reactors.
 - vii) Reactor Protection.

viii) *Line Differential Protection*

- (viii) 3 winding transformer protection relay for Main-1 & Main-2 shall be provided for all the transformers under the scope of this bid

b) All Numerical Relays should have following minimum features.

- i) 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. The relay shall have suitable communication facility for future connectivity to SCADA.
- ii) Relays shall have one no. front RJ45 or USB port (for RS 232 port Converter to USB shall be supplied for each substation along with spare) for Local Relay Parameterization and Two nos. rear FO port for connectivity to SAS over IEC61850 protocol.
- iii) The relay shall have self-communication port monitoring feature and failure shall generate alarm.
- iv) The relay shall have sufficient battery back up to keep the internal clock running for at least 2 years in absence of auxiliary supply. The capacitor discharging power is not sufficient and won't be accepted. Proper battery back must be provided.
- v) Should have minimum 12 configurable LEDs for 132kV and above voltage class.
- vi) Should have minimum **24 Binary Inputs and 32 Binary Outputs**. Moreover, the relays shall have minimum 30% BI & BO as spare after fulfilment of scheme requirement.

- vi) All BI/BOs shall be site configurable
- vii) Shall have front minimum 3 lines LCD display with Alpha numeric keypad.
- viii) Numerical relays are to be provided with built in Event / Disturbance / Fault Recorder features.
- ix) 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/ features goes out of service the other feature/application (s) will remain un-effected.
- x) The relays shall be site configurable (Including logic development)
- xi) Configured features & set values shall be in non-volatile memory
- xii) Must have real time clock for time stamping of events/ disturbances with time synchronization inputs (GPRS etc.). Time synchronisation through SNTP compatible.
- xiii) The major component cards shall be hot swappable and front or rear loading.
- xiv) The relays should have self-diagnostic features identifying area of fault or failure of a particular component or card.
- xv) 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.
- xvi) Relay shall have inbuilt PRP ports.
- xvii) Relays shall have redundant communication channels for Protection Communication.
- c) Hardware based measurement shall not be acceptable.
- d) The relay should have high immunity to electrical and electromagnetic interference.
- e) The same relay shall be provided with both 1A CT inputs and shall be site selectable.
- f) It shall be possible to energise the relay from either AC or DC auxiliary supply. Auxiliary dc supply shall be suitable for both 110 and 220 Volt and shall be site selectable.
- g) 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.
- h) 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.
- i) 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.
- j) Must have additional feature of local breaker back up protection
 - i) The relay shall have built in Circuit Breaker Supervision Functions.
 - ii) The relay shall be able to detect any discrepancy found between NO & NC contacts of breaker.

- iii) The relay shall monitor number of breaker trip operations.
 - iv) The relay shall also monitor the breaker operating time.
- k) The relays shall have the following tools for fault diagnostics:
 - i) Fault record (shall be function of IED): – The relay shall have the facility to store fault records with information on cause of trip, date, time, trip values of electrical parameters.
 - ii) Event record (shall be function of IED): – The relay shall have the facility to store time stamped event records with 1ms resolution.
 - iii) Disturbance records (shall be function of IED): – The relay shall have capacity to store disturbance records of at least 10 sec. duration and sampling rate per cycle shall be more than 15.
- l) It shall be possible to preserve stored information in the event of an auxiliary supply failure with the help of a battery backup.
- m) The relay settings shall be provided with password protection.
- n) It shall be possible to change the relay setting from the front panel using the key pads/ Work station of SAS and Laptop.
- o) 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.
- p) The Numerical Relays shall be provided with 2 sets of common support software (latest version) compatible with latest version of Windows OS which will allow easy settings of relays in addition to uploading of event, fault, disturbance records, and measurements to Station HMI/ DR Work Station. The relay settings shall also be changed from local or remote using the same software.
- q) In case of line protection and transformer/reactor protection, the features like fault recorder, disturbance recorder and event logging function as available (including if available as optional feature) in these relays shall be supplied and activated **at no extra cost to the owner**.
- r) The manufacturer shall have to provide up-graded support software if any within 10 years span.

21.16 Transmission Line Protection :

21.16.1 Line Differential Protection Relay (If Applicable)

Main I and Main II Line Differential Protection shall be of **different make and model**.

The relay shall have all the features as per Distance protection relay over and above following features

1. It shall be working on phase segregated Current Differential protection principle.
2. It shall have multiple slope characteristic (preferably) to have stability against CT saturation and heavy through faults as well as sensitivity for internal faults.

3. It shall measure Differential as well as restrain current continuously and shall display the same as measurement.
5. It shall communicate to remote end through IEEE C37.94 format.
6. It shall have redundant communication channels for protection communication.
7. It shall communicate analogue as well as digital signals to remote end.
8. It shall have various communication options for remote communication i.e. mono-mode / multi-mode for direct communication / communication through multiplexer.
9. It shall have Line charging current compensation feature for better sensitivity.
10. Distance protection function can be utilized as independent or as back up of Differential protection in case of failure of remote communication. . It shall have a full scheme distance protection scheme to provide independent protection in parallel with the differential scheme in case of a communication channel failure for the differential scheme. The distance protection then provide protection for the entire line including the remote end back up capability either in case of a communications failure or via use of an independent communication channel to provide a fully redundant scheme of protection (that is a second main protection scheme). Eight channels for intertrip and other binary signals are available in the communication between the IEDs. The auto-reclose for single-, two- and/or three phase reclosing includes priority circuits for multi-breaker arrangements. It co-operates with the synchronism check.
11. It shall communicate time coordinated current signals for remote communication to execute Line differential protection algorithm accurately. Time synchronization through GPS shall also be possible.
12. It shall monitor individual communication links continuously and switchover to standby link after preset time in case of failure of one link.
13. It shall supervise individual telegrams.
14. It shall detect reflected telegrams.
15. It shall detect change in communication It shall measure delay time for remote end along with dynamic compensation of the same in differential protection algorithm.
17. It shall also supervise maximum permissible delay time.
18. It shall generate alarm for heavily disturbed communication link. Technical Parameters
 - A. Line Differential Protection setting:
 1. Minimum operating current - 20 to 200% of I_n
 2. Slope (Single/dual) - 10 to 100%
 3. End section (Single/dual) - 20 to 1000% of I_n
 4. Highset operating current - 100 to 5000% of I_n

5. 2 nd Harmonic blocking - 5 to 100 %
6. Typical operating time - 25 ms
7. Operating time for high set - 15 to 20 ms
8. Charging current comp. – Selectable
- B. Remote communication:
 9. Analogue signal transfer – Minimum 3 Nos.
 10. Binary signal transfer - Minimum 8 Nos
 11. Remote Communication module

Dual modules suitable for

 - a) 1300 nm - multi-mode

OR

 - b) 1300 / 1550 nm – mono-mode

(finalized during detailed engineering)
 12. Synchronization mode - GPS / Echo (finalized during detailed engineering)
 13. Time delay alarm - 5 to 500 ms, step 5 ms (for communication fail)
 14. Time delay - 5 to 500 ms, step 5 ms (for switching to redundant channel)
 15. Asymmetric delay - - 20 to +20 ms, step 1 ms (When echo mode is used)
 16. Max. Transmission delay – 0 to 40 ms, step 1 ms

21.16.2 Distance Protection Relay

- i) The distance protection relay shall be fully numerical using microprocessors and be based on a non-switched scheme.
- ii) The distance protection relay shall have at least three completely independent non switched forward directional zones, one extended zone and a reverse directional zone protection.
- iii) Have non-switched measurement, which implies processing of six possible fault loops (six – loop measurement).
- iv) The protection algorithm shall utilize fault voltages and currents, as well as the superimposed voltages and currents to arrive at a secure trip decision in the shortest possible time with reliability, selectivity and full sensitivity to all types of faults online.
- v) Have polygonal characteristics with independently adjustable reactive and resistive reaches for maximum selectivity and maximum fault resistance coverage. The zones shall have independent settable earth fault compensation factors to cater to adjacent lines with different zero sequence to positive sequence ratios.
- vi) Selection shall be so that the first zone of the relay can be set to about 80% - 85% of the protected line without any risk of non-selective tripping.
- ix) The second and third zone elements shall provide backup protection in the event of the carrier protection or the first zone element failing to clear the fault, zone-2 shall cover full protected

section plus 50 % of the next section, zone-3 shall normally cover the two adjacent sections completely. The zones must have independent time settings.

