ASSAM POWER GENERATION CORPORATION LIMITED

Office of The General Manager, NTPS, APGCL,
Namrup Thermal Power Station, Namrup, 786622.
Website: www.apgcl.org

E-TENDER NO: 01 of 2026

NAME OF WORK:
SUPPLY INSTALLATION TESTING AND COMMISSIONING OF 33 KV NEW DILLIGHAT FEEDER EXTENSION AND DEDICATED 33 KV BAY WITH CIRCUIT BREAKER AT NTPS SWITCHYARD, APGCL

ASSAM POWER GENERATION CORPORATION LIMITED

NOTICE INVITING TENDER (NIT)

E-Tender No: 01 of 2026

No:GM/NTPS/APGCL/2026/T-7/21

Invitee	**The GENERAL MANAGER, NTPS, APGCL, NAMRUP -786622**
Name of the work	**SUPPLY INSTALLATION TESTING AND COMMISSIONING OF 33 KV NEW DILLIGHAT FEEDER EXTENSION AND DEDICATED 33 KV BAY WITH CIRCUIT BREAKER AT NTPS SWITCHYARD, APGCL**
Bidder Eligibility Criteria	• The Bidder should not have been blacklisted by any State Government, Central Government, State PSU, Central PSU, Private Company, etc. • The Bidder must have average annual Turnover of at least Rs. 9.00 Lakh (Rupees Nine Lakh Only) during 03 (three) Financial Year, FY: 2022-23, 2023-24 & 2024-25. • The bidder must have a valid Electrical Contractor License and valid Electrical Supervisor License (HT minimum of 11 KV) issued by competent Licensing Authority. • The bidder must have past experience of successfully executing at least 1 (One) no. work of Electrical High tension maintenance work(minimum of 11 Kv) in the past 05 (Five) years.
Tender Processing Fee	Online Tender Processing Fee(non-refundable) of Rs. 590.00/- (Rupees Five Hundred Ninety only) shall be collected from Bidder during bidding at https://assamtenders.gov.in.
EMD	Rs. 37,000.00 (Rupees Thirty-Seven Thousand) as EMD amount should be deposited online by the bidder during bid submission at https://assamtenders.gov.in. Also, EMD through Bank Guarantee (BG) is also accepted. **Note: No EMD Exemption is provided for this Tender.**
Start Date of Online Tender Submission	**From 10.00 hours of 09.01.2026**
Last date of online Tender Submission	**Up to 12.00 hours of 29.01.2026**
Tender opening	**a. Technical Bid: At 12.00 hours of 30.01.2026** **b. Price Bid: *To be intimated later.***
For APGCL Tender Document, please visit e-procurement portal **https://assamtenders.gov.in.** Bidder has to submit tender online only at **https://assamtenders.gov.in.** Any corrigendum will be made available in **https://assamtenders.gov.in only.**	

J. Borgohain
7/1/2026.

General Manager
NTPS, APGCL, NAMRUP-786622

(A) INTRODUCTION and OBJECTIVE:

Introduction:

Assam Power Generation Corporation Ltd. (APGCL) is a state GENCO operating in the state of Assam and with the vision of availability of reliable and quality power at competitive rates and on a sustainable basis.

APGCL has various gas based thermal power plants as well as hydro power plants. The Thermal Power Plants of APGCL are Lakwa Thermal Power Station, located in the District of Charaideo and Namrup Thermal Power Station, located in the District of Dibrugarh in the State of Assam. The various Hydro Plants of APGCL are Karbi Langpi Hydro Electric Power Project and Myntriang Small Hydro Electric Project, both located in the District of Karbi Anglong in the State of Assam. In addition, there are various hydro and solar projects in pipeline/under construction of APGCL.

Objective of the Tender:

Presently, APGCL intends to engage a competent and experienced contractor for the supply, installation, testing, and commissioning of the 33 kV New Dillighat Feeder Extension along with a dedicated 33 kV bay equipped with a circuit breaker at the NTPS Switchyard. The objective of this tender is to enhance the reliability and capacity of the existing power evacuation system, strengthen the switchyard infrastructure, and ensure safe, efficient, and uninterrupted power delivery. This initiative aims to improve operational flexibility, support future load growth, and align the system with applicable technical standards and APGCL's operational requirements The details are provided in the Scope of Work under Clause-E of this document.

(B) Intent of Tender:

The intent of this tender document is to furnish the work scope for the work **"SUPPLY INSTALLATION TESTING AND COMMISSIONING OF 33 KV NEW DILLIGHAT FEEDER EXTENSION AND DEDICATED 33 KV BAY WITH CIRCUIT BREAKER AT NTPS SWITCHYARD, APGCL"**- as well as provide technical and commercial requirements to be furnished and fulfilled by the bidders participating in the tender.

