BIDDING DOCUMENT

FOR

Design, Engineering & Supply of 33kV bay terminal equipment for 04 Nos Feeder bay, one each at 132kV Azara, 132kV Sishugram, 132kV Dhaligaon and 400kV Kukurmara GSS of AEGCL".

FUND: "Deposit – AAI, APDCL & OIL"

(E-Tender)

BID IDENTIFICATION NO:

AEGCL/MD/33kV/APDCL/AAI/OIL/2020/BID (Supply)

ASSAM ELECTRICITY GRID CORPORATION LIMITED

Section -1

Instructions to Bidders

This section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Table of Clauses

Section 1 – Instructions to Bidders

1.1.0 General

1.1.1. Scope of Bid

1.1.1.1. In support of the Invitation for Bids indicated in the Bid Data Sheet (BDS), the ***CGM (PP&D)*** on behalf of ***Assam Electricity Grid Corporation Limited (AEGCL)*** (hereinafter referred to as "the Purchaser" or "AEGCL"), issues this Bidding Document for the supply of Goods and Related Services incidental thereto as specified in **Section 3 (Employer's Requirements)**. The name and identification nos. of this Competitive Bidding are provided in the Bid Data Sheet (BDS) attached as Appendix to ITB-1 of this Section.

Period of Completion

***06 (Six)* months** from the date of acceptance of the purchase order or LOA/techo-commercially clear order. Bidders should note that time is the essence of this bid. The bidders who cannot commit to complete the work within the stipulated time may refrain themselves.

1.1.1.2. Unless otherwise stated, throughout this Bidding Document definitions of terms shall be as prescribed in **Section 4** (Special Conditions of Contract).

1.1.2. Eligible Bidders

1.1.2.1. Subject to meeting the Qualifying Requirements, a Bidder may be a firm or company. When the bidder is a firm, the names and address of the partners should be indicated and a copy of the certificate of registration with the concerned Registrar of firms should be enclosed with the Bid.

1.1.2.2. When the bidder is a Company, the company registration document along with Memorandum of Association should be submitted.

1.1.2.3. When the bidder is an individual carrying on business in a firm's name, the tender should be submitted by the owner of the firm, who may describe himself as carrying on business in the firm's name.

1.1.2.4. When the bidder is a **Joint Venture (JV)** of two or more firms as partners, all partners shall comply with the following requirements:

(a) The Bid, and, in case of successful Bid, the Form of Agreement shall be signed by all the Partners so as to be legally binding on all partners.

(b) One of the partners shall be authorized to be as the Lead Partner and submitting a Power of Attorney signed by legally authorized signatories of all the partners shall evidence this authorization.

(c) The Lead partner shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture and the entire execution of the Contract;

(d) All the partners of the Joint Venture shall be jointly and severally liable for the execution of the contract in accordance with the contract terms and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Bid Form and the Form of Agreement (in case successful bidder).

(e) A copy of the registered agreement entered into by the Joint Venture partners shall be submitted with the Bid.

(f) Joint Venture Agreement must be registered in the Court of Law. Notarized Joint venture agreement shall not be acceptable. Original copy of registered Joint Venture Agreement & Notarized Power of Attorney (if any) shall be submitted prior to one hour of the opening of technical bid.

1.2.0 Contents of Bidding Document

1.2.1. Sections of Bidding Document

1.2.1.1. The Bidding Document consists of following six Sections, and should be read in conjunction with any Addenda issued in accordance with ITB ***Clause*** 1.2.3.

Section 1 - Instructions to Bidders (ITB) with Appendix-1 and Appendix-2
Section 2 - Bidding Forms (BDF)
Section 3 - Purchaser's Requirements (PRQ)
Section 4 - "General Conditions of Supply and Erection of AEGCL"
(This *section is supplied separately)*
Section 5- Special Conditions of Contract (SCC)
Section 6 - Contract Forms (COF)

1.2.1.2. *The completed Section 6 shall constitute "the Contract".*

1.2.1.3. The Invitation for Bids issued by the Purchaser is not part of the Bidding Document.

1.2.1.4. The Purchaser is not responsible for the completeness of the Bidding Document and its addenda, if they were not obtained directly from the source stated by the Purchaser in the Invitation for Bids.

1.2.1.5. The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

1.2.2. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

1.2.2.1. A prospective Bidder requiring any clarification of the Bidding Document shall contact the Purchaser in writing at the Purchaser's address indicated in the ***BDS*** or raise his enquirers during the pre-bid meeting if provided for in accordance with ***ITB Clause*** 1.2.2.4. The Purchaser 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 Purchaser's response shall be in writing with copies to all Bidders who have acquired the Bidding Document in accordance with ***ITB Clause*** 1.2.1.4, including a description of the inquiry but without identifying its source. Should the Purchaser deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ***ITB Clause*** 1.2.3 and ***ITB Clause*** 1.4.2.2.

1.2.2.2. The Bidder is advised to visit and examine the sites where the works are 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 sites shall be at the Bidder's own expense.

1.2.2.3. The Bidder and any of its personnel or agents will be granted permission by the Purchaser 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 Purchaser 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.

1.2.2.4. The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the ***BDS***. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

1.2.2.5. The Bidder is requested, as far as possible, to submit any questions in writing, to reach the Purchaser not later than **one week** before the pre-bid meeting.

1.2.2.6. Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ***ITB Clause*** 1.2.1.4. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Purchaser exclusively through the issue of an Addendum pursuant to ***ITB Clause*** 1.2.3 and not through the minutes of the pre-bid meeting.

1.2.2.7. Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

1.2.3. Amendment of Bidding Document

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

1.2.3.2. 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 the Purchaser in accordance with ***ITB Clause*** 1.2.1.4.

1.2.3.3. To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Purchaser may, at its discretion, extend the deadline for the submission of bids, pursuant to ***ITB Clause*** 1.4.2.2.

1.3.0 Preparation of Bids

1.3.1. Cost of Bidding

1.3.1.1. The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

1.3.2. Language of Bid

1.3.2.1. The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, shall be written in the English language. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages into the English language, in which case, for purposes of interpretation of the Bid, such translation shall govern.

1.3.3. Documents Comprising the Bid

1.3.3.1. The Bid shall comprise two envelopes submitted simultaneously, one called the '**Technical Bid'** containing the documents listed in ***ITB Clause 1.3.3.2*** and the other the '**Price Bid'** containing the documents listed in ***ITB Clause 1.3.3.3***, both envelopes must be submitted online through e-tendering portal http://assamtenders.gov.in.

1.3.3.2. The Technical Bid submitted by the Bidder shall comprise the following:

(a) Letter of Technical Bid;

(b) Bid Security, in accordance with ***ITB Clause*** 1.3.9;

(c) Tender Fee.

(d) Registered Joint venture agreement, if applicable.

(e) Written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ***ITB Clause*** 1.3.10.1; (i.e. Notarized Power of Attorney)

(f) Documentary evidence establishing the Bidder's eligibility and qualifications to perform the contract if its Bid is accepted;

(g) Documentary evidence establishing in accordance with ***ITB Clause*** 1.3.6 that the plant and services offered by the Bidder conform to the Bidding Document;

(h) Documents as called for in ***ITB Clauses***1.1.2.1***,*** 1.1.2.2***,*** and1.1.2.3;

(i) Any other document required in the ***BDS***.

1.3.3.3. The Price Bid submitted by the Bidder shall comprise the following:

(a) Letter of Price Bid;

(j) completed schedules as required, including Price Schedules, in accordance with ***ITB Clauses***1.3.4 and 1.3.7; and

(k) any other document required in the ***BDS***

1.3.4. Letter of Bid and Schedules

1.3.4.1. The Letters of Technical Bid and Price Bid, and the Schedules, and all documents listed under ***ITB Clause***1.3.3, shall be prepared using the relevant forms furnished in Section 2 (Bidding Forms). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

1.3.5. Documents Establishing the Eligibility and Qualifications of the Bidder

1.3.5.1. To establish its eligibility and qualifications to perform the Contract in accordance with Appendix 2 of ITB (Evaluation and Qualification Criteria), the Bidder shall provide the information requested in the corresponding information sheets included in Section 2 (Bidding Forms).

1.3.6. Documents Establishing Conformity of the Goods and Services

1.3.6.1. The documentary evidence of the conformity of the goods and services to the Bidding Document may be in the form of literature, drawings and data, and shall furnish:

(a) A detailed description of the essential technical and performance characteristics of the goods and services, including the functional guarantees of the Goods, in response to the Specification;

(b) A commentary on the Purchaser's Specification and adequate evidence demonstrating the substantial responsiveness of the plant and services to those specifications. Bidders shall note that standards for workmanship, materials and equipment designated by the Purchaser in the Bidding Document are intended to be descriptive (establishing standards of quality and performance) only and not restrictive. The Bidder may substitute alternative standards, brand names and/or catalog numbers in its bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions are substantially equivalent or superior to the standards designated in the Specification.

1.3.7. Bid Prices

1.3.7.1. Unless otherwise specified in the **BDS** and/or Section 3 (Purchaser's Requirements), bidders shall quote for the entire scope of supply and services on a "single responsibility" basis such that the total bid price covers all the Supplier's obligations mentioned in or to be reasonably inferred from the bidding document in respect of the design, manufacture, including procurement, delivery, and completion of the entire scope.

1.3.7.2. Bidders are required to quote the price for the commercial, contractual and technical obligations outlined in the bidding document. No deviation in this regard normally, shall be accepted.

1.3.7.3. Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules included in Section 2 (Bidding Forms). Separate numbered Schedules included in Section 2 (Bidding Forms) shall be used for each of the following elements. The total amount from each Schedule (1 & 2) shall be summarized in a Grand Summary (Schedule 3) giving the total bid price(s) to be entered in the Bid Form. In case of e-tender, the bidder shall fill up the Price schedules as provided in the online tender.

Schedule No. 1: Supply of Goods

Schedule No. 1(a): Freight & Insurance against Supply

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

1.3.7.5. The prices shall be fixed.

(a) The 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***.

1.3.8. Period of Validity of Bids

1.3.8.1. Bids shall remain valid for the period of **180 days** after the bid submission deadline date prescribed by the Purchaser. A bid valid for a shorter period ***shall be rejected*** by the Purchaser as non-responsive.

1.3.8.2. In exceptional circumstances, prior to the expiration of the bid validity period, the Purchaser 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 is requested in accordance with ***ITB Clause***1.3.9, it shall also be extended for a corresponding period. A 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.

1.3.9. Bid Security

1.3.9.1. The Bidder shall furnish as part of its bid, in original form, a Bid Security as specified in the ***BDS***. The amount of Bid Security shall be as specified in the **BDS**.

1.3.9.2. The bid security shall be a demand guarantee, in the forms of an unconditional bank guarantee from a Scheduled or Nationalized Bank. The bid security shall be submitted using the 'Bid Security Form' included in Section 3 (Bidding Forms). The form must include the complete name of the Bidder. The bid security shall be valid for thirty days (30) beyond the original validity period of the bid, or beyond any period of extension if requested under ***ITB Clause*** 1.3.8.2.

1.3.9.3. Bids not complying with ***ITB Clause***1.3.9.1 and ***ITB Clause***1.3.9.2, ***shall be rejected*** by the Purchaser as ***non-responsive***.

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

1.3.9.5. The bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security pursuant to ***ITB Clause***1.6.4.

1.3.9.6. The bid security may be forfeited:

(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid Form, except as provided in ***ITB Clause***1.3.8.2or

(b) if the successful Bidder fails to:

(i) Sign the Contract in accordance with ***ITB Clause***1.6.1; or

(ii) Furnish a performance security in accordance with ***ITB Clause***1.6.2.

1.3.10. Format and Signing of Bid

1.3.10.1. The Bidder shall prepare one original of the Technical Bid and one original of the Price Bid comprising the Bid as described in ***ITB Clause***1.3.3

1.3.10.2. 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 ***BDS*** 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 initialised by the person signing the bid.

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

1.3.10.4. Any interrelations, erasures, or overwriting shall be valid only if they are signed or initialised by the person signing the bid.

1.4.0 Submission and Opening of Bids

1.4.1. On-line submission of Bids

1.4.1.1. The Technical as well as Price Bid should be submitted through online portal only.

1.4.1.2. For Technical bid, all forms and supporting documents as required by ITB Clause 1.3.2 and duly signed and stamped as per ITB Clause 1.3.10 are to be uploaded to the e-tendering portal. The documents are to be uploaded in pdf format and each file should not exceed 5 MB is size. In case a document is more that 5 MB in size, the same may be split to make the size below 5 MB

1.4.1.3. The Price Bid must be submitted in the Price Schedule provided on the e-tendering portal as per the online format.

1.4.2. Deadline for Submission of Bids

1.4.2.1. Bids shall be received ***ONLINE*** only on or before the date and time indicated in the ***BDS***.

1.4.2.2. The Purchaser may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ***ITB Clause***1.2.3, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

1.4.3. Late Bids

1.4.3.1. The e-tendering portal shall allow the bidders to submit bids up to the date and time specified in ITB Clause 1.4.2 as per Server Clock. Bidders are advised to submit their bids well in advance of the deadline for submission of bids to avoid any last minute difficulties.

1.4.4. Withdrawal, Substitution, and Modification of Bids

1.4.4.1. E-tendering portal shall allow modification of bids any time before the deadline for Bid Submission. A bidder may withdraw its bid, by sending a written notice duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ***ITB Clause***1.3.10.1, Notices must be received by the purchaser prior to the deadline prescribed for submission of bids, in accordance with ***ITB Clause*** 1.4.2.

1.4.4.2. No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Technical Bid or any extension thereof.

1.4.5. Bid Opening

1.4.5.1. The Purchaser shall conduct the opening of Technical Bids through online process at the address, date and time specified in the BDS. The Bid Opening Committee shall open the bids received online in the presence of Bidders` designated representatives who choose to attend. The Price Bids will remain unopened until the specified time of their opening.

1.4.5.2. First, physical envelopes marked "WITHDRAWAL" shall be opened and read out and the corresponding bid shall not be considered/ rejected with comments. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal duly signed by an authorized representative and is read out at bid opening.

1.4.5.3. All the Technical Bids shall be opened one at a time, and the following read out and recorded

a. the name of the Bidder;

b. the presence of a Bid Security, if required; and

c. any other details as the Purchaser may consider appropriate.

Only Technical Bids and alternative Technical Bids read out and recorded at bid opening shall be considered for evaluation. No bid shall be rejected at the opening of Technical Bids except for withdrawn bids.

1.4.5.4. The Purchaser shall prepare a record of the opening of Technical Bids that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal and alternate proposals and the presence or absence of a bid security or a bid securing declaration, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record

1.4.5.5. At the end of the evaluation of the Technical Bids, the Purchaser will invite bidders who have submitted substantially responsive Technical Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Purchaser. Bidders shall be given reasonable notice of the opening of Price Bids.

1.4.5.6. The Purchaser shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders` representatives who choose to attend at the address, date and time specified by the Purchaser. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

1.4.5.7. All the Price Bids shall be opened one at a time and the following read out and recorded:

a) the name of the Bidder;

b) the Bid Prices, including any discounts and alternative offers; and

c) any other details as the Purchaser may consider appropriate.

Only Bid Prices and discounts read out and recorded during the opening of Price Bids shall be considered for evaluation. No Bid shall be rejected at the opening of Price Bids.

1.4.5.8. The Purchaser shall prepare a record of the opening of Price Bids that shall include, as a minimum: the name of the Bidder, the Bid Price (per lot if applicable), any discounts. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record

1.5.0 Evaluation and Comparison of Bids

1.5.1. Confidentiality

Information relating to the evaluation of bids and recommendation of contract award shall not be disclosed to Bidders or any other persons not officially concerned with such process.

1.5.1.1. Any attempt by a Bidder to influence the Purchaser in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.

1.5.1.2. Notwithstanding ***ITB Clause***1.5.1.1, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Purchaser on any matter related to the bidding process, it should do so in writing duly signed by an authorized representative.

1.5.2. Clarification of Bids

1.5.2.1. To assist in the examination, evaluation, and comparison of the Technical and Price Bids, and qualification of the Bidders, the Purchaser may, at its discretion, ask any Bidder for a clarification of its bid or submission of any shortfall documents. However, the following may be noted in this regard:

- Any clarification submitted by a Bidder that is not in response to a request by the Purchaser shall not be considered.
- The ***clarification or shortfall documents shall be submitted through the e-tendering portal only***. No other means of communication shall be considered unless specified otherwise.
- No change in the substance of the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the evaluation of the bids, in accordance with ***ITB Clause***1.5.9.

1.5.2.2. If a Bidder does not provide clarifications/shortfall documents of its bid by the date and time set in the Purchaser's request, its bid may be rejected.

1.5.3. Deviations, Reservations, and Omissions

1.5.3.1. During the evaluation of bids, the following definitions apply:

a) "Deviation" is a departure from the requirements specified in the Bidding Document;

b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and

c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

1.5.4. Preliminary Examination of Technical Bids

1.5.4.1. The Purchaser shall examine the Technical Bid to confirm that all documents and technical documentation requested in ***ITB Sub-Clause*** 1.3.3.2 have been provided, and to determine the completeness of each document submitted. If any of these documents or information is missing, ***the Bid may be rejected***.

1.5.4.2. The Purchaser shall confirm that the following documents and information have been provided both as hard copies and along with Technical Bid in the e-tendering portal. The hard copies are to be submitted within the time as specified in the ***IFB***.

a) Letter of Technical Bid;
b) written confirmation of authorization to commit the Bidder (i.e. Notarized Power of Attorney)
c) Registered JV agreement, if applicable

1.5.4.3. Preliminary Requirement of Opening of Technical BIDS

The bidder should submit hard copies of documents mentioned in clause 1.5.4.2 (a), (b), (c) & (d) in separate physical envelope 2(two) hours prior to bid submission deadline.

1.5.5. Responsiveness of Technical Bid

1.5.5.1. The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ***ITB Clause***1.3.3.

1.5.5.2. A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

a) If accepted, would:

(i). affect in any substantial way the scope, quality, or performance of the plant and services specified in the Contract; or

(ii). limit in any substantial way, inconsistent with the Bidding Document, the Purchaser's rights or the Bidder's obligations under the proposed Contract; or

b) If rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

1.5.5.3. The Purchaser shall examine the technical aspects of the Bid submitted in accordance with ***ITB Clause***1.3.6, Technical Proposal, in particular to confirm that all requirements of Section 3 (Purchaser's Requirements) have been met without any material deviation or reservation.

1.5.5.4. If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Purchaser and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

1.5.6. Non material Nonconformity

1.5.6.1. Provided that a Bid is substantially responsive, the Purchaser may waive any nonconformity in the bid that does not constitute a material deviation, reservation or omission.

1.5.6.2. Provided that a Bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial non conformity in the Bid related to documentation requirements. Requesting information or documentation on

such non conformity shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

1.5.6.3. Provided that a Bid is substantially responsive, the Purchaser shall rectify nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method indicated in ***Appendix-2 of ITB (Evaluation and Qualification Criteria)***.