- x) Shall have resetting time of less than 55 milli-seconds (including the resetting time of trip relays)
- xi) All the zones shall have setting such that they can detect the fault online from minimum 0.3 km to 500 km.
- xii) The maximum fault current could be as high as 63kA but the minimum fault current could be as low as 20% of rated current. The starting and measuring relays characteristics should be satisfactory under these extreme varying conditions.
- xiii) The relay shall use the memory voltage for proper directional discrimination at close in 3 phase fault which shall be based on positive sequence voltages. The directional discrimination and phase selection based on negative sequence measurement techniques is not acceptable.
- xiv) Have adequate number of forward zones (minimum three) and a reverse zone. The zone reach setting ranges shall be sufficient to cover line lengths appropriate to each zone. Carrier aided scheme options such as permissive under reach, overreach, & blocking and non-carrier aided schemes of zone 1 extension and Loss of load accelerated tripping schemes shall be available as standard. Weak in feed logic and current reversal guard also shall be provided.
- xv) In case the carrier channel fails, one out of the non-carrier-based schemes cited above should come into operation automatically to ensure high speed and simultaneous opening of breakers at both ends of the line.
- xvi) Shall have suitable number of potential free contacts for Carrier Aided Tripping, Auto Reclosing, CB Failure, Disturbance/Fault recorder and Data Acquisition System.
- xvii) Have a maximum operating time up to trip impulse to circuit breaker (complete protection time including applicable carrier and trip relay time) for SIR 0.01-4: as 40ms at the nearest end and 60ms at the other end of line & for SIR 4-15: as 45ms at the nearest end and 65ms at the other end of line with carrier transmission time taken as 20ms. Isochronic curves shall be provided in support of operating times.
- xviii) Shall have an independent Directional Earth Fault (DEF) protection element to detect highly resistive faults as a built in feature. This element shall have an inverse time/definite time characteristic.
- xix) Has logic to detect loss of single /two-phase voltage input as well as three-phase voltage loss during energisation and normal load conditions. The voltage circuit monitoring logic in addition to blocking the distance protection element, enable an emergency over current element to provide a standby protection to the feeder until the re-appearance of voltage signal.
- xx) The VT fuse failure function shall function properly irrespective of the loading on the line. In other words, the function shall not be inhibited during operation of line under very low load conditions.
- xxi) Have necessary logic to take care of switch-on-to-fault condition. Energisation of transformers at remote line ends and the accompanying inrush current shall not cause any instability to the operation of relay.
- xxii) Have power swing blocking and Out of Step protection feature, with facilities for fast detection of power swing selective blocking of zones settable unblocking criteria for earth faults, phase faults and three phase faults. It shall be on the principle of measurement of the rate of impedance vector change and monitoring of the vector path. It should have the Earth fault detection feature, which shall override power swing blocking and allow the relay to operate for trip as per zone detection. The relay shall be blocked for the set time for the first PS sensed and remain unblocked for the set time for the successive PS.
- xxiii) Be suitable for single pole or three pole tripping. However, relays offered for 132 kV lines provided with mechanically ganged circuit breakers, single pole tripping need not to be provided.
- xxiv) Be suitable for both bus PT or Line PT/ CVT supply.
- xxv) Shall have in built Trip circuit supervision facility to monitor both pre- and post close supervision facilities. An alarm shall be generated.

- xxvi) Shall have in built broken conductor detection by way of level detector or negative sequence measurement.
- xxvii) Shall have df/dt functions.
- xxviii) Shall have multistage under frequency setting options.
- xxix) The sensitivity of the logic shall not be affected during operation under low load.
- xxx) Shall have a fault locator with an accuracy of $\pm 3\%$. The display should be in kilometres and preferably in percentage impedance too. The fault locator should have built in mutual compensation for parallel circuit.
- xxxi) Have mutual zero sequence compensation factor setting. The relay shall have facility to select different group settings to cater for mutual coupling on account of multi circuit line conditions. The minimum no. of group should be four.
- xxxii) Have at least 24 no of programmable BI and 32 no of programmable BO contact to cater for DR/SER carrier aided tripping auto re-closing etc.
- xxxiii) The distance relays shall have a built-in auto-reclose function with facilities for single pole / three pole / single and three pole tripping. It shall be possible to trigger the A/R function from an external protection. A voltage check function which can be programmed for deadline charging/dead bus charging / check synchronising shall be included. However, the relay shall support independent A/R scheme.
- xxxiii) Shall have additional features to provide under/ over voltage protection.
- xxxiv) Shall have additional features to provide under frequency protection
- xxxv) Shall have memory circuits with defined characteristics in all three phases to ensure correct operation during close-up 3 phase faults and other adverse conditions and shall operate instantaneously when circuit breaker is closed to zero-volt 3 phase fault.
- xxxvi) The protective relays shall be suitable for use with capacitor voltage transformers having non electronic damping and transient response as per IEC.
- xxxvii) Shall have a continuous current rating of two times of rated current. The voltage circuit shall be capable of operation at 1.2 times rated voltage. The relay shall be also capable of carrying a high short time current of 70 times rated current without damage for a period of 1 sec.
- xxxviii) Must have a current reversal guard feature.
- xxxix) Shall have Stub Protection function with current setting minimum range of 1 to 3 pu with definite time delay setting, minimum range of 0 to 100 msec
- xl) Have feature of load encroachment blinder to safeguard the protection trip during heavy line loading condition.

21.16.3 Integrated Numerical Transformer Protection Relay

a) GENERAL REQUIREMENTS:

- i) Shall be stable during magnetising inrush and over fluxing conditions. Stabilization under inrush conditions shall be based on the presence of second harmonic components in the differential currents.
- ii) Shall have saturation discriminator as an additional safeguard for stability under through fault conditions.
- iii) Shall have zero sequence current filtering, which may be deactivated separately for each winding, for special applications.
- iv) Shall have software to take care of the angle & ratio correction of CT inputs.
- v) Shall have all output relays suitable for both signals and trip duties

b) FUNCTIONAL DESCRIPTIONS:

The integrated Numerical Transformer Protection Scheme shall have following functional qualities:

1) Differential protection:

- i) The relay shall be biased differential protection with triple slope tripping characteristics with faulty phase identification / indication. The range for the differential pick-up shall be from 0.1 to 2.5 p.u. Its operating time shall not exceed 30 ms at 5 times rated current.
- ii) The relay shall have two adjustable bias slopes from 20 % to 150 % and slope from 40% to 150 %, to provide maximum sensitivity for internal faults with high stability for through faults
- iii) The relay shall have an unrestrained high set element to back up the biased differential function and the setting range for it shall have a minimum setting of 5pu and a maximum setting of 30pu.
- iv) The relay shall have the second harmonic restraint feature for stability under transformer inrush condition. The setting shall be 15-25%.
- v) Further, the fifth harmonic blocking for stability under transient over fluxing condition shall be provided.
- vi) Have suitable non-linear resistors along with stabilizing resistor for CT Circuit to limit peak voltage during in-zone faults in case of high impedancetype.
- vii) Have a fault recording feature to record graphic form of instantaneous values of following analogue channels during faults and disturbances for the pre fault and post fault period: **Current in all three windings in nine analogue channels plus three analogue channels for Backup protection in case of 400kV class/ 220kV Class (In case of loaded tertiary) or 9 analogue channels for lower voltage transformers and voltage in three channel.**
- viii) The Disturbance recorder function built in the Differential Protection IED shall have the facility to record the following external digital channel signals associated with transformer which shall be wired to differential relay apart from the digital signals pertaining to differential relay:
 - a) REF Protection Operated
 - b) HV Breaker Status (Main & Tie/Transfer both separately)
 - c) IV/LV Breaker status (Main & Tie/Transfer both separately)
 - d) Bucholz/OLTC/OTI/WTI alarm
 - e) Bucholz/ PRD/ SPR Trip
 - f) Group-A/ Group-B lockout relay tripNecessary hardware and software, for automatic up loading of the data captured by disturbance recorder to the personal computer (DR Work Station) available in the sub station, shall be included in the scope.
- ix) The Relay shall have Reverse Power Protection feature.
- x) The Differential Relay shall be designed for the protection & control of 3 winding Transformer

2) Restricted Earth fault Protection:

The scheme shall have in-built restricted earth Fault (REF) for both the windings. The REF function shall be configurable to Auto Transformer also. This function should be provided to maximise the sensitivity of the protection of earth faults. **Both the Differential relay shall have inherent high impedance REF element.** The REF function should be able to share Current Transformers with the biased differential function. As in traditional REF protections, the function should respond only to the fundamental frequency component of the currents. For star/star transformer, both the windings shall be protected through REF, as such relay shall have sufficient analogue channels to accommodate the same.