(C) Eligibility of Bidder:

(a) The Bidder must have an average annual Turnover of at least Rs. 9.00 Lakh (Rupees Nine Lakhs Only) during the 03 (three) Financial Year, FY 2022-23, 2023-24 & 2024-25.
- In this regard, a certified copy from the Chartered Accountant should be submitted by the bidder along with his technical bid.
- The certified copy must be accompanied by relevant financial documents viz. - Balance Sheet, Profit & Loss Statement, etc. of the last 03 (three) financial year, FY 2022-23, 2023-24 & 2024-25.

(b) The bidder must have a valid Electrical Contractor License and Electrical Supervisor License (HT minimum of 11 KV) issued by Competent Licensing Authority. Copy of these documents to be submitted in technical bid.

(c) The Bidder must have valid EPF and ESIC Registration. Copy of these documents to be submitted in technical bid.

(d) Copy of acknowledgement of ITR filled for last three financial years (i.e. for FY 2022 -23, 2023-24 & 2024-25).

(D) Experience of bidder:

The bidder must have experience of successfully executing at least 1 (One) no. work of Electrical High tension maintenance work (minimum 11 Kv) in the past 05 (Five) years having a minimum executed value of 05 Lakhs rupees.

- Bidders shall submit relevant documents in support of the experience along with their technical bid. Such documents shall include but not limited to work order copy and work completion report / performance report etc.
- Any adverse remark on the performance of the bidder, quality of material supplied by bidder/quality of work executed by bidder, failure to meet work schedule by the bidder, etc. received from any Client of the bidder may be considered as ground for disqualification of the bidder from this tender.

All the above criteria must be fulfilled by bidder failing which the submitted bid of the bidder may be treated non-responsive.

Relevant Documents related to the above points are to be submitted by the bidder in the technical bid.

Also, bidder shall fill up and submit with technical bid all the **bidding forms (B1 to B7)**.

In the absence of the requisite documents, the bid may be considered non-responsive.

Notwithstanding anything stated herein above, APGCL reserves the right to assess the capacity and capability of the bidder to execute the work.

(E) SCOPE OF WORK:

SUPPLY INSTALLATION TESTING AND COMMISSIONING OF 33 KV NEW DILLIGHAT FEEDER EXTENSION AND DEDICATED 33 KV BAY WITH CIRCUIT BREAKER AT NTPS SWITCHYARD, APGCL.

1. The Scope of work of the bidder shall be as follows:

Table A

SL NO	Material Description	Unit	Qty	Remarks
1	33 KV Double Pole Bracing Channel 100X50X6 mm)	No	15	N/A
2	50X50X6 mm MS Bracing Angle	No	18	N/A
3	33KV Polymeric Pin Insulator 90 KN with pin	No	12	N/A
4	33 KV Polymer type Disc Insulator 90 KN B&S type	No	33	N/A
5	33KV HW fitting for Disc Insulator Polymeric 90 KN B&S TENSION TYPE	No	21	N/A
6	33KV HW fitting for Disc Insulator Polymeric 90 KN B&S Suspension TYPE	No	12	N/A
7	Stay set complete	Set	4	N/A
8	Hot Dip 7/10 SWG Stay Wire	Kg	20	N/A
9	Guy Insulator	No	4	N/A
10	Back Clamp for Cross arm(RCC)	No	20	N/A
11	Back Clamp for Cross arm(tubular)	No	20	N/A
12	ACSR Racoon Conductor	Km	1	N/A

13	Suspension clamp for ACSR Racoon	No	12	N/A
14	Stay Clamp	Pair	4	N/A
15	4-core 1.1 kV Grade copper 2.5 SQ.MM.(Armored)	Mtr.	100	N/A
16	GI Earthing Pipe 50 mm dia	No	3	N/A
17	GI Wire 8 SWG for earthing	Kg	20	N/A
18	GI Steel Tubular Pole, SP-56, 11 mtr	No	7	N/A
19	GI Steel Tubular Pole, SP-76, 14.50 mtr	No	4	N/A
20	Installation of earthing system with MS flats 50x10mm (for earthing mat) with GI flat riser 25x6mm (for earthing conductor) and GI pipe 50mm dia of length 3000mm for earth electrodes) including excavation of earth welding etc. as necessary	SQM.	6	N/A
21	RCC Foundation for 33 KV CT	No	3	N/A
22	RCC Foundation for 33 KV LA	No	3	N/A
23	RCC Foundation for 33 KV Isolator	No	1	N/A
24	RCC Foundation for VCB	No	1	N/A
25	G.I. Bolts, Nuts & Washers(assorted)	Kg	30	N/A
26	33 KV VCB 1250 A with GI Mounting Structure and bimetallic terminal connector (for panther conductor) , Short circuit Breaking capacity: 26.3 kA, Impulse withstand voltage: 170 kVp	Set	1	**ANNEXURE V**
27	TBGO-DBCR without Earth switch but with GI mounting structure and bimetallic terminal connector (for panther conductor) ,1250 Amps	Set	1	N/A
28	TBGO-DBCR with Earth switch and GI mounting structure and bimetallic terminal connector (for panther conductor) , 1250 Amps	Set	1	N/A
29	33 kV Grade 0.5 Class 1ph Outdoor CT with GI mounting structure & marshaling Box with bimetallic terminal connector (for panther conductor) (Set comprising of three units) 50/5-5 A, , 25kA for 3 sec, IS 2705/ IEC 61869 compliant	Set	1	**ANNEXURE IV**
30	33 KV 10 KA Lightning Arrestor(Line Type)	Set	1	N/A
31	Grouting and muffering of Tubular Poles	Job	11	N/A
32	Grouting of Stay set with PCC and boulder	No	4	N/A
33	Installation, testing and commissioning of Circuit breaker, LA's, CT's,Isolators	Job	1	N/A

