

KERALA STATE ELECTRICITY BOARD LTD
Thiruvananthapuram

(Incorporated under the Indian Companies Act,1956)

CIN: U40100KL2011SGC027424 GST: 32AAECK2277NBZ1

Registered Office: Vydyuthi Bhavanam, Pattom, Thiruvananthapuram 695 004 Website:

www.kseb.in

BID NO.KSEB/CESCM/2026-27/00013 dated 06/06/2026

FOR THE SUPPLY OF 36 NOS., 8MVA, 33kV/11kV THREE PHASE TRANSFORMER

PRE-QUALIFICATION BID

PART – II

(To be submitted online along with Part-I and General Conditions of Contract and Schedule for the Supply of Materials)

(Office of the Chief Engineer
(Supply Chain Management),
Kerala State Electricity Board Ltd.,
Vydyuthi Bhavanam, Pattom. P.O
Thiruvananthapuram – 695 004,
Kerala State, India.
Phone – 0471-2514530/ 2514568
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Sd/-
Chief Engineer (SCM)&CSC

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Instructions to Bidders

- 1) **Introduction:-** The bidder shall carefully study the details in PQ Bid Parts-I & II and the General Conditions of Contract and Schedule for the supply of materials and Instructions to Bidders before the submission of the bid. Submitting through digital signature certificate (DSC) is equivalent that the Bidder signed and sealed on all the pages of the Bid specification (Part -I and II) and the General Conditions of Contract and Schedule for the supply of materials.
- 2) **Acceptance of Bid:-** All Bid documents shall be submitted online only and in the designated covers/ envelopes on the web site www.etenders.kerala.gov.in.
- 3) Acceptance of the bid rests with the Kerala State Electricity Board Limited, which is not bound to accept the lowest or any other bid. The KSEB Limited will not be responsible for any expenses or losses that may be incurred by the bidder in the preparation of the bid.
- 4) **Alterations:-** No alterations shall be made in the bid form or schedule or the specifications annexed hereto, except to the extent of filling in.
- 5) If the bidder needs any clarification on the General Conditions of Contract and Schedule for the supply of materials or the specification, he should get it clarified in writing from the Office of the Chief Engineer (SCM)&CSC in order that the doubt may be got cleared before the submission of the bid.
- 6) **Bid Agreement & Bid Form:-** The bidder should attach along with their bid an agreement form duly filled and signed in Kerala Government non judicial **stamp paper worth Rs.200/-** as per specimen form given in Appendix-III of General Conditions of Contract. Bids without agreement in Kerala non judicial stamp paper of proper value will be rejected. Bid form as per Annexure III of Part III shall also be furnished in Kerala Government non judicial **stamp paper worth Rs 200/-**.
- 7) **Earnest Money Deposit:-** Every bidder except State PSUs & MSMEs with Udyog Aadhar Registration, shall remit an amount as specified in NIT, as Earnest Money Deposit. Also, please refer Clause-5 of General Conditions of Contract in this regard and Part-I - Pre-qualification bid. If any bidder withdraws his bid before the period fixed for the acceptance, or if the bidder whose bid is accepted fails to execute the agreement and furnish the security deposit as called for herein, the earnest money deposited by him will be forfeited to the KSEB Limited. The EMD should be paid through online payment through SBI Internet Banking only.

The earnest money deposit of the unsuccessful bidders will be returned as soon as possible after the tender is settled but that of the successful bidder will be released after furnishing necessary security deposit and execution of contract agreement. No interest will be paid on the earnest money. In case of online payment, bidder should ensure that bid submission fee and EMD are remitted as one single transaction.

Kerala Government Public Sector Undertakings are exempted from furnishing EMD. State PSUs shall produce Certificate from Industries Department of Government of Kerala. MSME with Udyog Aadhar Registration are exempted from furnishing EMD and Bid Submission Fee on production of valid documents in support of the claim.

EMD amount above Rs.10 lakh can also be submitted as Bank Guarantee (BG) with a minimum validity of 9 months from the date of opening of pre-qualification bid and shall be extended upto the date of execution of Agreement, if required.

Bids without earnest money will be rejected. The earnest money deposit is checked first and if earnest money deposit particulars are not acceptable the pre-qualification bid will not be opened.

8) **Destination of Delivery:-**

- a) Timely delivery of the materials covered by this bid is of prime importance and hence the bidder shall also offer the optimum delivery possible.
- b) **The destination station for the dispatch of the item will be intimated at the time of issuing MDCC. However, the consignment should be delivered anywhere in Kerala without any extra cost, if required by the KSEB Limited. This will be intimated at the time of issue of MDCC. The unloading of the material at stores/ stations is manufacturer's responsibility and will be to his account.**

9) **Site Visit:-** Bidders are advised to inspect the sites, and get in touch with the local transport contractors, and get them familiarized with the routes and methods of transport to site. This is most important as it is very essential for the successful execution of the contract, that the manufacturer should be in possession of information regarding local conditions to enable him to be in a position to handle all materials and to transport them safely to site. The manufacturers at their cost shall arrange loading and unloading of materials at sites.

10) **Contract Agreement:-**

- a) The successful bidder shall execute an agreement in the form prescribed by the KSEB Limited in Appendix-I of General Conditions of Contract for the due fulfillment of the contract within 15 days from the date of placement of detailed order and shall have to pay all stamp duty, lawyer's charge and other expenses incidental to the execution of the agreement. Failure to execute the agreement within the period specified will entail the penalties set out on para 10 (b) below.
- b) The successful bidder shall, before he enters into an agreement in writing, **deposit a sum equivalent to 5% (Five) of the value of the contract towards security deposit.** The Security deposit can be deposited in the form of demand draft payable at State Bank of India, KSEB Administrative Complex Branch, Vyduthi Bhavan, Pattom or in the form of Bank Guarantee in stamp paper worth Rs.500/- from a Nationalised/ Scheduled Bank. If the successful bidder fails to furnish the

security deposit and execute the agreement as stated above, the earnest money deposited by him will be forfeited to KSEB Limited and the bid will be floated again at the defaulter's risk. Any loss incurred by KSEB Limited on account of re-tender will be recovered from the defaulter who will however not be entitled to any gain accruing there by.

- c) **The 5% Security Deposit will be released after completion of entire guarantee period plus 3 months, provided, Non Liability Certificate is received from all the Consignees. But in the event of any dispute arising between the KSEB Limited and the contractor, the KSEB Limited shall be entitled to deduct out of the deposits or the balance thereof until such dispute is determined, the amount of such damage costs, charges and expenses as may be claimed. The same may also be deducted from any other sum which may be due at any time from the KSEB Limited to the contractor.**

- 11) **Breach of contract:-** In case the successful bidders, after having made partial supplies, fail to fulfill the contract in full or any of the materials is not supplied, such supplies may at the discretion of the purchasing officers be arranged by means of another bid/quotation or by negotiation from the next higher bidder, and the loss if any, caused to the KSEB Limited thereby shall, together with such sums as may be fixed by the KSEB Limited towards damages and losses, be recovered from the defaulting contractors.

Even in case where no alternative purchases are arranged for the materials not supplied, the proportionate portion of the security deposit based on the cost of materials not supplied at the rate shown in the bid of the defaulter, shall be forfeited and the balance alone shall be refunded.

The Purchaser without prejudice to the conditions laid in the General Conditions of Contract may terminate the contract, if the manufacturer fails to commence the supply within the stipulated time or fails to perform any other obligations under this contract or does not cure its failure within a period allowed by the purchaser after the receipt of the defaulted notice from the purchaser. After termination of contract, KSEBL will have liberty to arrange alternative purchase of the materials at the risk and cost of the manufacturer.

- 12) **Payment Conditions:-**

- a) 95% Basic rate with 100% taxes and Freight and insurance charges will be paid through KSEB Limited's funds in due course on State Bank of India or its subsidiaries by the consignee after receipt, verification and acceptance by the consignee and balance 5% after completion of guarantee period specified in the guarantee clause below or on production of Performance Bank Guarantee in stamp paper worth Rs.500/- from a Nationalized /Scheduled Bank for an amount equivalent to 5% of contract value valid for entire guarantee period plus

three months. The Performance Bank Guarantee will be released only after the successful completion of the contract period provided Non Liability certificate is received from all the Consignees.

Clause-15 of the General Conditions of Contract stand amended to this extent. Bank charges, if any, incurred in connection with effecting payments will be to the manufacturer's account. KSEB Limited has all liberty to change the type of payment depending on the prevailing condition. Any reduction in rates of tax on any supply of goods or services or the benefit of input tax credit shall be passed on to the recipient by way of commensurate reduction in prices. KSEB Limited is a registered dealer under the Goods and Service Tax Act. GST identification Number (GSTIN) of KSEB Limited in 32AAECK2277NBZ1.

Taxes quoted by the firm will be reimbursed after obtaining an undertaking from the manufacturer in Kerala Govt. non judicial stamp paper worth Rs.200/- in the following format.

"P.O No.....dated..... (Name & Address of firm) hereby agreed that if any dispute on payment of taxes from concerned tax authorities occurs in future, the firm shall indemnify the KSEB Limited from such liabilities and manufacturer will be liable for the additions, loss or cost on account of such discrepancies/ dispute".

Final payment will be made on production of an undertaking by the manufacturer/ contractor that all taxes payable to the Central/ State Government Department/ Agencies due to the supply/ contract have been paid by him and if any claim is received in future from any Central/ State Government Department / Agencies under existing laws regarding this supply/ contract, the manufacturer/ contractor shall be liable to pay the same.

- b) Deleted.
- c) In the case of tenders invited for the purchase of materials with "VARIABLE price "the payments may be made promptly by the Purchaser not later than Sixty (60) days after satisfactory completion of the delivery and acceptance and submission of an invoice or claim by the manufacturer with all relevant supporting documents and certification of material receiving authority in the ARU". Eligible claim on account of Taxes, in tune with the provision of CGST Act 2017, will only be entertained.
- d) If the bills require pre-audit, (for bill amount greater than 10 lakh), 75% of the payment to be released as per (a) above may be made as per conditions (c) above and balance amount may be made within period of 10 days over and above 60 days as applicable.
- e) Mode of payment – RTGS mode from the ARU's of the concerned consignees.

- 13) **Firmness of Rates:-** The price is variable as per IEEMA formula applicable for the subject item. The **Price Variation** is payable as per the IEEMA formula without ceiling.

Price variation will be allowed for supplies made during the scheduled delivery period, as per the formula given in Annexure-IV.

'When the material is offered and delivered as per the scheduled delivery period mentioned in the PO, then the updated basic price as per IEEMA formula on the offer date shall be considered for effecting payment'.

The term "Offer date" mentioned in the tender/PO will be taken as the material readiness date. Date of opening of the PQ bid will be taken as the date of tendering as mentioned in IEEMA price variation clause. Price variation calculation will be made for delivered quantity to each consignee.

Materials supplied during the scheduled delivery period will only be considered as eligible for price variation. Rate of materials supplied after the scheduled delivery period will be refixed as per the Re-fixation clause of the purchase order.

Change in statutory levies on account of change in policy decisions of the Government after the date of opening of tender but during the scheduled delivery period will be to KSEBL's account but any increase in statutory levies on account of crossing the limit of turnover of the firm as specified by Government rules and regulations will not be compensated by KSEBL.

- 14) **Tax Changes if any:-** Changes in taxes on account of change in policy decision of the Government after the date of the opening of tender, but during the scheduled delivery period will be to KSEB Limited's account but any increase in taxes on account of crossing limits of turnover of your firm as specified by Government rules and regulations or due to delay in supply will not be compensated by the KSEB Limited.
- 15) **Imported Goods:-** The successful bidder shall apply for and meet all expenses in connection with the procurement of Import Licenses if any in respect of the various items of equipment to be imported and the KSEB Limited shall not render any assistance in this regard.
- 16) **Currency:-** The rates quoted should be in the unit specified in the schedule attached and should be in Indian currency only. Offers with any other currency will be rejected. The column "Total" should also be correctly filled in.
- 17) **Turnover & Solvency Certificate:-** The bidders should produce turn over and solvency certificate as specified in conditions for pre-qualification in Part-I of the bid document.
- 18) **Jurisdiction:-** The courts situated at the place where the headquarters of the KSEB Limited is situated viz. Thiruvananthapuram alone will have jurisdiction to entertain civil suits pertaining to the contract.

- 19) **Notice:-** Every notice hereby required or authorized to be given may be either given to the bidder personally or left at his residence or last known place of abode or business, or may be handed over to his agent personally or may be addressed to the bidder by post at his usual or last known place of abode; if so addressed to the contractor and posted shall be deemed to have been sufficiently served on the bidder, on the date which the ordinary course of mail, would reach his place of abode or business.
- 20) **Standards:-** The bidder shall undertake to supply the materials according to the standard samples and specifications.
- 21) **Rate Enhancement:-** Representation for enhancement of the accepted rates will not be considered.
- 22) **Price Split up:-** The prices quoted shall indicate all freight and Insurance charges and taxes etc. which may become payable by the contractor under existing or further laws or rules of the country of origin or supply during the course of execution of the contract. If taxes are not shown explicitly, it will be assumed that the prices quoted are inclusive of all such taxes, unloading charges etc. and extra claims therefore will not be accepted. The ruling rates of taxes as applicable shall be stated in bid. Increase in the rate of taxes, outside the contractual delivery period will be to the manufacturers account. In case payment of customs/ duty is to be borne by purchaser the duty will be paid on unloaded invoice price (*ie; invoice price of the goods cleared through customs*) only in the first instance and difference being paid when the bidder produces the final assessment orders later. The taxes will be admitted at actuals after furnishing an undertaking in Kerala non-judicial stamp paper worth Rs.200/- from the manufacturer that if any, dispute on payment of taxes from concerned tax authorities occurs in future, the firm shall indemnify the KSEB Limited from such liabilities and the manufacturer will be made liable for the additions, loss or cost on account of such discrepancies/ dispute.
- 23) **Penalty:-** Penalty will be applicable for belated supplies.

The penalty for the delay in number of days from the date of scheduled delivery date to the actual delivery date will be assessed at the rate of 0.1% of the all inclusive rate minus taxes per day (subject to a max. of 10%) will be deducted from the invoice. Penalty rate shall be applied on the all inclusive rate minus taxes. But where the actual damages are provided as exceeding this amount the contractor is liable to pay such damages instead of the said liquidated damages.

The bidders should be prepared to accept order on condition that in the event of their defaults to supply as ordered/ failure to supply within the period stipulated in the order, the security deposit will be forfeited.

Actual delivery/Acceptance of material – A maximum period of 15 days will be required for verification and acceptance of the item by the consignee. Damages and defects, if any, noticed will be intimated to you with in the period. Final acceptance of

the material will be made after conducting tests if deemed necessary by the purchaser and the lot not satisfying the test will be rejected.

If the items are offered for inspection as stipulated in the Pre-despatch inspection & Testing Clause 31 (ii), the materials will be accepted without imposing penalty if they are delivered:

- (a) within 15 days from the date of issue of MDCC for manufacturers within Kerala State
- (b) within 25 days from the date of issue of MDCC for manufacturers outside Kerala State

This is not applicable for re-fixation of prices. Penalty is applicable for belated replacement of materials rejected also, as stated above.