3) Over fluxing Protection:

- i) The over fluxing protection shall be built in the relay. By pairs of V/f and t, it shall be possible to plot the over fluxing characteristics so that accurate adaptation of the power transformer data is ensured.
- ii) In addition, the relay should have a definite time element for alarm.
- iii) The relay should monitor all the three phase voltages for calculation of V/f and should take the highest voltage for V/f calculation.

4) Thermal Overload Protection:

- i) Shall have two stages of thermal overload protection for alarm and trip condition with continuously adjustable setting range of 100-400% of rated current and time constant setting range of 1.0 to 10.00sec continuously.
- ii) Shall be single pole type.
- iii) Shall have a drop off/pick up ratio greater than 95%.
- iv) Shall have separately adjustable time delay relays for alarm having a setting range of 1 to 10 seconds continuously.

5) Over Current and Earth fault protection:

- i) The relay shall have three stages of definite time **Directional** over current protection as backup operating with separate measuring systems for the evaluation of the three phase currents, the negative sequence current and the residual current.
- ii) In addition, the relay shall have three stages of Inverse time **Directional** over current protection operating based on one measuring system each for the three phase currents, the negative sequence current and the residual current.
- iii) Shall have additional features to provide under/ over voltage protection.
- iv) Shall have additional features to provide under frequency protection.
- v) The Earth fault relay shall have directional IDMT characteristic with a definitive minimum time of 3.0 seconds at 10 times setting and have a variable setting range of 20-80% of rated current. (with selectable IEC Curves).
- vi) The Earth fault relay shall have low transient, overreach high set instantaneous unit of continuously variable setting range 200-800 % of rated current.

6) Transformer Neutral Current relay (for 400 KV class transformer only) shall

- i) Have directional IDMT characteristic with a definite minimum time of 3.0 seconds at 10 times setting and have a variable setting range of 20-80% of rated current. (with selectable IEC Curves)

21.16.4 Over Current and Earth Fault Relays

These relays shall be of numeric, single/multi pole, directional /non-directional type with 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: 63.5 or 110volt

- (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) The relay shall have blocking scheme on Reverse Power Flow.
- (ix) Include LED indicators.

21.16.5 Reactor Protection

21.16.5.1 REACTOR DIFFERENTIAL PROTECTION RELAY Shall

- (i). Be triple pole type.
- (ii). Have operation time less than 25 milli-seconds at 5 times setting
- (iii). Be tuned to system frequency.
- (iv). Have an operating current sensitivity of at least 10% of nominal current
- (v). Have current setting range of 10 to 40% of 1 Amp. or a suitable voltage setting range
- (vi). Be high impedance / biased differential type.
- (vii). Have suitable non-linear resistors along with stabilizing resistor for CT Circuit to limit peak voltage during in-zone faults in case of high impedancetype.
- (viii). Be stable for all external faults.

21.16.5.2 REACTOR RESTRICTED EARTH FAULT PROTECTION RELAY shall

- (i). Be single pole type.
- (ii). Be of current/voltage operated high impedance type.
- (iii). Have a current setting of 05-40% of 1 Amp. / have a suitable voltage setting range
- (iv). Be tuned to system frequency
- (v). Have a suitable non-linear resistor to limit the peak voltage to 1000 Volts.

21.16.5.3 REACTOR BACK UP IMPEDANCE PROTECTION RELAY shall

- (i). Be triple pole type, with faulty phase identification/ indication.
- (ii). Be single step polarized 'mho' distance/ impedance relay suitable for measuring phase to ground and phase to phase faults
- (iii). Have adequate ohmic setting range to cover at least 60% of the impedance of the reactor and shall be continuously variable
- (iv). Have an adjustable characteristic angle of 30-80 degree
- (v). Have a definite time delay relay with a continuously adjustable setting range of 0.2-2.0 seconds
- (vi). Include VT failure relay which shall block the tripping during VT fuse failure condition.
- (vii). Have Back Up over Current and Earth fault protection as built in function.

21.16.6 Circuit Breaker Protection

a) LOCAL BREAKER BACK-UP PROTECTION SCHEME shall

- (i). Be triple pole type.
- (ii). Have an operating time of less than 15 milli seconds
- (iii). Have a resetting time of less than 15 milli seconds
- (iv). Have three over current elements

- (v). Be arranged to get individual initiation from the corresponding phase of main protections of line for each over current element. However, common three phase initiation is acceptable for other protections and transformer /reactor equipment protections
 - (vi). Have a setting range of 10-80% of rated current
 - (vii). Have a continuous thermal withstand two times rated current irrespective of the setting
 - (viii). Have a timer with continuously adjustable setting range of 0.1-1 seconds
 - (ix). Have necessary auxiliary relays to make a comprehensive Scheme
 - (x). Shall have re-trip feature for tripping its own CB after initiation with a set time delay.
 - (xi). Be acceptable as Built-in protection function of distributed bus bar protection scheme only; however in that case separate LBB relay shall be provided for tie bays.
- b) **NUMERICAL AUTO RECLOSING FUNCTION** (where specified) shall be an in built feature of Main-I and Main-II protection relay. The Auto Reclose shall
- (i). Have single phase and three phase reclosing facilities.
 - (ii). Have a continuously variable single-phase dead time range of 0.1-2 Seconds
 - (iii). Have a continuously variable three phase dead time range of 0.1-2 Seconds
 - (iv). Have a continuously variable reclaim time range of 5-300 seconds
 - (v). Incorporate a four-position selector switch/ from which single phase/three phase/single and three phase auto-reclosure and non-auto reclosure mode can be selected. Alternatively, the mode of auto reclosing can be selected through HMI of the relay or BCU & SAS.
 - (vi). Have facilities for selecting check synchronizing or dead line charging features. It shall be possible at any time to change the required feature by reconnection of links.
 - (vii). Be of single shot type
 - (viii). Have priority circuit to closing of both circuit breakers in case one and half breaker arrangements to allow sequential closing of breakers
 - (ix). Include check synchronizing relay which shall
 - Have a time setting continuously variable between 0.5-5 seconds with a facility of additional 10 seconds
 - Have a response time within 200 milli seconds with the timer disconnected.
 - Have a phase angle setting not exceeding 35 degree
 - Have a voltage difference setting not exceeding 10%
 - Include deadline charging relay, which shall
 - Have two sets of relays and each set shall be able to monitor the three-phase voltage where one set shall be connected to the line CVTs with a fixed setting of 20% of rated voltage and the other set shall be connected to the bus CVTs with a fixed setting of 80% of rated voltage.
 - Incorporate necessary auxiliary relays and timers to give comprehensive scheme.

Auto Reclose function shall be an in-built feature of the BCU and the signal exchange for auto-reclose function from BCU to main relays and vice versa shall be achieved through hard wiring and GOOSE parallelly.

21.17 Bus Bar Protection Relay

- a) These relays shall also be of numeric type.
- b) Redundant (1+1) numerical low impedance biased differential Bus Bar protection scheme for each bus system (Bus1 +Bus2) for 400kV shall be provided. The scheme shall be engineered so as to ensure that operation of any one out of two schemes connected to main faulty bus shall result in tripping of the same.
- c) Single bus bar protection scheme shall be provided for each main bus (**Main I/Main II**) and transfer bus (as applicable) for 220KV and **132kV** voltage level.
- d) Each Bus Bar protection scheme shall

- i) Have maximum operating time up to trip impulse to trip relay for all types of faults of 25 milliseconds at 5 times setting value.
 - ii) Operate selectively for each bus bar
 - iii) Give hundred percent security up to 63 KA for fault level for 400 KV , 50kA for 220 KV and 40 KA for 132 KV
 - iv) Incorporate continuous supervision for CT secondary against any possible open circuit and if it occurs, shall render the relevant zone of protection inoperative and initiate an alarm
 - v) Not give false operation during normal load flow in bus bars
 - vi) Incorporate clear zone indication
- e) It shall have End fault Protection & LBB function
- f). Be of phase segregated and triple pole type. The bus bar scheme may be Centralized or De-Centralized type and it must accommodate all future bays as per Project along with tripping relays.
- g) Provide independent zones of protection (including transfer bus if any). If the bus section is provided, then each side of bus section shall have separate set of bus bar protection schemes
- h) Include individual high speed electrically reset tripping relays for each feeder. However, in case of distributed Bus bar protection, individual trip relay shall not be required if bay unit is having trip duty contacts for breaker tripping.
- i) Be transient free in operation
- j) Include continuous D.C. supplies supervision
- a) Not cause tripping for the differential current below the load current of heaviest loaded feeder. Contractor shall submit application check for the same.
- b) Shall include necessary C.T. switching relays wherever C.T. switching is involved and have 'CT' selection incomplete alarm
- c) Include protection 'IN/OUT' switch for each zone
- d) Shall include trip relays, CT switching relays (if applicable) , auxiliary CTs (if applicable) as well as additional power supply modules, input modules etc. as may be required to provide a Bus bar protection scheme for the complete bus arrangement i.e. for all the bays or breakers including future bays as per the Single line diagram for new substations. However, for extension of bus bar protection scheme in existing substations, scope shall be limited to the bay or breakers covered under this specification. Suitable panels (if required) to mount these are also included in the scope of the work.
- e) In case of distributed Bus bar Protection, the bay units for future bays may be installed in a separate panel and the same shall be located in switchyard panel room where bus bar protection panel shall be installed.