Note:

The scope of work shall 'further' include but not limited to: -

- Packing and loading of the ordered materials by bidder.
- Safe transportation of the ordered materials to NTPS Central Store for inspection and thereafter unloading at work site.
- To buy Insurance for indemnification against any loss & damage of the materials during transit up to NTPS site and thereafter till handover of the items to APGCL.

Note:

a. **Bidder must ensure that they fully understand the Scope of Work and all Terms & Conditions stated in this Tender for the purpose of bidding.**
b. **The bidder may visit NTPS site on any working day for further information.**

For the site visit the bidder may contact the following:

The General Manager,
Namrup Thermal Power Station
Namrup, P.O. NTPS,
Dist.: Dibrugarh,
State: Assam. PIN: 786622.
Contact No.: 9435597454(M).
Email Id: jadupran.borgohain@apgcl.org.

(F) TERMS & CONDITIONS:

The bidder must adhere to all the below mentioned clauses of this tender document and also, the tender must be submitted as per instructions given in this document, in the absence of which the submitted tender of the bidder may not be considered for evaluation at this end. However, in case of deviation from any of APGCL's tender document clause by the bidder, the same must be stated clearly as per the format given below:

EXCEPTION AND DEVIATION PROFORMA

Sl.No.	Ref of Bid Document		Subject	Deviation Details
	Page No.	***Clause No.***		

In case the bidder fails to state the deviation(s) clearly, it will be presumed that the bidder has accepted all terms and conditions of this tender document. Also, acceptance/rejection of bidder's deviation(s) shall be at sole discretion of APGCL.

The clauses under the head- **'Terms & Conditions'** are given below:

1. **Firm Price**:
   The basic price(s) quoted by the bidder shall be firm without any variation in any way till completion of the work in full. The basic price, P&F, freight, transit insurance shall be quoted in the Price-Bid (BOQ1) of the submitted tender. **Total GST** shall be also quoted for every line item in the Price-Bid (BOQ1) of the submitted tender. However, the basic prices shall be inclusive of charges against loading/unloading, travelling expenses of Contractor's Personnel, boarding & lodging of Contractor's Personnel at

site. (*Guest House accommodation subjected to availability, with maximum two double bedded rooms can be arranged on Chargeable basis for contractor's engineers/officers. Workers' accommodation will be provided subjected to availability at Barrack/quarter on a chargeable basis*.)

2. **Terms of Payment**:
   100% payment of the total order value (including GST, P&F, F&I, etc.) shall be made after successful completion of the entire work of **SUPPLY INSTALLATION TESTING AND COMMISSIONING OF 33 KV NEW DILLIGHAT FEEDER EXTENSION AND DEDICATED 33 KV BAY WITH CIRCUIT BREAKER AT NTPS SWITCHYARD,** APGCL and subjected to fulfilment of Performance Security Deposit Clause of this tender.

   Paying Authority:
   The Assistant General Manager (F&A),
   NTPS, APGCL, Namrup-786622.

   Note:
   - All bills are to be processed through The General Manager (NTPS), APGCL.
   - Performance Bank Guarantee shall be submitted by the successful bidder **within 10 (ten) days** after receipt of the Work Order.

3. **Warranty Period:**
   The materials supplied along with workmanship shall be guaranteed for a period of 12 (Twelve) months from the date of successful commissioning.

   Free replacement of the material(s) and/or corrective measures for rectification of any faulty workmanship shall have to be done for any defect/improper functioning that may develop under normal use during the guarantee period. The free replacement and fault rectification should be done within a minimum time period as determined & directed by APGCL.