If any failure is noticed on or after erection/commissioning of the material within the guarantee period, the item shall be replaced/ repaired within **two weeks** of intimation of such failure, failing which penalty @ **0.5%** of the cost of the item/ week subject to a maximum limit of **5%** will be levied. If the material is not at all replaced, KSEBL will deduct cost of the item + 15% supervision charges from any bills of the supplier or from Security Deposit/Performance Bank Guarantee.

If the rejected materials are not lifted from site/ store **within 15 days** on receipt of intimation of rejection by the Consignee, the manufacturer/ Contractor shall be liable to pay ground rent @ **0.1%** of the value of rejected materials for every day of delay limited to maximum of 10% of the value of the rejected material. The rejected materials should be taken back within a maximum **period of 3 months** from the date of intimation of rejection by the consignee officer, failing which the KSEB Limited will be at liberty to dispose off the rejected material without any notice. No claims by the manufacturer will be entertained on account of the disposal.

- 24) **Default of Delivery:-** Where due to any defaults of the bidder in the execution of contract, the KSEB Limited makes purchases in open market after negotiation or after inviting fresh bid and settling any of such bids the contractor will be liable to pay the KSEB Limited the extra costs incurred by the KSEB Limited and also other expenses defrayed.
- 25) **Lowest Quote:-** The bidder shall quote the lowest rate. The quoted rate shall be final. **There shall be no negotiation regarding the price.**
- 26) **Rate Contract (DGS & D Rate):-** If any bidder has a Rate/ Running contract with the Director General of Supplies and Disposals, New Delhi for the supply of any of the items of stores mentioned in the schedule thereto a copy of the same should be enclosed with the bid.

- 27) **Special Conditions:-** Special conditions, if any mentioned in the offer of the bidder or in any other communication from him will not be applicable to the contract unless they are expressly accepted in writing by the purchaser.
- 28) **Source of Goods:-** Bidders shall clearly specify whether the goods are offered from indigenous sources/ imported stock in India or from foreign sources to be imported under a license. The KSEB Limited reserves the right to reject offers, using imported goods if the import trade control policy in force at the time of award of the contracts prohibits or restricts such imports. KSEB Limited will not in any way be responsible for obtaining foreign exchange if necessary.
- 29) **Incidental Expenses:-** All incidental expenses incurred by the KSEB Limited for making payment outside the District in which the claims arises shall be borne by the contractors.
- 30) **Appropriation:-** Any sum of money due and payable to the bidder (including security deposit returnable to him) under this contract may be appropriated by the purchasing officer or the KSEB Limited and set off against any claim of the purchasing officer or the KSEB Limited for the payment of a sum of money arising out of or under any other contract made by the contractor with the purchasing officer or the KSEB Limited or any other person authorized by the KSEB Limited.
- 31) **Pre-despatch inspection & testing:-** The KSEB Limited reserves its right to inspect and approve the materials before despatch. All facilities should be rendered for the KSEB Limited's representative for inspecting the materials before despatch. All routine / acceptance tests as prescribed in the relevant **IS/IEC** have to be conducted in his presence. The testing equipment / meters should have valid calibration certificate and one set of copy to be submitted to this office along with test report.
- i) The KSEB Limited representative shall be entitled at all reasonable times during manufacture, to inspect, examine and conduct tests on the materials and workmanship of the item to be supplied under this contract. If any part of the item offered is being manufactured elsewhere than in the manufacturer's premises, the manufacturer shall obtain permission for the KSEB Limited representatives to inspect, examine and test the items under manufacture as if they were being manufactured in manufacturer's premises (stage inspection). Such inspection, examination and testing shall not release the manufacturer from the obligations under this contract.
 - ii) **Material shall be ready at least 20 days prior to scheduled delivery date for each lot and advance intimation shall also be given to the Chief Engineer (SCM)&CSC regarding the readiness of goods with date & place for inspection & testing.**
 - iii) If the contract provides for testing in the premises of the manufacturer or any of his sub-contractors, the manufacturer shall provide all assistance, as may be

required for as may be reasonably demanded by the KSEB Limited's representative to carryout such tests efficiently.

- iv) All routine, type test and special test requested by the KSEBL shall be carried out with testing equipment/meters with valid calibration certificates obtained from NABL accredited Lab. The type tests should have been conducted by Central Power Research Institute (CPRI) / Electrical Research and Development Association (ERDA)/ State Government or Central Government owned/ approved NABL Laboratories/ any NABL accredited Laboratories/ Laboratories of Foreign Country accredited by National Accreditation Body of that Country such as PHELA/KERI/KEMA/CESI etc., if testing facility is not available in India as per IS/IEC relevant Standard. The type test report shall be valid as on the last date of submission of bid. If the type test report submitted is issued by private NABL accredited laboratory, NABL accreditation certificate valid as on the date of issuance of submitted type test report along with scope for testing of the material type tested shall be submitted along with the bid. Copy of the valid calibration certificate shall also be produced along with the test reports (2 set) for scrutiny and approving of test reports for issuing MDCC.
- v) **Penalty on Fake Inspection Call:-** After the receipt of the intimation for carrying out the Factory acceptance test of the offered lot, if the KSEB Limited representative found that the offered lot is not fully ready for despatch, the acceptance test will not be conducted and it will attract a **penalty of Rs.50,000/-** from the manufacturer. Then re-inspection will be conducted after receiving intimation on the readiness of the complete lot of materials in all respect for dispatch to KSEB Limited Store. The above amount will be deducted from the invoice submitted for the lot.
- vi) Re-inspection of the lot will be conducted at manufacturer's expense, after informing the readiness of the consignment in all respects.
- vii) **QA/QC plan of the firm as per relevant standards shall be submitted in advance and get approved from the Chief Engineer (SCM)&CSC before conducting Factory Acceptance test.**
- viii) The KSEB Ltd reserves the right to verify the genuineness of type test report submitted by the bidder. The fee, if required for verification shall be borne by the bidder. If the verification fee is not received within 10 days from the date of intimation letter regarding the same, the offer of such bidder shall be summarily rejected.
- ix) The materials will be inspected and relevant tests if deemed necessary will be conducted on receipt of the material by the consignee and the lot not satisfying the tests will be rejected.

- x) The purchaser reserves right to conduct retest of the materials even if it is inspected and tested at factory site by KSEBL representative, if deemed necessary during the time of acceptance by the Consignee.
 - xi) No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested, unless the inspection is waived off, by the purchaser in writing .
 - xii) The acceptance of any quantity of material shall in no way relieve the Bidder of any of his responsibilities for meeting all requirements of the specification, and shall not prevent subsequent rejection if such material is later found to be defective.
- 32) **Certificate Accompanying Payment:-** The bidder shall invariably furnish the following certificate with their bills for payment.
- Certified that the goods on which GST has been charged have not been exempted under GST Act or the Rules made there under and the charges on account of GST on these goods are correct under revision of relevant Act or the Rules made there under. Certified further that we (or our Branch or Agent) are registered as dealers in the State.....under Registration No.....
..... for purpose of GST.
- 33) **Guarantee: -** The materials offered should be guaranteed for a minimum period of **minimum period of 120 months from the date of acceptance by the consignee or 114 months from the date of commissioning** whichever is earlier. Any defective or damaged material shall be replaced by the manufacturer free of all costs to the KSEB Limited and to the full satisfaction of the KSEB Limited during the guarantee period.
- 34) **Disqualification against the price display other than in Price bid:-** The indication of price anywhere else other than in the Price bid will render the bid invalid and will be rejected.
- 35) **Insurance:-** All the materials which are ordered have to be fully insured from the time of dispatch from the manufacturer's works to the destination station and for one-month storage thereafter at the cost of the manufacturer. Proof of insurance shall be insisted.
- 36) **Force Majeure Condition:-** The manufacturer will not be liable for any liquidated damages for such delay due to force majeure conditions such as acts of God acts of public enemy, act of Government, fire, floods, epidemics, quarantine, restrictions, riots, civil commotion and freight embargo, **provided that manufacturer notify within 10 days from the beginning of such delay due to force majeure conditions, with valid proof for force majeure conditions.** The KSEB Limited will verify that fact on merit and grant suitable extensions of delivery period if facts satisfy.

- 37) **Additional Quantity:-** If KSEBL desires, the supplier has to supply the 25% additional quantity, if the additional order is placed within 6 months from the date of completion of supply as per the terms and conditions of the original P.O.

Willingness of the supplier shall be obtained If KSEBL desires to place additional order after 6 months from the date of completion of supply.

The materials if any, supplied after the scheduled delivery period noted in the 25% additional quantity order will be accepted, only on the condition that price of such materials will be refixed as per Price Re-fixation Clause of the original order.

The Chief Engineer (SCM)&CSC 's decision in re-fixing the price will be final.

- 38) **Price Re-fixation:-** Price re-fixation will be applied to the materials, not supplied as per the scheduled delivery period mentioned in the PO as follows:

- 1) If the material is offered and delivered ahead of the scheduled delivery period, without written request of the Agreement Authority, updated basic price as per IEEMA on the offer date and the updated basic price as per IEEMA on scheduled delivery date are compared and lowest price will be allowed.
- 2) If the material is offered and delivered ahead of the scheduled delivery period, as per the written request of the Agreement Authority, the updated basic price as per IEEMA on the Offer date will be allowed.
- 3) If the delivery is made after the scheduled delivery date of that particular lot, but within the overall delivery period specified in the P.O, lowest of the following will be considered for effecting payment of that lot:
 - i) Updated basic price as per IEEMA as on offer date.
 - ii) Updated basic price as per IEEMA as on scheduled delivery date.
 - iii) Updated basic price as per IEEMA as on the actual delivery date
- 4) The materials, if any, supplied after the overall scheduled delivery period will be refixed to the lowest of the following rates:
 - i) Updated basic price as per IEEMA as on the P.O date.
 - ii) Updated basic Price as per IEEMA as on offer date.
 - iii) Updated basic Price as per IEEMA as on scheduled delivery date.
 - iv) Updated basic Price as per IEEMA as on actual delivery date.
 - v) Lowest of the updated basic rate of the new P.O issued/ price revealed in the new price bid opened and accepted by KSEBL for the material with the same specification, during the period from the date of P.O till the actual date of supply, as on offer date/scheduled delivery date/ actual delivery date of the defaulted P.O.

The Chief Engineer (SCM)&CSC 's decision in re-fixing the price will be final.

- 39) **Determination of L1 Rates:-** When there is a tie in all inclusive rate, the basic price will be considered for arriving L1.
- 40) The bid shall be governed by the General Conditions of Contract and schedule for the supply of materials and the Special Conditions mentioned herein. IN CASE THERE IS ANY CONTRADICTION OR NON-CONFORMITY BETWEEN THE TWO, THE SPECIAL CONDITIONS MENTIONED HEREIN WILL PREVAIL.
- 41) **Right of Acceptance/ Rejection of Bid:-** The KSEB Limited reserves the right to accept or reject any bid without assigning any reason whatsoever. The fact that bid is prima facie found qualified, scrutiny will not, in any manner, take away the right of the bidding authority/KSEB Limited for further detailed consideration and verification of the bid of the bidders such as his experience, financial stability, tools and plants, all other relevant matters etc. even after the price bid is opened and considered, but before a final decision is taken regarding the award of contract, and the bidder will not have any right to question the act of the bidding authority/KSEB Limited in considering against qualification etc. of the bidder.
- 42) **Blacklisting/ Non eligibility:-** If the Bidder has been debarred/black listed from any Power utility in India or by the KSEBL, then the firm is not eligible for participating in the tender during the debarred/black listed period.

Sd/-

Chief Engineer (SCM)&CSC

Special Instructions to Bidders

- 1) Bids should be submitted by online only.
- 2) Bids with **VARIABLE** price will only be considered.
- 3) The bidder shall quote the lowest rate. The quoted rate shall be final. **There shall be no negotiation regarding the price.**
- 4) The basic price and F.O.R (Freight on Road) destination prices should invariably be quoted. The F.O.R. destination price will be the contract price. The unloading of the materials at destination station is manufacturer's responsibility, and will be to his account.
- 5) The rates of taxes shall be clearly specified.
- 6) Freight and Transit cum one month storage insurance charge shall be separately quoted.
- 7) In the event of the order, insurance cover should be arranged by the manufacturer. This insurance cover shall also include the storage of the equipment at KSEB Limited's warehouse for a period of 30 days after the receipt of the materials.
- 8) Conditional offers are liable to be rejected.
- 9) Bidder shall offer materials, which fully satisfy the technical specification given in the bid and the same has been successfully tested in any approved Laboratory as mentioned below.

For the specified material, attested copies of type test reports for the bidden item within a period of 5 years shall be furnished.

The firm which do not have complete type test certificates of the bidden item shall be considered, only if the firm submits 80% of the total number of Type Test Certificates prescribed in the bid, along with the bid documents. In such cases, an undertaking shall be submitted to the effect that in the event of order, the balance Type Test Reports for the bidden item shall be furnished before offering the inspection of the first lot without affecting the delivery schedule.

The Type Tests should have been conducted by Central Power Research Institute (CPRI) / Electrical Research and Development Association (ERDA)/ State Government or Central Government owned/ approved NABL Laboratories/ any NABL accredited Laboratories/ Laboratories of Foreign Country accredited by National Accreditation Body of that Country such as PHELA/KERI/KEMA/CESI etc., if testing facility is not available in India as per IS/IEC relevant Standard. The type test report shall be valid as on the last date of submission of bid. If the type test report submitted is issued by private NABL accredited laboratory, NABL accreditation certificate valid as on the date of issuance of

submitted type test report along with scope for testing of the material type tested shall be submitted along with the bid.

- 10) The materials offered shall be of the type tested model/ make itself and offering any other type will lead to disqualification of the bid without intimation.
- 11) KSEBL reserves the right to verify the authenticity of the type test report if required, with the lab in which test was conducted and its cost shall be borne by the manufacturer.
- 12) The commercial terms and conditions applicable will be as per the KSEB Ltd's General Conditions of contract and schedule for the supply of materials. The commercial terms shall be specifically stated in the deviation statement attached to pre-qualification bid.

Any increase in taxes applicable on the date of delivery will be admitted on production of documentary proof, provided the date of delivery is within the scheduled delivery period.

Any increase in taxes on account of crossing limit of turnover of your firm as specified by Government rules and regulation, or due to delay in supply will not be compensated by KSEB Ltd.

- 13) The Bidder shall have a minimum experience of 5 years in the field of design, manufacture and successful completion of supply, testing & commissioning (if applicable) of bidden item as per specification and relevant IS / IEC /EN /NFC standards to any Electricity Boards / Power Utility in India. For Power Transformers, same voltage rating with same or higher MVA, shall also be considered.

Attested scanned copies of purchase orders of the bidden item received and executed successfully by the bidder along with scanned copies of satisfactory Performance Certificate to prove 5 years experience, should be furnished in full shape.

For Distribution and Transmission material for which the Guarantee period specified is more than 3 years, the performance certificates issued by any Power utility for the bidden item for minimum five years from the date of commissioning shall be submitted.

- 14) The bidder shall be a genuine manufacturer of the item quoted. Valid Factory License/ ISO certificate/ BIS license shall be produced.
- 15) The manufacturer should have a minimum **3 times** production capacity of the ordered quantity and shall be certified by a **Chartered Engineer / General Manager**.
- 16) If the Bidder has been debarred/blacklisted from any Power Utility in India or by the KSEB Limited, then the firm is not eligible for participating in the tender during the debarred/blacklisted period.