21.18 Tee Differential Protection Relays (If Applicable)

- 1) **TEE-1 DIFFERENTIAL (BIAS) PROTECTION RELAY** shall
 - (a) be triple pole type
 - (b) have an operating time less than 30 milliseconds at 5 times the rated current
 - (c) have three instantaneous high set over current units
 - (d) have an adjustable bias setting range of 20-50%
 - (e) have an operating current setting of 15% of 1 Amp or less

- 2) **TEE-2 DIFFERENTIAL (HIGH IMPEDANCE) PROTECTION RELAY** shall
- (a) be triple pole type
 - (b) have operating time less than 25 milliseconds at 5 times setting
 - (c) be tuned to system frequency
 - (d) have current setting range of 20 to 80% of 1 Amp
 - (e) be voltage operated, high impedance type
 - (f) be stable for all external faults
 - (g) be provided with suitable nonlinear resistors across the relay to limit the peak voltage to 1000 volts

21.19 Trip Circuit Supervision Relay

- Trip circuit supervision relay shall be provided for each pole of the breaker for both trip coils with separate DC source.
- 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.
- The relay shall have adequate contacts for providing connection to alarm and event logger.
- 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.
- **Aux: Supply 24-230 DC. Contact: 2C/O SR**
- **Flag: Led Indication, Mounting-Flush**
- **Model No: 7PJ1321-5AA21-0AA0 (Make SIEMENS)**

21.20 Master Trip Relay

- High Speed Tripping Relay shall be instantaneous (operating time not to exceed 10 milli-seconds)
- The relays shall reset within 20 milli seconds
- The relay shall be re-settable/configurable from local SCADA.
- The relays shall be D.C. operated
- 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.
- The relays shall be provided with operation indicators for each element/coil.
- **Aux, Supply: 125 V DC**
- **Contacts: 8NO+2 NC H/R & E/R, Flag- H/R**
- **Mounting: Flush, Case: E2**
- **Model: 7PJ1524-1JC60-1AF0 (Make SIEMENS)**

21.21 CB Control Relay

- **Aux, Supply: 110-125 V DC**
- **Contacts: 6 NO, S/R**
- **Mounting: Flush**
- **Size: (2S 6C)**
- **Model: RK 214 003-AN, Type: RXMM1 (Make ABB)**

21.22 CB Control Relay

- **Aux, Supply: 110V DC**
- **Contacts: 3 NO +2 CO S/R, Flag-yes**
- **Mounting: Flush**
- **Model: 77PJ1111-6DA20-0AA0 (Make SIEMENS)**

21.23 DC Change Over Relay

- **Aux, Supply: 110-125 V DC**
- **Contacts: 2NO+2NC, S/R Flag: N/O**

- **Mounting:** Flush
- **Size:** (2S 6C)
- **Model:** RK 221 052-AN, Type: RXME1 (Make ABB)

21.24 AC Circuit Supv. Relay

- **Aux, Supply:** 230V AC
- **Size:** (2S 6C)
- **Mounting:** Flush, 2N/O+2N/C Contacts
- **Model:** RK 211 052 BS, Type: RXMA1 (Make ABB)

21.25 Contact multiplication relay for Trip Transfer

- **Aux, Supply:** 110V DC
- **Contacts:** 13 N/O + 1N/C. S/R, Flag-Yes
- **Size:** (2S 12C), **Mounting:** Flush
- **Type:** RXPSU14n (Make ABB)

21.26 Other Trip Relays

- For transformer protection other trip relays for Buchholz, winding & oil temperature high, PRD etc. shall be provided as per requirement.
- These High-Speed Tripping Relays shall be instantaneous (operating time not to exceed 10 milli-seconds)
- The relays shall have adequate contacts to meet the requirement of scheme

21.27 DC Supply Supervision Relay

- The relay shall be capable of monitoring the failure of D.C. supply to which, it is connected.
- It shall have adequate potential free contacts to meet the scheme requirement.
- The relay shall have a 'time delay on drop-off' of not less than 100 milli seconds and the relays shall be provided with operation indicator/flag.

21.28 TIME SYNCHRONISATION EQUIPMENT:

- The equipment must be Type tested for Shock, Vibration, Dry heat, Radiated Emission, Electromagnetic field immunity, Electrostatic discharge immunity test in a Standard Laboratory. Type test report shall be submitted along with the bid. Type tests shall be more than five years as on opening of this bid.
- The equipment shall be compliant to IEC 61850 Protocol. It shall also support the network protocols like NTPv4, SNTP, SNMPv1,2,3, SNMP Trap, SSH2, Ipv6, DHCP, HTTP (S), eMail, FTP, TELNET and Syslog
- 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.
- Time synchronisation equipment shall include antenna, all special cables and processing equipment etc.
- 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.
- Equipment shall operate up to the ambient temperature of 50 degree centigrade and 100% humidity.
- The synchronisation equipment shall have 20 nano 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.

- Equipment shall meet the requirement of IEC 60255 for storage & operation.
- The system shall be able to track the satellites to ensure no interruption of synchronisation signal.
- The output signal from each port shall be programmable at site for either one hour, half hour, minute or second pulse, as per requirement.
- 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
 - 5) RJ 45
 - 6) SNTP
 - 7) Optical
 - 8) IEEE 1588 PTP (Applicable only for process bus automation station)
- The equipment shall have a periodic time correction facility of one-second periodicity.
- 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%.
- 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/SAS Panels having display size of approx. 100 mm height.
- 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.
- Time Synchronisation software shall be window base and it should be provided free of cost after commissioning.

21.29 BAY CONTROL UNIT (BCU)

- The BCU must be type tested at KEMA/Internationally or nationally accredited other testing laboratories for IEC 61850 and other tests as per relevant IEC standards. The bidder is to submit type test reports along with the bid. The validity of type test report shall be as per Clause 14.4.2(iii).
- The bay unit shall use industrial grade components. The BCU shall be modular type. 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. **The BCU shall have Auto Reclose, LBB, U/O voltage and Synchronization function. The BCU shall have redundant power supply card i.e. in case of failure of one source/Card fail, the**

redundant shall pick up instantly. Power supply card failure shall generate necessary alarm to local SCADA.

- 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.
- 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. For 33kV, the HMI should display one bay and control thereof.
- The mimic diagram shall indicate the live & dead portion of the Bay.
- The BCU shall be capable to generate password for maintenance shutdown.
- One Bay level unit shall be provided for supervision and control of each 400KV, 220KV, 132kV and 33kV bay (a bay comprises of one circuit breaker and associated disconnectors, earth switches and instrument transformer). If the 33kV bus section comprises isolator only, then the isolator shall be controlled from the transformer LV side bay and same is the case for Bus PT Isolator which shall be controlled by Transformer LV side BCU. 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.
- The BCU shall have sufficient number of BI/BO as per the scheme requirement with additional 30% spare BI/BO.
- The Bay level units shall be installed in the control and relay panels located in the control room.
- 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.
- **Input / Output (I/O) modules**

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.

The measured values of SF6 Gas Pressures, Operating Mechanism Pressures, WTIs, OTI etc. are received through transducers to Bay Level Unit

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.

- **Operator Interface**

The HMI of BCU shall display the following informations

- i) the bay name
- ii) the date and time
- iii) the Local / Remote/Maintenance bay mode
- iv) the auto-recloser function status (on / off),
- v) the synchrocheck function status (on / off),
- vi) the interlock function status (on / off),
- vii) a list of measurements (in real value)
- viii) the bay graphical representation
- ix) the bay events classified in a chronological order
- x) the bay alarms

- xi) the list of disturbance records available
- xii) Bay interlock diagram

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

21.30 SWITCHED ETHERNET COMMUNICATION INFRASTRUCTURE:

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.