4. **Technical Details, GTP etc:**
   The bidder shall submit the following at the time of delivery of materials at site:

   a) GTP of the offered polymeric insulators. (Sl. No. 3 to 6 of Table A)
   b) GTP of the offered CT set. (Sl. No. 29 of Table A)
   c) GTP of the offered LA set. (Sl. No. 30 of Table A)
   d) GTP of the offered VCB set. (Sl. No. 26 of Table A)
   e) GTP of the offered Tubular poles. (Sl. No. 18 of Table A)
   f) GTP of the offered ACSR Conductors. (Sl. No. 12 of Table A)
   g) GTP of the offered Isolator set. (Sl. No. 27 to 28 of Table A)
   h) Type Test Report of offered Polymeric insulators. (Sl. No. 3 to 6 of Table A)
   i) Type Test Report of offered CT set. (Sl. No. 29 of Table A)
   j) Type Test Report of offered LA set. (Sl. No. 30 of Table A)
   k) Type Test Report of offered VCB set. (Sl. No. 26 of Table A)
   l) Type Test Report of ACSR Conductors offered. (Sl. No. 12 of Table A)
   m) Type Test Report of Isolator set. (Sl. No. 27 to 28 of Table A)

5. **Work Completion Period:**

   The Completion Period for the **SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF 33 KV NEW DILLIGHAT FEEDER EXTENSION AND DEDICATED 33 KV BAY WITH CIRCUIT BREAKER AT NTPS SWITCHYARD, APGCL** shall be 60 days (Sixty) days from the date of handing over of site.

   Liquidated damage due to delay in supply/completion of work shall be levied as per the Liquidated Damage Clause (Clause No. F-7) of this tender.

6. **Performance Security Deposit:**

On receipt of the Work Order, the successful bidder shall have to deposit a Bank Guarantee *(attached herewith as **Annexure-III**)* from a Nationalized or Scheduled Bank of RBI for an amount equivalent to 10% (ten percent) of the total value of Order (including GST, etc.) as performance security, immediately within 10 (ten) days from the date of receipt of the Work Order, duly pledged in favor of the Assistant Manager (F&A), NTPS, APGCL and such security deposit shall be valid up to 60 (sixty) days beyond the warranty period. All claims under this warranty shall be preferred to the executant's bank within 6 (six) months from the above 60 (sixty) days beyond warranty period.

If the Contractor fails or neglects to perform any of his obligations under the contract/as per work order/tender, then APGCL shall have the right to forfeit either in full or in part at its absolute discretion, the security deposit furnished by the Contractor. No interest shall be payable on such deposits.

Performance Security Deposit can also be submitted through Fixed Deposit (FD) and Demand Draft (DD), pledged/drawn in favor of the Assistant Manager (F&A), NTPS, APGCL. All other Terms & Conditions regarding the Performance Security Deposit shall remain the same as mentioned in the above paragraphs.

In case, performance bank guarantee is not submitted by the bidder, then 10% of the total work order value shall be deducted from the bill as Performance Security Deposit and this amount shall be retained by APGCL for the entire warranty period. If the Contractor fails or neglects to perform any of his obligations under the contract/as per work order/tender, then APGCL shall have the right to forfeit either in full or in part at its absolute discretion, such amount. No interest shall be payable on such deposits.

7. **Liquidated Damage (LD):**

In case of delay in work completion beyond the work completion period as mentioned in clause 'F 5', APGCL shall be entitled to: -

- Recover an amount at the rate of 1% of the total value of Uncompleted Work per week or part thereof of delay, subjected to maximum of 10% (ten percent) of the total Contract Price/Work Order value of Uncompleted Work as Liquidated Damage. However, the payment of liquidated damage shall not in any way relieve the Contractor from any of its obligation to complete the work or from any other obligation and liabilities of the Contractor under the Contract/as per work order.
- Purchase the undelivered material/equipment from elsewhere or to complete the balance work giving notice to the Contractor and to recover any extra expenditure incurred thereby for having to purchase these materials or complete the work at a higher price, at risk and responsibility of the Contractor.
- Cancel the Contract/Work Order wholly or in part and to purchase materials/equipment and execute the work at the full risk and cost of the Contractor and forfeit the security deposit.

(Note: The Term "Work" in this Clause refers to Supply, Installation, Testing & Commissioning Parts of the Scope of Work of Bidder.)

8. **Validity of the Bidder's Bid:**

The Bidder's Bid shall be valid for a period of **180 (one hundred eighty days)** from the date of opening of the technical bid. However, in exceptional circumstances, APGCL may request the Bidder for an extension of the bid validity period.

9. **Packing:**

The dispatched materials shall be packed suitably by the Contractor to withstand any rough handling to evade damage during transit.