1.5.7. Detailed Evaluation of Technical Bids

1.5.7.1. The Purchaser will carry out a detailed technical evaluation of the bids not previously rejected as being substantially non-responsive, in order to determine whether the technical aspects are in compliance with the Bidding Document. In order to reach such a determination, the Purchaser will examine and compare the technical aspects of the bids on the basis of the information supplied by the bidders, taking into account the following:

a) overall completeness and compliance with the Purchaser's Requirements; deviations from the Purchaser's Requirements; conformity of the goods and services offered with specified performance criteria; suitability of the goods and services offered in relation to the environmental and climatic conditions prevailing at the site; and quality, function and operation of any process control concept included in the bid. The bid that does not meet minimum acceptable standards of completeness, consistency and detail will be rejected for non-responsiveness;

b) type, quantity and long-term availability of mandatory and recommended spare parts and maintenance services; and

c) other relevant factors, if any, listed in ***Appendix to ITB-2 (Evaluation and Qualification Criteria)***.

1.5.8. Eligibility and Qualification of the Bidder

1.5.8.1. The Purchaser shall determine to its satisfaction during the evaluation of Technical Bids whether a Bidder meets the eligibility and qualifying criteria specified in ***Appendix to ITB-2*** **(Evaluation and Qualification Criteria).**

1.5.8.2. The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to relevant ***ITB Clause.***

1.5.8.3. ***An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Purchaser shall not open the Price Bid of the Bidder.***

1.5.9. Correction of Arithmetical Errors

1.5.9.1. During the evaluation of Price Bids, the Purchaser shall correct arithmetical errors on the following basis:

a) where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the former shall prevail and the latter will be corrected accordingly;

b) where there are errors between the total of the amounts of Schedule Nos. 1,& 2, and the amount given in Schedule No. 3 (Grand Summary), the former shall prevail and the latter will be corrected accordingly; and

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

1.5.9.2. If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its bid shall be ***disqualified and its bid security may be forfeited***.

1.5.10. Evaluation of Price Bids

1.5.10.1. The Purchaser shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be used.

1.5.10.2. To evaluate a Price Bid, the Purchaser shall consider the following:

a) the bid price, after including taxes, as quoted in the Price Schedules;

b) price adjustment for correction of arithmetical errors in accordance with ***ITB Clause***1.5.9.1; and

c) the evaluation factors if any indicated in Appendix 2 (Evaluation and Qualification Criteria).

1.5.11. Comparison of Bids

1.5.11.1. The Purchaser shall compare all substantially responsive Bids to determine the lowest evaluated bid, in accordance with ***ITB Clause*** 1.5.10.2.

1.5.12. Purchaser's Right to Accept Any Bid, and to Reject Any or All Bids

1.5.12.1. The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

1.6.0 Award of Contract

1.6.1. Award Criteria

1.6.1.1. The Purchaser shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be eligible and qualified to perform the Contract satisfactorily.

1.6.2. Notification of Award

1.6.2.1. Prior to the expiration of the period of bid validity, the Purchaser shall notify the successful Bidder, in writing, that its bid has been accepted. The notification letter (hereinafter and in the Conditions of Contract and Contract Forms called the "Letter of Acceptance") shall specify the sum that the Purchaser will pay the Contractor in consideration of the execution and completion of the plant and services (hereinafter and in the Conditions of Contract and Contract Forms called "the Contract Price").

1.6.2.2. Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

1.6.3. Signing of Contract

1.6.3.1. Within ***fifteen (15) days*** of receipt of the Letter of Acceptance, the successful Bidder shall be required to sign the Contract Agreement.

1.6.3.2. The contract signing shall take place at the premises of the Purchaser.

1.6.4. Performance Security

1.6.4.1. Within ***fifteen (15) days*** of the receipt of notification of award from the Purchaser, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, using for that purpose the Performance Security Form included in ***Appendix – 4, Section 6 (Contract Forms)***, or another form acceptable to the Purchaser.

1.6.4.2. Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Purchaser may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Purchaser to be qualified to perform the Contract satisfactorily.

APPENDIX TO ITB – 1

Bid Data Sheet (BDS)

A. Introduction

ITB 1.1.1.1	The number of the **IFB** is: ***AEGCL/MD/Tech-802 /AAI/LGBI Ghy/2019/***
	The Purchaser is: ***Assam Electricity Grid Corporation Limited.***
	The name of the Bid is: **Design, Engineering & Supply of 33kV bay terminal equipment for 04 Nos Feeder bay, one each at 132kV Azara, 132kV Sishugram, 132kV Dhaligaon and 400kV Kukurmara GSS of AEGCL".** ***The Bid ID NO:*** **AEGCL/MD/33kV/APDCL/AAI/OIL/2020/BID(Supply)**

ITB 1.2.2.1	For **clarification purposes** only, the Purchaser's address is: Attention: **AGM-VI** **O/O The Managing Director, AEGCL** Street Address: **Bijulee Bhawan, Paltanbazar** Floor/Room number: **First Floor** City: **Guwahati** PIN Code: **781001** Country: **India** Telephone: +91 361 2739520 Facsimile number: +91 361 2739513 Electronic mail address: agm.v.hq.aegcl@gmail.com (Subject: 04 Nos 33kV Bay)
ITB 1.2.2.4	**Purchaser may invite intending Bidders to a pre-bid meeting**, if Purchaser feels it is necessary. The date and time of such pre-bid meeting shall be intimated to intending bidders in due course of time.

ITB 1.3.3.2(i)	The Bidder shall submit with its Technical Bid the following additional documents: 1. Guaranteed and other Technical Particulars as required. 2. Type Test Certificates as required 3. Notarized Manufacturer's Authorization (if applicable).
ITB 1.3.7.1	Unless otherwise specifically indicated, bidders shall quote for the entire plant and services on 'single responsibility basis'.
ITB 1.3.7.5	The prices quoted by the Bidder shall be **FIXED for entire period of the Contract.**
ITB 1.3.8.1	The bid validity period shall be **180 (one hundred eighty)** days.

ITB 1.3.9.1	**The Bidder shall furnish a bid security amounting to Rs. 1,60,000.00**
ITB 1.3.10.1	The bidding is through E-tendering portal and received online, a bidder has to submit hard copies as specified by the Purchaser.
ITB 1.3.10.1	The written confirmation of authorization to sign on behalf of the Bidder shall consist of a written confirmation of Authorization to sign on behalf of the Bidder shall consist of ***Notarized Power of Attorney***.

ITB 1.4.2.1	For **bid submission purposes** only, **(E-tenders shall be accepted through online portal http://assamtenders.gov.in only)** The purchaser's address is: **O/O The Managing Director, AEGCL** Street Address: **BijuleeBhawan, Paltanbazar** Floor/Room number: **First Floor** City: **Guwahati** PIN Code: **781001** **The deadline for bid submission is** Date: **.2019** Time: -**12.00 Hours**
ITB 1.4.5.1	The bid opening of Technical Bids shall take place at **Office of The Managing Director, AEGCL** Street Address: **Bijulee Bhawan, Paltanbazar** Floor/Room number: **First Floor** City: **Guwahati (Assam)** PIN Code: **781001** Country: **India** Date: **.2019** Time: **12:00 Hours**

APPENDIX TO ITB - 2

Evaluation and Qualification Criteria (ECQ)

This Appendix contains all the criteria that the Purchaser shall use to evaluate bids and qualify Bidders. In accordance with ITB 1.5.7 and ITB 1.5.8, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 2 (Bidding Forms).

Table of Criteria

1. Evaluation

1.1 Technical Evaluation

In addition to the criteria listed in ITB 1.5.7.1 (a) – (c), no other factor shall apply.

1.2 Economic Evaluation

Any adjustments in price that result from the procedures outlined below shall be added, for purposes of comparative evaluation only, to arrive at an "Evaluated Bid Price." Bid prices quoted by bidders shall remain unaltered.

1.2.1 Quantifiable Deviations and Omissions

Quantifiable Deviations and Omissions from the contractual obligations: No financial assessment shall be made by the Purchaser for deviations and omissions from the requirements of the Bidding Document. All such deviations, omissions or reservations s[hall be dealt with in accordance with ITB Clauses 1.5.5.2, 1.5.5.3, 1.5.5.4, 1.5.6.1, 1.5.6.2,1.5.6.3,1.5.7.1(a)and1.5.9.

1.3 Time Schedule

Time to complete Works from the Commencement Date specified in **Article 3** of the Contract Agreement for determining time for completion of the works is **06 months.** Bids not meeting the above time schedule shall be rejected. However, no credit will be given for earlier completion.

1.4 Specific additional criteria

In addition to the above, no additional criteria shall be considered for evaluation of Bids.

2.0 Qualification

Qualification of bidder will be based on meeting the minimum pass / fail criteria specified below

2.1 General

The Bidder must satisfy the requirement of ITB Sub-Clause 1.1.2 and shall submit necessary document as per the said Clause.

2.1.1 The Bidder who is not a manufacturer of equipment(s) as required for in this bid for execution of the works shall submit ***an undertaking using 'Form-MA' (Manufacturer's Authorisation - Notarized), Section-2 (Bidding Form).***

2.2 Pending Litigation:

Using the 'Form LIT– 1' (Section 4, Bidding Form), bidder shall list all Pending Litigation.
All pending litigation shall be treated as resolved against the Bidder and so shall in total not represent more than **50% percent** of the Bidder's net worth.

2.3 Financial Situation

Criteria	**Compliance Requirements**				**Documents**
Requirement	Single Entity	Joint Venture			
		All Partners Combined	Each partner	One partner	Submission Requirements

2.3.1 Historical Financial Performance

Submission of audited balance sheets or other financial statements acceptable to the Purchaser, 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, a Bidder's net worth calculated as the difference between total assets and total liabilities should be positive	Must Meet Requirement	Not Applicable	Must Meet Requirement	Not Applicable	Form **'FIN-1'** With attachments

2.3.2 Average Annual Turnover.

Minimum **average annual turnover** of **Rs.60,00,000.00** calculated as total certified payments received for contracts in progress or completed, within the **last 3 years**.	Must Meet Requirement	Must Meet Requirement	25% Minimum	Must meet 40% of the requirement (lead partner)	Form **'FIN-2'**

2.3.3 Financial Resources/Cash Flow

Using Forms **FIN – 3** Section 4 (Bidding Forms) the Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet the **cash-flow requirement**, of **Rs.24,00,000**	Must Meet Requirement	Must Meet Requirement	25% Minimum	Must meet 40% of the requirement (lead partner)	Form **'FIN-3'**

2.4 Experience

2.4.1 General Experience

Criteria	**Compliance Requirements**				**Documents**
Requirement	Single Entity	Joint Venture			
		All Partners Combined	Each partner	One partner	Submission Requirements

Experience as a contractor/Partner in a JV/ sub contractor for work(s)/ contract(s) in last 5 (five) years as on bid submission deadline.	Must meet requirement	Not applicable	Must meet requirement	Not applicable	Form EXP- 1

2.4.2 **Specific Experience**

(a) Contracts of Similar Size and Nature

Criteria	**Compliance Requirements**				**Documents**
Requirement	Single Entity	Joint Venture			
		All Partners Combined	Each partner	One partner	Submission Requirements
Participation as contractor (partner in a JV or as subcontractor) in at least **1(one)** contract within the last 5 (five) years that have been successfully completed, where the contract consisted of following works: ***Supply of Bay terminal equipment of 33kV voltage class or above***	Must meet requirement	Must meet requirement	Not applicable	Must meet requirement	Form EXP – 2

2.5 Manufacturers

Manufacturers for the major items to be supplied such as, **CB, CT, PT, LA, Isolators (both with & without E/S), C&R panels** must meet the minimum criteria, herein listed.

1) The Manufacturer of equipment must have **at least 5 (five) years'** experience of manufacturing similar rated equipment as on date of bid opening. Using Forms EXP – 1 of Section 4 (Bidding Forms) the Bidder must furnish necessary information along with supporting documents (e.g., copy of contracts, performance & completion certificate, etc.) in support of this clause.

2) The Manufacturer of equipment must have designed, manufactured and tested as per IS/IEC or equivalent standard and supplied the equipment and which are in satisfactory operation for at least **03 (three) years** as on the date of bid opening. Using Forms EXP – 2 of Section 2 (Bidding Forms) the Bidder must furnish necessary information along with supporting documents **(e.g., copy of contracts, performance & completion certificate, valid type test reports etc.)** in support of this clause.

*****The performance certificate shall be in proper official letter pad with issue No and Date. It shall also contain the detail of work or supplies made along with the Work/Supply order No. and Date.***

NOTE: The bidder complying above requirements must submit with his bid the following documents to substantiate the requirements of this clause:

(i) Manufacturer must have production facility in India.

(ii) Manufacturer's authorization for the major items using the form provided in Section 2 (Bidding Forms). The Bidder is responsible for ensuring that the manufacturer or producer complies with the requirements of bidding document and meets the minimum criteria listed above for that item.

(iii) Type test certificates.

(iv) Manufacturer's experience list.

(v) GTP of all the equipment to be supplied.

(vi) Performance & Completion certificates should not be older than 8 (Eight) years on the date of opening of the technical bid.

2.6 Bidders are free to list more than one manufacturer against each item of the plant and services. However, necessary documents as mentioned in clause 2.5 must be furnished with the bid against each such manufacturer. Quoted rates and prices will be deemed to apply to whichever manufacturer is appointed, and no adjustment of the rates and prices will be permitted.

Section - 2

BIDDING FORMS

This Section contains the forms that are to be completed by the Bidder and submitted as part of his Bid.

1 Letter of Technical Bid

[Bidder's Letterhead]

Date: .....

Bid Identification No (s): .....

: .....

: .....

: .....

Invitation for Bid No.: .....

To:.....

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 1.2.3;

(b) We offer to design, manufacture, test and deliver, in conformity with the Bidding Document the following Goods and Related Services: . . . . . .

(c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of . . . . . days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period

Name .....

In the capacity of .....

Signed .....

.....

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

Date .....

.....

2 Letter of Price Bid

(***TO BE FURNISHED FOR EACH PACKAGE SEPARATELY)***

(NOT REQUIRED FOR E-TENDERING)

[Bidder's Letterhead]

Date: .....

Bid Identification No: .....

Invitation for Bid No.: .....

To:.....

We, the undersigned, declare that:

(i). We have examined and have no reservations to the Bidding Document, including Addenda issued in accordance with Instructions to Bidders (ITB) 1.2.3;

(ii). We offer to design, manufacture, test and deliver in conformity with the Bidding Document the following Goods and Related Services: . . . . . ;

(iii). The total price of our Bid is the sum of: ……,

(iv). Discount offered (if any) for (i) Supply (Schedule 1) ……%, and (ii) Related Services (Schedule 2, F& I,)…….....%

(v). Our bid shall be valid for a period of ..... days from the date fixed for the submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(vi). If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;

(vii). 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; and

(viii). We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Name .....

In the capacity of .....

Signed .....

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

Date .....

3 Price Schedules

PREAMBLE

General

1. The Price Schedules are divided into separate Schedules as follows:

   Schedule No. 1: Supply of Goods.
   Schedule No. 1(a): Freight & Insurance.

2. The entered rates and prices shall be deemed to cover the full scope as specified in the bidding document, including overheads and profit.
3. If bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ***ITB*** 1.2.2 prior to submitting their bid.

Pricing

4. Prices shall be filled in indelible ink/ on-line and any alterations necessary due to errors, etc., shall be initialed by the Bidder if asked for hardcopy.
5. Bid prices shall be quoted on-line in the manner indicated in Schedules.

   As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract.

   Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Purchaser's Requirements) or elsewhere in the Bidding Document.

NOTE: For E-Tendering please fill in the price details in the BoQ (Price Schedule) provided in the e – tendering portal.

*******The rates entered should be excluding GST**

4 Format of Bid Security

Bank Guarantee

(To be stamped in accordance with Stamp Act)
(The non-Judicial Stamp Paper should be in the name of issuing Bank)

..... ***Bank's Name and Address of Issuing Branch or Office .....***

Beneficiary: ***..... Name and Address of Purchaser .....***

Date: .....

Bid Security No.: .....

We have been informed that . . . . . ***name of the Bidder***. . . . . (Hereinafter called "the Bidder") has submitted to you its bid dated . . . . . (Hereinafter called "the Bid") for the execution of . . . .***Name & Identification No of Bid*** . . . . . under Invitation for Bids No. . . . . ("The IFB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we . . . . . ***name of Bank***. . . . . hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of . . . . . .***amount in figures*** . . . . . (. . . . . .***amount in words*** . . . . .) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Form of Bid; or

(b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or

(c) having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB.

This guarantee will expire: (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the performance security issued to you upon the instruction of the Bidder; and (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy your notification to the Bidder of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of the Bidder's bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

. . . . . ***.Bank's seal and authorized signature(s)*** . . . . . .

Note: All italicized text is for use in preparing this form and shall be deleted from the final document

5 Contract Execution Schedule

The Bidder shall indicate here his proposed Contract Execution Schedule if the contract is awarded to him. The Schedule shall match with the time for completion specified.

6 Bidders Qualification

To establish its qualifications to perform the contract in accordance with Appendix 2 of ITB (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

6.1 Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents. ❑ 1. In case of single entity/firm, documents, in accordance with ITB 1.1.2.1. ❑ 2. In case of single Company, documents, in accordance with ITB 1.1.2.2.	

6.2 Form LIT - Pending Litigation

Each Bidder must fill in this form

Pending Litigation

- ☐ **No pending litigation in accordance with Criteria 2.1.3 of Appendix 2 of ITB (Evaluation and Qualification Criteria)**
- ☐ **Pending litigation in accordance with Criteria 2.1.3 of Appendix 2 of ITB(Evaluation and Qualification Criteria)**

Year	Matter in Dispute	Value of Pending Claim in Rupees	Value of Pending Claim as a Percentage of Net Worth

6.3 Form FIN - 1: Financial Situation

Each Bidder must fill in this form

Financial Data for Previous 3 Years [Rupees]		
Year 1:	**Year 2:**	**Year 3:**

Information from Balance Sheet

Total Assets			
Total Liabilities			
Net Worth			
Current Assets			
Current Liabilities			

Information from Income Statement

Total Revenues			
Profits Before Taxes			
Profits After Taxes			

- ❑ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last three years, as indicated above, complying with the following conditions.
  - All such documents reflect the financial situation of the Bidder or partner to a JV, and not sister or parent companies.
  - Historic financial statements must be audited by a certified accountant.
  - Historic financial statements must be complete, including all notes to the financial statements.
  - Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

6.4 Form FIN - 2: Average Annual Turnover

Each Bidder must fill in this form

Year	Amount (Rupees)
Average Annual Turnover	

The information supplied should be the Annual Turnover of the Bidder in terms of the amounts billed to clients for each year for contracts in progress or completed.

6.5 Form FIN – 3: Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total cash flow demands of the subject contract or contracts as indicated in **Appendix 2 of ITB** (Evaluation and Qualification Criteria) with necessary supporting documents.

Financial Resources		
No.	**Source of financing**	**Amount (Rupees)**
1		
2		
3		

6.6 Form EXP – 1: General Experience

Each Bidder must fill in this form

General Experience				
Starting Month Year	**Ending Month Year**	**Years**	**Contract Identification and Name Name and Address of Purchaser Brief Description of the Works Executed by the Bidder**	**Role of Bidder**

6.7 Form EXP – 2: Specific Experience

Fill up one (1) form per contract.