- 21.30.1 One switch shall be provided to connect all IEDs for 1 Bay in LAN –I and the second optical port of Bay IEDs shall be connected to other Ethernet Switch in LAN-2. The maximum number of bays may be connected to these Ethernet Switch shall be two bays for 400KV, 220kV and 132kV. However, for 33kV, 3 numbers bay may be connected to one Ethernet Switch in this PRP architecture. The exact no of Ethernet switches required for complete implementation of the scheme shall decided during detailed engineering.
- 21.30.2 The managed Ethernet switch shall have minimum 20% port redundancy (Both Fibre & Copper ports).
- 21.30.3 Ethernet Switches shall have redundant power card.
- 21.30.4 Port monitoring softwares for Ethernet Switches are to be provided.
- 21.30.5 The make of the Ethernet switches shall be Ruggedcom/Hirschman/ABB.

21.31 FAULT RECORDER:

- 21.31.1 The fault recorder shall be provided for transmission line and the fault recorder as in-built feature of line distance relay is also acceptable provided the requirements of following clauses are met.
- 21.31.2 Fault recorder shall be capable to record the graphic form of instantaneous values of voltage and current in all three phases, open delta voltage & neutral current, open or closed position of relay contacts and breakers during the system disturbances.
- 21.31.3 The Fault recorder shall consist of individual acquisition units, one for each feeder and an Evaluation unit (as described in section sub-station automation through bus conforming to IEC 61850) which is common for the entire Substation. Necessary hardware and software shall also be supplied for online transfer of data from all acquisition units to Evaluation unit.
- 21.31.4 Fault recorder shall have at least 8 analogue and 16 digital channels for each feeder.
- 21.31.5 Acquisition units shall acquire the Disturbance data for the pre fault and post fault period and transfer them to Evaluation unit automatically to store in the hard disk. The acquisition units shall be located in the protection panels of the respective feeders.
- 21.31.6 The acquisition unit shall be suitable for inputs from current transformers with 1A rated secondary and capacitive voltage transformers with 63.5V (phase to neutral voltage) rated secondary. Any device required for processing of input signals in order to make the signals compatible to the Fault recorder equipment shall form an integral part of it. However, such processing of input signals shall in no way distort its waveform.
- 21.31.7 The equipment shall be carefully screened, shielded, earthed and protected as may be required for its safe functioning. Also, the Fault recorder shall have stable software,

reliable hardware, simplicity of maintenance and immunity from the effects of the hostile environment of EHV switchyard which are prone to various interference signals typically from large switching transients.

21.31.8 The evaluation unit hardware shall be as described in clause no. 4.0 of section sub-station automation.

21.31.9 Necessary software for transferring the data automatically from local evaluation unit to a remote station and receiving the same at the remote station through owner's PLCC/VSAT/LEASED LINE shall be provided.

21.31.10 Evaluation software shall be provided for the analysis and evaluation of the recorded data made available in the PC under WINDOWS environment. The Software features shall include repositioning of analog and digital signals, selection and amplification of time and amplitude scales of each analogue and digital channel, calculation of MAX/MIN frequency, phase difference values, recording of MAX/MIN values etc. of analogue channel, group of signal to be drawn on the same axis etc, listing and numbering of all analogue and digital channels and current, voltage, frequency and phase difference values at the time of fault/tripping. Also, the software should be capable of carrying out Fourier /Harmonic analysis of the current and voltage wave forms. The Disturbance records shall also be available in COMTRADE format (IEEE standard- Common Format for Transient data Exchange for Power System)

21.31.11 The Evaluation unit shall be connected to the printer to obtain the graphic form of disturbances whenever desired by the operator.

21.31.12 Fault recorder acquisition units shall be suitable to operate from 220V DC as available at sub-station Evaluation unit along with the printer shall normally be connected to 230V, single phase AC supply. In case of failure of AC supply, Evaluation unit and printer shall be switched automatically to the station DC through Inverter of adequate capacity which shall form a part of Distance recorder system. The inverter of adequate capacity shall be provided to cater the requirement specified in section sub-station automation clause no. 8.0 and DR evaluation unit.

21.31.13 The acquisition unit shall have the following features:

i) Facility shall exist to alarm operator in case of any internal faults in the acquisition units such as power supply fail, processor / memory fail etc. and same shall be wired to annunciation system.

ii) The frequency response shall be 5 Hz on lower side and 250 Hz or better on upper side.

iii) Scan rate shall be 1000 Hz/channel or better.

iv) Pre-fault time shall not be less than 100 milliseconds and the post fault time shall not be less than 2 seconds (adjustable). If another system fault occurs during one post-fault run time, the recorder shall also be able to record the same. However, the total memory of acquisition unit shall not be less than 5.0 seconds.

v) The open delta voltage and neutral current shall be derived either through software or externally by providing necessary auxiliary transformers.

vi) The acquisition unit shall be typically used to record the following digital channels:

1. Main CB R phase open
2. Main CB Y phase open
3. Main CB B phase open
4. Main-1 carrier received
5. Main-1 protection operated
6. Main/Tie /TBC Auto reclosed operated
7. Over Voltage -Stage-1 /2 operated
8. Reactor / Stub/TEE-1/2/UF protection operated
9. Direct Trip received
10. Main-2 carrier received

11. Main- 2/ Back Up protection operated
12. Bus bar protections operated
13. LBB operated of main /tie/TBC circuit breaker
14. Tie/TBC CB R phase open
15. Tie/TBC CB Y phase open
16. Tie/TBC CB B phase open

vii) In case the Fault recorder is in-built part of line distance protection, above digital channels may be interfaced either externally or internally.

viii) Any digital signal can be programmed to act as trigger for the acquisition unit. Analogue channels should have programmable threshold levels for triggers and selection for over or under levels should be possible.

21.31.14 The printer shall be compatible with the desktop PC and shall use Plain paper. The printout shall contain the Feeder identity, Date and time (in hour, minute and second up to 100th of a second), identity of trigger source and Graphic form of analogue and digital signals of all the channels. Two packets of paper (500 sheets in each packet) suitable for printer shall be supplied.

21.31.15 Each Fault recorder shall have its own time generator and the clock of the time generator shall be such that the drift is limited to +0.5 seconds/day, if allowed to run without synchronization. Further, Fault recorder shall have facility to synchronize its time generator from Time Synchronization Equipment having output of following types.

- i) Voltage signal: (0-5V continuously settable, with 50m Sec. minimum pulse duration).
- ii) Potential free contact (Minimum pulse duration of 50 m Sec.)
- iii) IRIG-B/SNTP
- iv) **RS232C/RS485/RJ 45/Optical port.**

The recorder shall give annunciation in case of absence of synchronizing within a specified time.

21.32 DISTANCE TO FAULT LOCATOR:

21.32.1 The Distance to Fault Locator shall be provided for transmission line and the fault locator as in-built feature of line distance relay is also acceptable provided the requirements of following clauses are met.

21.32.2 Distance to Fault Locator shall be electronic or microprocessor based and 'Online' type with built-in display unit.

21.32.3 The display shall be directly in percent of line length or kilometers without requiring any further calculations.

21.32.4 It shall have an accuracy of 3% or better for the typical conditions defined for operating timings measurement of distance relays. The accuracy should not be impaired under the following conditions:

- i) presence of remote end in-feed
- ii) predominant D.C. component in fault current
- iii) high fault arc resistance
- iv) severe CVT transients

21.32.5 It shall have mutual zero sequence compensation unit if fault locator is to be used on double circuit transmission line.

21.33 PROTECTION SCHEME FOR PANELS:

• 400KV Line Panel

The following protections scheme shall be provided for Panels for 400 KV Transmission lines:

Main Protection Scheme I & II:

Distance protection scheme using Numerical Relay as specified in detail in Clause 21.15 and 21.16.2 shall be implemented. The summary of the scheme detailed in the above clauses have the following feature:

- (i) Permissive under reach/over reach/ blocking communication mode.
- (ii) Suitable for single cum three phase tripping.
- (iii) Power swing blocking and out of step protection.
- (iv) Single shot single-cum-three phase auto re-closing with check synchronising and deadline charging features.
- (v) Fuse failure protection.
- (vi) Weak end in feed feature.
- (vii) Over/Under Voltage Protection
- (viii) Directional Over current and Earth Fault protection
- (ix) Current reversal guard feature
- (x) Stub protection function
- (xi) Load encroachment blinder feature.
- (xii) Switch on to fault feature.
- (xiii) In built Broken Conductor detection feature.
- (xiv) Shall have df/dt functions
- (xv) Under frequency protection
- (xvi) Carrier Aided Tripping
- (xvii) Main 1 and Main 2 relay shall of different make **and model**.