- 17) **Price Preference/ Purchase Preference:- As per Clause-24 of Annexure-I, Conditions of Pre-qualification in Part-I.**
- 18) The destination stations for the delivery of the item will be intimated later. It shall be delivered anywhere in Kerala without any extracost, if required by KSEB Limited. Unloading of the equipment shall be arranged by the manufacturer, at his cost.
- 19) Bidders should submit all the relevant documents in full shape along with Bid itself.
- 20) Bidders shall submit an attested scanned copy of GST (Goods & Service Tax) Registration Certificate of the firm.
- 21) All the hard copy of the tender documents submitted shall be signed by the authorized personnel having Power of Attorney and company seal shall be affixed.
- 22) Power of Attorney in non judicial stamp paper (worth necessary stamp duty of respective States - for KERALA, Rs.600/-) and duly attested by Registered Notary Public for authorizing the person/persons for signing the bid.
- 23) The Name, Contact Number including mobile No. and email id of the Bidder shall be clearly written in the bid form for future correspondence.
- 24) No post tender intimation regarding price will be considered.
- 25) Deleted.
- 26) In case any quality issue is suspected for the materials delivered at Store/Site, the purchaser reserves the right to test the materials at NABL accredited lab at the manufacturers' expenses.

Sd/-

Chief Engineer (SCM)&CSC

Annexure -I
Technical specification for 33/11kV 8MVA Power Transformer

1) Scope:-

- 1.1) This specification covers the design, manufacture, shop testing, supply, delivery, supervision of erection, testing and commissioning of 33/11kV, 8MVA three phase two winding transformer at various substations. **The transformers shall be delivered at the transformer plinth or at any desired site, anywhere in the state of Kerala as mentioned by KSEBL. All the transformer mounted relays shall be provided with IP 66 type protection; This is a must.**
- 1.2) All drawings, schedules and annexure appended to this specification shall form part of the specification and supplement the requirements specified. The equipment/ materials offered by the Bidder shall be complete in all respects and, whether called for specifically or not, all accessories, hardware and services required for normal satisfactory operation of the system shall be deemed to be included in the unit rates quoted. Design and manufacture shall also be such that equipment/ accessories of the same type and rating would be interchangeable.

Specific reference in this specification and documents to any material by trade name, make or catalogue number shall be construed as establishing standard of quality and performance and not as limiting competition. All equipment/ accessories offered shall also be of proven design and manufacture. The make of all accessories and hardware shall be subject to purchaser's approval.

- 1.3) It is not the intent to specify completely herein all details of the design and construction of equipment. However, the equipment shall conform in all respects to standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the supplier's guarantee in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgement, is not in accordance therewith. The equipments offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supplier's supply, irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
- 2) Quality Assurance:-** The supplier shall include a quality assurance programme (QAP) that will be used to ensure that the transformer design, materials, workmanship, test, service capability, maintenance and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO-9001.

The supplier shall have Minimum five years of experience as manufacturer of Power transformers of similar capacity and shall have all in-house facility in respect of qualifying to supply the item.

The quality plan shall describe:

- i) List of activities involved in design, procurement of raw materials and components, manufacture, stage inspection and final testing, preparation for dispatch, delivery, installation and commissioning
- ii) The identification reference of all documentation, standards, procedures, works, instructions, drawing, test methods, acceptance criteria etc.

- 3) **Codes & Standards:-** The transformer shall be manufactured and tested according to the latest revisions of IEC:60076 and IS:2026. The Material, equipment and methods used in the manufacture of power transformer shall conform to the latest edition of following:

Standard Name / No	Standard's Description
IEC Standards	
IEC:76	Power transformers
IEC:38	Standard Voltages.
IEC:71	Co-ordination of Insulation.
IEC:156	Method for Determination of the Electric Strength for Insulating Oil
IEC:61869	Instrument Transformers.
IEC:242	Standard Frequencies for Centralized Network Control Installations.
IEC:296	Specification for Unused Mineral Insulating Oils for Transformer and switchgear.
IEC:354	Loading Guide for Oil-Immersed Power Transformers.
IEC:445	Identification of Equipment Terminals and of Terminations of Certain Designated Conductors, Including General Rules for an Alphanumeric System.
IEC:529	Degrees of Protection Provided by Enclosures (IP Code)
IEC:551	Determination of Transformer and Reactor Sound Levels.
IEC:606	Application Guide for Power Transformer.
IEC:616	Terminal and Tapping Markings for Power Transformers.
IEC:947	Low- Voltage Switch gear and Control gear.
British Standards	
BS:148	Unused Mineral Insulation Oils for Transformers and Switchgear.
BS:223	Bushings for alternating Voltages above 1000 V.

BS:2562	Cable Boxes for Transformers and Reactors.
BS:6435	Unfilled enclosures for the Dry Termination of HV Cables for Transformers and Reactors.
Indian Standard	
IS:2026	Power transformers
IS:335	Insulating oil
IS:1271	Thermal evaluation and classification of electrical insulation
IS:2099	Bushing for Alternating voltage above 1000V
IS:16227	Instrument Transformers
IS:3347	Dimensions for porcelain Transformer bushing
IS:3637	Gas operated relays
IS:3639	Fitting & Accessories for power transformers
IS:4201	Application guide for CT's
IS:6600	Guide for loading of oil immersed transformers
IS:10028	Code of practice for selection, installation & maintenance of transformers
IS:13947	LV switchgear and control gear part-1
IS:5	Colours for ready mix paints
IS:5561	Electrical power connectors
	Indian Electricity Act
	CBIP manual on transformers
IEEE Std C57.125.- 2013 (Revision of IEEE Std 62 of 1995)	IEEE guide for Diagnostic Field Testing of Fluid Filled Power Transformers,Regulators and Reactors

In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows:

- 1) Guaranteed Technical Particulars (GTP)
- 2) This Specification
- 3) Referred Standards
- 4) Approved Vendor Drawings
- 5) Other documents.

4) Major Design Criteria & Parameters of the Transformer:-

4.1	Major design criteria	
4.1.1	Location of equipment	OUTDOOR
4.1.2	Reference design temperature	-5 to 40°C
4.1.3	Type	Oil immersed, Core type, Step down
4.1.4	Type of cooling	ONAN
4.1.5	Polarity	Subtractive
4.1.6	Voltage variation on supply side	+ / - 10%
4.1.7	Frequency variation on supply side	+ / - 5%
4.1.8	Transient condition	-20% or + 10% combined variation of voltage and frequency
4.1.9	Climatic conditions	Maximum temperature of air in shade: 40°C Minimum temperature of air in shade: 15°C Maximum humidity : 100% Average number of thunderstorm days per annum : 50 Average number of dust storm days per annum: 5 Average number of rainy days per annum: 90 Average annual rainfall : 3000 mm Number of months during which tropical monsoon Conditions prevail : 5 Altitude above M.S.L : 0-1000 m
4.1.10	Reference Standard	IEC 60076 and IS 2026
4.1.11	No. of windings per phases	2
4.1.12	No. of phases	3
4.1.13	Rated voltage ratio	33/11kV
4.1.14	Rated voltage of HV winding, kV	33
4.1.15	Rated voltage of LV winding, kV	11
4.1.16	Phase connection	

4.1.16.1	HV	STAR with Neutral solidly grounded	
4.1.16.2	LV	STAR with Neutral solidly grounded	
4.1.17	Rated frequency	50 Hz	
4.1.18	System Earthing		
4.1.18.1	HV side	Solidly grounded	
4.1.18.2	LV side	Solidly grounded	
4.1.19	Insulation level	HV	LV
4.1.19.1	Highest System voltage, kV	36	12
4.1.19.2	Lightning Impulse withstand voltage, kV peak	170	75
4.1.19.3	Basic Insulation level	170	75
4.1.20	Power frequency withstand voltage, kV rms	70	28
4.1.21	Design Clearances, mm	Phase to Phase	Phase to Earth
4.1.21.1	For nominal system voltage of 11kV	280	140
4.1.21.2	For nominal system voltage of 33kV	350	320
4.1.22	Short circuit withstand level	Shall withstand 1) 3 phase short circuit at secondary terminal with rated voltage maintained on the other side for 3 seconds and 2) Single phase short circuit at secondary terminal with rated voltage maintained on the other side for 3 seconds.	
4.1.23	Overload capability	As per IS 6600 & IEC 354	
4.1.24	Noise level	Shall not exceed limits as per NEMA TR1 with all accessories running, measured as per IEC 551/NEMA standard.	
4.1.25	Radio influence voltage	Maximum 250 μ V.	
4.1.26	Harmonic currents	Transformer to be designed for suppression of 3rd, 5th, 7th harmonic voltages and high frequency disturbances	

4.1.27	Partial discharge	Transformer to be free from PD up to 120% of rated voltage as the voltage is reduced from 150% of rated voltage ie. there shall be no significant rise above background level.
4.1.28	Parallel operation	Shall be designed to operate in parallel with similar transformer.
4.2	Major parameters	
4.2.1	Rating	8MVA (ONAN)
4.2.2	Vector group	YNyn0
4.2.3	Impedance	% impedance at principal tap at rated voltage, frequency at 8MVA Base shall be 8.35%, with a tolerance of +10%. No negative tolerance is allowed.
4.2.4	Losses	
4.2.4.1	No load loss	Maximum no load loss at rated condition allowed without any positive tolerance shall be 4.5 kW
4.2.4.2	Load losses at principal tap	Maximum load loss at rated condition @ 75°C and principal tap allowed without any positive tolerance shall be 27.5kW
4.2.5	Loss capitalization formulae	As per CBIP manual section : J(Clause 20.4 of the technical specification)
4.2.5.1	No load loss capitalization figure	Rs.4,72,003/- per kW
4.2.5.2	Load loss capitalization figure	Rs 2,51,106/- per kW
4.2.6	Temperature rise	For the purpose of maximum temperature rises of oil & winding the following ambient temperature considering the transformer to be operating at extreme tap position incurring extra copper losses a) Maximum ambient temperature :50°C b) Maximum ambient daily temperature:35°C c) Maximum yearly weighed ambient temp. 32°C
4.2.6.1	Temperature rise top oil by thermometer	45°C

4.2.6.2	Temperature rise winding by thermometer	55°C												
4.2.7	Flux density	Maximum flux density allowed in the core at rated voltage, rated frequency shall not exceed 1.70 Tesla												
4.2.8	Current density	Maximum current density on any portion of the winding (HV/LV) shall not exceed 2.80 Amp/Sq.mm												
4.2.9	Tappings on HV winding	Off Load units with steps of +2.5% to –7.5% to be provided on the HV winding in steps of 2.5% for rated voltage on the LV side												
4.2.10	Tan delta value	<0.5												
4.2.11	Polarization Index	>2												
4.2.12	Dielectric Absorption Ratio	>1.4												
4.2.13	Limit Value for IR	<table> <tr> <th>Sl No</th><th>Winding</th><th>Limit Value</th></tr> <tr> <td>1.</td><td>HV-Earth</td><td>3000MΩ @5kV; for 60Sec</td></tr> <tr> <td>2.</td><td>LV-Earth</td><td>1000MΩ @5kV; for 60Sec</td></tr> <tr> <td>3.</td><td>HV-LV</td><td>3000MΩ @5kV; for 60Sec</td></tr> </table>	Sl No	Winding	Limit Value	1.	HV-Earth	3000MΩ @5kV; for 60Sec	2.	LV-Earth	1000MΩ @5kV; for 60Sec	3.	HV-LV	3000MΩ @5kV; for 60Sec
Sl No	Winding	Limit Value												
1.	HV-Earth	3000MΩ @5kV; for 60Sec												
2.	LV-Earth	1000MΩ @5kV; for 60Sec												
3.	HV-LV	3000MΩ @5kV; for 60Sec												
CONSTRUCTION & DESIGN:-														
5.1	Type	ONAN, Copper wound, Core type, three phase, two winding, oil immersed with off load tap changer												
5.2	Major parts													
5.2.1	Tank													
5.2.1.1	Material of construction	The transformer tank and cover shall be fabricated from good commercial grade low carbon steel suitable for welding and of adequate thickness.												
5.2.1.2	Plate thickness	Adequate for meeting the requirements of pressure and vacuum type tests as per CBIP												
5.2.1.3	Welding features	1) All seams and joints shall be double welded 2) All welding shall be stress relieved for sheet thickness greater than 35 mm 3) All pipes, radiators, stiffeners, welded to the tank shall be welded externally.												

5.2.1.4	Tank feature	<ol style="list-style-type: none"> 1) Adequate space at bottom for collection of sediments 2) Stiffeners provided for rigidity shall be adequately sloped to prevent accumulation of water 3) No internal pockets in which gas / air can accumulate 4) No external pockets in which water can lodge 5) Tank bottom with welded skid base 6) Tank cover sloped to prevent retention of rain water 7) Minimum disconnection of pipe work and accessories for cover lifting 8) Tanks shall be of a strength to prevent permanent deformation during lifting, jacking, transportation with oil filled 9) Tank to be designed for oil filling under vacuum as mentioned in CBIP manual (Section. A clause 6.1.3) and continuous internal gas pressure of 0.35 atmosphere with oil at operating level. 10) Fitted with lifting lug to lift the tank cover only 11) Manhole of sufficient size required for inspection of core and winding 12) Oil level indicator for transportation
5.2.1.5	Flanged type adequately sized inspection cover rectangular in shape required for	<ol style="list-style-type: none"> 1) HV line bushing 2) HV neutral bushing 3) LV line bushing 4) LV neutral bushing 5) Off Load TC to winding connection from both sides. 6) Bushing CTs connections (Terminal Board for bushing CT- Projected flange (at least 10 cm from the tank top) with proper covering shall be provided to avoid moisture ingress) 7) Core assembly grounding inspection covers should be provided with jacking screws handle and shall not weight more than 25 KG. Overall design shall be in such a way that there shall not be any hindrance / overlapping of some other component, in front of any of inspection covers.

5.2.1.6	Fittings and accessories on main tank	See under fittings and accessories, section 7.0 of this specification.
5.2.2	Conservator for the main tank	
5.2.2.1	Capacity	Adequate between highest and lowest visible levels to meet the requirement of expansion of oil volume in the transformer and cooling equipment from minimum ambient temperature to 100 °C
5.2.2.2	Conservator oil preservation system	Normal free air breathing conservator with standard silica gel breathing device.
5.2.2.3	Conservator features	<ol style="list-style-type: none"> 1) Conservator shall be bolted into position so that it can be removed for cleaning / other maintenance purposes 2) Main pipe from tank shall project about 20 mm above conservator bottom for creating a sump for collection of impurities 3) Conservator minimum oil level corresponding to minimum temperature shall be well above the sump level 4) Conservator to main tank piping shall be supported at minimum two points.
5.2.2.4	1)Fittings and accessories on main tank conservator	<ol style="list-style-type: none"> 1)Prismatic oil gauge with NORMAL, MINIMUM and MAXIMUM marking. 2)End cover 3)Oil filling hole with cap. 4)Magnetic oil gauge with LOW LEVEL Alarm contact. 5)Silica Gel dehydrating breather with Oil seal and dust filter with clear acrylic single piece clearly transparent cover resistant to UV rays. 6)Drain cum filling valve (gate valve) with locking rod and position Indicator made of Brass, 25 mm with Cover plate. 7)Shut off valve (gate valve) with Position indicator made of Brass Located before and after Bucholz relay, 50 mm.