Contract of Similar Size and Nature			
Contract No. . . . . .**of**.	**Contract Identification**		
Award Date		**Completion Date**	
Role in Contract	❑ **Contractor**		❑ **Subcontractor**
Total Contract Amount	**(Rupees)**		
Purchaser's Name **Address** **Telephone/Fax Number** **E-mail**			
1. Brief Specification of Goods supplied **2. Date of commissioning.**			
Attached are copies of the following original documents. ❑ 1. Type Test Certificates. (Not older than five years on the date of Technical Bid opening) ❑ 2. Recent performance certificates (Not older than five years on the date of Technical Bid opening) ❑ 3. Copy of the Contract Document.			

7 Manufacturer's Authorization

[***The Bidder, in pursuant to ECQ Clause 2.1.2 (if applicable) shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. Please refer to notes at bottom]***

(Manufacturer's Letterhead)

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

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

To: [Insert: full name of Purchaser]

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

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

We hereby extend our full guarantee and warranty in accordance with ***Clause 6.9.0*** of the Special Conditions of Contract, for the above specified Goods supporting the Supply of specified Goods and fulfilling the Related Services by the Bidder against this Bidding Documents, and duly authorize said Bidder to act on our behalf in fulfilling these guarantee and warranty obligations. We also hereby declare that, we will furnish the Performance Guarantee in accordance with ***SCC Clause.*** Further, we also hereby declare that we and ……, *[insert: **name of the Bidder**]* have entered into a formal relationship in which, during the duration of the Contract (**including related services and warranty / defects liability**) we, the Manufacturer or Producer, will make our technical and engineering staff fully available to the technical and engineering staff of the successful Bidder to assist that Bidder, on a reasonable and best effort basis, in the performance of all its obligations to the Purchaser under the Contract.

For and on behalf of the Manufacturer

Signed: _____

Date: _____

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

Date:.....

Place:.....

(Signature).....…….....……..

(Printed Name).....…….

(Designation).....…….....

(Common Seal)…….....…..….....

Notes:

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

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

Section - 3

Employer's Requirements

(This Section contains the Technical Requirements and supplementary information that describe the Goods and Related Services)

Section 3
Employer's Requirements

3.1.0 Scope of Works

3.1.1. **The scope of works covers -** Design, engineering, manufacture and supply of 33kV Bay terminal equipments along with related accessories for 132kV Azara, 132kV Sishugram, 132kV Dhaligaon and 400kV Kukurmara GSS of AEGCL .

The brief description of the scope covered under this bidding document is furnished below:

- Design, engineering, manufacture, assembly and testing at manufacturer's works of 33kV terminal equipments and different substation materials.
- Loading at manufacturer's works, transportation and delivery at respective substation sites, including unloading at destination sites.

3.1.2. The Bill of Quantities for indicative purposes is furnished in Price Schedules of Section-2 (Vol-I) of this bidding document. The BOQ is as per BOQ Schedules attached in the online e-tender document.

3.1.3. The quantities in the above Annexure are provisional in nature and for bid comparison purpose only. Quantities may vary to the extent of (+) 20 % to (-) 20% in terms of Contract Price.

3.1.4. The bidder on its own responsibility may visit and examine the Site of Works and its surroundings and obtain information that may be necessary for preparing the bid. Any permits or licenses that may be required to execute the works should also be obtained by the contractor.

3.1.5. **The items mentioned in these Annexures shall only be used while quoting the bid prices. Any other items not specifically mentioned in the specification but which are required for installation, testing, commissioning and satisfactory operation of the cable as per Indian Standards/IE Rules/IE Act and concerned authority regulations are deemed to be included in the scope of the specification and no deviation in this regard shall be accepted**

No modifications/additions/ deletions shall be made by the bidder to the items and quantities given in these schedules.

3.2.0 Contractor to Inform Himself Fully

3.2.1. The contractor 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.

3.2.2. The Employer shall not be responsible for any misunderstanding or incorrect information obtained by the contractor other than information given to the contractor in writing by the Employer.

3.3.0 Service Conditions

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

a) Peak ambient day temperature in still air : 45°C
b) Minimum night temperatures : 0°C
c) Reference ambient day temperature : 45°C

d) Relative Humidity a) Maximum	: 100 %
b) Minimum	: 10 %
e) Altitude	: Below 1000 M above MSL
f) Maximum wind pressure	: As per IS: 802 latest code.
g) Seismic Intensity	: ZONE-V as per IS 1893.

3.4.0 Conformity with Indian Electricity Rules & Other Local Regulations

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

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

3.4.3. 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.

3.6.0 Standards

3.6.1. 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.

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

3.6.3. Equipment conforming to other international or authoritative Standards which ensure equivalent or better performance than that specified under Clause 3.6.0 above shall also be accepted. In that case relevant extracts of the same shall be forwarded with the bid.

3.7.0 Engineering Data

3.7.1. The furnishing of engineering data by the Contractor shall be in. accordance with the Bidding Document. The review of these data by the Employer 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 Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified
under these specifications.

3.7.2. All engineering data submitted by the Contractor after review by the Employer shall or part of the contract document.

3.8.0 Drawings and Documents for Approval

3.8.1. All necessary drawings and documents required for completion of the project is to be submitted by the contractor for approval. The drawings provided with bid (if any) are for indicative purpose only and fresh drawings are to be prepared by the contractor as per actual site condition after survey. The drawings and documents are to be approved by AEGCL.

3.8.2 All drawings submitted by the Contractor 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.

3.8.3. Each drawing submitted by the Contractor shall be clearly marked with the name of the Employer, 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.

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

3.8.5. The Contractor shall perform the work strictly in accordance with these drawings and no deviation shall be permitted without the written approval of the Employer, if so required.

3.8.6. All manufacturing, fabrication and erection work under the scope of Contractor prior to the approval of the drawings shall be at the Contractor's risk. The contractor may make any changes in the design which are necessary to conform to the provisions and intent of the contractor and such changes will again be subject to approval by the Employer.

3.8.7. The approval of the documents and drawings by the Employer shall mean that the Employer is satisfied that:
a) The Contractor has completed the part of the Works covered by the subject document (i.e. confirmation of progress of work).
b) The Works appear to comply with requirements of Specifications.
In no case the approval by the Employer of any document does imply compliance with neither all technical requirements nor the absence of errors in such documents. If errors are discovered any time during the validity of the contract, then the Contractor shall be responsible of their consequences.

3.8.8. All drawings shall be prepared using AutoCAD software version 2000 or later only. Drawings, which are not compatible to AutoCAD software version 2000 or later, shall not be acceptable. After final approval all the drawings shall be submitted to the Employer in readable CD's

3.8.9. The following is the general list of the documents and drawings that are to be approved by the Employer:
(i) General arrangement drawing with full dimensions.
(ii) Electrical schematic diagram, where applicable.
(iii) Wiring diagram, where applicable.

3.8.10. All Designs/Drawings/Calculations/Data submitted by the contractor, from time to time shall become the property of the Employer and Employer has the right to use or replicate such designs for future contracts / works without the permission of the Contractor. The Employer has all rights to use/ offer above designs/drawings/data sheets to any other authority without prior Permission of the Contractor.

3.9.0 Final Drawings and Documents

3.9.1. The successful Contractor shall require to provide following drawings and documents for each bay constructed in printed form:
(a) All approved drawings (AS BUILD) of equipment and works related to a particular bayin three (3) copies.

(b) Instruction manuals of all equipment related to a particular bay in three (3) copies.
These instruction manuals shall generally consist of-

(i) Operation Manuals,

(ii) Maintenance Manuals and

(iii) Spare Parts Bulletins.

(c) Copies of routine test reports (in triplicate) of relevant equipment.
(d) Final Guaranteed and Other technical particulars of relevant equipment.

3.9.2. In addition to the above the Contractor shall provide five (5) sets of all the drawings and documents toEmployer in printed form for his reference and record.

3.10.0 Application System Software

3.10.1. Contractor shall provide copies of licensed copies of application software / configuration & system software in the form of CD (in duplicate) for all IEDs, meters, SAS etc.

3.11.0 Quality Assurance, Inspection & Testing

3.11.1. To ensure that the supply and services under the scope of this Contract whether manufactured or performed within the Contractor's works or at his Sub Contractor'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 Employer after discussions before the award of Contract. A quality assurance programme of the Contractor shall generally cover but not limited to the following:

a) His organization structure for the management and implementation of the proposed quality assurance programme
b) Documentation control System.
c) Qualification data for Contractors key personnel.
d) The procedure for purchases of materials, parts components and selection of sub-Contractors services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.
e) System for shop manufacturing including process controls and fabrication and assembly controls.
f) Control of non-conforming items and system for corrective action.
g) Control of calibration and testing of measuring and testing equipment.
h) Inspection and test procedure for manufacture.
i) System for indication and appraisal of inspection status.
j) System for quality audits.
k) System for authorizing release of manufactured product to the Employer.
l) System for maintenance of records.
m) System for handling storage and delivery and
n) 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 Employer after incorporating necessary corrections by the Contractor as may be required.

3.11.2. **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 Employers inspection of equipment/material.

The Employer 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.

3.12.0 Employer's Supervision

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

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

a. Interpretation of all the terms and conditions of these Documents and Specifications.

b. Review and interpretation of all the Contractors drawings, engineering data etc.

c. Witness or authorize his representative to witness tests at the manufacturer's works or at site, or at any place where work is performed under the contract.

d. Inspect, accept or reject any equipment, material and work under the Contract, in accordance withthe 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, and

g. Supervise the Quality Assurance Programme implementation at all stages of the works.

3.12.3. **Inspection and Inspection Certificate**

3.12.4. 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.

3.12.5. 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 labour, 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.

3.12.6. 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 in pursuance to ***Clause 3.13.3***. 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) in pursuance to this Clause. However, these type test charges shall not be taken into account in comparing Price Bid.

3.12.7. 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.

3.12.8. **Tests**

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

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

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

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

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

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

3.12.9. 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.

3.12.10.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.

3.13.0 Type Test Reports

3.13.1. 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.

3.13.2. All Bids must be accompanied by the Type Test Certificates of materials offered (refer Clause 3.13.5below). Such type test certificates shall be acceptable only if:-

(a) Tests are conducted in an independent **testing laboratory with NABL accreditation**, or

(b) Tests are conducted in manufacturer's own laboratory.

In this case (i) the laboratory must have **NABL accreditation**; and

(ii) tests have been witnessed by technically qualified representatives of earlier clients or purchaser.

3.13.3. **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.**

3.13.4. **Type Test Reports older than five (5) years on the date of Technical bid opening shall not be accepted.**

3.14.0 Guaranteed Technical Particulars

3.14.1. The Guaranteed Technical Particulars of the various items shall be furnished by the Bidders with the Technical Bid in the prescribed Schedules attached in Volume-2 of the 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.

3.14.2. 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 what so ever shall be given to the bidder offering better/more stringent values than those required as per specification except where stated otherwise.

3.15.0 Construction Tools, Equipment Etc.

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

3.16.0 Materials Handling and Storage

3.16.1. 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.

3.16.2. 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.

3.16.3. 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.

3.16.4. 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.

3.16.5. All the materials stored in the open or dusty location must be covered with suitable weather-proof and flameproof covering material wherever applicable.

3.16.6. The Contractor shall be responsible for making suitable indoor storage facilities, to store all items/materials, which require indoor storage.

3.16.7. 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.

3.17.0 Contractor's Materials brought on to Site

3.17.1. The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the work under intimation to the Engineer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Engineer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

3.17.2. The Employers shall have a lien on such goods for any sum or sums, which may at any time, be due or owing to him by the Contractor, under in respect of or by reasons of the Contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose of any such goods, in such manner, as he shall think fit including public auction or private treaty.

3.17.3. After the completion of the Works, the Contractor shall remove from the Site under the direction of the Employer's site representative, the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Employer's site representative. If the Contractor fails to remove such materials within fifteen (15) days of issue of a notice by the Employer's site representative, the Employer's site representative shall have the liberty to dispose of such materials as detailed under clause **3.17.2** above and credit the proceeds thereto to the account of the Contractor.

3.18.0 Commissioning Spares

3.18.1. It will be the responsibility of the Contractor to provide all commissioning spares required for initial operation till the Employer declares the equipment as ready for commissioning. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.

3.18.2. These spares shall be received and stored by the Contractor at least 1 month prior to the schedule date of commencement of commissioning of the respective equipment and utilized as and when required. The unutilized spares and replaced parts, if any, at the end of successful completion of performance and guarantee test shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer's Representative.

3.19.0 Consignee Details

3.19.1 The Contractor shall supply the materials at four different substations situated at separate locations, i.e, 132kV Azara, 132kV Sishugram, 132kV Dhaligaon and 400kV Kukurmara GSS. The details of materials to be delivered at each substation is as follows:

SL	**Item Details**	**Unit**	400kV Kukurmara GSS	132kV Azara GSS	132kV Sishugram GSS	132kV Dhaligaon GSS
1.0	33kV Gang Operated VCB	Set	1	1	1	1
2.1	33kV, 400-200/1-1 A, 2 core CT	Nos	3	3	3	3
2.2	Marshalling Box for CT	Nos	1	1	1	1
3.1	33kV, PT	Nos	0	0	3	3
3.2	Marshalling Box for PT	Nos	0	0	1	1
4.1	33kV Motorised Isolator with E/S	Nos	1	1	1	1
4.2	33kV Motorised Isolator without E/S	Nos	1	1	1	1
5	Supply of **33kV Lightning Arrestor** with surge monitor and all accessories as required including terminal connectors.	Nos	3	3	3	3
6	Supply of **33kV Post insulator** along with terminal connectors.	Nos	2	2	2	2
7	**33kV equipment mounting structures, complete with all nuts and bolts.**					
7.1	33kV CT	set	3	3	3	3
7.2	33kV PT	set	0	0	3	3

7.3	33kV motor operated Isolator With earth switch	set	1	1	1	1
7.4	33kV motor operated Isolator Without earth switch	set	1	1	1	1
7.5	33kV LA	set	3	3	3	3
7.6	33kV PI	set	2	2	2	2
8	**Supply of 33kV feeder Control & Relay Panel (with BCU)**					
8.1	Simplex Type, capable of integration into **ERL SAS**	Set	0	0	1	0
8.2	Simplex Type, capable of integration into **ABB SAS**	Set	1	0	0	1
8.3	Simplex Type, capable of integration into **Siemens SAS**	Set	0	1	0	0
8.4	Managed Ethernet switch with OF patch for SAS	Nos	1	1	0	0
9	Supply of **3ph, 4 wire Energy meter** (Class-0.2)	Nos	1	1	1	1
10	**Supply of armoured Power Cables**					
10.1	2C, 6 sqmm	m	200	200	50	100
10.2	4C, 16 sqmm	m	200	200	100	100
10.3	3 1/2 C, 35 sqmm	m	200	200	250	250
11	**Supply of armoured Control Cables (Copper)**					
11.1	4C, 2.5 sqmm	m	200	200	250	500
11.2	7C, 1.5 sqmm	m	200	200	250	250
11.3	12C, 1.5 sqmm	m	200	200	250	250
11.4	19C, 1.5 sqmm	m	200	200	250	250
12	Supply of **AC marshalling KIOSK** capable of feeding 02 nos 33kV bay equipments.	Nos	1	1	1	1
13	**Supply of 33kV Swithchyard Structures**					
13.1	Coulmn : Type - T13 - 2 Nos (0.760MT approx)	MT	0	0	1.520	1.520
13.2	Beam: Type - B-8 - 1 No.(0.402MT approx)	MT	0	0	0.402	0.402
13.3	I beam section: (2MT per Pole) – height 10m	Nos	0	0	0	4
13.4	Channels & Angles for I Beam section including nuts and bolts.	MT	0	0	0	1
14	**Clamp Connectors etc.**					
14.1	UPG Clamps (Panther to Zebra)	Nos	0	0	12	0
14.2	UPG Clamps (Panther to MOOSE)	Nos	12	12	0	0
14.3	UPG Clamp Zebra	Nos	0	0	0	12
15	Supply of **ACSR Conductor**	km	0.150	0.150	0.200	0.300
16	Supply of **Havells, 60 W LED lighting se**t with all fittings and clamps for switchyard illumination.	Nos	4	4	4	4
17	**Earth mat Extension and equipment earthing**					

17.1	Main earth mat (65X12mm GI flat)	m	150	150	250	250
17.2	50X6 GI flat earthing conductor for earthing of indoor LT & Control Panels, junction boxe, marshalling box etc.	m	50	50	100	100
17.3	40mm Dia 3m long MS rod earth electrode (driven) with test link for each tower with peak and LA etc.	Nos	6	6	10	10
18	**Mandatory Spares for 33kv Circuit Breaker**					
18.1	Closing Coil	Nos	3	3	3	3
18.2	Tripping Coil	Nos	3	3	3	3
18.3	Spring Charging Motor	Nos	1	1	1	1
18.4	Operating mechanism	Nos	1	1	1	1
19	**Mandatoty Spares**					
19.1	33kV isolator contacts, (01 male & 01 Female = 1 set)	Set	3	3	3	3
19.2	33kV, 400-200/1-1 A, 2 core CT	Nos	1	1	1	1
19.3	33kV LA	Nos	1	1	1	1
19.4	Numerical back up relay	Nos	1	1	1	1
19.5	Master Trip Relay	Nos	1	1	1	1

Section - 4

Technical Specification

(This Section contains the Technical Requirements and supplementary information that describe the Goods and Related Services)

4.1.0 SCOPE AND GENERAL TECHNICAL CONDITIONS

4.1.1 INTENT OF THE SPECIFICATION

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

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

4.1.1.1 SCOPE

The work involves design, engineering, manufacture, assembly, inspection, testing at manufacturer's works before dispatch, packing, supply, including insurance during transit, delivery at site of various equipment and materials including substation steel structures as specified in subsequent Clauses and Sections.

It is not the intent to specify completely herein all details of design and construction of the equipment and accessories. However, the equipment and accessories shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in continuous operation up to the bidder's guarantees in a manner acceptable to the Purchaser. The Purchaser will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance therewith.

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

i) Design & supply of all substation switchgears, control gears and protection equipment as per this bidding document.
ii) Supply of substation/ equipment mounting steel structure, power cables etc as specified.

The various items of supply are described very briefly in the schedule of Bid Form, Prices & Other Schedules and annexure. The various items as defined in these schedules shall be read in conjunction with the corresponding section in the technical specifications including amendments and, additions if any.

The tentative Bill of Quantities is furnished in Section 3: Price Schedules. The BOQ is for indicative purpose only and the bidder is required to fill up the BOQ/price schedule as given in the e-tendering portal.

4.1.2 SUPPLIER TO INFORM HIMSELF FULLY

4.1.2.1 The Supplier should ensure that he has examined the General Conditions, qualifying criteria, Specifications and Schedules as brought out in Volume-1 and this Volume 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.

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

4.1.3 SERVICE CONDITIONS

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

A)	Peak ambient day temperature in still air	: 45^{O} C
B)	Minimum night temperatures	: 0^{O} C
C)	Reference ambient day temperature	: 45^{O} C
D)	Relative Humidity	
	a) Maximum b) Minimum	:100% : 10%
E)	Altitude	Below 1000M above MSL
F)	Maximum wind Pressure	As per IS: 802 latest code
G)	Other data	Refer meteorological date pertaining to the locations.
H)	Seismic intensity	Zone V as per IS 1893

4.1.4 CONFORMITY WITH INDIAN ELECTRICITY RULES & OTHER LOCAL REGULATIONS:

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

4.1.5 STANDARDS

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

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

4.1.5.1.3 Equipment conforming to other international or authoritative Standards which ensure equivalent or better performance than that specified under Clause 1.6.1 above shall also be accepted. In that case relevant extracts of the same shall be forwarded with the bid.