- **220 KV Line Panel**

The following protections scheme shall be provided for Panels for 220 KV Transmission lines:

a) Main Protection Scheme I & II:

Distance protection scheme using Numerical Relay as specified in detail in Clause 14.15 and 14.16.2 shall be implemented. The summary of the scheme detailed in the above clauses have the following feature:

- (i) Permissive under reach/over reach/ blocking communication mode.
- (ii) Suitable for single cum three phase tripping.
- (iii) Power swing blocking and out of step protection.
- (iv) Single shot single-cum-three phase auto re-closing with check synchronising and deadline charging features.
- (v) Fuse failure protection.
- (vi) Weak end in feed feature.
- (vii) Over/Under Voltage Protection
- (viii) Directional Over current and Earth Fault protection
- (ix) Current reversal guard feature
- (x) Stub protection function
- (xi) Load encroachment blinder feature.

- (xii) Switch on to fault feature.
- (xiii) In built Broken Conductor detection feature.
- (xiv) Shall have df/dt functions
- (xv) Under frequency protection
- (xvi) Main 1 and Main 2 relay shall of different **make and model**.

- **132 KV Line Panel**

The following protections scheme shall be provided for Panels for 132 kV Transmission lines:

- a) Main Protection Scheme I:

Distance protection scheme using Numerical Relay as specified in Clause 21.15 and 21.16.2.

- b) Backup Protection:

The backup protection shall be provided with directional single/ multi pole relays as specified in Clause 14.16.4. One triple pole over current relays for phase faults and one Earth Fault Relay for Earth Faults without high set elements shall be provided.

- **33KV Feeder Protection Panel**

The 33kV Feeder Panels shall be provided non directional single/ multi pole relays as specified in Clause 14.16.4. One triple pole over current relays for phase faults and one Earth Fault Relay for Earth Faults with high set elements shall be provided.

- **Power and Auto Transformer Protection Panel**

Integrated Transformer protection scheme as detailed in Clause 21.16.3 of the BID shall be provided for Panels for all Power and Auto Transformers:

- (a) Main Protection -1

Biased transformer differential protection employing relay type specified in Clause 21.32. The scheme shall include also following:

- (i) Second and fifth harmonic restraint feature.
- (ii) The relay shall also provide Restricted Earth Fault Protection
- (iii) The scheme shall have suitable input and output for transformer auxiliary protection like Buchholz, oil temperature, winding temperature etc.
- (iv) Over-fluxing protection
- (v) The relay shall have Back up protection features i.e Directional over current and earth fault with high set element. The high set unit should not operate due to transformer in-rush current.

- (b) Main Protection - 2

Protection function shall be same as Main Protection – I.

- (c) Backup Protection: The backup protection shall be provided with Directional relays as specified in Clause 14.16.3. One triple pole over current relays for phase faults and one Earth Fault Relay for Earth Faults with high set elements shall be provided. The high set unit should not operate due to transformer in-rush current.

- **Bus Bar Differential Protection Panel:**
- The Bus Bar Protection shall be provided as detailed in Clause 21.17 of the BID for 400kV, 220kV and 132kV Voltage Level.

- **Reactor Protection Panel:**
- The Reactor Protection shall be provided as detailed in Clause 21.16.5 of the BID.

21.34 RELAY MAINTENANCE TOOL KIT

MAINTENANCE TOOL KIT

- The bidder shall supply a complete maintenance tool kit set. The tool kit shall have generally current jack, card extender, card puller, required crimping tool, screw drivers, pliers etc.
- The tool kit shall contain test plugs, test leads, clips for maintenance and testing of relays supplied. Further detailing will be done during detail engineering.
- The Maintenance Tool Kit shall be of Universal type.

21.35 TESTS

- The supplier shall carryout 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.
- 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)

21.36 PRE-COMMISSIONING TESTS

- The contractor shall have to perform following minimum Pre-commissioning tests 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). Testing of voltage related elements like directional element, over fluxing, over/ under frequency, over/ under voltage features, tracing of curves and checking limits of set values and associated timings

- (vii). Checking of Boolean logic gates, BI/BO points of the numeric relays, checking conformity to specification and checking of set logics
- (viii). Checking of stability and sensitivity of differential zones by suitably applying 3-phase low voltages and shorting of primary circuits. Measurements of voltage and current inputs to all relays.
- (ix). Checking stability & sensitivity of bus differential relay zones by suitably injecting current
- (x). Primary injection of REF connected CTs, measurements of relay inputs and checking of stability and sensitivity of REF scheme
- (xi). Checking registration of event and disturbance records in the numeric relays and downloading
- (xii). Testing of carrier aided protection schemes and simulation with regard to transmission and receipt of protection signalling
- (xiii). Testing of AR schemes
- (xiv). Checking of healthiness of each dc circuit of panels
- (xv). Simulation of faults like Buchholz, OTI, WTI and other relays and checking of tripping of breaker and connected annunciation
- (xvi). Operation of master trip relays, tripping of breaker through each trip coil and checking of interlocks
- (xvii). Simulation of faults like low gas, air pressure and checking operation of interlocks. Checking anti pumping scheme of CB
- (xviii). Simulation to Check Checking of PT selection schemes
- (xix). Simulation to Check interlocks of all CB and isolator interlocks
- (xx). Simulation to Check annunciation of all events in BCU (Bay control unit) as well as SAS (Sub-station Automation System)
- (xxi). Simulation to Check of logic of BCU
- (xxii). Operation of tap changing of transformer through SAS
- (xxiii) 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.

21.37 TECHNICAL DATA SHEET FOR THE RELAY AND CONTROL PANELS

- 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 offer to complete the schemes described in the Specification whether such items are specifically mentioned or not.

400kV and 220kV Feeder Panels:

SL NO	ITEM	RATINGS AND PARTICULARS	
		400KV Panel with 1 ^{1/2} Breaker Scheme	220KV Panel with Main I & Main II
I	II	III	IV
A	LINE PANELS		
1	Protection and relays:		
	(a) Distance Protection Scheme I	1 No.	1 No.
	(b) Distance Protection Scheme II	1 no	1 no
	(c) LBB Protection Scheme.	Can be function of BCU/IEDs	Can be function of BCU/IEDs

	(d) Trip Circuit Supervision Relay for pre and post-closing	Supervision for 6 trip coils (2 trip coils per pole or phase)	Supervision for 6 trip coils (2 trip coils per pole or phase)
	(e) DC Supply healthy monitoring scheme for two separate DC source	2 No.	2 No.
	(e 1) DC Changeover Relay	2 Nos	2 Nos
	(f) AC Supply healthy monitoring scheme	1 No.	1 No.
	(g) High Speed Trip relay (1 & 3 pole)	2 sets. (each set will comprise of 3 Nos of 1ph trip relay and 1 No of 3ph trip relay)	2 sets. (each set will comprise of 3 Nos of 1ph trip relay and 1 No of 3ph trip relay)
	(h) PT-CVT Selection Scheme with PT1-PT2-CVT selection relay	1 Set. Complete Bus PT1-Bus PT2-CVT Selection Scheme	1 Set. Complete Bus PT1-Bus PT2-CVT Selection Scheme
	(i) Auxiliary relay, timer relay for healthiness of relays, auto reclose communication link etc.	As required (Can be function of BCU)	As required (Can be function of BCU)
	(j) Trip Transfer Relay	-	2 sets
	(j) Fault Recorder	1 set (shall be function of IED)	1 set (shall be function of IED)
	(k) Distance to fault locator	1 set (shall be function of IED)	1 set (shall be function of IED)
	(l) Under Voltage protection relay for isolator/earth switch Interlock	2 nos	2 nos
	(m) Over Voltage Protection Scheme	1 set (maybe function of IED)	1 Set (maybe function of IED)
2	Meters		
	(a) ABT tri-vector Meter (SAMAST Compliant) with TTB	1 No	1 No
3	Controls/ Status indication/ Annunciation		
	Bay control unit (IED)	1 No. (Function of BCU/ SAS)	1 No. (Function of BCU/ SAS)

132kV and 33kV feeder Panels:

SL NO	ITEM	RATINGS AND PARTICULARS	
		132 kV Panel with Main & Transfer Bus Scheme	33 kV feeder panel with single bus system
		V	VI
A	LINE PANELS		
1	Protection and relays:		
	(a) Distance Protection Scheme	1 No.	-.
	(b) Back up directional over current and earth fault scheme	1 Set	-