		<p>8) Flange for breather connection.</p> <p>9) Air release valve on conservator (gate valve) made of Brass, 25 mm with cover plate.</p> <p>10) Air release plug as required.</p> <p>11) The connection from the transformer tank to the conservator shall be arranged at a raising angle of 3 to 9 degrees to the horizontal up to buchholz relay and the pipe shall have a dia of 50mm. One valve each shall be provided on both sides of the buchholz relay.</p>
5.2.2.5	Essential provision for mounting of conservator	Conservator to be mounted in such a manner that the top cover of the transformer, and any other cover or fitting on the transformer can be lifted without disturbing the conservator.
5.2.2.6	Essential provision for breather	<p>1. Breather piping shall not have any Valve placed in between.</p> <p>2. Breather piping from conservator shall be supported in such a way that the maximum unsupported length of the breather piping shall not be more than 3 meters.</p> <p>3. Breather shall be removable type mounted at height of 1200mm from the ground level so that it can be attended to easily for inspection / maintenance.</p> <p>4. The design of the breather shall be such that, water shall not retain on any part of the breather and water shall not enter in to the breather directly during rainy time.</p>
5.2.3	Cooling System	
5.2.3.1	Radiators	
5.2.3.1.1	General	The total capacity of the coolers for each transformer shall be minimum 120% of actual requirement
5.2.3.1.2	Thickness	1.2mm (minimum)
5.2.3.1.3	Features	Detachable type with lifting lugs, air release plug, drain plug, isolating valve top and bottom for each radiator, Radiator support from ground if required.

5.2.3.1.4	Essential provision if radiators mounted separately	Expansion bellow to be provided in the pipes between main tank and radiator headers
5.2.3.1.5	Essential provision for all type of radiators provided	Radiator header pipes shall not originate from tank top cover, to make the tank top cover removable at site with minimum labour
5.2.4	Core	
5.2.4.1	Material	High grade, non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel laminations specially made for the construction of power transformers.
5.2.4.2	Grade	Hi-B
5.2.4.3	Lamination thickness	0.23 to 0.27mm
5.2.4.4	Design flux density at rated conditions at principal tap	<1.7 Tesla
5.2.4.5	Maximum flux density at 10% over excitation / overfluxing	<1.9 Tesla
5.2.4.6	Core design features	<ol style="list-style-type: none"> 1) Magnetic circuit designed to avoid short circuit paths within core or to the earthed clamping structure 2) Magnetic circuit shall not produce flux components at right angles to the plane of lamination to avoid local heating. 3) Least possible air gap and rigid clamping for minimum core loss and noise generation 4) Adequately braced to withstand bolted faults on secondary terminals without mechanical damage and damage / displacement during transportation and positioning 5) Percentage harmonic potential with the maximum flux density under any condition limited to avoid capacitor overloading in the system 6) All steel sections used for supporting the core shall be thoroughly sand blasted after cutting, drilling, welding

		<p>7) Provision of lifting lugs for core coil assembly</p> <p>8) Supporting framework designed not to obstruct complete drainage of oil from transformer</p> <p>9) The insulation of core to bolts and core to clamps plates shall be able to withstand a voltage of 2KV rms for one min. However boltless construction shall be preferred to avoid generation of hot spots and decomposition of oil as well as to reduce noise level.</p>
5.2.5	Winding	
5.2.5.1	Material	Electrolytic Copper
5.2.5.2	Maximum current density allowed	2.80 A/ mm ²
5.2.5.3	Winding Insulating material	Class A, non catalytic, inert to transformer oil, free from compounds liable to ooze out, shrink or collapse
5.2.5.4	Winding Insulation	<p>HV winding: Uniform insulation as amended in IS 2026.</p> <p>LV winding: Uniform insulation as amended in IS 2026.</p>
5.2.5.5	Design features	<p>1) The windings shall be designed to withstand the impulse and power frequency test voltages as per standards.</p> <p>2) The windings shall be designed to reduce to a minimum the out of balance forces in the transformer at all voltage ratios.</p> <p>3) The insulation of the windings and connections shall be free from insulating composition liable to soften, ooze out, shrink or collapse and be non-catalytic and chemically inactive in transformer oil during service.</p> <p>4) Stacks of winding to receive adequate shrinkage treatment before final assembly. Adjustable devices shall be provided for taking up any possible shrinkage of coils in service.</p> <p>5) Connection braced to withstand shock during transport, switching, short circuit, or other transients.</p>

		<p>6) Conductor width on edge exceeding si times its thickness</p> <p>7) Threaded connection with locking facility</p> <p>8) Winding leads rigidly supported, using guide tubes if practicable</p> <p>9) Winding structure and major insulation not to obstruct free flow of oil through ducts.</p> <p>10) Provision of taps as indicated in the technical particulars</p> <p>11) The conductors shall be transposed at sufficient intervals in order to minimize eddy currents and equalize the distribution of currents and temperature along the windings.</p> <p>12) Winding cylinders both inner and outer and between HV and LV should be of at least 5mm thick single layer</p> <p>13) Packing blocks above the windings should be of densified wooden blocks and not dovetail spacers pasted together.</p> <p>14) Step wedges used for core packing should be of densified wood</p> <p>15) Tetron thread or cotton tapes shall be used for tying or positioning the winding leads. (cable ties are not acceptable)</p>
5.2.5.6	Essential provision for core coil assembly	Core coil assembly shall be mounted on bottom of the tank. Earthing of core clamping structure and earthing of magnetic circuit shall be in line with CBIP reference guidelines / manual.
5.2.6	Transformer Oil	See Clause No.19 for the specification of transformer oil. Confirming IS:335.
5.2.6.1	Type	Class 1 new mineral insulating oil as per IS:335 shall be supplied. No inhibitors shall be used.
5.2.6.2	Quantity	The transformer and associated oil filled equipments shall be supplied along with the first filling of oil and 10% excess quantity of oil shall also be supplied in

		non- refundable drums.
5.2.7	Bushings and Terminations	For all bushings, check nut shall be provided for clamping rings
5.2.7.1	HV Phase & Neutral bushings	36kV class, porcelain bushing as per IS:3347 having minimum 400Amp. rating without arcing horn
5.2.7.2	LV & LV Neutral bushings	17.5kV class, oil communicating type porcelain bushing as per IS 3347(as per section C, clause 11.0 of CBIP) of having minimum 630 Amp. rating without arcing horn.
5.2.7.3	Minimum creepage distance of bushing	25mm/kV (Refer GTP)
5.2.7.4 to 5.2.7.7	Deleted	
5.2.7.8	Protected creepage distance	Protected creepage distance of at least 40% of total creepage distance is to be provided
5.2.7.9	Continuous Current rating	Minimum 20 % higher than the current corresponding to the minimum tap of the transformer
5.2.7.10	Rated thermal short time current	
5.2.7.10.1	HV Line and Neutral bushing	25 times rated current for 2 sec.
5.2.7.10.2	LV line and Neutral bushing	25 times rated current for 2 sec.
5.2.7.11	Atmospheric protection for clamp and fitting of iron and steel	Hot dip galvanizing as per IS 2633
5.2.7.12	Bushing terminal lugs in oil and air	Tinned copper
5.2.7.13	Sealing washers /Gasket ring	Nitrile rubber/ Expanded TEFLON (PTFE) as Applicable
5.2.8	Current Transformers	
5.2.8.1	WTI CT	As per GTP
5.2.8.2	Rating	As per GTP
5.2.8.3	Essential provision	1) CT mounting shall be such that CT can be replaced

		without removing tank cover 2)CT secondaries shall be wired upto TB with TB spec. as per Cl. 5.7.1 of this specification
5.2.9	Marshaling Box Cubicle	
5.2.9.1	Material of construction	CRCA sheet steel of thickness minimum 2.5 mm for load as well as non load bearing member, with toughened glass window in front of gauges. Internal Labels for various components (Contactors, MCBs, Fuses, Switches, TBs, Auxiliary Relays, Heaters, Sockets etc.) shall be of stainless steel/anodized Aluminium plate with text engraved (plastic/paper labels/stickers shall not be used). External Labels - shall be Stainless steel plate with engraved name in black color letters. Drawing holder shall be provided on MK door. LED tube shall be used for interior lighting of MK. View glass in MK shall be toughened glass. Door earthing shall be with 4mm braided Copper wire, which shall be housed inside a flexible PVC tube. Removable gland plate - All unwanted cable holes shall be closed using grommet and cap. Cable entry holes in the gland plate shall be aligned in line with the relevant Terminal Block (adequate clearance to space heater shall be maintained). Gland plate shall be earthed using 4sqmm Copper wire. Wire size shall not be less than 2.5sqmm. 4sqmm wire shall be used for CT wiring. Color coding for 230V AC circuits shall be Red for phase & Black for neutral. The cable shall be flame-retardant low smoke low halogen type. Double earthing shall be provided for MK
5.2.9.2	Major equipments in Marshalling box	1) Mechanical gauge for WTI 2) Mechanical gauge for OTI 3) Space heater with thermostat control. 4) cubicle illumination lamp with door switch 5) 5A socket with switch. 6) Other panel accessories listed elsewhere
5.2.9.3	Gland plate	Min. 3 mm thick detachable with knockout 6 x 1 inch
5.2.9.4	Contacts wired to terminal	WTI alarm and trip

	block	OTI alarm and trip Buchholz relay alarm and trip MOG low level alarm PRV trip3
5.2.9.5	Signals to be wired to terminal block	WTI CT 4 to 20 mA signals for remote WTI and OTI repeater shall be made available at M.K.(Facility to manually test alarm and trip without opening the cover of OTI and WTI shall be provided)
5.2.9.6	Ingress protection	IP 55 plus additional rain canopy to be provided(PVC type)
5.2.9.7	Welding	Continuous welding on joints, welding at regular intervals on joints and filling of gaps with use of M-seal not accepted.
5.2.9.8	Cable entry	Bottom for all cables
5.2.9.9	Panel internal Access	Front only through front door double leaf with antitheft hinges
5.2.9.10	Panel back access	None
5.2.9.11	Mounting of marshalling box	On tank. (Height to the top of the MK shall be 1mtr (maximum) from the tank bottom)
5.2.9.12	Panel supply	240 V AC, single phase, 50 Hz / 110 V DC
5.2.9.13	Panel accessories	1) Cubicle lamp with door switch and separate fuse/ MCB 2) Approved space heaters controlled by Thermostat & hygrostat and separate fuse/ MCB 3) Incoming fuse switch / MCB for the incoming supply 4) Panel wiring diagram fixed on back of panel door (inside) on Aluminum plate engraved fixed by rivet 5) Stainless steel door handle with lock & additional facility for padlock 6) Earthing boss for the marshaling box 7) Single phase power plug industrial type 15/5 Amp. With MCB.

		8) All hinged parts (doors etc) shall be properly grounded. 9) Dual earthing facility for the M.K
5.2.9.14	Painting of marshalling box	As per CI No. 5.10 of this Specification
5.2.9.15	Hardware, Gasket, Cables and Wires, Terminal blocks, Cable gland, Cable lugs of marshalling box	As per CI No. 5.3, 5.4, 5.6, 5.7, 5.8, 5.9 of this Specification
5.3	Hardware	
5.3.1	External	M12 Size & below Stainless Steel & above M12 Hot Dip galvanized Steel
5.3.2	Internal	Cadmium plated except special hardware for frame parts and core assembly as per manufacturer's design
5.4	Gasket	
5.4.1	For transformer, surfaces interfacing with oil like inspection cover etc. shall be used to ensure perfect oil tightness. All gasket shall be closed design. (without open ends) and shall be one piece only. Rubber gaskets used in flange type connection of various compartment shall be laid in grooves or groove equivalent section on bolt side of the gasket, throughout the length.(All flange)	Nitrile rubber based
5.4.2	For marshalling box,	Neoprene rubber based
5.5	Valves	
5.5.1	Material of construction	Brass
5.5.2	Type	Both end flanged gate valve / butterfly valve

		depending on application
5.5.3	Size	As per manufacture's standard
5.5.4	Essential provision	Position indicator, locking rod, padlocking facility, valve guard, cover plate.
5.6	Cable routing on Transformer	Control cable for accessories on transformer tank to marshalling box and WTI, OTI Capillaries shall be routed through perforated GI covered trays.
5.6.1	Control cable specification	<p>PVC insulated, extruded PVC inner sheathed, armoured, extruded PVC outer sheathed 1100 V grade control cable as per latest edition of IS 1554Part 1 minimum 2.5 sqmm for signals and 4 sqmm for CT with multi strand copper conductor. All wires of panels and all multi core cables shall have ferrules, which bear the same number at both ends.</p> <p>At these ends of inter connection between the wiring carried out by separate contractors; where a change of number cannot be avoided double ferrules shall be provided on each wire. The change of numbering shall be shown on the appropriate diagram of the equipment.</p> <p>The same ferrule number shall not be used on wires in different circuits on the same panels Ferrules shall be of white insulating material shall be provided with glossy finish to prevent the addition of dirt. They shall be clearly and durably marked in block and shall not be affected by damp or oil</p>
5.6.2	Specification of wires to be used inside marshalling box,	PVC insulated multi strand flexible copper wires of minimum 2.5 sqmm size, 1100 V grade as per latest edition of relevant IS
5.6.3	Essential provision for Capillary routing from transformer to marshalling box	Routing shall be done in such a way that adequate protection is available from mechanical and fire damage.
5.7	Terminal Blocks to be used by the vendor	<p>Nylon 66 material, minimum 4 sq mm, screw type for control wiring and potential circuit.</p> <p>Terminal blocks to be located in such a way to achieve</p>

		the termination height as min 250mm from gland plate. All terminals shall be stud type. Terminal blocks shall be polyamide type only. Protection shroud with warning label shall be provided in the terminal blocks for AC, DC and space heater connector etc
5.7.1	Essential provision for CT terminals	Sliding link type disconnecting terminal block screwdriver operated stud type with facility for CT terminal shorting material of housing melamine/Nylon66
5.8	Cable glands to used by the vendor	Nickel plated brass double compression weatherproof cable gland
5.9	Cable lugs to be used by the vendor	All wire lugs used in MK components shall be of ring type ensuring firm contact and tight holding on screwing
5.9.1	For power cables	Tinned copper pre insulated Ring type as application shall be used.
5.9.2	For control cable	Tinned copper pre insulated flat, Ring, Fork type as application. For CT connection ring type lug shall be used.
5.10	Painting of transformer, conservator, Radiator, cable boxes marshalling box.	
5.10.1	Surface preparation	By 7 tank pre-treatment process or shot blasting method
5.10.2	Finish on internal surfaces of the transformer interfacing with oil	Bright Yellow heat resistance and oil resistant paint two coats. Paint shall neither react nor dissolve in hot transformer insulating oil.
5.10.3	Frame parts	Bright Yellow heat resistance and oil resistant paint two coats. Paint shall neither react nor dissolve in hot transformer insulating oil.
5.10.4	Finish on inner surface of the marshalling box	White Polyurethane paint anti-condensation type two coats, minimum dry film thickness 80 microns
5.10.5	Finish on outer surface of the transformer, conservator, radiator, cable boxes,	RAL 7035 shade polyurethane paint two coats, minimum dry film thickness 80 microns over an intermediate coat of epoxy high build micaceous iron

	marshalling box	oxide (75 μ m) above a priming coat of epoxy base zinc primer (40 μ m)
5.11	Internal Earthing Arrangements	
5.11.1	General	All metal parts of the transformer with the exception of the individual core laminations, core bolts and associated individual clamping plates shall be maintained at same potential.
5.11.2	Earthing of core clamping structure	The top main core clamping structure shall be connected to the tank body by a copper strap. The bottom clamping structure shall be earthed by i) Connection through vertical tie rods to the top structure. Or ii) By a connection to the top structure on the same side of the core as the main earth connection to the tank.
5.11.3	Earthing of Magnetic Circuit	The magnetic circuit shall be earthed at one point only through a link placed in an accessible position beneath an inspection opening in the tank cover. The connection to the link shall be on the same side of the core as the main earth connection. When magnetic circuits are subdivided into separate isolated sections by ducts perpendicular to the plane of laminations all such sections should be earthed.
5.11.4	Earthing of Coil Clamping Rings	Where coil clamping rings are of metal at earth potential, each ring shall be connected to the adjacent core clamping structure on the same side of transformer as the main earth connections.
5.12.	CENTRE OF GRAVITY	The centre of gravity of the assembled transformer shall be low and as near the vertical centre line as possible. The transformer shall be stable with or without oil. If the centre of gravity is eccentric relative to track either with or without oil, its location shall be shown on the outline drawing.