4.1.6 ENGINEERING DATA

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

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

4.1.7 DRAWINGS AND DOCUMENTS FOR APPROVAL

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

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

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

4.1.7.4 Each drawing submitted by the Supplier shall be clearly marked with the name of the Purchaser, the specification title, the specification number and the name of the Project. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be to the scale and in S.I. units.

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

4.1.8 INSPECTION & INSPECTION CERTIFICATE

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

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

4.1.8.3 If desired by the Purchaser, the Supplier shall also carry out type tests as per applicable Standards for which Purchaser shall bear the expenses except in cases where such tests have to be carried out in pursuance to ***Clause 1.18.3***. The Supplier is required to quote unit rates of type test charges in a separate Schedule (if such schedule is provided in the Bidding Document) in pursuance to this Clause. However, these type test charges shall not be taken into account in comparing Price Bid.

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

4.1.8.5 Tests

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

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

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

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

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

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

4.1.8.6 The standards and norms to which these tests will be carried out are specified in subsequent Sections of this Specification. Where a particular test is a specific requirement of this Specification, the norms and procedure of the test shall be as specified or as mutually agreed to between the Supplier and the Purchaser in the Quality Assurance Programme.

4.1.8.7 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.

4.1.9 EMPLOYER'S SUPERVISION

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

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

(a) Interpretation of all the terms and conditions of these Documents and Specifications.

(b) Review and interpretation of all the Contractors drawings, engineering data etc.

(c) Witness or authorize his representative to witness tests at the manufacturer's works or at site, or at any place where work is performed under the contract.

(d) Inspect, accept or reject any equipment, material and work under the Contract, in accordance with the Specifications.

(e) Issue certificate of acceptance and/or progressive payment and final payment certificate.

2.1.10 GUARANTEED TECHNICAL PARTICULARS

2.1.10.1 The Guaranteed Technical Particulars of the various items shall be furnished by the Bidders. 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.

2.1.10.2 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 what *so* ever shall be given to the bidder offering better/more stringent values than those required as per specification except where stated otherwise.

2.1.11 PACKING

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

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

2.1.11.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'up' and 'down' on the sides of boxes, and handling and unpacking instructions as considered necessary. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea.

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

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

2.1.12 CONSTRUCTION TOOLS, EQUIPMENTS ETC.

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

2.1.13 MATERIALS HANDLING AND STORAGE

2.1.13.1 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 theContractor.

2.1.13.2 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.

2.1.13.3 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.

2.1.13.4 All items shall be handled very carefully to prevent any damage or loss. The materials stored shall be properly protected to prevent damage. The materials from the store shall be moved to the actual location at the appropriate time to avoid damage of such materials at Site.

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

2.1.13.6 The Contractor shall be responsible for making suitable indoor storage facilities, to store all items/materials, which require indoor storage.

2.1.13.7 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.

2.1.13.8 The Employer will verify the storage facilities arranged by the contractor and despatch clearance will be provided only after Employer is satisfied.

2.1.14 CONTRACTOR'S MATERIALS BROUGHT ON TO SITE

2.1.14.1 The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the work under intimation to the Engineer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Engineer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage there to

2.1.14.2 The Employers shall have a lien on such goods for any sum or sums, which may at any time, be due or owing to him by the Contractor, under in respect of or by reasons of the Contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose of any such goods, in such manner, as he shall think fit including public auction or private treaty.

2.1.14.3 After the completion of the Works, the Contractor shall remove from the Site under the direction of the Engineer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Engineer. If the Contractor fails to remove such materials within fifteen (15) days of issue of a notice by the Engineer, the Engineer shall have the liberty to dispose of such materials as detailed under clause 1.24.2 above and credit the proceeds thereto to the account of the Contractor.

2.1.15 COMMISSIONING SPARES

1.24.1 It will be the responsibility of the Contractor to provide all commissioning spares required for initial operation till the Employer declares the equipment as ready for commissioning. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.

1.24.2 These spares shall be received and stored by the Contractor at least 3 months prior to the schedule date of commencement of commissioning of the respective equipment and utilized as and when required. The unutilised spares and replaced parts, if any, at the end of successful completion of performance and guarantee test shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer's Representative.

4.2.0 SPECIFICATION FOR DESIGN AND FABRICATION OF SUBSTATION STEEL STRUCTURES

4.2.1 SCOPE

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

4.2.2 MATERIALS

4.2.2.1 Structural Steel

The structures shall be of structural steel conforming to any of the grade, as appropriate, of IS 2062 (latest edition) Steel conforming IS 8500 may also be used.

Medium and high strength structural steels with known properties conforming to any other national or international standards may also be used.

4.2.2.2 Bolts

Bolts used shall conform to IS12427 or bolts of property class 4.6 conforming to IS 6639 may also be used.

High strength bolts, if used (only with steel conforming to IS 8500) shall conform to property class 8.8 of IS 3757.

Foundation Bolts shall conform to IS 5624.

Step bolts shall conform to IS 10238

4.2.2.3 Nuts

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

Nuts to be used with high strength bolts shall conform to IS 6623.

4.2.2.4 Washers

Washers shall conform to IS 2016. Heavy washers shall conform to IS 6610. Spring washers shall conform to type B of IS 3663

Washers to be used with high strength bolts and nuts shall conform to IS 6649.

4.2.2.5 Galvanisation

Structural members, plain and heavy washers shall be galvanized in accordance with the provisions of IS 4759.

Spring washers shall be hot dip galvanized as per service grade 4 of IS 4759 or IS 1537.

4.2.2.6 Other Materials

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

4.2.3 DESIGN PARAMETERS

4.2.3.1 Switchyard structures such as columns, beams and equipment mounting structures shall be designed as per actual site requirement. The drawings are to be submitted for approval prior to supply/execution.
Note: Structures with earth peak shall assume to have four earth wires for design purpose in normal condition.

4.2.3.2 **Spans**

Following Spans shall be considered in design of all structures as applicable:-

a). Line gantries (structures to terminate lines):

(i) For 33 KV Switchyard: 50 Meter, wind & weight span.

b). All other Structures

(i) For 33 KV Switchyard: 20 Meter, wind & weight span.

4.2.4 Deviation Angle

The design of line gantries shall only be checked for a maximum deviation angle of 300 from normal at centre of gantries to Dead End Tower.

4.2.5 Conductors and Shield Wires

a) The Conductor shall conform to IS: 398 (latest edition) except where otherwise specified herein.

The details of the ACSR Moose, ACSR Zebra and ACSR Panther conductors are tabulated below:

	DESCRIPTION	**ACSR 'MOOSE'**	**ACSR 'ZEBRA'**	**ACSR 'PANTHER'**
1	Code name	MOOSE	ZEBRA	PANTHER
2	Number of strands & size	Al: 54/ 3.53 mm	Al: 54/ 3.18 mm	Al: 30/ 3.00 mm
		St: 7/ 3.53 mm	St: 7/ 3.18 mm	St: 7/ 3.00 mm
3	Overall diameter	35.05 MM	28.62 mm	21.00 mm
4	Breaking load	136.38 KN	130.32 kN	130.32 kN
5	Weight of conductor	2004 Kg/KM	1621 kg / km	974 kg / km
6	Co-efficient Of Linear Expansion	23x10-6 /0C	19.35x10-6 /0C	19.35x10-6 /0C
7	Number of strand			
	Steel centre	1	1	1
	1st Steel Layer	6	6	6
	1st Aluminium Layer	12	12	12
	2nd Aluminium Layer	18	18	18
	3rd Aluminium Layer	24	24	-
8	Sectional area of Aluminium	528.50 mm2	428.90 mm2	212.10 mm2
9	Total sectional area	597.00 mm2	484.50 mm2	261.50 mm2
10	Calculated d.c. resistance at 20 C	0.05552 ohm/km	0.06869 ohm/km	0.1400 ohm/km
11	Ultimate tensile strength	161.2 kN	130.32 kN	89.67

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

4.2.6 DESIGN DRAWINGS

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

4.2.6.2 The structural drawings, Bill of materials and shop fabrication drawings for all the structures shall be submitted in four copies and will be finally approved by the Purchaser.

The fabrication shall be taken up from the approved shop drawings.

The overall responsibility of fabricating structure members correctly lies with the Supplier only and the Supplier shall ensure that all the members can be fitted while erecting without any undue strain on them.

4.2.7 ACCESSORIES

4.2.7.1 Step Bolts

Each column/tower shall be provided with step bolts conforming to IS: 10238 of not less than 16mm diameter and 175mm long spaced not more than 450mm apart and extending from 2.5 meters above the ground level to the top. Each step bolt shall be provided with two nuts on one end to fasten the bolt securely to the tower and button head at the other end to prevent the feet from slipping away. The step bolts shall be capable of withstanding a vertical load not less than 1.5 KN.

4.2.7.2 Insulator Strings and Conductor Clamps Attachments

a) Single suspension and tension insulator string assemblies shall be used for stringing busbars For the attachment of Suspension Insulator string, a suitable strain plate of sufficient thickness for transferring the load to the tower body shall be provided. To achieve requisite clearances, if the design calls for providing extra D-shackles, link plate etc. before connecting the insulator string the insulator string the same shall be supplied by the Supplier.

b) At tension points strain plates of suitable dimensions placed on the beams, shall be provided for taking the hooks or D-shackles of the tension insulator strings. To achieve requisite clearances, if the design calls for providing extra D-shackles, link plate etc. before connecting the insulator string the same shall be supplied by the Supplier.

4.2.7.3 Earth wire Clamps Attachment

i. **Suspension Clamp**

The detailed drawing shall be submitted by the Supplier for Purchaser's approval. The Supplier shall also supply U-bolts, D-shackles wherever required.

a) **Tension Clamps**

Earth-wire peaks of tension towers shall be provided with suitable plates to accommodate the shackle of tension clamps. The Supplier shall also supply the U-bolts wherever required and take Purchaser's approval for details of the attachments before the mass fabrication.

4.2.8 FABRICATION

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

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

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

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

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

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

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

g. Minimum Thickness of Tower Members shall be as follows: -

ITEM	Minimum thickness (in mm)
Leg members & main chords of beams in compression	5
Other members	4

4.2.9 Drilling and Punching

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

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

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

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

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

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

4.2.10 Erection mark

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

4.2.11 GALVANIZING AND PAINTING

4.2.11.1 Galvanising of the various members of the structures shall be done only after all works of sawing, shearing, drilling, filling, bending and matching are completed. Galvanising shall be done by the hot dip process as recommended in IIS: 2629 or other such authoritative international standards and shall produce a smooth, clean and uniform coating of not less than 61 0 gm per square meter. The preparation for galvanising and the galvanising process itself must not affect adversely the mechanical properties of the treated materials. No manual Galvanization process will be accepted.

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

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

4.2.12 EARTHING

4.2.12.1 To keep provision in the structures for earthling, holes shall be drilled on two diagonal opposite legs of the towers/columns/mounting structures. The holes shall be suitable for bolting 65 mm X 1 2 mm GII strips and

shall be such that the lower hole is about 350 mm above the ground level, clear of the concrete muffing, for connecting the earthling strip.

4.2.13 TEST AND TEST CERTFICATE

4.2.13.1 Each consignment ready for transportation shall be offered to ASEB for inspection before dispatch giving a minimum time of not less than 30 days. Samples of fabricated structure materials shall be subjected to following tests: -

a) Steel: The structural steel shall conform to IS 226 and IS 8500, BS 4360-1068 or ISO / R 630 other such authoritative international standards. Manufacturer's test certificate shall be submitted for all used steel.

b) Galvanising: The galvanising shall be as per IS 2633 or BS 729 other such authoritative international standards. Zinc coating over the galvanised surfaces shall not be less than 610 gm per square meter.

c) Bolts and nuts: Manufacturer's test certificate as per standard practice shall be submitted.

4.2.14 TEST AT SUPPLIER'S PREMISES

4.2.14.1 The Supplier shall fabricate one specimen structure of each type as soon as possible after placement of order and before starting the bulk fabrication of the structures ordered. It shall be assembled on a foundation as nearly similar as practicable to site and tested with suitable test loads as per specified broken wire condition, multiplied by the corresponding factor of safety to ensure that the design and fabrication complies with the requirements. Each structure shall be capable of withstanding the above-mentioned tests without any injury or any permanent deflection at any part. If any member is found to be weak or damaged the design should be suitably modified and the tower re-tested.

4.2.14.2 After the first lot of the structures manufactured, the members forming one structure of each type shall be selected at random from the lots of similar member and assembled in exactly the same manner as to be done at site. The structure then shall be set on foundation as nearly similar as practicable to site and tested with equivalent test load for which the structure has been designed.

4.2.14.3 No structure or any member thereof, which failed the test shall be supplied.

VACUUM CIRCUIT BREAKERS

SPECIFICATION OF 36 KV OUTDOOR TYPE PORCELAIN CLAD VACUUM CIRCUIT BREAKERS (PCVCB)

4.3 GENERAL TECHNICAL REQUIREMENTS

4.3.1 INTRODUCTION

The circuit breakers should be complete in all respects with insulators, bimetallic connectors, interrupting chamber, operating mechanism control cabinet, interlocks, auxiliary switches indicating devices, supporting structures, accessories, etc., described herein and briefly listed in the schedule of requirements. The scope of supply shall also include necessary special tools and plants required for erection as indicated, if any.

4.3.2 STANDARDS

The circuit breaker shall conform in all respects to the requirements of latest issue of IS/IEC specifications except for modifications specified herein. The equipment manufactured according to any other authoritative standards which ensure an equal or better quality than the provision of IS/IEC specifications shall also be acceptable. The salient point of difference between the proposed standard and provision of these specification shall be clearly brought out in the tender. A copy of English version of such specifications shall be enclosed with the tender.

The list of standards mentioned in this specification and to which the circuit conform is given below:

1.	IEC-62271-100	High Voltage A.C. Circuit Breakers
2.	IEC-60137	Bushing for alternating Voltages above 1000 volts
3.	IEC-60071	Insulation Co-ordination
4.	IEC-60694	Common clauses for high voltages switchgear and control gear standards
5.	IEC-60815	Specification for Creepage distances
6.	IS-13118	Specifications for high voltage alternating current circuit breakers
7.	IS-2099	High voltages porcelain bushings
8.	IS-4379	Identification of the contents of industrial gas cylinders
9.	IS-3072	Installation and maintenance of switchgear
10.	IEC-60267	Guide for testing of circuit breakers with respect to out of phase switching
11.	IS-802	Code of practice for use of structural steel in overhead transmission lines
12.	IEC-17A Study Group Dec.1981	Sealing of interrupters / breakers
13.	IS-1554	PVC insulated cables upto and including 1000 volts
14.	IS-5	Colors for ready mixed paints and channels
15.	Ref.Standard IES	Internal Electro-Technical Commission Bureau Central Data Commission, Elecro Technique International, 1, Ruede Verembe, Geneva, Switzerland

16.	IS	Indian Standard Bureau of India Standard, Manak Bhawan 9, Bahadurshah Zafar Marg, New Delhi – 110 002, India

4.3.3 SERVICE CONDITONS

CLIMATIC CONDITONS

The breakers and accessories to be supplied against this specification shall be suitable for satisfactory continuous operation as per section-I.

AUXILIARY POWER SUPPLY

Auxiliary electrical equipment shall be suitable for operation on the following supply system.

a)	Power Devices (like motors)	:	415 V, 3 phase 4 wire 50 hz, neutral grounded AC supply
b)	DC Alarm, Control and Protective Devices	:	220/110 V/30 V DC, ungrounded 2 wire (Substation wise exact details shall be furnished by the successful bidder after survey)
c)	Lighting	:	240 V, single phase 50 Hz AC supply

Bidder's scope includes supply of interconnecting cables, terminal boxes, etc. The above supply voltage may vary as indicated below and all devices shall be suitable for continuous operation over the entire range of voltages

i)	AC Supply	Voltage + 10% -15% Frequency $\pm$ 5%
ii)	DC Supply	-15% to + 10%

4.3.4 GENERAL REQUIREMENT OF 36 KV/OUTDOOR VACUUM CIRCUIT BREAKERS

The vacuum type circuit breaker shall have vacuum interrupters, designed to provide a long contact life at all currents upto rated making and breaking current during switching operation. The vacuum interrupters sealed for life shall be encapsulated by porcelain insulators for out door installation requirement of the circuit breakers. The offered breakers shall be suitable for out door operation under climatic conditions specified without any protection from sun, rain and dust storm.

The vacuum interrupters of each phase shall be housed in a separate porcelain insulator. The three identical poles shall be mounted on a common base frame and the contact system of three poles should be mechanically linked to provide three pole gang opening/closing for all type of faults.

i) The offered equipment shall be practically maintenance free over a long period.

ii) All mechanical parts and linkages shall be robust in construction and maintenance free, over at least 10,000 switching operations, except for lubrication of pins/articulated joints at interval of 5 years or 5000 operations.
iii) Similar parts shall be strictly interchangeable without special adjustment of individual fittings. Parts requiring maintenance shall be easily accessible, without requiring extensive dismantling of adjacent parts.
iv) The operating mechanism will be self maintained and of proper operation endurance not less than the mechanical life of circuit breaking unit. It shall be spring operated type described hereinafter.
v) The circuit breaker shall be supplied complete with all auxiliary equipment, meant necessary for the safe operation, routine and periodic maintenance. All internal wiring including those of spare auxiliary contacts shall be complete and wired up to terminal blocks.
vi) The breaker shall be totally re-strike free under all duty conditions. The details of any device incorporated to limit or control the rate of rise of re-striking voltage across the circuit breaker contacts shall be stated.
vii) The breaker shall be reasonably quiet in operation and the noise level shall not exceed 140 decibels.
viii) The breaker shall be suitable for three phase re-closing operation.
ix) An operation counter, visible from the ground level even with the mechanism housing closed shall be provided.

4.3.5 FIXED AND MOVING CONTACT

The fixed and moving contacts of the breaker have to ensure permanent full contact during closing. All making and breaking contacts shall be hermetically sealed and free from atmospheric effects.

The main contacts should have low contact resistance.

4.3.6 RECOVERY VOLTAGE AND POWER FACTOR

The circuit breaker shall be capable of interrupting rated power with recovery voltage equal to the rated maximum line to line service voltage at rated frequency and at a power factor equal to or exceeding 0.15. In case of multiple break circuit breaker, devices/method adopted for ensuring uniform voltage distribution across all the breaks shall be indicated and actual voltage distribution recorded during interruption tests shall be furnished with the bid.

4.3.7 RESTRIKING RECOVERY

The complete data for the phase factor, amplitude factor, etc., for rate of rise of re-striking voltage shall be furnished in the tender.

4.3.8 LINE CHARGING INTERRUPTING CAPACITY

The circuit breaker shall be designed so as to be capable of interrupting line charging currents without undue rise in the voltage on the supply side without re-strike and without showing sign of undue strains.

The maximum permissible switching over voltage shall not exceed 2.5 p.u. The guaranteed over voltage, which will not be exceeded while interrupting the rated line charging current for which the breaker is designed to interrupt shall also be stated. The results of the tests conducted along with the copies of the

oscillographs to prove ability of the breakers to interrupt the rated as well as lower values of the line charging current shall be furnished with the tender.