	(c) Back up non directional over current and earth fault scheme	-	1 set
	(d) LBB Protection Scheme.	Can be function of BCU/IEDs	Can be function of BCU/IEDs
	(e) Trip Circuit Supervision Relay for pre and post-closing	Supervision for 2 trip coils	Supervision for 2 trip coils
	(f) DC Supply healthy monitoring scheme, for two DC source	2 No.	2 No.
	(f 1) DC Changeover	2 Nos	2 Nos
	(g) AC Supply healthy monitoring Scheme	1 No.	1 No.
	(h) High Speed Trip relay	2 No.	2 No.
	(h1) High Speed Trip Relay for LBB	1 No	1 No
	(i) Auxiliary relay, timer relay for healthiness of relays, auto reclose communication link etc.	As required (Can be function of BCU)	As required (Can be function of BCU)
	(j) Trip Transfer Relay	2 sets	2 sets
	(j) Line CVT-Bus PT selection relay	1 No	-
	(k) 33kV Incomer PT selection	-	-
	(l) Distance to Fault Locator	1 set (shall be function of IED)	-
	(m) Fault Recorder	1 set (shall be function of IED)	
	(l) Under Voltage protection relay for isolator/earth switch Interlock	2 nos (function of IED)	
	(m) Over Voltage Protection Scheme	1 set (maybe function of IED)	
2	Meters		
	(a) ABT tri-vector Meter (SAMAST Compliant) with TTB	1 No	1 No
3	Controls/ Status indication/ Annunciation		
	Bay Control Unit (IED with HMI)	1No.(Function of BCU/ SAS)	1No.

Transformer Protection Panels

SL NO	ITEM	RATINGS AND PARTICULARS			
		400/220/33 kV Transformer Panel	220/132 kV Transformer Panel	220/33 kV Transformer Panel	132/33kV Transformer Panel
		VII	VIII	IX	X

B	TRANSFORMER PANELS				
1	Protection and Relays:				
	(a) Differential Protection Scheme	2 No.	2 No.	2 No.	2 No.
	(b) Restricted Earth Fault Protection Scheme	(inherent High imp REF)	(inherent High imp REF)	(inherent High imp REF)	(inherent High imp REF)
	(c) Back up directional over current scheme and earth fault scheme for HV side.	Could be feature of relay	Could be feature of relay	Could be feature of relay	Could be feature of relay
	(d) Back up directional over current and earth fault scheme for MV/LV Side.	Could be feature of relay	Could be feature of relay	Could be feature of relay	Could be feature of relay
	(e) LBB Protection Scheme.	Can be function of BCU/IEDs	Can be function of BCU/IEDs	Can be function of BCU/IEDs	Can be function of BCU/IEDs
	(f) Over Fluxing Protection scheme	Can be function of IED	Can be function of IED	Can be function of IED	Can be function of IED
	(g) Overload protection scheme	Can be function of IED	Can be function of IED	Can be function of IED	Can be function of IED
	(g.1) Tertiary Side O/C and Open Delta Voltage Protection	1 set	1 set	-	-
	(h) Trip Circuit Supervision Relay Scheme for ascertaining pre and post-closing healthiness.	Supervision for 4/12 trip coils (2 trip coils per pole/breaker on each side)	Supervision for 4/8 trip coils (2 trip coils per pole/breaker on each side)	Supervision for 4/8 trip coils (2 trip coils per pole/breaker on each side)	Supervision for 4 trip coils (2 trip coils per breaker on each side)
	(i) DC Supply healthy monitoring scheme	2 No.	2 No..	2 No.	2 No.
	(i1) DC Changeover Relay	2 No.	2 No.	2 No.	2 No.
	(j) AC Supply healthy monitoring scheme	1 No.	1 No.	1 No.	1 No.
	(k) High Speed Trip relay (HV Side)	2 No.	2 No.	2 No.	2 No.
	(l) High Speed Trip relay (MV/LV Side)	2 No.	2 No.	2 No.	2 No.
	(m) Trip Transfer Relay	2 sets	2 sets	2 sets	2 sets
	(m) PT Selection Scheme on HV / MV/LV Side as applicable	1 No. Complete Bus PT Selection Scheme (Can be function of BCU)	1 No. Complete Bus PT Selection Scheme (Can be function of BCU)	1 No. Complete Bus PT Selection Scheme (can be function of BCU)	1 No. Complete Bus PT Selection Scheme (can be function of BCU)
	(m1) PT Selection Relay	3 Nos for HV/ 2 Nos for LV	2 Nos for HV/ 2 No for MV	2 Nos for HV/ 2 No for LV	1 No for HV/ 2 No for LV

	(n) Tripping relay for Bucholtz, PRD, WT I, OTI, OSR etc.	As required	As required	As required	As required
	(o) Alarm auxiliary for Bucholtz, PRD, WT I, OTI, MOG, Air Cell leakage etc.	As required (Can be a function of BCU)	As required (Can be a function of BCU)	As required (Can be a function of BCU)	As required (Can be a function of BCU)
	(p) Transformer tap position status/raise & lower	Can be a function of BCU	Can be a function of BCU	Can be a function of BCU	Can be a function of BCU
	(q) Reverse Power Protection	Can be function of IED	Can be function of IED	Can be function of IED	Can be function of IED
2	Meters				
	(a) ABT tri-vector Meter (SAMAST Compliant) With TTB	2 No. (on 400kV and 220 kV side)	2 No. (on 220 kV and 132 kV side)	2 No. (on 220 kV and 33kV side)	2 Nos. (132 kV & 33 kV side)
3	Controls / interlocks / Status indication/ Annunciation				
	Bay Control Unit (IED), one for each HV & LV side.	2 Nos. (Function of BCU/ SAS)	2 Nos. (Function of BCU/ SAS)	2 Nos. (Function of BCU/ SAS)	2 Nos. (Function of BCU/ SAS)

Reactor Protection Panel

The Reactor Protection Panel shall consist of following protection features/schemes:

SL. NO	Description	400 kV
		XI
1	Reactor Differential Protection scheme	1 No
2	Restricted Earth fault Protection scheme:	1 No
3	Reactor back up impedance protection scheme	1 Set
4	Three phase trip relays (Only for Bus Reactor)	2 Nos.
5	CVT selection relay as per scheme requirement	Lot

400kV, 220 kV and 132 kV Bus Coupler / Bypass Breaker Panel

SL NO	ITEM	RATINGS AND PARTICULARS	
		220 kV Panel with Main I & Main II Scheme	132 kV Panel with Main 1 & Transfer Bus Scheme
		XII	XIII
A	BUS COUPLER PANEL		
1	Protection and relays:		
	(a) Back up directional over current and earth fault scheme	1 Set	1 Set
	(b) Bus Bar differential protection	Main I and Main II	Applicable, where specified in BoQ
	(c) LBB Protection Scheme.	Can be function of BCU/IEDs	Can be function of BCU/IEDs
	(d) Trip Circuit Supervision Relay for pre and post-closing	Supervision for 6 trip coils (2 trip coil for each Phase)	Supervision for 2 trip coils
	(e) DC Supply healthy monitoring scheme	2 No.	2 No.
	(e) DC Changeover Relay	2 No.	2 No.
	(f) AC Supply healthy monitoring scheme	1 No.	1 No.
	(g) High Speed Trip relay	2 Sets. .(each set will comprise of 3 Nos of 1ph trip relay and 1 No of 3ph trip relay)	2 No.
	(h) PT Selection Scheme	1No. Complete Bus PT Selection Scheme (Can be function of BCU)	Not applicable
	(i) Auxiliary relay, timer relay scheme	As required	As required
2	Metering	Function of BCU/ SAS	Function of BCU/ SAS
3	Controls/Annunciation/Status indication		
	Bay control unit (IED)	1 No. (Function of BCU/ SAS)	1 No. (Function of BCU/ SAS)

400kV Tie Breaker Panel

SL NO	ITEM	Ratings and Particulars
		4000 kV Panel with 1 ^{1/2} Breaker Scheme
		XIV
B	TIE PANEL	
1	Protection and relays:	
	(a) Back up directional over current and earth fault scheme	
	(b) Bus Bar differential protection	
	(c) LBB Relay.	1 No
	(d) Trip Circuit Supervision Relay for pre and post-closing	Supervision for 6 trip coils (2 trip coils per pole or phase)
	(e) DC Supply healthy monitoring scheme	2 No.
	(f) DC Changeover Relay	2 No
	(f) AC Supply healthy monitoring scheme	1 No.
	(g) High Speed Trip relay	2 Sets. (each set will comprise of 3 Nos of 1ph trip relay and 1 No of 3ph trip relay)
	(h) Auxiliary relay, timer relay scheme	As required
2	Metering	Function of BCU/ SAS
3	Controls/Annunciation/Status indication	
	Bay control unit (IED)	1 No.