6.0.	MINIMUM PROTECTIVE DEVICES ON TRANSFORMER:-	
6.1	Spring loaded with detachable diaphragm type pressure relief valve with two trip contacts for the main tank with limit switch design IP 65 with additional rainhood.	Required
6.2	Double float Bucholz relay with alarm and trip contacts, service and test position, with test cock and draining provision for the main tank, terminal box shall be IP 65 with drain plug for rainwater draining.	Required
6.3	Oil temperature indicator metallic bulb type 150 mm diameter with maximum reading pointer, potential free independent adjustable alarm and trip contacts, resetting device with temperature sensing element.	Required
6.4	Winding temperature indicator with maximum reading pointer, four sets of potential free independent adjustable alarm, fan controls and trip contacts, resetting device with temperature sensing element, thermal image coil. winding temperature indication wired up to TBs in marshalling box for external connection.	Required
7	FITTINGS AND ACCESSORIES ON TRANSFORMER:- Following shall be fixed on each transformer.	
7.1	Rating and diagram plate: Anodized aluminum black lettering on satin silver background fixed by rivet	
7.2	Oil filling instruction plate : Anodized aluminum black lettering on satin silver background fixed by rivet	
7.3	Valve schedule plate:- Anodized aluminum black lettering on satin silver background fixed by rivet	
7.4	Terminal marking plate for bushing WTI, OTI etc.: Anodized aluminum black lettering on satin silver background fixed by rivet	
7.5	Company monogram plat	

7.6	Lifting lugs / bollards with antiskid head to lift complete transformer with oil
7.7	Lashing lug
7.8	Jacking pad with Haulage hole to raise or lower complete transformer with oil. A minimum of four jacking pads shall be provided in accessible position.
7.9	Each jacking pad shall be designed to support with an adequate factor of safety at least half of the total mass of the transformer filled with oil allowing in addition to maximum possible misalignment of the jacking force to the centre of the working surface.
7.10.	Detachable bi-directional roller assembly (swivel type) with nipple for lubrication and anti-earthquake locking device. The wheels shall be capable of swiveling when transformer is lifted with provision for locking the swivel movement. Roller shall be suitable for 90 lb rail. Suitable anti rolling clamp for 90 lb rail minimum 4 nos. shall be provided. Rail gauge should be 1435mm
7.11	Pockets for OTI, WTI, on tank
7.12	Pockets for ordinary thermometer on tank cover (top)
7.13	Ordinary thermometer 1 no.
7.14	Drain valve (gate valve) for the main tank (Half of the diameter of the drain valve shall be positioned beneath the base plate of the main tank to ensure natural draining of complete oil. However any chance of hitting of valve bottom to the ground should be avoided)
7.16	Drain valve (gate valve) for all headers, if headers are provided.
7.17	Filter valve (gate valve) at top and bottom of the main tank, 50 mm
7.18	Sampling valve (gate valve) at top and bottom of the main tank, 15 mm
7.19	Vacuum breaking valve (gate valve), 25 mm
7.20	Drain plug / Drain valve on tank base
7.21	Air release plug on various fitting and accessories
7.22	Earthing pad on tank for transformer earthing complete with non ferrous nut, bolt, washers, spring washers etc. The earthing pads shall be non rusted & corrosive, made of stainless steel and shall not be painted. It shall have the capacity to carry the fault current as per specification.
7.23	Vacuum pulling pipe with blanking plate on main conservator pipe work
7.24	Rainhood (canopy) for PRV and Bucholz relays on main transformer to avoid water ingress(PVC type)

7.25	Oil level gauge on tank for transformer shipment	
7.26	Earthing bridge by copper strip jumpers on all gasketed joints at least two points for electrical continuity	
7.27	Ladder with anti climbing device and safety flap, with lockable hinged plate for at least 1.5 m from ground level. Safe space for stepping on to tank from ladder to be ensured	
7.29	Skid base welded type	
7.30	Core, frame to tank earthing	
7.31	Danger plate made of anodized aluminum white lettering on red background fixed by rivet	
7.32	Identification plate for all accessories, protective devices, instruments, thermometer pockets, earthing terminals, all inspection covers, cable boxes, marshalling boxes etc. made of anodized aluminium black lettering on silver background fixed by rivet	
8	OFF LOAD TAP CHANGER:-	
8.1	Requirement	Each transformer shall be provided with an off load tap changing Mechanism. Tap changing shall be carried out by means of an externally operated self positioning tap switch when the transformer is de-energised condition. The operating spindle shall be carried through an oil tight gland in the tank side with locking arrangement and position indicator. Off circuit tap changer shall be located on the side of the transformer tank at a convenient operating height from the ground level. However, to access the tap switch a ladder shall be provided if required. Shall have a tap position indicator. The pad-locking arrangement of the transformer shall be such that it can be locked only when the contacts are properly engaged. The contacts shall be silver plated and the design shall ensure very low contact resistance.
8.2	Tappings	As per Clause 4.2.9 of this specification.
9.0	MAKE OF DIFFERENT COMPONENTS:-	
9.1	Magnetic oil level indicator	Sukrut or equivalent
9.2	Pressure relief valve	Sukrut / Qualitrol or equivalent

9.3	Bucholz relay	Proyog / ATVUS or equivalent
9.4	Oil surge relay	NA
9.5	Winding Temperature Indicator	Precimeasure / Perfect Controls / Pradeep sales
9.6	Oil Temperature Indicator	Precimeasure / Perfect Controls / Pradeep sales
9.7	WCT	Pragati /ECS / KAPPA/ or equivalent
9.8	Switch	L & T (Salzer) / Siemens or equivalent
9.9	HRC fuse links	Siemens / L & T / GE or equivalent
9.10	Fuse base	Siemens / L & T / GE or equivalent
9.11	Meters	IMP / AE / MECO or equivalent
9.12	Terminals	Connectwell / Elmex or equivalent
9.13	Push buttons / Actuator	L & T / Siemens or equivalent
9.14	Thermostat	Velco or equivalent
9.15	Heater	Velco or equivalent
9.16	Control selector switch	Siemens or equivalent
9.17	Auxiliary relays	Jyoti / Easun Reyrolle or equivalent
9.18	Timers	L & T / Siemens or equivalent
10.0	INSPECTION & TESTING:- All testing equipments and instruments shall be got calibrated from National Accredited Labs (NABL) and shall have valid calibration certificates at the time of testing.	
10.1	Inspection and Testing during manufacture	Client shall be intimated minimum 20 days in advance for the stage inspection during manufacturing and all test results shall be got approved before proceeding to next stage of production. The Bidder shall keep the purchaser informed in advance of the time of starting and of the progress of manufacture of the offered equipment in its various stages so that arrangements can be made for inspection
10.1.1	Tank and conservator	1) Check correct dimension between wheels demonstrate turning of wheels through 90 deg and

		<p>further dimensional check.</p> <p>2) Check for physical properties of material for lifting lugs, jacking pads etc. all load bearing welds, including lifting lug welds shall be subjected to required load tests</p> <p>3) Leakage test of the conservator & radiators as per CBIP</p> <p>4) Certification of all test results</p> <p>5) Oil leakage test on all tanks at normal head of oil plus 35 kN / sqm at the base of the tank for 24 hrs</p> <p>6) Vacuum and pressure test on tank as type test as per CBIP</p>
10.1.2	Core	<p>1) Vendor to submit the documentary evidence for procurement of CRGO laminations and prove that they have procured / used new core material. During in process inspection at lamination the vendor , Customer shall randomly select / seal lamination for testing at ERDA / CPRI (Accredited NABL labs) for Specific core loss, accelerated ageing test, surface insulation resistivity, AC permeability and magnetization , Stacking factor, ductility etc. This testing shall be in the scope of vendor.</p> <p>2) Check on the quality of varnish if used on the stampings.</p> <p>a) Measurement of thickness and hardness of varnish on stampings</p> <p>b) Solvent resistance test to check that varnish does not react in hot oil</p> <p>c) Check overall quality of varnish by sampling to ensure uniform hipping color, no bare spot. No ever burnt varnish layer and no bubbles on varnished surface</p> <p>3) Check on the amount of burrs</p> <p>4) Bow check on stamping</p> <p>5) Check for the overlapping of stampings. Corners of the sheet are to be apart.</p> <p>6) Visual and dimensional check during assembly stage.</p> <p>7) Check on complete core for measurements of iron-loss and check for any hot spot by exciting the core so as to include the designed value of flux density in the</p>

		<p>core</p> <p>8) Check for inter laminar insulation between core sectors before and after pressing</p> <p>9) Visual and dimensional check for straightness and roundness of core, thickness of limbs and suitability of clamps</p> <p>10) High voltage test (2KV for one minute) between core and clamps</p> <p>11) Certification of all test results</p> <p>CRGO steel for core shall be purchased only from the approved Vendors. List available at http://apps.powergridindia.com/ims.</p>
10.1.3	Insulating material	<p>1) Sample check for physical properties of material</p> <p>2) Check for dielectric strength</p> <p>3) Visual and dimensional checks</p> <p>4) Check for the reaction of hot oil on insulating materials</p> <p>5) Certification of all test results</p>
10.1.4	Windings	<p>1) Sample check on winding conductor for mechanical properties and electrical conductivity</p> <p>2) Visual and dimensional check on conductor for scratches, dept. mark etc.</p> <p>3) Sample check on insulating paper for bursting strength, electric strength</p> <p>4) Check for the reaction of hot oil on insulating paper</p> <p>5) Check for the binding of the insulating paper on conductor</p> <p>6) Check and ensure that physical condition of all materials taken for winding is satisfactory and free of dust.</p> <p>7) Check for absence of short circuit between parallel strands.</p> <p>8) Check for Brazed joints wherever applicable</p> <p>9) Measurement of voltage ratio to be carried out when core / yoke is completely restocked and all</p>

		connections are ready. 10) Certification of all test results.
10.1.4.1	Checks before drying process	1) Check conditions of insulation on the conductor and between the windings 2) Check insulation distance between high voltage connection cables and earthed and other live parts 3) Check insulation distance between low voltage connection cables and earthed and other parts 4) Insulation test of core earthing 5) Check for proper cleanliness 6) Check tightness of coils i.e. no free movements 7) Certification of all test results.
10.1.4.2	Checks during drying process	1) Measurement and recording of temperature and drying time during vacuum treatment. 2) Check for completeness of drying 3) Certification of all test result.
10.1.5	Oil	As per IS 335/ IEC:296
10.1.6	Test on fittings and accessories	As per standard practice
10.2	Routine tests (Factory Acceptance Tests)	The sequence of routine testing shall be as follows. 1) Visual and dimension check for completely assembled transformer. 2) Measurements of voltage ratio. 3) Measurements of winding resistance at principal tap and two extreme taps. 4) Vector group and polarity test. 5) Measurements of insulation resistance. 6) Separate source voltage withstand test. 7) Measurements of iron losses and exciting current at rated frequency and 90%, 100% and 110% rated voltage. 8) Induced voltage withstand test. 9) Load losses measurement.

		<p>10) Impedance measurement of principal tap (HV and LV) of the transformer.</p> <p>11) Routine test of tanks.</p> <p>12) Induced voltage withstand test (to be repeated if type tests are conducted).</p> <p>13) Measurement of iron loss (to be repeated if type tests are conducted).</p> <p>14) Measurement of capacitance and Tan Delta for transformer oil and windings.(for all transformers).</p> <p>15) Phase relation test, polarity, angular displacement and phase sequence.</p> <p>16) Ratio of HV WTI CT/ LV WTI CT as applicable.</p> <p>17) Oil leakage test on assembled transformer.</p> <p>18) Magnetic balance test..</p> <p>19) Power frequency voltage withstand test on all auxiliary circuits.</p> <p>20) Sweep Frequency Response Analysis (SFRA/FRA) shall be carried out as special test on the first unit at manufacturer's premises in presence of representative of KSEBL free of cost. Hard and soft copies of the test result shall be handed over to KSEBL. Before commissioning of each Transformer at site, the SFRA/FRA test shall be conducted by the test engineers of the manufacturer in presence of KSEBL representative, in case of any necessity noticed by KSEBL Engineers. The Testing Engineers & FRA kit for such pre-commissioning site testing shall have to be arranged by the manufacturer free of cost. Soft copy of the test result of SFRA conducted on the first unit (specifying the Sl.No of the transformer) at manufacturer's premises shall be forwarded along with the test report of FAT of all other transformers for reference purpose.</p> <p>21) Dielectric routine tests (IEC 60076-3).</p> <p>Note:-</p> <p>1) Certification of all test results shall be done.</p>
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		2) CT/PT used for testing shall have accuracy 0.2S/0.2
10.3	Type tests	<p>Following type tests shall be carried out on one transformer of each rating and type (In Govt. recognized independent test laboratory / Internationally accredited test lab or at manufacturer's facility if it is approved by competent authority) from the lot offered for inspection. Type test results for transformer of same type and design shall be submitted along with Bid not older than 5 years. For any change in the design/type already tested and design/type offered against this specification, the KSEBL reserves the right to demand repetition of the tests without any extra cost</p> <p>1) Impulse withstand test on all three HV and LV limbs of the transformers for chopped wave as per standard.</p> <p>2) Temperature rise test as per IS.</p> <p>3) Dissolved gas analysis before and after Temperature rise test.</p> <p>4) Pressure relief device test.</p> <p>5) Pressure and Vacuum test on tank* (*Stage Inspection).</p> <p>6) Noise level Measurement.</p> <p>7) Dielectric type tests (IEC 60076-3).</p>
10.3.1	Deleted	
10.3.2	Notification to bidders	<p>The product offered must be of type tested quality. In case the product offered is never type tested the same as per above list to be conducted by bidder at his own cost at Govt. recognized independent test laboratory / Internationally accredited test lab or at manufacturer's facility if it is approved by component authority. Reports of tests as per Clause 10.1.5,10.1.6,10.2,10.3 &10.4 shall be submitted by the bidder along with the bid</p>
10.4	Special Tests	Following Special tests shall be conducted on one transformer of each rating and type.