4.3.9 TRANSFORMER CHARGING CURRENT BREAKING CAPACITY

The breaker shall be capable of interrupting inductive currents, such as those occurring while switching off unloaded transformers, without giving rise to undue over voltage and without re-strikes. The maximum over voltage value, which will not be exceeded under such conditions shall be stated in the tender.

4.3.10 BREAKING CAPACITY FOR SHORTLINE FAULTS

The interrupting capacity of the breaker for short line faults shall be stated in the tender. The details of the test conducted for proving the capability of the breaker under a short line fault occurring from one phase to earth conditions shall also be stated in the tender. The rated characteristics for short line faults shall be in accordance with stipulation contained in clause 4.105 of IEC 62271-100.

4.3.11 AUTOMATIC RAPID RECLOSING

36 kV circuit breaker shall be suitable for 3 pole rapid re-closing.

4.3.12 OUT OF PHASE SWITCHING

The circuit breaker shall be capable of satisfactory operation even under conditions of phase opposition that may arise due to faulty synchronization. The maximum power that the breaker can satisfactorily interrupt under “Phase Opposition” shall be stated in the bid”.

4.3.13 TEMPERATURE RISE

The maximum temperature attained by any part of the equipment when in service at side and under continuous full load conditions and exposed to the direct rays of the sun shall not exceed the permissible limits fixed by IEC. When the standards specify the limits of temperature rise these shall not be exceeded when corrected for the difference between ambient temperature specified in the approved specification.

The limits of temperature rise shall also be corrected for altitude as per IEC and stated in the bid.

4.3.14 INSULATORS SUPPORTS AND HOUSING

The porcelain used shall be homogenous, free from cavities and other flaws. The insulators shall be designed to have ample insulation, mechanical strength and rigidity for satisfactory operation under conditions specified above.. The puncture strength of bushing shall be greater than the flash over value. The design of bushing shall be such that the complete bushing in a self-contained unit and no audible discharge shall be detected at a voltage upto a working voltage (Phase Voltage) plus 10%. The support insulator shall conform to IEC-60137. Minimum clearance between phases, between live parts and grounded objects shall be as per IS-3072-1975 and should conform to Indian Electricity Rules-1956. The minimum creepage distance for severely polluted atmosphere shall be 25 mm/KV as per IEC-815-1985.

The details for atmospheric pollution of various sub-stations where these breakers are to be installed shall be as per Clause 1.3.1 of this specification. The air clearance of bushing should be such that if the bushings

were tested at an altitude of less than 1000 meters, air clearance would withstand the application of higher voltages (IS-2099-1973 para 6.1). In order to avoid breakdown at extremely low pressures the support insulators should not be covered by moisture and conducting dust. Insulators should therefore be extremely clean and should have antitracking properties. Sharp contours in conducting parts should be avoided for breakdown of insulation. The insulators shall be capable to withstand the seismic acceleration of 0.3 g in horizontal direction.

4.3.15 OPERATING MECHANISM GENERAL REQUIREMENTS

The operating mechanism shall be stored energy type and capable of giving specified duty of the breaker (sequence of opening and closing) as specified under O-0.3 sec-CO-3 min-CO. The breaker shall also pass the operational test which ascertains the capabilities of operating mechanism. The operating mechanism shall be capable to perform the following functions efficiently.

i) To provide means where the circuit breaker can be closed rapidly, at all currents from zero to rated making current capacity.
ii) To hold the circuit breaker in closed position by toggles or latches till the tripping signal is received.
iii) To allow the circuit breaker to open without delay immediately on receiving tripping signal.
iv) To perform auto re-closure duty cycle.
v) To perform the related functions such as indication, contacts, etc.

Operating mechanism should also be suitable for three phase auto re-close duty. The closing spring shall be automatically charged by motor immediately after closing operation. In case of failure of supply to the spring charging motor, the spring shall be chargeable by hand-crank.

a) **TRIPPING/CLOSING COILS**

The circuit breakers shall be provided with two trip coils and one closing coil per breaker. First trip coil shall be utilized for tripping the breaker on main protection fault detection. Whereas second trip coil shall be used to trip the breaker when first trip coil fails to trip the breaker and backup protection comes into operation and shall also be used to trip the breaker on command. Provision shall be given for trip circuit supervision both in pre close and post close condition of the breaker. All the breakers shall have provision for independent electrical operation of trip coils from local as well as remote through local/remote selector switch.

b) **TRIP FREE FEATURES**

When the breaker has been instructed to close by manual instructions using push button, the operating mechanism will start operating for closing operations. If in the mean time a fault has taken place, the relay provision shall be such that it should close the trip circuit simultaneously interrupting the live circuit of closing coil which has been instructed for close command.

The trip free mechanism shall permit the circuit breaker to be tripped by the protective relay even if it is under the process of closing. An anti-pumping device to prevent the circuit breaker from reclosing after an automatic opening shall be provided to avoid the breaker from pumping i.e., anti pumping relay should interrupt the closing coil circuit.

c) **Controls**

The circuit breaker shall be controlled by a control switch located in the control cabinet . The control arrangement shall be such as to disconnect the remote control circuits of the breaker, when it is under test. Local control devices, selector switch and position indicator shall be located in weather and vermin-proof cabinet with degree of protection not less than IP-55. The circuit breaker control scheme shall incorporate trip circuit supervision arrangement. Local/remote selector switch shall be provided for all breakers for selection of "Local" control/remote control.

Provision shall be made for local manual, electrical and spring controls. Necessary equipment's for local controls shall be housed in the circuit breaker cabinet of weather-proof construction. In addition to this, a hand closing device for facilitating maintenance shall also be provided.

Each circuit breaker shall have a mechanical open/closed and spring charge indicator in addition to facilities for provisions for semaphore indicators for breakers which are required for the mimic diagram in the control room. Lamps for indicating, `close/open' position of the breaker shall also be provided.

The contact pressure spring and tripping spring shall be chargeable during closing operation to ensure the breaker is ready to open. Mechanically ON/OFF indicator, spring charged indicator and operation counter shall be provided on the front of the control cubicle. For tripping, the spring provided shall ensure the trippings

Mechanical indicator, to show the 'open' and 'close' position of the breaker shall be provided in a position where it will be visible to a man standing on ground with mechanism housing open. An operation counter, visible from the ground even with the mechanism housing closed, shall be provided. Electrical tripping of the breaker shall be performed by shunt trip coils.

Closing coil shall operate correctly at all value of voltage between 85% and 110% of the rated voltage. Shunt trip coils shall operate correctly under all operating conditions of the circuit breaker upto the rated breaking capacity and at all values of supply voltage between 85% and 110% of rated voltage. The variation in A.C. supply voltage shall be –15%to +10% while variation in frequency shall be $\pm$3. Working parts of the mechanism shall be non-corrosive material. Bearings which require grease shall be equipped with pressure type fillings.

Bearing pins, bolts, nuts and other parts shall be adequately pinned or locked to prevent loosening or changing adjustment with repeated operation of the circuit breaker. It shall be possible to trip the circuit breaker even in the event of failure of power supply.

Operating mechanism and all accessories shall be enclosed in control cabinet. A common marshalling box for the three poles of the breaker shall be provided, along with supply of tubing, cables from individual pole operating boxes to the common marshalling box, local.

4.3.16 SPRING OPERATED MECHANISM

The motor compressed spring mechanism shall consists of a closing spring which is wound or compressed by an electric motor immediately after the breaker closes.

After the breaker has tripped, the tripping spring shall remain in the released position as long as the breaker is open, but the closing spring shall remain wound and ready for closing operation. The operating

mechanism shall have all the necessary auxiliaries, apparatus for operation and supervision, like motor starter with thermal overload release, one closing coil, two trip coils, push button for local electrical operation, local/remote control selector switch, push button for direct mechanical tripping, auxiliary switches, anti puming contactors, operation counter, socket for inspection, lamp and heater with switch. Spring charging motor shall be standard single phase universal motor suitable for 220 volts supply.

i) Operating voltages for closing/tripping coils shall be 220/110/48/24 Volts DC **or as per actual DC voltage available at existing substations which is to be verified by supplier after award of contract.**

ii) Operating voltages for heater elements shall be 220V AC 50 HZ. Other features of the spring operated mechanism shall be as follows.

a) The spring operating mechanism shall have adequate energy stored in the operating to close and latch the circuit breaker against the rated making current and also to provide the required energy for tripping mechanism in case the tripping energy is derived from the operating mechanism.
b) The mechanism shall be capable of performing the rated operating duty cycle of O-0.3Sec-CO-3 Min-CO...
c) The spring charging motor shall be AC or DC operated and shall not take more than 30 sec., to fully charge the closing spring made for automatic charging. Charging of spring by the motor should not interfere with the operation of the breakers.
d) The motor shall be adequately rated to carry out a minimum of one duty cycle. Also provision shall be made to protect the motor against overloads.
e) In case of failure of power supply to spring charging motor, the mechanism shall be capable of performing one open-close-open operation.
f) Mechanical interlocks shall be provided in the operating mechanism to prevent discharging of the closing springs when the breaker is already in closed position. Provision shall be made to prevent a closing operation to be carried out with the spring partially charged.
g) Facility shall be provided for manual charging of closing springs.

4.3.17 CONTROL CABINET

The switchgear operating mechanism, the control equipment such switch for closing and tripping the breakers, various control relays, antipuming device, a set of terminal blocks for wiring connections, MCB's for disconnecting the control auxiliary power supplies including relays, etc., shall be enclosed in a cabinet to be mounted on a suitable structure at a convenient working height at the end of the breaker in the outdoor switchyard. The supporting structure and the enclosure shall be capable of withstanding the typical tropical climatic conditions, change of ambient temperature, severe dust-storms, very high relative humidity those are prevailing at the site of location of switchgear.

i) ENCLOSURE

The enclosure shall be made out of stretched level steel plates not less than 3 mm thick and of light section structural steel. It should be weather proof as well as vermin proof.

The enclosure shall provide protection against dust and foreign objects. Each cabinet section shall have full width and full length hinged doors mounted on the front that swing fully open. The doors shall be provided with latches to securely hold it with the cabinet. Doors shall be of sturdy construction, with resilient material

covering, fully perimeterically contacting the cabinet frame to provide dust protection and prevent metal to metal contact except at the latch points. Filtered ventilation shall be provided along with the rigid supports for control and other equipment, measuring instruments, mounting cabinet members and equipment shall not restrict easy access to terminal blocks for terminating and testing external connection or to equipment for maintenance.

All screws and bolts used for assembling and mounting wire and cable termination, supports, devices and other equipment shall be provided with lock washers or other locking devices. All metal parts shall be clean and free of weld splatter, rust and mill scale prior to application of double coat of zinc chromate primer which should be followed by an under coat to serve as base and binder for the finishing coat. The shade of exterior and interior shall be as per GTR. The mounting structure shall be galvanized and shall be as per IS-802-II-1978.

ii) **HEATERS**

Suitable heaters shall be mounted in the cabinet to prevent condensation. Heaters shall be controlled by thermostat and shall be provided with ON/OFF switches and fuses. .Heaters shall be suitable for 240 V AC supply voltage.

iii) **LIGHTING**

At least one 13 watt CFL fixture and lamp working on 240 V 50 c/s AC supply shall be provided in each switchgear control cubicle section and shall be located suitably to provide adequate interior lighting of the cubicle. A single-pole 6 Amp. lighting switch shall be provided for each cubicle alongwth 5/15 amp..

The lighting and convenient outlet circuits shall be completely wired in conduit and terminated on cubicle terminal blocks.

iv) **WIRING AND CABLING**

a) Unless otherwise specified control wire shall be stranded tinned copper switchboard wire with 1.1 kV PVC insulation conforming to the requirements of IS-1554.
b) All the control circuit and secondary wiring shall be wired completely and brought out to terminal block ready for external connections in the control cabinet. The cross-section of control wire shall not be less than 2.5 mm2 copper (14 SWG).
c) All spare auxiliary contacts of the circuit breaker shall be supplied wired upto terminal block. Each terminal in terminal block shall be suitable for at least 2 x 2.5 mm^2 copper conductor.
d) All wiring termination on terminal blocks shall be made through lugs.
e) All wires shall be identified with non-metallic sleeve or tube type markers at each terminations.
f) Terminal blocks shall be made up of moulded non-inflammable plastic material with blocks and barriers moulded integrally have white marking strips for circuit identification and moulded plastic covers. Disconnecting type terminal blocks will be provided.

v) **GROUNDING**

A ground bus of copper bar not less than 6 mm by 25 mm shall be provided for grounding the cabnet.

4.3.18 ACCESSORIES

Each circuit breaker assembly shall be supplied with the following accessories.

i) Line and earthing terminals and terminal connectors.
ii) Control housing with:

a) One auxiliary switch with adequate number of auxiliary contacts, but not less than 20 nos. (10 NO + 10 NC) for each breaker. These shall be over and above the No. of contacts used for closing, tripping and re-closing and interlocking circuit of the circuit breaker. All auxiliary contacts shall be capable of use as "Normally closed" or "Normally open" contacts. Special auxiliary contacts required for the re-closing circuit if any, shall also be provided. There shall be provision, to add more auxiliary contacts at a later date, if required.
b) Operation counter
c) Position indicator (Close/Open)
d) Necessary cable glands
e) Fuses
f) Manual trip device and local test push buttons
g) Terminal blocks and wiring for all control equipment and
h) Adequate number of heaters for continuous operation to prevent moisture condensation in the housing of operating mechanism
i) Selector switch for local/remote control.

4.3.19 SUPPORTING STRUCTURE

The circuit breakers shall be supplied complete with necessary galvanized steel supporting structures, foundation and fixing bolts, etc., the galvanizing shall be as per IS. The mounting of the breaker shall be such as to ensure the safety of the operating staff and should conform to Indian Electricity Rules, 1956. Minimum ground clearance of live part from ground level shall be 3700 mm from finished ground level.

The bidder shall submit detailed design calculations and detailed design calculations and detailed drawings in respect of supporting structures suitable for the equipment offered.

All material for making connections between the circuit breaker and its control shall also be included in the scope of supply. Facility to earth the circuit breaker structure at two points shall be provided.

4.3.20 SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulation oil, as far as accessible, shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paint.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limits specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.

All ferrous hardware, exposed to atmosphere, shall be hot dip galvanized.

4.3.21 GALVANISING

All ferrous parts including all sizes of nuts, bolts, plain and spring washers, support channels, structures, shall be hot dip galvanized conforming to latest version of IS:2629 or any other equivalent authoritative standard.

4.3.22 CABLE TERMINATION

Suitable cable glands for terminating the multicore cable, shall be provided wherever required.

4.3.23 TERMINAL CONNECTIONS AND EARTH TERMINALS

Each circuit breaker connected with incoming and outgoing feeders shall be provided with solderless clamp type connectors suitable for ACSR conductor.

Each circuit breaker pole and control cabinet shall be provided with appropriate number of grounding terminals and clamps for receiving ground connections.

Each circuit breaker pole and control cabinet shall be provided with appropriate number of grounding terminals and clamps for receiving ground connections.

4.3.24 INTERLOCKS

Necessary interlocks to prevent closing or opening of the breaker under low pressure of the contact spring and devices for initiating alarm shall be provided. The detailed interlocking scheme based upon single line diagram as applicable for the substation shall be provided by the contractor

Requirement of interlock shall be as given below:

i) Isolator should not be operated unless the associated breaker is in open position.
ii) The circuit breaker shall close only after all isolators associated with it have been in closed position.

In case of double bus bar arrangement following additional requirement for interlocking shall be provided.

i) One bus bar selector isolator of any bay excepting the bus coupler bay shall close only when,
   a) The circuit breaker of corresponding bay is open and locked.
   b) The other bus isolator of that bay is open.

ii) When one bus isolator of any bay excepting the bus coupler bay is closed. The other shall close only when the bus coupler circuit breaker and both the bus isolators are closed.
iii) Bus isolator of bus coupler bay shall operate only when the bus coupler breaker is open.
iv) The bypass isolator of feeder shall close when the feeder circuit breaker and its adjoining isolators are closed.

4.3.25 EARTHING SYSTEM

All switchgear enclosures should be bolted metal to metal and should carry the full earth return current. Connection between phases at the earthing points shall be dimensioned for carrying full earth return current i.e., actual service current not rated current.

4.3.26 VACUUM INTERRUPTER ASSEMBLY

Each pole of the circuit breaker shall be provided with vacuum interrupter, one for each phase, hermetically sealed for life and encapsulated by ceramic insulators. The interrupter shall be provided with steel chromium are chamber to prevent vaporized contact material being deposited on the insulating body. A further shield giving protection to the metal bellows shall also follow the travel of the moving contacts to seal the interrupter against the surroundings atmosphere.

It shall have high and consistent dielectric strength of vacuum unaffected by environment and switching operations. Bronzed joints should ensure retention of vacuum for life time. It shall have low and stable contact resistance due to absence of oxidation effects and shall ensure low power loss. The arcing voltage shall be low and minimum contact erosion.

4.3.27 GUARANTEED TECHNCIAL PARTICULARS

Guaranteed and technical particulars as called for in Section-II shall be furnished along with the tender. Particulars which are subject to guarantee shall be clearly marked.

4.3.28 TESTS

TYPE TESTS

Each circuit breaker shall comply with requirements of type tests prescribed in IEC publication No. 62271-100

i) Short time and peak withstand current test .
ii) Short circuit breaking capacity and making capacity.
iii) Capacitive current switching test : Cable charging current breaking test(Ur less than or equal to 52 kV).
iv) Dielectric test i.e., power frequency withstand and impulse withstand test
v) Temperature rise test.
vi) Mechanical Endurance Test at ambient temperature.
vii) Measurement of resistance of the main circuit.

ROUTINE TESTS

Routine Tests as per IEC- 62271-100 shall be carried out on each breaker in presence of purchaser's representative at the manufacturer's expenses at his works except, where agreed to otherwise. All test reports should be submitted and should be got approved from the purchaser before despatch of the equipment.

SITE TESTS ON CONTROL AND AUXILIARY CIRCUIT

The following tests shall be conducted at site.

i) Voltage tests on control and auxiliary circuit.

ii) Measurements of resistance of the main circuit.
iii) Mechanical Operation Tests.

4.3.29 NAME PLATE

Equipment should be provided with name plate giving full details of manufacture, capacities and other details as specified in the relevant ISS or other specification stipulated.