10. **Insurance:**

Transit Insurance of the supplied/dispatched materials shall be done by the Contractor. In case of any loss/damage/pilferage/non-delivery/short delivery by carriers, etc., the Contractor shall take necessary corrective measures immediately without waiting for settlement of Contractor's Claims with his carriers/underwriters. Transit Insurance amount for supplying materials shall be quoted by the bidder in the BOQ.

Also, insurance of all work personnel of the Contactor engaged during the work execution at work site is mandatory on behalf of the Contactor and necessary documents in this regard are required to be submitted by the Contactor to APGCL Official at work site before commencement of work. Without proper Insurance of all site personnel of the Contractor engaged for the work at work site, the Contractor shall not be allowed to execute the work at site and any delay in work completion for this shall be at Contractor's sole responsibility. Cost of Insurance of Contractor's Site Personnel working at work site shall be at Contractor's scope.

11. Mandatory documents:

The bidder must upload the scanned copies of the following mentioned documents along with the technical part of the submitted tender on assamtenders.gov.in, failing which the submitted bid of the bidder may be treated non-responsive.

a. Signed & Sealed copy of duly filled Proforma (Annexure-I).
b. Copy of PAN Card, EPF Registration & ESI Certificate.
c. Copy of valid GST Registration Certificate of the bidder's Firm.
d. Copy of acknowledgement of ITR filled for last three financial years (i.e. for FY 2022 -23, 2023-24 & 2024-25).
e. **Documents related to bidder's eligibility and past experience as per Clauses C&D of this tender document.**
f. Documents related to bidder's Firm: Certificate of registration of the Firm (in case of Solo Proprietor)/ Partnership Deed (in case of LLP)/ Certificate of Incorporation (in case of Company), Joint Venture Agreement, whichever is applicable. Note: In case of Joint Venture (JV), the bidder must be the **Lead Partner** in the JV.
g. Documents related to the bidder's average annual turnover during 03 (three) Financial Year (FY 2022-23, 2023-24 & 2024-25). **These documents must be certified by a Chartered Accountant.**
h. **Signed & Sealed Confirmation from Bidder stating that they had quoted for all items (entire bidder's scope) required as per this Tender Clause No. E (Scope of Work)/BoQ1. No Part Offer is accepted.**
i. **Payment proof of EMD.**
j. All **Bidding Forms (B1 to B7)**, duly filled up as per the instructions provided therein.
k. **All other documents as sought in this Tender.**
l. **Any other document as deemed necessary as per this tender of APGCL.**

12. Clarification and Additional Information:

During the submitted bid's evaluation, APGCL may request bidder for any clarification on the submitted bid and/or documents related to the tender. The bidder shall submit the sought clarifications and/or document(s) within stipulated time as determined by the undersigned. However, seeking clarification and document(s) during bid evaluation shall be on sole discretion of APGCL.

13. Tender Processing Fee & Earnest Money Deposit (EMD):

Tender Processing Fee (Non-refundable) @ Rs. 590.00/- (Rupees Five Hundred Ninety only) shall be collected online from Bidder during bid submission at https://assamtenders.gov.in.

Rs. 37,000.00 (Rupees Thirty-Seven Thousand) as EMD amount should be deposited online by the bidder during bid submission at https://assamtenders.gov.in.

Also, EMD through Bank Guarantee (BG) is also accepted.

Note: No EMD Exemption is provided for this Tender.

Apart from online submission of EMD, EMD through Bank Guarantee (BG) is also

accepted. **If EMD is submitted through BG, the bidder will be required to upload the scan copy of the BG during online Bid submission and the original Hard Copy of the BG should reach O/o The AGM (F&A), NTPS on or before bid opening**.

Instructions to bidder who intends to pay the EMD amount of the tender through Bank Guarantee.

For bidders opting for payment of EMD through BG, the bidder shall follow the below steps at online portal https://assamtenders.gov.in.

- The bidder shall select the EMD exemption option as **"Yes"** and in the following steps shall upload the Scanned BG documents and proceed.
- If the bidder selects the EMD exemption option as **"No"** then the system shall prompt to pay the EMD fees online. There shall be no option to upload the scanned BG document against EMD in that case and the bidder has to pay the EMD online only. This is due to limitation/restriction of the portal. The bidder may not be able to proceed further or revert to the former menu. Hence for BG payment of EMD, the bidder shall select **"YES"** option.
- Since EMD exemption is not given for this tender and due to the limitation/restriction of the portal, the bidder may not be able to proceed with BG as EMD by selecting the "**No EMD exemption option**" of the portal hence, **the bidders are advised to proceed by selecting the EMD exemption as "Yes" in case EMD is submitted though BG.**

Address to which the Original BG is to be submitted on or before Bid Opening:

The Assistant General Manager (F&A), NTPS, APGCL, Namrup-786622

The BG shall be duly pledged in favour of **the Assistant General Manager (F&A), NTPS, APGCL and shall be valid for 01 (one) year period from the Start Date of online Bid submission.**

No interest shall be payable on such deposits.
BG format for EMD is given below in this document (Annexure-II)

Note: No EMD Exemption is provided for this Tender.