		<p>a) Dielectric special tests (IEC 60076-3).</p> <p>b) Determination of capacitances windings-to-earth, and between windings.</p> <p>c) Determination of transient voltage transfer characteristics.</p> <p>d) Measurement of zero-sequence impedance(s) on three-phase transformers (10.7).</p> <p>e) Short-circuit withstand test (IEC 60076-5).</p> <p>f) Determination of sound levels (IEC 60551).</p> <p>g) Measurement of the harmonics of the no-load current (10.6).</p> <p>h) Measurement of insulation resistance to earth of the windings.</p> <p>i) Measurement of dissipation factor ($\tan \delta$) of the insulation system capacitances.</p> <p>j) Specific Resistance of oil to be tested at NABL accredited third party labs, whose samples shall be selected & sealed by customer inspection engineer.</p>
10.4.1	Note for special test	<p>Dynamic Short Circuit Test:- In case the product offered is never tested for dynamic short circuit the same to be conducted by bidder at his own cost at Govt. recognized independent test laboratory / internationally accredited test lab.</p>
10.5	Test Reports:-	
	<p>After all factory acceptance tests have been completed, two certified copies of each test report shall be furnished. Soft copy of the same shall also be submitted. Each report shall furnish the following information.</p> <ol style="list-style-type: none"> 1) Complete identification data including serial number of the transformer. 2) Method of application, where applied, duration, and interpretation of results in each tests. 3) Temperature data corrected at 75°C including ambient temperature. <p>Permissible limit of test results as per relevant standards, guaranteed value as per offer and actual test results shall be indicated in the test reports.</p>	
11.0.	PACKING:-	
	<p>The packing may be in accordance with the supplier's standard practice but he should give full particulars of packing for the approval of the purchaser. Special arrangement should be made to facilitate handling and to protect and</p>	

	<p>projecting connections from damage in transit. Vibration monitoring device shall be fitted on the transformer to monitor the vibration during transit. The maximum weight of a single package should not be more than 40 tons and maximum size of package should not be more than 4m x 4m x 2.4m (hxlxb). The transformer shall be shipped filled with oil/with inert gas (which ever way desired by the purchaser depending on the size etc.). All parts shall be adequately marked to facilitate field erection. Boxes and crates shall be marked with the contact number and shall have a packing list enclosed showing the parts contained therein, weight and special lifting and storing instruction if any.</p> <p>As the equipment is liable to be stored in the open, packing shall be suitable for outdoor storage under humid atmospheric conditions.</p> <p>Provision for “sealing” the band bolts of minimum two numbers (preferably diagonally opposite) after final testing and before despatch shall be provided.</p>
12.	<p>TOOLS:- The following tools of reputed firms having high quality shall be supplied along with each transformer</p> <ol style="list-style-type: none"> 1) DE Spanner set from 32 mm to 6 mm size .All spanners shall be single ended case hardened. 2) 20 cm heavy duty cutting pliers 3) Nose pliers 4) Circlip pliers (Inner & Outer) 5) Hydraulic jacks suitable for this transformer (4 Nos.) 6) Screw drivers – 4 nos (1 large, 2 medium, 1 small) 7) Star screw driver 8) Monkey pliers 9) Adjustable spanners 10) Tomy bar – 2 nos and any special tool required. 11) Tools for cutting & making various type holes on gaskets <p>All the tools except jack must be supplied in a toolbox.</p>
13	SPECIAL WARRANTY:- Deleted
14	DRAWINGS AND DOCUMENTS TO BE FURNISHED BY THE SUPPLIER:-
	<p>Within two weeks after the award of the contract the manufacturer shall supply four copies of drawings which will describe the equipment in detail for approval. <u>All Schedule of stage inspection shall be submitted along with the drawings and</u></p>

	<p><u>QAP and got approved well in advance before the commencement of stage inspections.</u> All test procedures and test formats shall be submitted and got approved by KSEB</p> <p>The following drawings/ technical literature for each item are to be supplied as part of this contract.</p> <ol style="list-style-type: none"> General arrangement (GA) drawing of the transformer showing plan, elevation, end view (left side & right side view looking from HV Side) and 3D view identifying various fittings and accessories, dimensions, weight, clearance, quantity of insulating oil, centre of gravity etc. (Dimensions with +/-5% tolerance only). This shall be submitted along with the bid also. Assembly drawings and weights of main component parts (with $\pm 5\%$ tolerance only). Shipping drawings showing dimensions and weights of each package. Drawings giving details of foundation and structure. Tap changing gear arrangement showing constructional details and general arrangement. Schematic control and wiring diagram for all auxiliary equipments and cooler control system. Schematic diagram showing the flow of oil in the cooling system as well as each limb and winding. Longitudinal and cross sectional views showing the duct sizes, cooling pipes etc. for the transformer drawn to scale shall be furnished. Large scale drawings of high and low tension windings of the transformers showing the nature and arrangement of insulation and terminal connections. Bushing drawing and specification. Details of name plate, terminal marking and connection diagram. All type Test results for transformer of same type and design shall be submitted, not older than 5 years. Six copies of instruction books/operation and maintenance manuals and spare part bulletins per transformer. Description, literature and data on transformer construction, winding, bushing, tap changing gear etc. (2 sets per transformer)
15)	SPARES :- Deleted
16)	<p>EXPERIENCE:- The tenderers are required to furnish information regarding the experience on the following points along with the tender document.</p> <ol style="list-style-type: none"> Name of Manufacturer. Status of the Firm as manufacturer of the transformer quoted. Description of the transformers similar to that quoted supplied and installed during the last 5 years with the name of the party to whom supply was made. Details as where the transformers were installed, their performance etc. Testing facilities at manufacturer's works. If the manufacturer has collaboration with another firm, details regarding the

	same shall be submitted along with tender documents. But the Kerala State Electricity Board Ltd. will have the Power to waive the stipulation in respect of experience in the case of new firms having collaboration with well experienced firms (Experience not less than 10 years) provided, the collaborator furnish the purchaser with performance guarantee for the equipment and on facility inspection at Manufactures' works and approval by KSEBL. Also KSEBL have the full authority to reject the offer of any vendor, if the facilities are found to be inadequate for all necessary testing and manufacturing processes in accordance with the referred standards in tender documents.
17)	SUPERVISION OF ERECTION:- The MANUFACTURER shall arrange for the services of their Supervisor/ Engineer during erection, testing and commissioning of the transformers at sites at free of cost as many time as required by KSEBL.
18)	DEVIATION:- Deviation from this specification, if any, shall be clearly brought out in the offer. Unless owner explicitly accepts such deviations, it shall be construed that the offer fully complies with the specification.

19) SPECIFICATION FOR TRANSFORMER OIL (IS: 335):

I) Unused uninhibited Insulating Oil Parameters:

Sl. No.	Characteristics.	Methods of Test.	Requirement
A) Function:-			
1 a)	Kinematic Viscosity at 40°C	IS:1448 Part 25 or	12mm ² /s (Max.)
b)	Kinematic Viscosity at 30°C	ISO:3104 or ASTM D7042	1800mm ² /s (Max.)
2)	Appearance	A representative sample of the oil shall be examined in a 100 mm thick layer, at ambient temperature.	The oil shall be clear and bright, transparent and free from suspended matter or sediment.
3)	Pour point	IS:1448 Part 10/ Sec.2 or ISO:3016	-40°C (Max.)
4)	Water content	IEC:60814	
a)	For bulk supply		30 mg/ kg (Max.)
b)	For delivery in drums		40 mg/ kg (Max.)
5)	Electric strength (break down voltage)	IS:6792 or IEC:60156	Minimum 30kV (New unfiltered Oil)/ 70kV (After treatment)
6)	Density at 20°C	IS:1448 Part 16 or ISO:12185 or ISO:3675 or ASTM D7042	895 kg/ m ³ (Max.)

7)	Dielectric dissipation factor (tan delta) at 90°C Max.	IS:16086 or IEC:60247 or IEC:61620	0.0025 (Max.)
8)	Negative impulse testing kVp @ 25°C	ASTM D3300	145 (Min.)
B) Refining/ Stability:			
1)	Colour	ISO:2049	Max.1.5
2)	Appearance	-	Clear, free from sediment and suspended matter
3)	Neutralization value (total acidity)	IEC62021-1 or IEC:62021-2	0.01 mg KOH/g (Max.)
4)	Interfacial tension at 27°C	IEC:62961 or ASTM D971	0.04 N/m (Min.)
5)	Corrosive sulphur	DIN51353,	Non-corrosive on copper and paper
6)	Potentially corrosive sulphur	IEC:62535	Non-corrosive
7)	Presence of oxidation inhibitor.	IS:13631 or IEC:60666	Not detectable (<0.01%)
8)	DBDS	IEC:62697-1	Not detectable (<5 mg/kg)
9)	Metal passivator additives	IEC:60666	Not detectable (<5 mg/kg)
10)	2-Furfural and related compound content	IS:15668 or IEC:61198	Not detectable (<0.05 mg/kg) for each individual compound
C) Performance			
1)	Oxidation stability	IEC:61125 (method c). Test duration:164 hours	
	-Total acidity*	4.8.4 of IEC:61125:2018	1.2mg KOH/g (Max.)
	-Sludge*	4.8.1 of IEC:61125:2018	0.8% (Max.)
	-Dielectric Dissipation Factor* (tan delta) at 90°C	4.8.5 of IEC:61125:2018	0.5 (Max.)
	* values at the end of oxidation stability test		

D) Health, Safety and Environment (HSE)			
1)	Flash Point	IS:1448 Part 21 or ISO:2719	135°C (Min.)
2)	Poly Cyclic Aromatic (PCA) content	IP:346	<3%
3)	Poly Chlorinated Biphenyl (PCB) content	IS:16082 or IEC:61619	Not detectable (<2 mg/kg)

Note:- Supplier shall declare the chemical family and function of all additives and the concentrations in the cases of inhibitors, antioxidants and passivators.

III) Oil used for first filling, testing and impregnation of active parts at manufacturer's works shall meet parameters as mentioned below.

1)	Break Down Voltage (BDV)	-	70 kV (Min.)
2)	Moisture content	-	5 ppm (Max.)
3)	Tan-delta at 90°C	-	0.005 (Max.)
4)	Interfacial tension	-	0.04 N/m (Min.)

IV) Each lot of the oil shall be tested prior to filling in main tank at site for the following.

1)	Break Down Voltage (BDV)	-	70 kV (Min.)
2)	Moisture content	-	5 ppm (Max.)
3)	Tan-delta at 90°C	-	0.0025 (Max.)
4)	Interfacial tension	-	0.04 N/m (Min.)

V) After filtration & settling and prior to energization at site oil shall be tested for following.

1)	Break Down Voltage (BDV)	-	70 kV (Min.)
2)	Moisture content at hot condition	-	5 ppm (Max.)
3)	Tan-delta at 90°C	-	0.005 (Max.)
4)	Interfacial tension	-	0.04 N/m (Min.)
5)	*Oxidation stability		
	a) Acidity*		0.3 (mg KOH/g) (Max.) - For Inhibited Oil. 1.2 mg KOH/g (Max.) - For Uninhibited Oil

b)	Sludge*	0.05% (Max.) -For Inhibited Oil. 0.8% (Max.) - For Uninhibited Oil
c)	Tan delta at 90°C	0.05 (Max.) -For Inhibited Oil. 0.5 (Max.) - For Uninhibited Oil
6)	Total PCB content*	Not detectable (<2 mg/kg)

* Separate oil sample shall be taken and test results shall be submitted within 45 days after commissioning for approval of the utility.

20. TRANSFORMER LOSSES & EVALUATION OF BID:-

- 1) The transformers are to be designed with minimum permissible losses.
- 2) The quoted losses shall be considered as maximum, without any positive tolerance. The bidders are, however, at liberty to quote the guaranteed losses. The evaluation of the offer shall be done on basis of maximum guaranteed loss.
- 3) In case of any order, if the figure/s of losses during test are found, higher than the figures guaranteed for maximum losses without any positive tolerance on individual components of losses, the transformer will, at the option of the purchaser / owner be rejected, or accepted with the reduction in prices as under. The measurement of losses shall be carried out with 3 (Three) Watt meter method only and CT,s, PT,s and meters used for these measurements shall be of class of accuracy of 0.2S/0.2.
- 4) For the purpose of financial evaluation of bids, the quoted losses shall be compared for all the bidders of particular tender.

The following formula is adopted by the KSEBL for working out comparable costs with difference in prices and losses:

$$\text{Capitalized cost of transformer} = \text{IC} + \text{AWL} + \text{BWN}$$

Where, IC = Cost of Transformer (All inclusive unit rate offered);

WL = Load losses in KW at rated tap and rated voltage ;

WN= No load loss in KW at rated tap and rated voltage ,

A & B are load and no load capitalization figures

A =Rs 251,106 per KW B = Rs. 472,003/- per kW

- 21) **PENALTY FOR HIGHER LOSSES:-** In case of order if the figures of losses measured during tests or in service are found to be higher than the figures guaranteed, at the option of the KSEBL, will be rejected or accepted with the reduction in price with 1.5 times of the above figures.

22) REJECTION:- The Purchaser may reject transformer, if any of the following conditions during or service arises:

- i) Losses exceed the specified values by 10% or more.
- ii) Impedance value exceeds the guaranteed value by 10% or more.
- iii) Oil or winding temperature rise exceeds the specified value by 5 deg. C.
- iv) Transformer fails on impulse test.
- v) Transformer fails on power frequency voltage withstand test.
- vi) The difference in impedance values of any two phase during single phase short circuit impedance test exceeds 2% of the average value guaranteed by the manufacturer / contractor.
- vii) Transformer is proved to have been manufactured not in accordance with agreed specification.

23) Transportation:-

- 1) The Supplier shall be responsible to select and verify the route, mode of transportation and make all necessary arrangement with the appropriate authorities for the transportation of the equipment. The dimension of the equipment shall be such that when packed for transportation, it will comply with the requirements of loading and clearance restrictions for the selected route. It shall be the responsibility of the supplier to coordinate the arrangement for transportation of the transformer for all the stages from the manufacturer's work to site.
- 2) The supplier shall carry out the route survey along with the transporter and finalize the detailed methodology for transportation of transformer and based on route survey. If any bottlenecks are observed in the route proposed, it shall be the responsibility of the supplier to ensure hassle free transportation of the equipment through the route.
- 3) The main tank of the transformer shall be inland transported on low bed trailers. There should be provision for tracking the location of consignment at all times during transportation from manufacturer's works to designated site. The supplier shall intimate KSEB Limited about the details of transporter engaged for transportation of the Transformer for tracking the Transformer during transit.
- 4) All metal blanking plates and covers which are specifically required to transport and storage of the transformer shall be considered part of the transformer and handed over to the Purchaser after completion of the erection. Bill of quantity of these items shall be included in the relevant drawing/document.