4.3.30 TECHNICAL PARAMETERS

36 KV CIRCUIT BREAKERS

S. NO.	DESCRIPTION		VALUES
i)	Rate voltage (KV rms)	:	36 KV
ii)	Rated frequency (Hz)	:	50
iii)	System neutral earthing	:	Solidly grounded system
iv)	Type of arc quenching medium	:	Vacuum
v)	Rated normal current at site conditions (Amps)	:	1250 Amps
vi)	Number of poles	:	3
vii)	Installation	:	Outdoor type
viii)	Temperature rise	:	As per IEC 56 (Table-4) Page-19
ix)	Rated short circuit	:	
	a) Interrupting capacity at 36 KV	:	25 KA
	b) The percentage DC components	:	As per IEC-62271-100
	c) Duration of short circuit	:	1 Sec.
x)	Rated short circuit making	:	62.5 KA
xi)	First pole to clear factor	:	1.5
xii)	Rated short time current	:	25 KA
xiii)	Rated duration of short circuit	:	3 Seconds
xiv)	Total break time for any current upto the rated breaking current with limiting condition of operating and quenching media pressure (ms)	:	< 80 ms
xv)	Closing time (ms)	:	< 150 ms
xvi)	Mounting	:	Hot dip galvanized lattices steel support structured bolted type
xvii)	Phase to phase spacing in the switch yard i.e, interpole spacing for breaker (min) in mm	:	470±10
xviii)	Required ground clearance from the lowest line terminal if both the terminals are not in same horizontal plane (mm)	:	3700
xix)	Height of concrete plinth (mm)	:	150
xx)	Minimum height of the lowest part of the support insulator from ground liner (mm)	:	3194
xxi)	Minimum creepage distance of support insulator (mm)	:	900

S. NO.	DESCRIPTION		VALUES
xxii)	Minimum corona extinction voltage (kv rms)	:	92
xxiii)	Standard value of rated transient recovery voltage for terminal fault	:	As per IEC-56
xxiv)	Standard value of rated line Characteristics for short line faults	:	
	RRRV	:	KV/ms=0.214
	Surge Peak Factor		K=1.6 A
	Impedance	:	450
xxv)	Rated operating duty cycle	:	O-0.3 Second - CO-3 Minutes-CO
	b) Auto reclosing	:	Suitable for three phase Auto reclosing duty
xxvi)	Rated insulation level under heavy pollution condition 1.2/50 micro second lightening Impulse withstand voltage (KV peak)to earth	:	170 KV
xxvii)	Power frequency withstand voltage KV (rms) to earth (KV rms)	:	70 KV
xxviii	Rated characteristic for out of Phase breaking	:	
	a) Out of phase breaking capacity	:	25% of rated breaking capacity
	b) Standard values of transient recovery	:	As oper IEC-56
	c) Operating mechanism	:	Spring operated, Anti pumping and Trip free mechanism
	d) Power available for operating mechanism	:	Three phase 415 Volts 50 C/S or single phase 50 C/S 240 volts
xxix)	a) Rated supply voltage of closing and operating devices and auxiliary circuits	:	1)220 V DC/30 VDC 2)240 Volts AC 50 C/S single phase 3)415 volts 50 Hz three phase
	b) Permissible voltage variation	:	1)In case of DC Power supply voltage variation shall be between 85% to 110% of normal voltage. 2)In case of AC power supply voltage variation shall be of the normal voltage as per IS-15% to +10%.
	c) Permissible frequency	:	± 3% from normal 50 Hz as per IS 2026 part-I 1977 para 4.4
	d) Combined variation of frequency and voltage	:	± 10%
xxx)	Auxiliary contacts (number & rating)	:	12 NO and 12 NC on each pole having continuous current rating of 10 Amps. DC breaking rating capacity shall be 2 Amps with

S. NO.	DESCRIPTION		VALUES
			circuit time constant less than 20 ms at 220/30 volts DC
xxxi)	Number of trip coils	:	Two trip coils and 1 close coil with anti-pumping arrangement
xxxii)	Rated terminal load	:	100 kg. Static. The breaker shall be designed to withstand the rated terminal load, wind, load, earthquake load and short circuit forces
xxxiii	Noise level of the equipment	:	Not exceeding 140 db

4.3.1 **DRAWINGS AND INSTRUCTION MANUALS**

Following drawings for each item are to be supplied as part of the contract.

i) General outline drawings, showing dimensions, front and side elevations and plan of the circuit breaker and its local control panel.
ii) Outline drawing of bushings showing dimensions and number of sheds and creepage distance.
iii) Assembly and sub-assembly drawings with numbered parts.
iv) Sectional views showing the general constructional features, operating mechanism and are extinguishing chamber, etc.
v) Dimension and assembly of important auxiliaries.
vi) Detailed drawings of operating mechanism. And inter-phase mechanism.
vii) Test certificates.
viii) Detailed drawings of mounting structure.
ix) Spare parts and catalogue
x) Wiring diagram showing the local and remote control scheme of breaker including alarms indication devices instruments relay and timer wiring.
xi) Write up on working of control schematic of breaker.
xii) Foundation plan including weights of various components and impact loadings for working foundation design. Three copies for each pkg. of the above drawings and instruction manuals covering instructions for installations, operation and maintenance shall be supplied by the contractor(s) without any extra cost.

4.4.0 TECHNICAL SPECIFICATION OF OUTDOOR CURRENT AND POTENTIAL TRANSFORMERS

4.4.1 SCOPE OF CONTRACT

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

4.4.2 STANDARDS

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

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

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

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

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

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

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

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

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

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

4.4.3 GENERAL REQUIREMENTS

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

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

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

4.4.3.4 The instrument transformers shall be completely filled with oil.

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

4.4.3.6 All instrument transformers shall be of single phase unit.

4.4.3.7 The instrument transformers shall be so designed to withstand the effects of temperature, wind load, short circuit conditions and other adverse conditions.

4.4.3.8 All similar parts, particularly removable ones, shall be interchangeable with one another.

4.4.3.9 All cable ferrules, lugs, tags, etc. required for identification and cabling shall be supplied complete for speedy erection and commissioning as per approved schematics.

4.4.3.10 The instrument transformers shall be designed to ensure that condensation of moisture is controlled by proper selection of organic insulating materials having low moisture absorbing characteristics.

4.4.3.11 All steel work shall be degreased, pickled and phosphated and then applied with two coats of Zinc Chromate primer and two coats of finishing synthetic enamel paint.

4.4.4 INSULATING OIL

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

4.4.5 COMMON MARSHALLING BOXES

4.4.5.1 The outdoor type common marshalling boxes shall conform to the latest edition of IS 5039 and other general requirements specified hereunder.

4.4.5.2 The common marshalling boxes shall be suitable for mounting on the steel mounting structures of the instrument transformers.

4.4.5.3 One common marshalling box shall be supplied with each set of instrument transformers. The marshalling box shall be made of sheet steel and weather proof. The thickness of sheet steel used shall be not less than 3.0 mm. It is intended to bring all the secondary terminals to the common marshalling.

4.4.5.4 The enclosures of the common marshalling boxes shall provide a degree of protection of not less than IP 55 (As per IS 2147).

4.4.5.5 The common marshalling boxes shall be provided with double hinged front doors with pad locking arrangement. All doors and removable covers and plates shall be sealed all around with neoprene gaskets or similar arrangement.

4.4.5.6 Each marshalling box shall be fitted with terminal blocks made out of moulded non-inflammable plastic materials and having adequate number of terminals with binding screws washers etc. Secondary terminals of the instrument transformers shall be connected to the respective common marshalling boxes. All out going terminals of each instrument transformer shall terminate on the terminal blocks of the common marshalling boxes. The terminal blocks shall be arranged to provide maximum accessibility to all conductor terminals.

4.4.5.7 Each terminal shall be suitably marked with identification numbers. Not more than two wires shall be connected to any one terminal. ***At least 20 % spare terminals shall be provided over and above the required number***.

4.4.5.8 All terminal strips shall be of isolating type terminals and they will be of minimum 10 A continuous current rating.

4.4.5.9 All cable entries shall be from bottom. Suitable removable gland plate shall be provided on the box for this purpose. Necessary number of cable glands shall be supplied fitted on to this gland plate. Cable glands shall be screw on type and made of brass.

4.4.5.10 Each common marshalling box shall be provided with two numbers of earthing terminals of galvanised bolt and nut type.

4.4.5.11 All steel, inside and outside work shall be degreased, pickled and phosphate and then applied with two coats of Zinc Chromate primer and two coats of finishing synthetic enamel paint. The colour of finishing paint shall be as follows: -

i) Inside: Glossy White

ii) Outside: Light Grey (Shade No. 697 of IS: 5)

4.4.6 BUSHINGS AND INSULATORS

4.4.6.1 Bushings and Insulators shall be of Porcelain, Solid core type. Porcelain used for the manufacture of bushings and insulators shall be homogeneous, free from defects, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture.

4.4.6.2 Glazing of the porcelain shall be of uniform brown colour, free from blisters, burns and other similar defects. Bushings shall be designed to have sufficient mechanical strength and rigidity for the conditions under which they will be used. All bushings of identical ratings shall be interchangeable.

4.4.6.3 Puncture strength of bushings shall be greater than the dry flashover value. When operating at normal voltage, there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action. No radio interference shall be caused by the bushings when operating at the normal rated voltage.

4.4.6.4 The design of bushing shall be such that the complete bushing is a self-contained unit and no audible discharge shall be detected at a voltage up to a working voltage (Phase Voltage) plus 10%. The minimum creepage distance for severely polluted atmosphere shall be 25 mm/KV.

4.4.6.5 Sharp contours in conducting parts should be avoided for breakdown of insulation. The insulators shall be capable to withstand the seismic acceleration of 0.5 g in horizontal direction and 0.6g in vertical direction.

4.4.6.6 Bushings shall satisfactorily withstand the insulation level specified in data sheet.

4.4.7 TESTS

2.4.1.1 Routine/Acceptance Tests (all units)

2.4.1.2 **A**ll routine tests shall be carried out in accordance with relevant Standards. All routine/acceptance tests shall be witnessed by the Purchaser/his authorised representative.

2.4.1.3 **Type Tests:** The bidder shall furnish type test certificates and results for the all tests as per relevant Standards along with the bid for current and potential transformers of identical design.

2.4.1.4 Type test certificates so furnished shall not be older than 5 (five) years as on date of Bid opening.

4.4.8 NAME PLATES

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

4.4.9 MOUNTING STRUCTURES

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

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

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

4.4.10 SAFETY EARTHING

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

4.4.11 TERMINAL CONNECTORS

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

4.4.12 TECHNICAL DATA SHEET FOR CURRENT AND POTENTIALTRANSFORMERS

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

4.4.12.2 TYPE AND RATING:

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

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

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

(b) Winding II	3P	3P
(v) Rated voltage factor	1.2	1.2

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

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

4.5.0 TECHNICAL SPECIFICATION OF ISOLATORS

4.5.1 SCOPE

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

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

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

4.5.1.4 The bidder shall offer ac motor operated Isolators and earth switches.

4.5.2 GENERAL

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

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

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

(i). Isolator assembled with complete base frame, linkages, operating mechanism, control cabinet, interlocks etc.

(ii). All necessary parts to provide a complete and operable isolator installation, control parts and other devices whether specifically called for herein or not.

(iii) The isolator shall be designed for use in the geographic and meteorological conditions as given in Section 1.

4.5.3 DUTY REQUIREMENTS

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

4.5.3.2 The earth switches, wherever provided, shall be constructionally interlocked so that the earth switches can be operated only when the isolator is open and vice versa. The constructional interlocks shall be built in construction of isolator and shall be in addition to the electrical and mechanical interlocks provided in the operating mechanism.

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

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

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

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

4.5.4 CONSTRUCTIONAL DETAILS

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

4.5.4.2 **Contacts:**

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

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

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

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

4.5.4.7 **Blades:**

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

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

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

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

4.5.4.12 **Insulators:**

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

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

4.5.4.15 **Base:**

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

4.5.5 EARTHING SWITCHES

4.5.5.1 Where earthing switches are specified these shall include the complete operating mechanism and auxiliary contacts.

4.5.5.2 The earthing switches shall form an integral part of the isolator and shall be mounted on the base frame of the isolator.

4.5.5.3 The earthing switches shall be constructionally interlocked with the isolator so that the earthing switches can be operated only when the isolator is open and vice versa. The constructional interlocks shall be built in construction of isolator and shall be in addition to the electrical interlocks.

4.5.5.4 Suitable mechanical arrangement shall be provided for de-linking electrical drive for mechanical operation.

4.5.5.5 Each earth switch shall be provided with flexible copper/aluminium braids for connection to earth terminal. These braids shall have the same short time current carrying capacity as the earth blade. The transfer of fault current through swivel connection will not be accepted.

4.5.5.6 The frame of each isolator and earthing switches shall be provided with two reliable earth terminals for connection to the earth mat.

4.5.5.7 Isolator design shall be such as to permit addition of earth switches at a future date. It should be possible to interchange position of earth switch to either side.

4.5.5.8 The earth switch should be able to carry the same fault current as the main blades of the Isolators and shall withstand dynamic stresses.

4.5.6 OPERATING MECHANISM

4.5.6.1 The bidder shall offer motor operated Isolators and earth switches. Earth Switches of 36 kV shall only be manual operated.

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

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

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

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

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

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

4.5.7 OPERATION

4.5.7.1 The main Isolator and earth switches shall be gang operated.

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

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

4.5.7.4 The isolator shall be provided with positive continuous control throughout the entire cycle of operation. The operating pipes and rods shall be sufficiently rigid to maintain positive control under the most adverse conditions and when operated in tension or compression for isolator closing. They shall also be capable of withstanding all torsion and bending stresses due to operation of the isolator. Wherever supported the operating rods shall be provided with bearings on either ends. The operating rods/ pipes shall be provided with suitable universal couplings to account for any angular misalignment.

4.5.7.5 All rotating parts shall be provided with grease packed roller or ball bearings in sealed housings designed to prevent the ingress of moisture, dirt or other foreign matter. Bearings pressure shall be kept low to ensure long life and ease of operation. Locking pins wherever used shall be rustproof.

4.5.7.6 Signalling of closed position shall not take place unless it is certain that the movable contacts, have reached a position in which rated normal current, peak withstand current and short time withstand current can be carried safely. Signalling of open position shall not take place unless movable contacts have reached a position such that clearance between contacts is at least 80% of the isolating distance.

4.5.7.7 The position of movable contact system (main blades) of each of the Isolators and earthing switches shall be indicated by a mechanical indicator at the lower end of the vertical rod of shaft for the Isolators and earthing switch. The indicator shall be of metal and shall be visible from operating level.

4.5.7.8 The Supplier shall furnish the following details along with quality norms, during detailed engineering stage.

(i) Current transfer arrangement from main blades of isolator along with milivolt drop immediately across transfer point.

(ii) Details to demonstrate smooth transfer of rotary motion from motor shaft to the insulator along with stoppers to prevent over travel.

4.5.8 TEST AND INSPECTION

4.5.8.1 The switches shall be subjected to the following type test in accordance to with IS: 9920.

i. Dielectric test (impulse and one minute) power frequency withstands voltage.
ii. Temperature rise test
iii. Rated off load breaking current capacity
iv. Rated active load breaking capacity
v. Rated line charging breaking capacity
vi. Rated short time current
vii. Rated peak withstand current

viii. Mechanical and Electrical Endurance

4.5.8.2 The equipment shall be subjected to the following routine test.

(i) Power frequency voltage dry test
(ii) Measurement of resistance of the main circuit
(iii) Operating test.

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

4.5.9 AUXILIARY SWITCHES

4.5.9.1 All isolators and earth switches shall be provided with 220/110 volts, 6 Ampere auxiliary switches for their remote position indication on the control board and for electrical interlocking with other equipment. In addition to the auxiliary switches required for remote position indications and for their operation. There shall be six pairs of NO and six pairs of NC contacts for each isolating switch and three pairs of NO and three pairs of NC contacts for each earthing switch. All contacts shall be brought out to terminal blocks

4.5.10 CONNECTORS

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

4.5.11 MOUNTING STRUCTURES

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

4.5.12 TECHNICAL DATA SHEET FOR ISOLATORS

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

9	Rated 1 minute power frequency withstand voltage, kV (rms)	
	i) To earth & between poles	70
	ii) Across isolating distance	80
10	Minimum Creepage distance of insulators, mm	31mm/kV
11	Temperature rise	As per relevant IS

4.6.0 TECHNICAL SPECIFICATION FOR SURGE ARRESTORS

4.6.1 SCOPE

4.6.1.1 This Section covers the specifications for design, manufacture, shop & factory testing before dispatch of 33 kV 10 kA, Station class heavy duty, gapless metal (zinc) oxide Surge Arrestors complete with fittings & accessories.

4.6.2 STANDARDS

4.6.2.1 The design, manufacture and performance of Surge Arrestors shall comply with IS: 3070 Part-3 unless otherwise specifically specified in this Specification

4.6.3 GENERAL REQUIREMENT

4.6.3.1 The surge arrestor shall draw negligible current at operating voltage and at the same time offer least resistance during the flow of surge current.

4.6.3.2 The surge arrestor shall consist of non-linear resistor elements placed in series and housed in electrical grade porcelain housing/silicon polymeric of specified creepage distance.

4.6.3.3 The assembly shall be hermetically sealed with suitable rubber gaskets with effective sealing system arrangement to prevent ingress of moisture.

4.6.3.4 The surge arrestor shall be provided with line and earth terminals of suitable size. The ground side terminal of surge arrestor shall be connected with 25x6 mm galvanized strip, one end connected to the surge arrestor and second end to a separate ground electrode. The bidder shall also recommend the procedure which shall be followed in providing the earthing/system to the Surge Arrestor.

4.6.3.5 The surge arrestor shall not operate under power frequency and temporary over voltage conditions but under surge conditions, the surge arrestor shall change over to the conducting mode.

4.6.3.6 The surge arrestor shall be suitable for circuit breaker performing 0-0.3sec.-CO-3min-CO- duty in the system.

4.6.3.7 Surge arrestors shall have a suitable pressure relief system to avoid damage to the porcelain/ silicon polymeric housing and providing path for flow of rated fault currents in the event of arrestor failure.

4.6.3.8 The reference current of the arrestor shall be high enough to eliminate the influence of grading and stray capacitance on the measured reference voltage.

4.6.3.9 The Surge Arrestor shall be thermally stable and the bidder shall furnish a copy of thermal stability test with the bid.

4.6.3.10 The arrestor shall be capable of handling terminal energy for high surges, external pollution and transient over voltage and have low losses at operating voltages.

4.6.4 ARRESTOR HOUSING

4.6.4.1 The arrestor housing shall be made up of porcelain/***silicon polymeric*** housing and shall be homogenous, free from laminations, cavities and other flaws of imperfections that might affect the mechanical and dielectric quality. The housing shall be of uniform brown colour, free from blisters, burrs and other similar defects.

4.6.4.2 Arrestors shall be complete with insulating bases, fasteners for stacking units together, surge counters with leakage current meters and terminal connectors.

4.6.4.3 The **housing shall be so coordinated that external flashover shall not occur due to application of** any impulse or switching surge voltage up to the maximum design value for arrestor. The arrestors shall not fail due to contamination. The arrester housings shall be designed for pressure relief class as given in Technical Parameters of the specification.

4.6.4.4 Sealed housings shall exhibit no measurable leakage.

4.6.5 FITTINGS & ACCESSORIES

4.6.5.1 The surge arrestor shall be complete with insulating bases, fasteners for stacking units together, surge counters with leakage current meters and terminal connectors.

4.6.5.2 The terminals shall be non-magnetic, corrosion proof, robust and of adequate size and shall be so located that incoming and outgoing connections are made with minimum possible bends. The top metal cap and base of surge arrestor shall be galvanized. The line terminal shall have a built in clamping device which can be adjusted for both horizontal and vertical takeoff.

4.6.5.3 Grading corona control rings if necessary shall be provided on each complete arrestor pole for proper stress distribution.