14. **OWNER'S RIGHT TO ACCEPT OR REJECT A BID**:
APGCL reserves the right to accept a bid other than the lowest and to accept or reject any bid in whole or part, or to reject all bids with or without notice or reasons. Such decisions by APGCL shall bear no liability whatsoever consequence upon such decisions on Contractor.

15. **Precautions to be Taken During Execution of Work:**
The Contractor shall take reasonable and statutory precaution during execution of the work at work site so as to avoid accident and damage to equipment and injury to workman and to prevent theft, pilferage etc.

16. **Liability for Accident and Damage:**
The Contractor shall not claim for compensation arising out of any accident(s) or damages done during the course of work execution at work site & the Contractor will be responsible for paying compensation to the worker as per Workmen Compensation Act, 1923 and subsequent amendments thereof. It is further clarified that in case any payment is to be made by the Contractor under the said Workmen Compensation Act, the same shall be paid forthwith and in case of failure in making such payments APGCL shall make payment and the amount so paid shall be deducted from the bills of the Contractor.

17. **Award of Contract**:
The responsive bidder shall be issued LOI/Work Order prior to expiry of bid validity. Bidder shall confirm acceptance of the LOI/Work Order via email within 05 (five) days from the date of issue of formal Work order. In case the bidder does not respond within these 05 (five) days, it will be presumed that the bidder has accepted the work order.

18. **Force Majeure:**

Normally, force majeure shall cover only act of God, fire, war, riots and act of Government etc. Any constraints other than those specified above, will not constitute a force majeure condition. In view of other constraints beyond the control of the Contractor, primarily due to statutory compulsion, extension of delivery time may also be considered on merit of individual case. In case of a force majeure condition, the Contractor shall notify APGCL in writing such condition within 10 (ten) days from the beginning of such delay for consideration and acceptance.

19. <u>Settlement of Disputes</u>

Amicable Settlement

If any dispute or difference (s) of any kind whatsoever arise between the parties in connection with or arising out of the work/contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the Contract whether during the progress of the Contract or after its completion and whether before or after the termination, abandonment or breach of the Contract, the parties shall seek to resolve any such disputes or differences by mutual consultation between the authorized representatives of both the parties for amicable settlement of the dispute within a period of ninety (90) days after receipt by one party of the other party's request for such amicable settlement.

Arbitration:

Any dispute, controversy or claim arising out of or relating to this work/contract or the breach, termination or invalidity thereof, that cannot be settled amicably between both the parties shall be settled by Arbitration.

In any arbitration proceeding hereunder-

a. Arbitration shall be in accordance with the Arbitration & Conciliation Act, 1996 or any statutory amendment thereof.
b. Arbitration shall be by a sole arbitrator, if agreed upon by the Parties. Failing agreement on the identity of such sole arbitrator, each Party shall appoint one arbitrator, and these two appointed arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel and act as the Presiding Arbitrator.
c. In an arbitration proceeding consisting of three arbitrators, if a party fails to appoint an arbitrator within 30 days from the receipt of a request to do so from the other party; or the two appointed arbitrators fail to agree on the third arbitrator within thirty days from the date of their appointment, the appointment shall be made upon request of a party by the High Court or by the President, Institution of Engineers (India), Assam State Centre.
d. In an arbitration with sole arbitrator, if the parties fail to agree on the arbitrator within 30 days from receipt of a request by one party from the other party to so agree, the appointment shall be made, upon request of a party, by the High Court or by the President, Institution of Engineers (India), Assam State Centre.
e. Proceedings shall, unless otherwise agreed by the Parties, be held in Guwahati.
f. English language shall be the official language for all purposes.
g. Decision of the sole arbitrator or of a majority of the arbitrators (or of the third arbitrator if there is no such majority) and the Arbitral Award shall be final and binding on the parties and the persons claiming under them respectively and shall be enforceable in any court of competent jurisdiction, and the Parties hereby waive any objections to or claims of immunity in respect of such enforcement.

h. The arbitrators and the parties to the arbitration shall maintain confidentiality of all arbitral proceedings except award where its disclosure is necessary for the purpose of implementation, enforcement and setting aside of the award.
i. The cost of arbitration shall be equally shared among both the parties.
j. The arbitrators and the parties to the arbitration shall maintain confidentiality of all arbitral proceedings except award where its disclosure is necessary for the purpose of implementation, enforcement and setting aside of the award.
k. The cost of arbitration shall be equally shared among both the parties.