- 5) As the packing is liable to be stored in the open, the packing shall be suitable for outdoor storage under humid atmospheric conditions. All parts shall be adequately marked to facilitate erection at site.
- 6) Each consignment shall be accompanied by a detailed packing list. Any material found short/damaged in the consignment shall be supplied or made good by the supplier without any extra cost to KSEB Limited.
- 7) Each transformer shall be filled with (on returnable basis) 2 nos. of suitable impact recorders, on diagonally opposite locations, which can measure and store the amplitude and frequency or amplitude and duration of impacts and acceleration in three axe directions' . The impact recorders shall be of different make for reliability. The acceptance criteria and limits of impact, which can be withstood by the equipment during transportation and handling in all three directions, shall not exceed "3g"for 50 m Sec(20Hz) or as per supplier standard, whichever is lower. After unloading the impact recorder, data shall be retrieved and verified in presence of KSEBL officials and same shall be submitted to KSEBL.
- 8) The Non Operating Shock Specification (NOSS)' of the transformer shall be specified by the bidder. The Impact recorder shall be removed only after positioning the transformer completely on the plinth in the correct position. As the transformer (8MVA) is transported with oil, a sample of oil should be taken from the bottom and tested for BDV and moisture content at site. The values shall be BDV 60 kV(min) and Moisture content 20 PPM(maxm).

24) QUALITY ASSURANCE PLAN:-

24.1. The bidder shall invariably furnish the following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of material offered.

- i) The structure of organization.
- ii) The duties and responsibilities assigned to staff ensuring quality of work.
- iii) The system of purchasing, taking delivery and verification of materials.
- iv) The system for ensuring quality of workmanship.
- v) The quality assurance arrangements shall conform to be relevant requirements of ISO 9001 or ISO 9002 as appropriate.
- vi) Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested. List of test normally carried out on raw materials in presence of Bidder's representative, copies of test certificates.
- vii) Information and copies of test certificates as in (vi) above in respect of bought out accessories.

- viii) List of manufacturing facilities available.
- ix) Level of automation achieved and list of areas where manual procession exists.
- x) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.
- xi) Lists of testing equipment available with the bidder for final testing of equipment specified and test plant limitation. If any, vis-a-vis the type, special acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in schedule of deviations from specified test requirements.

24.2. The successful Contractor shall within 30 days of placement of order, submit following information to the purchaser.

- i) List of raw materials as well as bought out accessories and the names of sub suppliers selected from those furnished along with offers.
- ii) Type test certificates of the raw materials and bought out accessories if required by the purchaser.
- iii) Quality assurance plan (QAP) with hold points for purchaser's inspection. The quality assurance plan and purchasers hold points shall be discussed between the purchaser and Contractor before the QAP is finalized.

The Contractor shall submit the routine test certificates of bought out accessories and central excise asses for raw material at the time of routine testing if required by the purchaser and ensure that the quality assurance requirements of specification are followed by the sub-contractor.

24.3) The quality assurance programme shall give a description of the quality system and quality plans with the following details.

A) Quality System:-

- The structure of the organization.
- The duties and responsibilities assigned to staff ensuring quality of work.
- The system for purchasing, taking delivery and verification of materials.
- The system for ensuring quality workmanship.
- The system for control of documentation.
- The system for the retention of records.
- The arrangement for the contractor's internal auditing.
- `A list of administration and work procedures required to achieve and verify contract's quality requirements. These procedures shall be made readily available to the purchaser for inspection on request.

B) Quality Plans:-

- An outline of the proposed work and programme sequence.
- The structure of the contractors organization for the contract.
- The duties and responsibilities assigned to staff ensuring quality of work.
- Hold and Notification points.
- Submission of Engineering documents required by the Specification.
- The inspection of materials and components on receipt.
- Reference to the contractors work procedures appropriate to each activity.
- Inspection during fabrication/Construction.
- Final inspection and test.

Sd/-
Chief Engineer (SCM)&CSC

ANNEXURE – II**Guaranteed Technical Specification for 33/11kV 8MVA Power Transformer**

(Values to be offered with relevant IS/IEC/CBIP/IEEMA Standard only)

Sl. No.	Particular	Specified / Required	Offered
1.0	General		
1.1	Make & Country of origin		
1.2	Type	The transformer shall be of two winding, 3 phase oil immersed core type with ONAN cooling suitable for outdoor service as step down transformers.	
2.0	Nominal continuous rating, kVA	8000	
3.0	Type of Cooling	ONAN	
4.0	Normal ratio of transformation	33/11kV	
5.0	Rated voltage (KV)		
5.1	HV winding	33	
5.2	LV winding	11	
6.0	Rated current (Amps)		
6.1	HV winding	139.97	
6.2	LV winding	419.9	
7	Connections		
7.1	HV winding	STAR with Neutral directly earthed	
7.2	LV winding	STAR with Neutral directly earthed	
7.3	Vector group reference	YNyn0	
8.0	Impedance at principal tap on rated MVA Base at current and		

	frequency at 75 °C with 100 % Rating (%))		
8.1	Impedance (%))	8.35% , Tolerance +10% No negative tolerance allowed	
8.2	Reactance (%))		
8.3	Resistance (%))		
8.4	Impedance at Lowest tap on rated MVA Base at current and frequency at 75 °C with 100 % Rating (%))		
8.5	Impedance at highest tap on rated MVA Base at current and frequency at 75 °C with 100 % Rating (%))		
9.0	Resistance of the winding at 75°C at principal tap (ohm)		
9.1	a) HV		
9.2	b) LV		
10.0	Zero sequence impedance at reference temperature of 75°C at principal tap %), Ω / phase		
11.0	Losses		
11.1	Guaranteed maximum losses at principal tap at full load and 75° C without any positive tolerance(kW)		
11.1.1	No load loss at rated voltage and frequency at principal tap (max.), kW	4.5	
11.1.2	Tolerance if any on the above		
11.1.3	No load loss at rated voltage and frequency at highest tap (max.)		

11.1.4	Tolerance if any on the above		
11.2	Load loss at rated output, rated frequency and 75° C winding temperature at		
11.2.1	Principal tap (kW)	27.5	
11.2.2	Highest tap (kW)		
11.2.3	Lowest tap (kW)		
11.2.4	Tolerance if any on the above		
12.0	Temperature rise		
12.1	Temperature rise of oil above reference design ambient of 35°C (By thermometer) at full ONAN rating °C	45°C	
12.2	Temperature rise of winding above reference design ambient of 35 °C (By thermometer) at full ONAN rating °C	55°C	
12.3	Temperature gradient between oil and winding (°C)	10°C	
12.4	Temp. rise by hot spot temperature °C indicator		
12.5	Limit for hot spot temperature for which transformer is designed.		
13.0	Efficiency		
13.1	Efficiency at 75 ° C winding temperature and unity power factor %		
13.1.1	At 110% load		
13.1.2	At 100% load		
13.1.3	At 75% load		
13.1.4	At 50% load		
13.1.5	At 25% load		

13.2	Efficiency at 75°C winding temperature & 0.8 power factor lag %		
13.2.1	At 110% load		
13.2.2	At 100% load		
13.2.3	At 75% load		
13.2.4	At 50% load		
13.2.5	At 25% load		
13.3	Maximum efficiency %		
13.4	% Load and power factor at which Max efficiency occurs		
14.0	Short time rating for 2 seconds of		
14.1	HV winding		
14.2	LV winding		
15.0	Permissible over loading		
15.1	HV winding		
15.2	LV winding		
16.0	Terminal arrangement		
16.1	High voltage		
16.2	HV Neutral		
16.3	LV winding		
16.4	LV Neutral		
17.0	Test voltage		HV /HVN / LV / LVN
17.1	Lightning impulse test voltage, kV peak		
17.2	Power frequency with stand test voltage for 1 minute, kV rms		

19	Noise level when energized at normal voltage, frequency without load (db)		
20	External short circuit withstand capacity (MVA) and duration (Seconds)		
21	Over flux withstand capacity of the transformer and duration.		
22	Regulation (%)		
22.1	Regulation at full load at 75 ° C		
22.1.1	At unity power factor		
22.1.2	At 0.8 power factor lagging		
22.2	Regulation at 110% load at 75 ° C		
22.2.1	At unity power factor		
22.2.2	At 0.8 power factor lagging		
23	Tapping		
23.1	Type	Off load tap changer	
23.2	Capacity	Full capacity	
23.3	Range-steps x % variation	As per clause 4.2.9 of this specification	
23.4	Taps provided on HV winding (Yes/No)	Yes.	
23.8	No.of steps		
23.9	Range (variation)		
24	Radiators		
24.1	Overall dimensions l x b x h ,mm		
24.2	Total weight with oil, Kg		
24.3	Total weight without oil		
24.4	Vacuum withstand capacity, tor		

24.5	Capacity of cooling units		
24.6	Mounting of radiators		
24.7	Number of radiators		
24.8	Type & size of individual radiator valve		
24.9	Total radiating surface, sq mm		
2410	Thickness of radiator tubes, mm	Minimum 1.2 mm	
24.11	Oil drain plug and air release plug provided on each radiator Yes/No	Yes	
24.12	Schematic flow diagram of the cooling system furnished (Yes/No)		
25	Core		
25.1	Type of core construction	MoH or better grade	
25..2	Type of core joints		
25.3	Core material grade	High grade, non ageing, low loss, high permeability, grain oriented, cold rolled silicon steel laminations,	
25.4	Thickness of lamination mm	Max. 0.27 mm with insulating coating on both sides	
25.5.	Insulation of core lamination, mm		
25.6	Specific loss of core material (Watts/Kg)		
25.7	Whether core construction is without core bolts		
25.13	Details of oil duct		
25.14	Whether in the plane and at right angle to the plane of winding		
25.15	Across the plane of laminations		

25.16	Design flux density of the core at rated voltage & frequency at principal tap, Tesla		
25.16.1	a) Core		
25.16.2	b) Yoke		
25.17	Maximum flux density allowed in the core at extreme over excitation / over fluxing , Tesla		
25.18	Magnetising current at normal ratio and frequency		
25.18.1	85 % of rated voltage		
25.18.2	100 % of rated voltage		
25.18.3	105 % of rated voltage		
25.19	Power factor of Mag. Current at normal voltage ratio and frequency		
25.20	Materials of core clamping plate		
25.21	Thickness of core clamping plate		
25.22	Insulation of core clamping plate		
25.23	Describe Location/ method of core grounding		
25.24	Details of oil ducts in core		
25.25	Equivalent cross section area of core, mm ²		
25.25.1	Designed stack height		
25.25.2	Designed perturn voltage		
25.26	Guaranteed No load current at 90% / 100% / 110% rated voltage & frequency (Amp)		
25.26.1	HV		

25.26.2	LV		
26	Type of winding		
26.1	HV		
26.2	LV		
26.3	HV winding Conductor material	Electrolytic copper as per relevant standard	
26.4	LV winding Conductor material	Electrolytic copper as per relevant standard	
26.5	Maximum current density allowed, Amp per mm ²		
26.5.1	a)HV winding	2.8A / sq.mm	
26.5.2	b)LV winding	2.8A / sq.mm	
26.6	Whether HV windings are interleaved		
26.7	Whether HV windings are pre shrunk		
26.8	Whether electro-static shields are provided to obtain uniform voltage distribution in the HV winding		
26.9	Gauge/area of cross section of conductor, mm ²		
26.9.1	HV		
26.9.2	LV		
26.10	Maximum current density achieved in winding (LV/HV/) – Amps/ mm ²		
26.11	Insulating material used for		

26.11.1	HV turn		
26.11.2	Tap winding - Earth		
26.11.3	LV turn		
26.12	Insulating material used in between		
26.12.1	LV- core		
26.12.2	HV-LV		
26.12.3	Tap winding to earth		
26.13	Insulating material thickness, mm		
26.13.1	HV turn		
26.13.2	LV turn		
26.13.4	LV to core		
26.13.5	HV to LV		
26.14	Type of coil axial supports		
26.14.1	HV winding		
26.14.2	LV winding		
26.15	Type of coil radial supports		
26.15.1	HV winding		
26.15.2	LV winding		

26.16	Maximum allowable torque on coil clamping bolts		
26.17	Inter-turn insulation		
26.17.1	Extent of extreme end turns reinforcement		
26.17.2	Extent of end turns reinforcement		
26.17.3	Extent of turns adjacent to tapings		
26.17.4	Test voltage for 10 Seconds 50 cycles inter turn insulation test on 26.17.1), kV rms		
26.17.5	Test voltage for 10 Seconds 50 cycles inter turn insulation test on (26.17.2), kV rms		
26.17.6	Test voltage for 10 Seconds 50 cycles inter turn insulation test on 26.17.3), kV rms		
26.17.7	Test voltage for 10 Seconds 50 cycles inter turn insulation test on main body of the winding, kV rms		
27	Minimum design clearance , mm		
27.1	HV to earth in air		
27.2	HV to earth in oil		
27.3	LV to earth in air		
27.4	LV to earth in oil		
27.5	Between HV & LV in Air		
27.6	Between HV & LV in oil		

27.7	Top winding and yoke		
27.8	Bottom winding and yoke		
28	Insulating oil		
28.1	Governing standard	IS335	
28.2	Spec. resistance (ohms-cm) at 27°C / 90° C		
28.3	Tan delta		
28.4	Water content , ppm		
28.5	Dielectrc strength (BDV), kV		
28.6	Characteristics of oil after ageing test		
28.7	Spec. resistance (ohms-cm) at 27°C / 90° C		
28.8	Tan delta		
28.9	Sludge content		
28.10	Neutralisation number		
28.11	Quantity of oil Ltrs		
28.12	In the transformer tank		
28.13	In each radiator		
28.14	Total quantity		
28.15	10% excess oil furnished?	Yes	

28.16	Type of oil	New insulating oil as per IS:335, and Cl.19 of the specification				
29	Conservator					
29.1	Details of oil preservation equipment offered	As per Clause 5.2.2 2 of this specification				
29.2	Oil preservation system provided (Yes/No)	Yes/No				
29.3	Total volume of conservator (Ltr)					
29.4	Volume between highest and lowest visible oil levels (Ltr)					
	HV Bushings					
			HV	HV Neutral	LV	LV Neutral
30.1	Make					
30.2	Type					
30.3	Reference standard					
30.4	Rated Voltage class, kV					
30.5	Rated current , Amp					
30.6	Lightning Impulse withstand voltage, kV					
30.8	Power frequency withstand voltage, kV					
30.14	Creepage distance in mm					
30.15	Creepage distance (protected)					
30.18	Weight of assembled bushing, Kg					
30.19	Minimum clearance height for removal of bushings, mm					
30.20	Recommended gap setting for Arcing horn					
30.21	Terminal connections	As per Clause 5.2.7	As per Clause 5.2.7			

31	Marshalling box cubicle provided as per clause no. 5.2.9 of spec. (Yes / no)	Yes	
31.1	Make & Type		
31.2	Details of apparatus proposed to be housed in the kiosk	As per clause 5.2.9 of this specification.	
35	Details of bushing CT		
35.1	Purpose		
35.2	Installed on which bushing HV/LV		
35.3	No. of bushing CTs installed		
35.4	Type		
35.5	Make		
35.6	Reference standard		
35.7	No. of cores		
35.8	Whether TEST winding provided or not		
35.9	CT ratio		
35.10	Burden ,VA		
35.11	Class of accuracy		
36	Details of protective devices		
36.1	Pressure release device		
36.1.1	Make & Type		
36.1.2	Minimum pressure the device is set to rupture.		
36.1.3	Rain hood provided or not		
36.2	Explosion vent		
36.2.1	Type & make		
36.2.2	Minimum pressure the device is set to rupture.		