4.6.6 SURGE MONITOR

4.6.6.1 A self-contained discharge counter suitably enclosed for outdoor use and requiring no auxiliary or battery supply for operation shall be provided for each single pole unit. Leakage current meter with suitable scale range to measure leakage current of surge arrestor shall also be supplied within the same enclosure. The number of operations performed by the arrestor shall be recorded by a suitable cyclometric counter and surge monitor shall be provided with an inspection window. There shall be a provision for putting ammeter to record the current/alarm contacts in the control room if the leakage current exceeds the permitted value. Similar provision shall be considered for surge counter also.

4.6.6.2 Surge monitor shall be mounted on the support structure at a suitable height so that the reading can be taken from ground level through the inspection window and length of connecting leads up to grounding point and bends are minimum.

4.6.7 TESTS

4.6.7.1 **Test on Surge Arrestors**

The Surge Arrestors offered shall be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 3070 (Part-3). In addition, the suitability of the Surge Arrestors shall also be established for the following:

Residual voltage test
Reference voltage test
Leakage current at M.C.O.V
P.D. test
Sealing test
Thermal stability test
Aging and Energy capability test
Watt loss test
Each metal oxide block shall be tested for guaranteed specific energy capability in addition to routine/acceptance test as per IEC/IS.

4.6.7.2 The surge arrestor housing shall also be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 2071.

4.6.7.3 **Galvanization Test**
All Ferrous parts exposed to atmospheric condition shall have passed the type tests and be subjected to routine and acceptance tests in accordance with IS: 2633 & IS 6745.

4.6.8 NAME PLATE

4.6.8.1 The name plate attached to the arrestor shall carry the following information:
Rated Voltage
Continuous Operation Voltage
Normal discharge current
Pressure relief rated current
Manufacturers Trade Mark
Name of Sub-station
Year of Manufacturer
Name of the manufacture
Purchase Order Number along with date

4.6.9 TECHNICAL DATA SHEET FOR SURGE ARRESTOR

	Particulars	**Voltage class**
		33 kV
1	Rated voltage of arrester, kV	30
2	Rated frequency, Hz	50 Hz
3	Nominal discharge current of arrester, kA	10
4	Maximum residual voltage at nominal discharge current, kV (peak)	108
5	Maximum steep current impulse residual voltage at kV (kVP)	120
6	One minute power frequency withstand voltage of arrester insulation, kV (rms)	70
7	1.2 / 50 □ second impulse withstand voltage of arrester insulation, kV (peak)	170
9	Line discharge class	2
10	**Insulator Housing**	
	Power frequency withstand test voltage(wet) (kV rms)	70
	Lightning impulse withstand tests voltage(KVp)	170
	Pressure Relief Class	40
	Creepage distance not less than (mm)	31mm/kV

4.7.0 Technical Specification for Control and Relay Panels (With Automation)

SCOPE

This Section is intended to cover the design, manufacture, assembly, testing at manufacturer's works of Indoor Relay and Control Panels.

The Control and Relay Panels required are for control and protection of the Power Transformers, Feeders and for others according to requirements. The supply shall include all accessories, special tools, relevant software, supporting steels, spare parts, drawings, instruction manuals etc. The panels shall be supplied complete with all accessories as specified and completely assembled and all internal wiring completed.

The sub-stations will have automation as per guidelines of IEC 61850. The contractor has to supply the C&R panels to match the requirement of Sub-station Automation System (SAS) as specified in the subsequent chapter.

STANDARDS

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

TYPE OF PANEL

All panels shall be simplex type. One simplex panel shall be used for each feeder and bus coupler / by pass breaker. For transformer bays two simplex panels (one each for HV and LV sides) may be used if required.

Simplex Control and Relay Panels shall consist of vertical swing front panels with equipment mounted thereon and having front glass door. Each cubicle assembly shall be provided with doors on the rear having handles with built in locking facility. It shall have double leaf doors with lift off hinges at the back for panels of width more than 800 mm.

These panels shall be of the following approximate dimensions: Height: 2250mm + 15mm anti-vibration pad + 50 mm (base) Depth: 800mm (MAX)

Width: 800 mm to 1000 mm

CONSTRUCTIONAL FEATURES

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

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

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.

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.

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.

MOUNTING OF EQUIPMENTS

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.

INTERNAL WIRING

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

Wiring shall be carried out with 1100-Volt grade, single core, stranded copper conductor wires with PVC insulation. The minimum size of stranded copper conductor used for internal wiring shall be as follows:

(a) All circuits except instrument transformers circuits:

(b) Instrument transformers circuit:

1.5 sq. mm. per lead.

2.5 sq. mm. per lead.

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.

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.

Interconnections to adjacent panels shall be brought out to a separate set of terminals blocks located near the slots or holes meant for taking the interconnecting wires. Arrangement shall permit easy inter connection to adjacent panels at site and wires for this purpose shall be provided by the CONTRACTOR looped and bunched properly inside the panel.

A laminated copy of total schematics is to be fixed on the inside of door.

TERMINAL BLOCKS

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

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.

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

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

PAINTING

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

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.

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.

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.

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

The inside of the panels shall be glossy white.

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

NAME PLATES AND MARKINGS

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

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.

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

MISCELLANEOUS ACCESSORIES

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

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)

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

EARTHING

All panels shall be equipped with an earth bus securely fixed along with inside base of the panels. The materials and the sizes of the bus bar shall be at least 25X4 mm copper. 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.

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.

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

ENERGY METER – GENERAL TECHNICAL REQUIREMENTS

Connection type:	CT/VT – operated
Wiring Configuration:	3-Phase 3-Wire, 3-Phase 4-Wire
Voltage range :	110 V (P-P), 63.5 V (P-N)
Current range:	-/5(10) A, -/1(2) A
Accuracy:	Class 0.2s
Mains frequency:	50 Hz ± 5%
Burden:	As per IS 14697, IEC 62052-11, IEC62053-21, IS 15959
Enclosure:	Engineering Plastic or similar
Sealing:	Provision of sealing on main cover and terminal cover
Ingress protection:	IP 51 or higher
Temperature:	-10 to +55 degree Celsius (operating) -25 to +70 degree Celsius (Storage)
Humidity:	95% non condensing RH
Tariff rate registers:	Up to 8 rate registers, for two energy channels
Maximum demand:	Up to 2 types, configurable in 8 registers
Load survey;	Up to 90 days load profile for 8 parameters (Configurable), with 30 minute integration period.
Communication:	Optical port for local communication Optional RS 232/RS 485 port on RJ – 11 for remote communication. Optional RS 485 port on RJ-11 with MODBUS
Additioanl Features:	1) Import/Export metering and forward metering option 2) High and low voltage, under and over load, metering events support. 3) Time of day metering with maximum demand registration and automatic billing. 4) Backlit LCD Display and annunciations for various critical events. 5) Scroll lock feature for continuous display of a desired parameter on display. 6) High-resolution energy display mode for dial test 7) DLMS protocol for meter reading, with option for remote reading port. 8) Advance event detection feature for voltage, current and magnetic influences. 9) Two metrology LEDs for accuracy testing of different energy types. 10) Meter reading in absence of mains, using internal battery.

CONTROL & RELAY PANELS

This Section is intended to cover the design, manufacture, assembly, testing at manufacturer's works of Indoor Relay and Control Panels.

The Control and Relay Panels required are for control and protection of the Power Transformers, Feeders and for others according to requirements. The supply shall include all accessories, special tools, relevant software, supporting steels, spare parts, drawings, instruction manuals etc. The panels shall be supplied complete with all accessories as specified and completely assembled and all internal wiring completed.

The sub-stations will have automation as per guidelines of IEC 61850. The contractor has to supply the C&R panels to match the requirement of Sub-station Automation System (SAS) as specified in the subsequent chapter.

RELAYS

GENERAL

All relays shall conform to the requirements of IS 3231/IEC 60255/ IEC 61000 or other relevant Standards.

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.

Two sets of relevant software for relay configuration & setting, maintenance etc to be supplied to each station. The numeric relay and software shall be upgradable.

Relays shall be suitable for flush mounting with connectors from rear.

All draw out cases or plug in type modular cases will have proper testing facilities. The testing facilities provided on the relays shall be specifically stated in the bid. Necessary test plug shall be in the CONTRACTOR's scope of supply and shall be supplied loose. Unless otherwise specified all auxiliary relays and timers shall be supplied either in non-draw out cases or plug in type modular cases.

All A.C. relays shall be suitable for operation at 50 Hz. A.C. Voltage operated relays shall be suitable for110 volts VT 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.

All Protective relays, auxiliary relays and timers except the lockout relays and interlocking relays shall be provided with self-reset type contacts. All protective relays, trip relays and timers shall be provided with electrically reset positive action operation indicators provided with proper inscription. Similar separate operating indicators (auxiliary relays) shall also be provided in the trip circuits of protections located outside the board such as Buchholz relays, temperature protection etc.

No control relays that shall trip the circuit breaker when the relays are de-energized shall be employed in the circuits.

All relays shall withstand a test voltage of 2.5 kV, 50 Hz r.m.s. voltage for one second.

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

GENERAL SPECIFICATION OF NUMERICAL RELAYS

Numerical Relays shall be provided for the following **applications** :

Distance Protection (Main I¬ & Main II) of different make for 220 kV lines
Distance Protection for 132 kV and 66 kV Lines
Back up directional over current and earth fault relays for 132 kV and 66 kV Lines
Back up non directional over current (3 O/C) and earth fault relays for 33kV lines
Integrated Numerical Transformer Protection
Back up non directional over current (3 O/C) and earth fault relays with high set units for power & auto transformers.

All **Numerical Relays** should have following **minimum features**.

- Relays shall be communicable on **IEC61850** protocol without any protocol converter. Certificate from KEMA confirming interoperability, ***Goose messaging & publishing as per IEC61850*** standard shall be submitted along with the tender.
- Relays shall have one no. front RJ45 or USB port for Local Relay Parameterization and♣ **Two nos. rear FO port**/ Rear RS485 for connectivity to SAS over IEC61850 protocol
- The relay shall have self-communication port monitoring feature and failure shall generate♣alarm. Relays shall have redundant power supply card i.e. in case of failure of one source fail, the redundant shall pick up instantly. Power supply card failure shall generate necessary alarm to local SCADA.
- The relay shall have sufficient battery back up to keep the internal clock running for atleast 2 years in absence of auxiliary supply
- Should have minimum 16 configurable LEDs
- Should have sufficient Binary Inputs and Binary Outputs as per scheme requirement including 30% BI & BO spare.
- All BI/BOs shall be site configurable
- Shall have front minimum 4 lines LCD display with Alpha numeric key pad♣
- Numerical relays are to be provided with built in Event / Disturbance / Fault Recorder features. The bidder shall bring out in the bid that the Numerical relays providing different protection features / application in a single unit if any one of the application/feature goes out of service the other feature/application (s) will remain un-effected.
- **The relays shall be site configurable (Including logic development)**
- Configured features♣ & set values shall be in non volatile memory Must have real time clock for time stamping of events/ disturbances with time♣ synchronization inputs (GPRS etc.), Time synchronisation through SNTP & IRIG-B compatible.
- The relays should have self-diagnostic features identifying area of fault or failure of a♣particular component or card.
- Shall have in built Circuit Breaker Failure protection based on undercurrent detection♣and/or circuit breaker auxiliary contact status. Provision shall be given to initiate the breaker fail logic using a digital input from external protection devices.

Hardware based measurement shall not be acceptable.

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

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

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 as per available site DC voltage***.

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.

Extensive disturbance recording facility shall be available for at least up to 10 seconds to capture maximum possible information. Necessary software shall be provided for retrieving and analysing the records.

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

Must have additional feature of local breaker back up protection

- The relay shall have built in Circuit Breaker Supervision Functions
- The relay shall be able to detect any discrepancy found between NO¬ & NC contacts of breaker
- The relay shall monitor number of breaker trip operations
- The relay shall also monitor the breaker operating time

The relays shall have the following tools for fault diagnostics-

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

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 / retrievable from local as well as remote terminal through the communication port.

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

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

INTEGRATED NUMERICAL TRANSFORMER PROTECTION RELAY

General requirements

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

Functional Descriptions

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

a) **Differential protection**

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.

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.

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.

The relay shall have the second harmonic restraint feature for stability under transformer inrush condition. The setting shall be 15-25%.
Further, the fifth harmonic blocking for stability under transient over fluxing condition shall be provided.

b) **Restricted Earth fault Protection**

The scheme shall have in-built restricted earth Fault (REF) for both the windings. This function should be provided to maximize the sensitivity of the protection of earth faults.

The REF function should be a high impedance 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.

c) **Over fluxing Protection**

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. In addition the relay should have a definite time element for alarm.

d) **Thermal Overload Protection**

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 1000.0 min continuously.
Shall be single pole type.
Shall have a drop off/pick up ratio greater than 95%
Shall have separately adjustable time delay relays for alarm having a setting range of 1to 10 seconds continuously.

e) **Over Current Protection**

The relay shall have three stages of definite time 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.
In addition, the relay shall have three stages of Inverse time over current protection operating based on one measuring system each for the three phase currents, the negative sequence current and the residual current.
f) Shall have additional features to provide **under/ over voltage protection.**
g) Shall have additional features to provide **under frequency protection.**

OVER CURRENT AND EARTH FAULT RELAYS

These relays shall be of numeric, single/multi pole, directional /non-directional type with or without high set element as specified. These relays shall have the following features/characteristics:
(i). IDMT characteristic with definite minimum time of 3 second at 10 times setting.
(ii). Other operating curves such as inverse, very inverse shall be selectable
(iii). Adjustable setting range of 50-200 % and 20-80% of rated current for over current and earth fault relays respectively.
(iv). The directional relays shall have a Maximum torque angle of 45° current leading for directional over current unit & 30 lag for directional earth fault. Other MTAs should be settable
(v). Voltage polarizing coil: 63.5 or 110 volt
(vi). Must have faulty phase, type of fault identification
(vii). The directional relays shall have over voltage/ under voltage & under frequency built in protection
(viii). The relay shall have blocking scheme on Reverse Power Flow.
(ix). Shall be draw out type

TRIP CIRCUIT SUPERVISION RELAY

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.

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.

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

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.

PROTECTION SCHEME FOR PANELS

33 KV FEEDER PROTECTION PANEL

The 33 kV Feeder Panels shall be provided non directional single/ multi pole relays as specified

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

The following protections scheme shall be provided for Panels for all Power and Auto Transformers:

(a) **Main Protection**
Biased transformer differential protection employing relay type specified. As overall protection scheme for transformers following features of the Numerical Relay shall be employed:
(i) Restricted Earth Fault Protection.
(ii) Over-fluxing protection
(iii) Under Frequency and Over Voltage Protection

(b) **Backup Protection**
The backup protection shall be provided with non-directional relays as specified. 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.

SWITCHES

Control and instrument switches shall be rotary operated type with plates clearly marked to show operating position and circuit designation plates and suitable for flush mounting with only switch front plate and operating handle projecting out. Handles of different shapes and suitable inscriptions on switches shall be provided as on switch identification.

The selection of operating handles for the different types of switches shall be as follows:-

(a) Breaker and isolator - Pistol grip, black control switches.
(b) Synchronizing switches-Oval; black, keyed handle.
(c) Selector switches - Oval or knob; black
(d) Instrument switches - Round, Knurled, black.
(e) Protection transfer - Pistol grip; lockable and black switch.

The control switch of breaker and isolator shall be of spring return to neutral type.

Instrument selection switches shall be of maintained contact (stay put) type. Ammeter selector switches shall have make before type contacts so as to prevent open circuit of CT secondary when changing the position of the switch.

Synchronising switches shall be of maintained contact type having a common removable handle for a group of switches. The handle shall be removable only in the OFF position and it shall be arranged to the 'ON' position. One contact of each switch shall be connected in the closing circuit of the respective breaker so that the breaker cannot be closed until the switch is turned to the 'ON' position.

The contacts of all switches shall preferably open and close with snap action. Contacts of switches shall be with coated with pure silver. Spring shall not be used as current carrying parts.

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)

PRE-COMMISSIONING TESTS

The contractor shall have to perform following minimum Pre-commissioning tests, as applicable, for commissioning of the C&R panels. For this purpose, the contractor shall arrange all required tools and testing equipment at site.
(i). IR values of all circuits.
(ii). Measurement of burden in CT & PT circuits.
(iii). Primary current injection of CT circuits with connected burden
(iv).Energisation of PTs at suitable low voltage and measurement of PT inputs at all measuring points
(v). Secondary ac current injection of relays, dynamic testing of all numeric relays. Tracing of zone curves, limits. Checking of relay timings, inherent or set values. For this testing, the contractor shall bring 'Omicron' or equivalent test kit.

(vi).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 inter locks
(xvii) Simulation of faults like low gas, air pressure and checking operation of inter locks. Checking anti umping scheme of CB.
(xviii).Simulation to Check Checking of PT selection schemes
(xix). Simulation to Check interlocks of all CB and isolator inter locks
(xx). Simulation to Check annunciation of all events in BCU (Bay control unit) as well as SAS (Substation automation System)
(xxi). Simulation to Check of logic of BCU.
(xxii). Operation of tap changing of transformer through SAS

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

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

Section - 5

General Conditions of Supply and Erection of AEGCL

This Section 'General Conditions of Supply and Erection of AEGCL' is supplementary to Section -5 'Special Conditions of Contract' of this document.

Whenever there is a conflict, the provisions in SCC or the other Sections of this document shall prevail over those in the 'General Conditions of Supply and Erection of AEGCL'.

Section - 6

Special Conditions of Contract

This Section 'SCC' is supplementary to Section -5 'General Conditions of Supply and Erection of AEGCL'.
Whenever there is a conflict, the provisions in this Section shall prevail over those in the 'General Conditions of Supply and Erection of AEGCL'.

Table of Clauses

Section - 6
Special Conditions of Contract

6.0.0 DEFINITION OF TERMS

"Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein; they shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

"Contract Documents" means the documents listed in Article 1.1 (Contract Document) of the Contract Agreement (including any amendments thereto).

"Contract Price" means the price payable to the Supplier as specified in the Agreement, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract.

"Day" means calendar day

"Year" means 365 days.

"Month" means calendar month.

"Party" means the "Purchaser" or the "Supplier", as the context requires.

"*Purchaser*" means the Assam Electricity Grid Corporation Limited (in short AEGCL) and its assignees.

The "*Supplier*" shall mean the bidder whose tender/ bid has been accepted by the "Purchaser" and shall include the bidder's legal representatives, successors and assignees.

"Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.

"Delivery" means the transfer of the Goods from the Supplier to the Purchaser in accordance with the terms and conditions set forth in the Contract.

"Completion" means the fulfilment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.

"Related Services" means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other similar obligations of the Supplier under the Contract.

The "Specification" shall mean the "Purchaser's Requirements".

"Supplier" means the natural person, a company/firm, or a combination of these, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Agreement, and includes the legal successors or permitted assigns of the Supplier.

6.1.0 CONTRACT DOCUMENTS

6.1.1. Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory. The Contract shall be read as a whole.

6.2.0 LEGAL JURISDITCTION

6.2.1. For any litigation arising out of the contract which cannot be resolve through mutual agreement or through Arbitration the honorable Guwahati High Court will have sole jurisdiction of all settlement.

6.3.0 LANGUAGE

6.3.1. The ruling language of the Contract shall be English.

6.4.0 SCOPE OF SUPPLY

6.4.1. The Goods and Related Services to be supplied shall be as specified in Schedule No. 1 and Schedule No. 2 of Section -2, Bidding Forms.