20. <u>Legal Jurisdiction</u>:

Any disputes or differences arising under, out of, or in connection with this work /contract, shall be subject to the exclusive jurisdiction of courts at Guwahati only.

21. Mistakes/Errors in submitted Bid:

The Contractor shall be responsible and liable for any change in the work due to any discrepancies, errors, or omissions in the submitted bid which have arisen due to inaccurate information or particulars furnished by the Contractor, even though approved by APGCL.

22. Copy Right Etc.:

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

23. Subletting Contract:

The Contractor shall not, without the consent in writing of APGCL assign or sublet his contract, or any substantial part thereof, or interest therein of benefit or advantage whatsoever, other than for raw materials or for minor details or for any part of the work of which the Sub-contractors are named in the tender provided any such consent shall not relieve the Contractor from any obligation, duty or responsibility under the contract.

24. Variation of Quantity:

APGCL might increase or decrease the quantity of materials by 20% if so required and the bidder shall agree to the same and shall supply the materials at the same quoted rates/prices in BOQ and terms and conditions stipulated in the tender except in regard to delivery schedule/work completion period, which shall be mutually agreed upon in case of increase in the ordered quantity from that in the tender.

25. Co-Operation with Other Contractors:

The Contractor shall agree to co-operate with the APGCL's other contractors for associated supplies and freely exchange with them such technical information as is necessary to obtain the most efficient and economical design and to avoid unnecessary duplication. No remuneration shall come from APGCL for such technical co-operation.

26. Contractual Failure:

In the event of contractual failure of any respect on the part of the Contractor, APGCL shall be entitled to **forfeit** the performance security deposit or any deposit or any payment due to the Contractor from this or his other contracts towards the recovery of APGCL's claim for damages arising out of the failure. In addition, APGCL may black-list or ban the Contractor or pending enquiry, suspend him or take any other steps considered suitable.

27. Rejection:

In the event, any of the materials supplied by the Contractor or work executed is found defective or otherwise not in conformity with the requirements of the contract/tender specifications, APGCL shall either reject the material/work or request the Contractor in writing to rectify the same. The Contractor, on receipt of such notification shall rectify or replace the defective material/rectify the defective work free of cost to APGCL. If the Contractor fails to do so, APGCL may at its option: -

(a) Replace or rectify such defective/non-conforming material/correct the defective work and recover the extra cost so involved plus 15% as overhead charge from the Contractor, or

(b) Terminate the contract for default, or

(c) Acquire the defective material at a reduced price as considered equitable under the circumstances.

28. <u>Deduction from Contract Price</u>:

All cost, damages or expenses which APGCL may have made for which, under the contract, the Contractor is liable, may be deducted by APGCL from any money due or becoming due by APGCL to the Contractor or may be recovered by action at law or otherwise from the Contractor.

In the event of recovery to the necessary extent becoming impossible owing to insufficiency of the earnest money/security deposit and withheld amounts, the balance due to APGCL may at the option of APGCL be recovered from any money due to the Contractor from APGCL under other contracts with the Contractor.

29. <u>Death, Bankruptcy etc.</u>:

If the Contractor becomes bankrupt or being a corporation is in the process of winding up, amalgamation or reorganization, then APGCL shall be at liberty to:-

(a) Terminate the contract forthwith by notice in writing to the Contractor or to the liquidator or receiver or to any person in whom the contract may become vested.
(b) Give such liquidator, receiver or other person the option of carrying out the contract subject to his providing a guarantee for the due and faithful performance of the contract up to an amount to be determined by APGCL.

In case of death of the Contractor before completion of the work, then APGCL shall be at liberty to:

(a) Close up the contract and take over the completed portion of work/supply done and made as per specification and make final payment to the legal heir of the Contractor on receipt of claim from such legal heir.
(b) Give the contract to the legal heir of the Contractor subject to his depositing a performance security for the due and faithful performance of the contract. The performance security amount shall be determined by APGCL commensurate with the incomplete portion of the work/supply. APGCL will enter into a fresh contract with the legal heir of the Contractor on the same terms and conditions of the earlier contract.

30. <u>Regulation of Local Authorities</u>:

The Contractor shall abide by the regulation of local Authorities unless such regulation is repugnant to any terms of the contract agreed upon.

The Contractor is required to fulfill all criteria related to Labour Laws.

The Contractor will also comply with all regulations/directives of both State & Central Government Pollution Control Boards.