36.3	Bucholz relay of main tank		
36.3.1	Type & make		
36.3.2	No. of contacts		
36.5	OTI		
36.5.1	Make & Type		
36.5.2	No. of contacts		
36.5.3	Setting range		
36.6	WTI		
36.6.1	Make & Type		
36.6.2	No. of contacts		
36.6.3	Setting range		
36.7	Oil Level guage		
36.7.1	Type & make		
36.7.2	No. of contacts		
37	Lifting Jacks		
37.1	No. of jacks in one set	4 Nos.	
37.2	Type and make		
37.3	Capacity (tonnes) of 1 No. Jack		
37.4	Pitch, mm		
37.5	Lift, mm		
37.6	Height in closed position, mm		
37.7	Mean dia. of thread, mm		
38	Alarm and trip contact ratings of protective devices		
38.1	Rated/making/ breaking currents , Amp @ voltage for		
38.2	PRV for main tank		
38.3	Bucholz relay		
38.4	OTI		

38.5	WTI		
38.6	Magnetic oil level gauge		
39	Fittings accessories for each transformer are furnished as per different clauses in the specification (Bidder shall attach separate sheet giving details, make and bill of materials)	Yes	
40	Painting: as per clause 5.10 for the transformer , cable boxes, radiator, marshalling box, etc (Yes/No)	Yes	
41	Details of Tank		
41.1	Material	Robust mild steel plate without pitting and low carbon content	
41.2	Approximate thickness of sheet		
-41.2.1	Sides mm		
-41.2.2	Bottom mm		
-41.2.3	Cover (Top) mm		
-41.2.4	Radiators mm		
41.3	Pressure mm of Hg	Twice the normal head of oil / normal pressure + 35 kN/m ² whichever is lower , As per CBIP	
41.4	Vacuum recommended for Hot oil Circulation		
41.5	Vacuum to be maintained during oil filling in transformer tank		
41.6	Vacuum to which the tank can be subjected without distortion as per specification	As per CBIP	

41.7	Confirmation of tank designed and tested for vacuum pressure (Ref: CBIP manual) (Yes/No)	Yes	
41.8	Is the tank lid slopped?	Yes	
41.9	Inspection cover provided (Yes/No)	Yes, as per clause No 5.2.1.5	
41.10	Location of inspection cover (Yes/No)	As per clause No 5.2.1.5	
41.11	Min. dimensions of inspection cover (provide list of all inspection cover with dimension), mm x mm		
41.12	No. of bi-directional wheels provided		
41.13	Track gauge required for the wheels in longitudinal axis	1435mm	
41.12	Type of pressure relief device/ explosion vent and the pressure at which it operates.		
41.15	Minimum clearance height for lifting core and winding from tank, mm		
41.16	Minimum clearance height for lifting tank cover, mm		
42	Over all transformer dimensions		
42.1	Length , mm		
42.2	Breadth , mm		
42.3	Height , mm		
42.4	Transformer tank dimensions		
-42.4.1	Length , mm		
-42.4.2	Breadth , mm		
-42.4.3	Height , mm		
42.5	Marshalling box dimensions		
-42.5.1	Length , mm		

-42.5.2	Breadth , mm		
-42.5.3	Height , mm		
42.6	Weight data		
-42.6.1	Core, Kg		
-42.6.2	Frame parts, Kg		
-42.6.3	Core and frame, Kg		
-42.6.4	Total winding Kg		
-42.6.5	Core and frame winding, Kg		
-42.6.6	Tank, Kg		
-42.6.7	Tank lid, Kg		
-42.6.8	Empty conservator tank , Kg		
-42.6.9	Each radiator empty , Kg		
-42.6.10	Total weight of all radiator empty , Kg		
-42.6.11	Weight of oil in tank , Kg		
-42.6.12	Weight of oil in each conservator , Kg		
-42.6.13	Weight of oil in each radiators , Kg		
-42.6.14	Total weight of oil in radiator , Kg		
-42.6.16	Total transport weight of the transformer , Kg		
42.7	Volume data		
-42.7.1	Volume of oil in main tank , liters		
-42.7.2	Volume of oil between highest and lowest levels of main conservator ,liters		
-42.7.4	Volume of oil in each radiator , liters		
-42.7.5	Total volume of oil in radiators , liters		
-42.7.7	Transformer total oil volume ,		

	liters		
42.8	Shipping dat		
-42.8.1	Weight of heaviest package, kG		
-42.8.2	Dimensions of the largest package (L x B x H) mm		
43	Tests		
43.1	All in process tests confirmed as per Cl.10.1.4.1 and10.1.4.2 (Yes /No)		
43.2	All types tests confirmed as per Cl. 10.3 (Yes /No)		
43.3	All routine tests confirmed as per Cl.10.2 (Yes /No)		
43.4	All special tests confirmed as per Cl.10.4 (Yes /No)		
44	Transformer will transport with oil/gas		
45	Quality Assurance Plan: An outline of quality assurance plan used by the bidder	To be submitted	
46	General warranty for the transformer	Here specify clearly the conditions of general warranty terms	
47	IP class of protection for transformer realys	IP 65	
48	Important design parameters		
48.1	Maximum no load loss at rated condition allowed without any		

	positive tolerance (kW).		
48.2	Maximum load loss at rated condition @ 75°C and principal tap allowed without any positive tolerance (kW).		
48.3	Grade of core sheet, Hi-B or better		
48.4	Type of winding for HV		
48.5	Design value of flux density		
48.6	Design value of current density		
48.7	Weight of HV winding with and without insulation		
48.8	Weight of LV winding with and without insulation		
48.9	Weight of support insulators including insulation cylinders		
48.1	Weight of core(kg)		
48.11	Weight of core clamp		
48.12	Per turn voltage		
48.13	Conductor cross section HV LV		
48.14	Winding stack height(mm)		
48.15	Confirm that the weight of copper in winding and CRGO in core during detailed design and manufacturing and supply of the transformer is not less than the values mentioned above.		
48.16	Transformer tank dimensions(mm)(l x b x h)		
48.17	Weight of tank (kg)		

48.18	Total volume of oil in tank (Litres)		
48.19	Weight of core, winding and frame(kg)		
48.2	Overall dimensions of the transformer(mm)(lxbxh)		

Bidder's Name	
Name	
Designation	
Date	

KERALA STATE ELECTRICITY BOARD LTD

**ANNEXURE-III (A)
STATEMENT OF DEVIATIONS**

Name of Work:- Supply of 8MVA,33kV/11kV Transformer

BID NO.KSEB/CESCM/2026-27 dated 06/06/2026

Bidder's Name & Address:



To

The Chief Engineer (SCM)&CSC,
Kerala State Electricity Board Limited,
4th Floor, Vidyuthi Bhavanam,
Pattom, Thiruvananthapuram – 695 004.

Dear Sirs,

Sub:- Deviations from bid conditions relating to BID NO.KSEB/CESCM/2025-26/00013 dated 06/06/2026 for the Supply of 8MVA,33kV/11kV Transformer - reg.

Irrespective of whatever has been stated to the contrary anywhere else in our offer, only the following are the deviations and variations from and exception to the specifications and documents for the subject Bid No..KSEB/CESCM/2026-27/00013 dated 06/06/2026. These deviations and variations are exhaustive. Except these deviations, the entire supply will be effected as per your tender specifications and documents. Further I/We agree that additional conditions, if any, found in the offer other than those stated below, except those pertaining to any rebates offered/reductions in cost to the KSEB Ltd shall not be given effect to. I/We also certify that the financial implication if these deviations are to be withdrawn has also been furnished.



Name and address of the Bidder

ANNEXURE – III(B)
SCHEDULE OF DEVIATIONS

To

The Chief Engineer (SCM)&CSC,
Kerala State Electricity Board Limited,
4th Floor, Vidyuthi Bhavanam,
Pattom, Thiruvananthapuram – 695 004.

Bid No.KSEB/CESCM/2026-27/00013 dated 06/06/2026

Name and Address of Bidder

Dear Sirs,

Sub:- Deviations for the supply of 8MVA,33kV/11kV Transformer – reg.

Sl. No	Description of Deviation (Technical & Commercial)	Ref. of page Clause & Part No. of tender documents, item Nos.	Monetary implication of the condition for total withdrawal of deviation	
			`Rs. in Figures	` Rs.in words
1	2	3	4	5

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Note:- In columns 4 & 5 above the bidder should indicate the amount of money, if any, which he would charge extra (ie., in addition to the rates quoted by him) for withdrawal of his condition / deviation and for accepting the conditions as stipulated in the tender documents. Full details as to how the monetary implications as given above have been arrived at shall also be clearly stated by the Bidder.

Place :

Date :

Name and Address of Bidder

The bidder should furnish only deviation in this proforma, Comments shall not be included here.

ANNEXURE – III(C)
DECLARATION OF DEVIATIONS

From



To

The Chief Engineer (SCM)&CSC,
Kerala State Electricity Board Ltd,
Pattom, Thiruvananthapuram – 695 004.

Dear Sir,

Sub:- Bid for the supply of 8MVA,33kV/11kV Transformer - reg.

Ref:- Bid No.KSEB/CESCM/2026-27/00013 dated 06/06/2026

This has reference to your above referred bid. As required therein we are pleased to submit our price bid in cover-III. We have also submitted the pre-qualification bid in cover II.

We declare that we are qualified to participate in the above-referred bid in line with your qualification requirements stipulated in the “Bid documents”. We further declare that we have brought out all our deviations to the conditions of contract stipulated in your bid documents indicating therein the cost for withdrawing the conditions in case you require as doing so. We also declare that the maximum liability to you for such withdrawal will be limited to the amount mentioned against each deviation separately.

It is understood that the deviations to the conditions of the bid documents as have been brought out are exhaustive.

We agree and declare that irrespective of whatever has been stated elsewhere in the bid documents only those deviations that have been specifically brought out in Annexure- III(A), Part-II hold good.

Thanking you,

Yours faithfully,



Name and address of the Bidder

ANNEXURE IV**Price Variation formula as per IEEMA circular for the bidden Item****PRICE VARIATION CLAUSE FOR COPPER WOUND DISTRIBUTION TRANSFORMERS COMPLETE WITH ALL ACCESSORIES AND COMPONENTS**

(of ratings above 2,500kVA and voltage class up to 33kV)

Supplied against domestic contracts

IEEMA/PVC/DIST_CU_Above 2.5MVA/2021**Effective from 01 September 2021**

The price variation clause is applicable for 'Copper Wound Distribution Transformers' for single & three phase of rating above 2,500 kVA and voltage class up to 33kV; supplied against domestic contracts. A separate price variation clause IEEMA/ PVC/Dist_CU_Above 2.5 MVA/DE/2021 has been evolved for above types of Transformers supplied against export/ deemed export contracts under special imprest licensing scheme.

The price quoted / confirmed is based on the input cost of raw materials / components and labor cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices/indices, the price payable shall be subject to adjustment, up or down in accordance with the following formula:

$$P = \frac{P_0}{100} \left(8 + 40 \frac{C}{C_0} + 24 \frac{ES}{ES_0} + 8 \frac{IS}{IS_0} + 4 \frac{IM}{IM_0} + 8 \frac{TO}{TO_0} + 8 \frac{W}{W_0} \right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula

P₀ = Price quoted / confirmedC₀ = Price of CC copper rods (refer notes) This price is as applicable for the month, **ONE** month prior to the date of tendering.ES₀ = Price of CRGO Electrical Steel Lamination (refer note) This price is as applicable for the month, **ONE** month prior to the date of tendering.IS₀ = Price of MS Plate of 6mm thickness (refer notes) This price is as applicable for the month, **ONE** month prior to the date of tendering.IM₀ = Price of Insulating Materials (refer notes) This price is as applicable for the

month, ONE month prior to the date of tendering.

TO₀ = Price of Transformer Oil (refer notes) This price is as applicable for the month, ONE month prior to the date of tendering.

W₀ = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Government of India (Base 2016 = 100)

This index number is as applicable for the month, THREE months prior to the date of tendering.

For example, if date of tendering falls in December 2021, applicable prices of Copper (C₀), Transformer Oil (TO₀), CRGO Steel Sheets (ES₀), MS Plate (IS₀) and Insulating Materials (IM₀) should be as on 1st November 2021 and all India average consumer price index No.(W₀) should be for the month of September 2021.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/PWR_DIST_TRF (R-1)/ / ONE month prior to the date of tendering.

C = Price of CC copper rods (refer notes) This price is as applicable for the month, ONE month prior to the date of delivery.

ES = Price of CRGO Electrical Steel Lamination (refer note) This price is as applicable for the month, ONE month prior to the date of delivery.

IS = Price of MS Plate of 6mm thickness (refer notes) This price is as applicable for the month, ONE month prior to the date of delivery.

IM = Price of Insulating Materials (refer notes) This price is as applicable for the month, ONE month prior to the date of delivery.

TO = Price of Transformer Oil (refer notes) This price is as applicable for the month, ONE month prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Government of India (Base 2016 = 100)

This index number is as applicable for the month, THREE months prior to the date of delivery.

For example, if date of delivery in terms of clause given below falls in December 2022, applicable price of Copper (C), Transformer Oil (TO), MS Plate (IS) and Insulating Materials(IM), should be as on 1st November 2022, price of CRGO Steel Sheets (ES) as on 1st October 2022 and all India average consumer price index Number (W) should be for the month of September 2022.

The date of delivery is the date on which the transformer is notified as being ready for inspection / despatch (in the absence of such notification, the date of manufacturer's despatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto) whichever is earlier.

Notes:-

- a) All prices are exclusive of GST amount and exclusive of any other central, state or local taxes etc.
- b) Date of Tendering is the due date of tender submission or date of tender opening whichever is earlier.
- c) The details of prices are as under:
 - 1) The price of 8mm CC copper rods (in Rs./MT) is ex-works price as quoted by the primary producer.
 - 2) The price of CRGO Electrical Steel lamination suitable for Transformers of voltage up to 33kV is the average price as quoted by processing centres of mills and lamination suppliers.
 - 3) Price of steel is the average retail price of MS Plate 7mm thickness as published by Joint Plant Committee (JPC) in Rs./MT.
 - 4) The average price of Insulating materials (in Rs./Kg) of pre-compressed pressboards of size 3mm and 10mm thick, 3200mm x 4100mm C&F price in free currency per MT converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the month as quoted by primary suppliers. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.
 - 5) The price of Transformer Oil (in Rs./K.Ltr) is the average price on ex-refinery basis as quoted by primary producers for supply in drums.
- d) Some purchasers are purchasing oil immersed Transformers from manufacturers without first filling of oil. Oil for first filling is procured and filled by the purchasers. For such suppliers PVC formula, excluding Oil will apply as under:

$$P = \frac{P_0}{92} \left(8 + 40 \frac{C}{C_0} + 24 \frac{ES}{ES_0} + 8 \frac{IS}{IS_0} + 4 \frac{IM}{IM_0} + 8 \frac{W}{W_0} \right)$$

Where description of P, P₀, C, ES, IS, IM, W etc. remains same as mentioned earlier.

Sd/-

Chief Engineer (SCM)&CSC