6.4.2. Unless otherwise stipulated in expressly limited in the ***Purchaser's Requirements***, the Scope of Supply shall include all such items not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Delivery and Completion of the Goods and Related Services as if such items were expressly mentioned in the Contract.

6.5.0 DELIVERY SCHEDULE

6.5.1. For the purpose of determining the completion time of the Contract, the date on which the Supplier signs the Contract Agreement, shall be taken as Commencement Date of the contract.

6.5.2. The Delivery of the Goods and Completion of the Related Services shall be in accordance with the Delivery and **Completion Schedule specified in the Article 3** of the Contract Agreement (Contract Forms) or within such extended time to which the Supplier shall be entitled under ***SCC Clause* 6.15.0** hereof.

6.6.0 CONTRACT PRICE

6.6.1. The Contract Price shall be as specified in **Article 2 (Contract Price)** of the Contract Agreement.

6.6.2. Unless an escalation clause is provided for in the **Article 2 (Contract Price)**, the Contract Price shall be a firm shall not subject to any alteration, except in the event of a Change in the Works or as otherwise provided in the Contract.

6.7.0 TERMS OF PAYMENT

6.7.1. The Contract Price shall be paid as specified in subsequent sub-clauses, if not provided in Contract Forms, Section-6.

6.7.2. Payment against Goods and F&I (Price Schedule 1& 1A) shall be made as follows: -

A. <u>PROGRESSIVE PAYMENTS FOR SUPPLY ITEMS:</u> (ONLY SUPPLY)

1. Within 60 (sixty) days from the date of submission of the invoice against supply, 80% (eighty percent) payment of the total supply amount would be made along with 100% GST on receipt and acceptance of materials in full and good condition.
2. In total 5 (five) Nos. of progressive supply invoice/ bill would be entertained.
3. For payment of 80% of the total supply amount, maximum 4 (four) Nos. of progressive supply invoices/ bills would be entertained.
4. Remaining 1 (one) No. of supply invoice/ bill of 20% balance supply amount would be entertained on completion of supply in full and good condition.

B. <u>DOCUMENTS TO BE SUBMITTED WITH THE INVOICE (Only Supply)</u>.

(a) Unconditional acceptance of the Letter of Award and signed Contract Agreement, by the contractor for supply.
(b) Detailed Supply Plan /Project Execution Plan/ PERT chart approved by AEGCL.
(c) Documentary evidence of dispatch (R/R or receipt of L/R). – (for Supply only.)
(d) Contractor's detailed invoice & packing list identifying contents of each shipment/supply.-(for Supply only.)

(e) Copy of certificate in respect of payments of State/ Central taxes, duties, levies, etc. have been made against supply of equipment/ materials through contractors/ sub-vendors under the contract, if applicable.
(f) Certified copy of Insurance Policy/ Insurance Certificate.
(g) Manufacturer's/ Contractor's Guarantee Certificate of Quality.
(h) Material Dispatch Clearance Certificate (MDCC)/ Dispatch Instructions (DI) for dispatch of materials from the manufacturer's works. MDCC/DI shall be issued by authorised Officer of AEGCL.-(for Supply only.)
(i) Manufacturer's/ Supplier's copy of challan.-(for Supply only.)
(j) Copy of testing/ inspection of equipment/ material clearance certificate issued by AEGCL.
(k) Copy of Goods Receipt Sheet (GRS)/ Materials Received Voucher (MRV)/ Materials Handing Over Voucher (MHOV).-(for Supply only.)
(l) Joint Measurement Sheet. - (for erection only.)
(m) Labour Licence, Insurance, etc. - (for erection only.)
(n) Payments would be made subject to fulfilment of the following conditions-

(i) Advance copy of invoices/ bills in duplicate with documents/ information as stated under clause (a) to (n), whichever is applicable, are to be furnished sufficiently in advance.
(ii) Any demurrage charges on account of late intimation and/or delivery of documents by the Bank is to be borne by the supplier.
(iii) The supplier should intimate the dispatch of each and every consignment to the Purchaser and the Consignee.
(iv) All Bank charges are to be borne by the supplier.
(v) Payment through Bank for supply of equipment/ materials, dispatched by Rail would be allowed if required, however the equipment/ materials have to reach at destination/ project site in full and good condition and additional expenditure in any form for this is to be borne by the supplier. A prior approval from appropriate authority of the AEGCL is to be taken in this respect.
(vi) Payment through Bank in respect of material/ equipment dispatched by road transport would be allowed if required, provided that the transport agency is approved by the Banking Association and prior approval thereof is given by the AEGCL's appropriate authority.

Further, Performance Guarantee of 10% of total contract value for of the project in the form of Bank Guarantee (BG) from a nationalized or scheduled Bank of RBI for a period of 60 (sixty) months from the date of supply is to be submitted with acceptance of LOI and before signing of the Contract Agreement. Moreover, before one month (i.e. 30 days) of expiry of the BG, renewal is to be done by the contractor if required, otherwise revocation would be done by AEGCL within claim period. BG is to be submitted strictly as per prescribed format of the AEGCL. BG should remain valid up to 60 (sixty) days beyond warranty/ Performance Guarantee Period.

6.7.5 ADVANCE PAYMENT

No advance payment is applicable for this contract.

6.8.0 PERFORMANCE SECURITY DEPOSIT

6.8.1. The Supplier shall have to deposit to the extent of 10% (ten percent) of the total value of the order as performance security (Bank Guarantee), within Fifteen (15) days of receipt of notification of award, duly pledged in favor of the Purchaser and such security deposits shall be valid up to 60 days beyond the warranty period.

6.8.2. If required, the supplier on his own has to renew the BG at least 1(one) month before the date of expiry of the BG; failing which the BG shall be revoked by AEGCL within the claim period without any prior intimation to the contractor

6.8.3. If the Supplier fails or neglects to observe, perform any of his obligations under the contract, it will be lawful for the "Purchaser" to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the supplier.

6.8.4. No interest shall be payable on such deposits.

6.9.0 WARRANTY

6.9.1. 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

6.9.2. 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

6.9.3. The warranty shall remain valid for a period of ***sixty (60) months*** *from the date of supply* (the Goods having been delivered to and accepted at the final destination indicated in the Purchaser's Requirement

6.9.4. If during the Period Warranty any defect should be 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.

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

6.10.0 COPY RIGHT ETC

6.10.1 The Supplier shall indemnify the purchaser against all claims actions, suits and proceedings for the infringement or alleged infringement of any patent, design or copyright protected either in the country of origin or in India by the use of any equipment supplied by the Supplier but such indemnity shall not cost any use of the equipment other than for the purposes indicated by or reasonably to be inferred from the specification.

6.11.0 QUANTITY VARIATION

6.11.1. "Purchaser" shall have the right to increase/decrease the ordered quantity by 20% within 50 days of the period of completion and the same shall be carried out at the same rates /prices and terms and conditions stipulated in the order except in regard to completion schedule, which shall be mutually agreed upon in case of enhancement of the ordered quantity.

6.12.0 INSPECTION AND TESTING

6.12.1. The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified in Sections 3, Purchaser's Requirements.

6.12.2. The inspections and tests may generally be conducted on the premises of the Supplier/Manufacture, at point of delivery. Subject to Sub-Clause **6.12.3**, The Supplier shall furnish all reasonable facilities and assistance, including access to drawings and production data to the inspectors at no charge to the Purchaser.

6.12.3. The Purchaser or its designated representative shall be entitled to attend the tests and/or inspections referred to in SCC Sub-Clause**6.12.2**, provided that the Purchaser bear all of its own costs and expenses incurred in connection with such attendance including, but not limited to, all travelling and board and lodging expenses.

6.12.4. Whenever the Supplier is ready to carry out any such test and/or inspection, the Supplier shall give a reasonable advance notice (not less than 30 days) of such test and/or inspection and of the place and time thereof to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

6.12.5. The Supplier/manufacture shall provide the Purchaser with a certified report of the results of any such test and/or inspection.

6.12.6. The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to SCC Sub-Clause **6.12.4**

6.12.7. If it is agreed between the Purchaser and the Supplier that the Purchaser shall not attend the test and/or inspection, then the Supplier may proceed with the test and/or inspection, and should provide the Purchaser with a certified report of the results thereof.

6.12.8. The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report pursuant to SCC Sub-Clause **6.12.5** & **6.12.7**, shall release the Supplier from any warranties or other obligations under the Contract.

6.13.0 INSURANCE

6.13.1. 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.

6.13.2. 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.

6.13.3. 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.

6.13.4. 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.

6.13.5. 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.

6.14.0 FORCE MAJEURE

6.14.1. "Force Majeure" shall mean any event beyond the reasonable control of the Purchaser or of the Supplier, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following:

(a) war, hostilities or warlike operations whether a state of war be declared or not, invasion, act of foreign enemy and civil war

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion and terrorist acts

(c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler or any other act or failure to act of any local state or national government authority

(d) strike, sabotage, lockout, embargo, import restriction, port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine and plague

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster

(f) shortage of labor, materials or utilities where caused by circumstances that are themselves Force Majeure.

6.14.2. If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.

6.14.3. The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with ***SCC Clause* 6.15.0**.

6.15.0 EXTENSION OF TIME FOR COMPLETION

6.15.1. The Time(s) for Completion specified in the Article 3 of the Contract Agreement (Contract Forms) shall be extended if the Supplier is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) any Change in the scope of works by the Purchaser; which justifies extension of completion time as provided in ***SCC Clause*** 6.11.0; and

(b) any occurrence of Force Majeure as provided in ***SCC Clause*** 6.14.0.

6.15.2. Except where otherwise specifically provided in the Contract, the Supplier shall submit to the Purchaser's Representative a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such

notice and supporting particulars of the claim, the Purchaser and the Supplier shall agree upon the period of such extension. In the event that the Supplier does not accept the Purchaser's estimate of a fair and reasonable time extension, the Supplier shall be entitled to refer the matter to a Dispute Board, pursuant to ***SCC Sub-Clause 6.18.0***.

6.16.0 LIQUIDATED DAMAGE

6.16.1. The Supplier guarantees that it shall attain Completion of the Works within the Time for Completion specified in the Contract Agreement pursuant to ***SCC Sub-Clause 6.5.2***, or within such extended time to which the Supplier shall be entitled under ***SCC Clause 6.15.0*** hereof.

6.16.2. If the Supplier fails to attain Completion of the Works within the Time for Completion or any extension thereof under ***SCC Clause 6.15.0***, the Supplier shall pay to the Purchaser liquidated damages at the rate of ***½ % (half percent)*** of the total Contract Price per week or part thereof delay. The aggregate amount of such liquidated damages shall in no event exceed ***10% (ten percent)*** of the total contract price.

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

6.16.3. Once the aggregated "Liquidated damage" reaches10% of the total contract price, the Purchaser may consider following actions:

(a) Procure the undelivered material/ equipment and/or complete the balance works from elsewhere giving notice to the supplier and to recover any extra expenditure incurred thereby for having to procure these materials and works at higher price, at the risk and responsibility of the Supplier; or

(b) Cancel the contract wholly or in part and to complete the works at the full risk and cost of the Supplier and forfeit the security deposit.

(c) Declare it as a "Contractual Failure" and act in accordance with ***SCC Clause* 6.17.0**.

6.17.0 CONTRACTUAL FAILURE

6.17.1. In the event of contractual failure of any respect on the part of the Supplier, the Purchaser shall be entitled to operate security deposit or any deposit or any payment due to supplier irrespective of whether his default relates to the particular orders or not towards the Purchaser's claim for damages arising out of the failure. In addition, the Purchaser may black-list or bans the "Supplier" or pending enquiry, suspend him or take any other steps considered suitable.

6.18.0 ARBITRATION

6.18.1. If at any time, any question, disputes or differences whatsoever shall rise between the Purchaser and the Supplier, upon or in relation to or in connection with the contract, either party may forthwith give notice to the other in writing of the existence of such question of dispute or difference and the same shall be referred to the adjudication of three Arbitrators, one to be nominated by the Purchaser the other by the Supplier and the third by the President of the Institution of Engineers, India/ Retired or Sitting Judge not below the status of a retired Judge of High Court of India. If either of the parties fail to appoint its arbitrators within 60(sixty) days after receipt of notice of the appointment of arbitrators then the President of the Institution of Engineers /retired or sitting Judge of India, as the case may be, shall have the power at request of either of the parties, to appoint an Arbitrator. A certified copy of the "President" making such an appointment shall be furnished to both parties

6.18.2. The arbitration shall be conducted as per provisions of the Indian Arbitration Act, shall be held at Guwahati or any other place as may be decided by the Purchaser. The decision of the majority of Arbitrators shall be final & binding upon the parties and the expenses of the arbitration shall be paid as may be determined by

the Arbitrator. However, any dispute arising out of this contract will first be discussed and settled bilaterally between Purchaser and the Supplier.

Section - 7

Contract Forms

(This Section contains the Letter of Acceptance, the Contract Agreement and Appendices to the Contract Agreement which, once completed, will form the Contract along with the Section 4 and Section 5. The Bidder should note that this Section shall be completed fully at the time of Contract signing)

Contract Forms

Table of Forms

Notification of Award

[AEGCL's letter head]

Letter of Acceptance

Supply of Goods and Related Services

[date]

To: [Name and address of the Supplier]

This is to notify you that your Bid dated [date] for execution of the [name of the Contract and identification number, as given in the Contract Data] for the Contract Price in the aggregate of [amounts in numbers and words] [name of currency] (as per Price Schedule-1), as corrected and modified in accordance with the Instructions to Bidders is hereby accepted, and it is decided to award on you the 'Supply and Delivery Contract' covering inter-alia Ex-works supply and Delivery of all Goods including Related Services.

You are requested to furnish the Performance Security within seven (7) days in accordance with the Conditions of Contract, using for that purpose one of the Performance Security Forms included in Section 8 (Contract Forms) of the Bidding Document

[Authorized Signature]

[Name and Title of Signatory]

Assam Electricity Grid Corporation Limited

Attachment: Contract Agreement

1. Contract Agreement

THIS AGREEMENT made the _____ day of _____, _____,

BETWEEN

Assam Electricity Grid Corporation Limited (herein after referred to as AEGCL), a corporation incorporated under the laws of Company Act, 1956 and having its registered office at First Floor, BijuliBhawan, Paltanbazar, Guwahati-781001, Assam and [***name of Supplier***], a firm/company incorporated under the laws of Company Act, 1956 and having its principal place of business at [***address of Supplier***] (hereinafter called "the Supplier"). [***in case of JV insert name and address of the Lead Partner as well as other Partners]***

WHEREAS AEGCL desires to engage the Supplier to the 'Supply and Related Service Contract'covering "Supply of Power & Control Cables of 1.1KV Class for various sub-stations in Assam under PSDF" Cables" with all accessories and delivery to various Substation Sites of AEGCL and Related Services, as detailed in the Contract Document, and the Supplier has agreed to such engagement upon and subject to the terms and conditions hereinafter appearing.

NOW IT IS HEREBY AGREED as follows:

Article 1	1.1	**Contract Documents** (Reference SCC Clause 6.1.0)
Contract Documents		The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract:
		(a) This Contract Agreement and the Appendices hereto (b) Letter of Price Bid and Price Schedules submitted by the Supplier

(c) Letter of Technical Bid and Technical Proposal submitted by the Supplier
(d) Special Conditions of Contract
(e) General Conditions of Supply and Erection.
(f) Specification (Purchaser's Requirements)
(g) Other completed Bidding Forms submitted with the Letters of Technical and Price Bids
(h) Guaranteed and other Technical Particulars (as submitted with the Bid).
(i) Any other documents (if necessary) shall be added here

1.2 **Order of Precedence** (Reference SCC Clause 6.1.0)

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above.

1.3 **Definitions** (Reference SCC Clause 06.0.0)

Capitalized words and phrases used herein shall have the same meanings as are ascribed to them in the SCC.

Article 2

Contract Price and Terms of Payment

2.1 **Contract Price** (Reference SCC Clause 6.6.0)
The Purchaser hereby agrees to pay to the Supplier the Contract Price in consideration of the performance by the Supplier of its obligations hereunder. The Contract Price shall [. . . ***amounts inrupees in words*** . . .], [. . . ***amounts in figures***. . .] as specified in Price Schedule No. 3 (Grand Summary).

The Contract Price is FIXED for entire period of the Contract.

2.2 **Terms of Payment** (Reference SCC Clause 6.7.0)
The terms and procedures of payment according to which the Purchaser will pay the Supplier are given in the Appendix (Terms and Procedures of Payment) hereto.

Article 3

Commencement Date and Completion Time

3.1 **Commencement Date** (Reference SCC Clause 6.5.1)

The Commencement Date upon which the period until the Time for Completion of the total scope under the Contract shall be counted from is the date of acceptance of LOA.

3.2 **Completion Time** (Reference SCC Clause 6.5.2)

The whole scope under this Contract shall be completed within **06 months** from Contract Commencement Date with following schedule:

Article 4. Appendices

5.1 The Appendices listed in the attached List of Appendices shall be deemed to form an integral part of this Contract Agreement.

5.2 Reference in the Contract to any Appendix shall mean the Appendices attached

hereto, and the Contract shall be read and construed accordingly.

IN WITNESS WHEREOF the Purchaser and the Supplier have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

Signed by, for and on behalf of the Purchaser

[***Signature***]

[***Title***]

in the presence of

[***Signature***]

[***Title***]

Signed by, for and on behalf of the Supplier

[***Signature***]

[***Title***]

in the presence of

[***Signature***]

[***Title***]

APPENDICES

Appendix 1 - Terms and Procedures of Payment

Appendix 2 - Time Schedule

Appendix 3 - Performance Security.

Appendix 4– PriceSchedules.

Appendix 5– Guaranteed and Other Technical Particulars.

Appendix 1 – Terms and Procedure of Payment

In accordance with the provisions of SCC Clause 6.7.0 (Terms of Payment), the Purchaser shall pay the Supplier in the following manner and at the following times, on the basis of the Price Breakdown given in the section on Price Schedules.

Appendix 2 - Time Schedule

(Bidders shall furnish with bids a construction schedule in form of bar chart. The time schedule should match with the completion time mentioned elsewhere in the Bidding Document)

Appendix 3 - Form of Performance Security

Bank Guarantee

(To be stamped in accordance with Stamp Act)

To: _____ *[name of Purchaser]*

_____ *[address of Purchaser]*

*WHEREAS*_____ *[name and address of Supplier/Manufacturer]* has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ *[name of Supplier/Manufacturer and brief description of Scope]* (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Supplier/Manufacturer shall furnish you with a Bank Guarantee by a recognized/scheduled bank for the sum specified therein as security for compliance with its obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Supplier/Manufacturer such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible *to* you, on behalf of the Supplier/Manufacturer, up to a total of _____ *[amount of Guarantee]*[1] _____ *[in words],* such sum being payable inthe currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum orsums within the limits of _____ *[amount of Guarantee]* as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Supplier/Manufacturer before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the scope to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until the date, 30 days beyond the Warranty Period as per the Contract.

Signature and Seal of the Guarantor _____

Name of Bank _____

Address _____

Date _____

1 An amount is to be inserted by the Guarantor, representing the percentage of the Contract Price specified in the Contract.

Appendix 4 – Guaranteed and other Technical Particulars