21.38 Monitoring, Control & Protection for Auxiliary Transformer

Suitable monitoring, control (operation of associated Circuit breaker and isolator) and protection for LT Auxiliary Transformer, connected to tertiary winding of auto transformer for the purpose of auxiliary supply shall be provided by the contractor. Overcurrent and open delta protection is required to be provided for the auxiliary transformer. These control and protection shall also be acceptable as built in feature either in the bay controller to be provided for the auxiliary system or in the control and protection IEDs to be provided for the auto transformer.

NOTE: 1) The relays (main / auxiliary) not covered within the above table shall be considered for complete commissioning of the protection scheme.

2) In Case of incomplete Diameter (D and I type layouts), control panel shall be equipped fully as if the Diameter is complete, unless otherwise specified. Annunciation relays shall also be provided for the same and if required, necessary panel shall be supplied to accommodate the same.

3) Relay setting template (in editable document format) shall be provided by the Contractor for each typical protection IEDs for relay setting purpose.

4) For GIS Sub Stations, GIS Gas Zone trip signals, if provided, for each gas tight compartments (gas zone) in the GIS LCC shall be integrated in the protection schematics to provide electrical isolation of faulty Gas Zone by tripping/ inter tripping its adjacent circuit breakers. The scheme shall be implemented through protection IEDs and auxiliary relay as required.

22.0 **Contract Agreement:**

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

23.0 **Liquidated Damage:**

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

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

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

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

24.0 **Warranty:**

24.1 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.

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

24.3 If during the Period Warranty any defect is found, the Purchaser shall give Notice to the Supplier/Manufacture 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.

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

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

25.0 **Payment terms:**

25.1 **No advance payment** shall be made in this contract.

- 25.2 No claim for interest shall be entertained by AEGCL.
- 25.3 The price is firm and no price variation shall be applicable.
- 25.4 First & Final bill for the supply & erection will be entertained only after **100%** completion of the work.
- 25.5 Payment will be made by **DGM, Silchar (T&T) Circle, AEGCL, Srikona, Silchar**. The Bidder / Firm will have to be submitted the following Net Banking details.
- (a) Banker's Name & Branch
 - (b) Account No
 - (c) Banker's address
 - (d) Banker's IFSC Code

26.0 Performance security deposit:

- 26.1 The successful bidder shall have to deposit through a **Bank Guarantee** from a Nationalized or scheduled Bank of RBI in AEGCL's standard proforma on non-judicial stamp of appropriate value for an amount equivalent to **10% (ten percent)** of the total value of the order as performance security, immediately within **10 (ten) days** from the issue of the letter of intent/detailed orders (as the case may be), duly pledged in favour of "**Managing Director, AEGCL, Paltan Bazar, Guwahati-01**", payable at **Guwahati**, and such security deposit shall be **valid up to 30 (Thirty) days** beyond the **warranty period of 18 (Eighteen) months**. The **Bank Guarantee (BG)** should be submitted to the **O/o the Deputy General Manager, Silchar T&T Circle, AEGCL, Silchar-788026** by the successful Bidder.
- 26.2 Please note that, if the selected Bidder / Firm fail to furnish the requisite performance security in the form of **Bank Guarantee**, an amount equivalent to **10%** of the Contract Price shall be retained as Security Deposits which shall be retained up to **18 (Eighteen) months** from the date of Supply. .
- 26.3 If the bidder / firm fails or neglects to observe and perform any of his obligations under the contract, Purchaser (AEGCL) shall have the right to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the Contractor/Firm.
- 26.4 No interest shall be payable on such deposits.

27.0 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.

28.0 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 **Cachar District**.

29.0 Insurance :

- The "Supplier" shall, have, unless, otherwise specified by the Purchaser, insure the materials through their underwrites at their cost and shall keep it insured against any loss/ damaged/ pilferage in transit, destruction or damage by fire/ flood, without exposure to vagaries of weather or through riot, civil commotion, war or rebellion, for the full value of the materials until the materials are received at the purchaser's destination store.
- The "Supplier" shall be responsible for safe arrival at destination, unloading and receipt of the materials by the consignee. The Purchaser will discharge consignee's responsibilities only and shall not be responsible for any damage/ loss/ pilferage/ non-delivery by the carriers.
- In case of any loss/ damage/ pilferage/ non-delivery/ short delivery by carriers etc.; the

Supplier shall replace free of cost missing / damaged / lost materials within **30(thirty) days** from the receipt of report thereof from the consignee(s) without waiting for settlement of their claims with their carriers / under-writers. Normally, such reports from the consignee(s) to the supplier shall be initiated within a period of 30(thirty) days from the date of receipt of each consignment by him /them.

- If it is considered necessary that the damage equipment either in part or in full to be sent back to the manufacturer's works for repair, the manufacturers/ suppliers will furnish the Bank Guarantee for the full value of equipment needing repairs and such Bank Guarantee shall remain valid till such time, the equipment are repaired and returned to the consignee in good condition. The to and fro freight, handling and insurance charges in such cases will be borne by the Supplier.
- Unless, otherwise mutually agreed upon, in case of failure by the Supplier to replenish /make good of the loss /damage /short supplied quantities, within the stipulated period, the Purchaser reserves the right to forfeit the security deposit and/ or adjust any outstanding payment to the "Supplier" with the Purchaser or take any other appropriate action.

30.0 Right to Reject:

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

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

31.0 Supply Location

Name of Work:- "Supply of Spare relays for 132 kV Srikona, 132 kV Pailapool & 132 kV Haflong Grid Sub-Station, under Silchar T&T Division, AEGCL"

Location:- 132 kV Srikona GSS, AEGCL

Appendix-1

Letter of Technical Bid

[Bidder's Letter head]

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 _____

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:
- (iv) Whether Partnership or any type:

A) Experience

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

(Details of works executed/under execution in the last three years including another department)

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

B) Financial Position

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

Year	Turn over

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

Name of the Bidder: -

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

PRICE BID

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

Name of the Bidder:

NIT No. AEGCL/STTC/Tech-12/2026-27/11

Dated: 13.08.2026

Name of the work: Supply of Spare relays for 132 kV Srikona, 132 kV Pailapool & 132 kV Haflong Grid Sub-Station, under Silchar T&T Division, AEGCL.

Sl No	Item Description	Make	Unit	Qty	Per Unit (Rs.)	Amount (Rs.)
1	7PJ13 Trip Circuit Supervision Relay (7PJ1321-5AA21-0AA0)	SIEMENS	Nos.	4		
2	7PJ15 High Speed Tripping Relay (7PJ1524-IJC60-1AF0)	SIEMENS	Nos.	4		
3	7PJ11 Auxiliary Relay (7PJ1111-6DA20-0AA0)	SIEMENS	Nos.	4		
4	RXME1-Hitachi Energy Auxiliary Relay Model- RK221 052-AN	ABB	Nos.	4		
5	RXMA1-Hitachi Energy Auxiliary Relay Model- RK211 052-BS	ABB	Nos.	4		
6	RXMM1-Hitachi Energy Relay Model- RK 214 003- AN	ABB	Nos.	4		
7	RXPSU14n ABB Bistable Relay Aux Supply-110V DC Contacts: 13 N/O + 1 N/C, S/R, Flag- Yes, Mounting: Flush, Size- (2S12C)	ABB	Nos.	4		
8	Freight & Insurance	-	-	-	-	
	Total (in Rs.)					
	Adding GST @18% (in Rs.)					
	Grand Total (in Rs.)					

Rupees in words _____

Name of the Bidder: -

Signature of the Bidder/Firm:-

Full Name:-

Postal Address:-

Phone/Mobile No.

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-33.0)	: Yes/No
5)	Date of completion of supply (Please specify the date of completion of supply as per specification)	: Yes/No
6)	‘Security and performance guarantee’ (Whether agreeable to accept as specified in Clause no-34.0)	: Yes/No
7)	List of orders executed for similar works furnished	: Yes/No
8)	Performance certificate from the Govt./Govt. undertaking furnished	: Yes/No
9)	Deviation from the specifications	
	a) Technical	: Yes/No
	b) Commercial	: Yes/No
10)	Information in respect of technical capability is furnished	: Yes/No
11)	Information in respect of Financial capability certificate from the Banker is furnished	: Yes/No
13)	PAN card as per Cl. No.19.0 (ii)	: Yes/No
14)	GST registration no. as per Cl. No. 19.0 (iv)	: Yes/No
15)	Registered Power of Attorney as per Cl.no. 19.0 (v) enclosed.	: Yes/No

Name of the Bidder: -

Signature of the Bidder/Firm

Full Name

Postal Address

Phone/Mobile No.