31. <u>Suspension Of Business Dealings with Firms/Contractors</u>:

APGCL may suspend business dealings with a Firm/Contractor, if:

(a) The Central Bureau of Investigation or any other investing agency recommends such a course in respect of a case under investigation; and if a prima facie case is made out that the firm is guilty of an offence involving unethical, unlawful, fraudulent means in relation to business dealings, which, if established, would result in business dealings with it being banned.
(b) APGCL has past record of non-performance of the Firm in it's previously awarded contracts.
(c) APGCL has record of ban against the Firm by other Government / Public sector utility.
(d) However, APGCL shall give the Firm/Contractor a fair chance to explain the circumstances of such previous suspensions.

32. <u>Banning Of Business Dealings with Firms/ Contractors</u>:

APGCL may ban business dealings with a Firm/Contractor, if:

(a) The owner (s) of the Firm/Contractor is convicted by a court of law following prosecution for offences involving unethical, unlawful, fraudulent means in relation to business dealings.

(b) There is strong justification that the Firm has been guilty of malpractices, such as, bribery, corruption, fraud, substitution of tenders, misrepresentation, evasion or habitual default in payment of any Government tax, etc.

(c) The Firm continuously refuses to return government dues without showing adequate cause and Government are reasonably satisfied that this is not due to reasonable dispute which would attract proceeding in arbitration or court of law.

(d) The Firm is found guilty of involving in unethical practices, such as:

1. "Corrupt practice" involving offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence the action of any such official procurement process or in contract execution.
2. "Fraudulent practice" involving misrepresentation or omission of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer.
3. "Collusive practice" involving a scheme among bidders (prior to or after submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.
4. "Coercive practice" involving harming or threatening to harm directly or indirectly, persons or their property to influence procurement process or the execution of a contract.

APGCL may sanction a Firm/ Contractor or its successor, including declaring ineligible, indefinitely or for a period of not less than 3 (three) years.

(G) <u>GENERAL INSTRUCTIONS TO BIDDER</u>:

1. The tender document can be downloaded from **https://assamtenders.gov.in.** Tender Processing Fee and EMD shall be submitted online during bid submission at https://assamtenders.gov.in. However, EMD can also be paid through Bank Guarantee as detailed above in clause F-13. Tendering shall be done in online mode only at https://assamtenders.gov.in and technical bid and Price bid (BOQ1) must also be submitted online at https://assamtenders.gov.in**.**

2. The bid shall be completed in two bid system as detailed below:

Technical & un-priced commercial part – Technical bid.
Priced commercial part – Price bid.

(a) <u>Technical and Un-priced Part – Technical Bid</u>:

This part shall contain technical and commercial (**<u>Un-priced Part</u>**) bid including the following mentioned documents that has to be uploaded on **<u>https://assamtenders.gov.in</u>**:

- Signed & Sealed copy of duly filled up Proforma (Annexure-I).
- All Bidding Forms attached with this document.
- Technical and Commercial part (<u>Un-priced Part</u>) of bidder's Offer.
- All requisite documents as per the Clauses of this tender document.
- Any other relevant document as required/requested for this tender.

Techno-commercial bid disclosing any price shall be rejected.

(b) Priced Part – Price Bid (BOQ1):

Priced part (BOQ1) shall contain "**Offered Price**" along with total GST and shall be **submitted online only at https://assamtenders.gov.in**. The basic prices shall be **inclusive of** charges against loading/unloading, travelling expenses of Contractor's Personnel, boarding & lodging of Contractor's Personnel at site etc.

Please Note, **while filling up the GST column of the BOQ1**, the bidders should be **careful** not to quote unit GST rate against the line items containing multiple quantities. **They shall quote the total GST** against all individual line items (i.e., GST on the Total Basic Price of individual line items of BoQ1).

P&F, Freight & Transit Insurance shall be quoted by the bidder in BoQ1.

Price quoted by the bidder must be in INR.

Note: No part offer of the tender shall be accepted. Bidder shall quote for all items in BOQ1.

3. Submission of Bid:

Technical & Un-priced and Priced parts of the Bid must be submitted in online mode only along with scanned copies of all supporting/requested documents at https://assamtenders.gov.in. The Bidder will be required to encrypt & sign its online bid using his own Digital Signature Certificate (Class- II or higher with both Signing and Encryption Certificates). Prospective Bidders must procure DSC before participating in the tenders. Bids are to be submitted at e- tender portal https://assamtenders.gov.in only.

No Hard Copy of the bid to be submitted to APGCL.

4. Date and Time of Submission:

Bid must be submitted by the due date and time mentioned in the Notice Inviting Tender or any extension thereof as duly notified in writing by APGCL.

5. Queries:

For any query regarding the tender, bidder shall email to

- manuranjan.baruah@apgcl.org
- raktimpratim.dutta@apgcl.org
- abhijit.dutta@apgcl.org

6. BID Opening:

a) Opening of Techno-commercial & Un-priced Part of Bid:

i) On the date and time mentioned in 'NIT', the Technical and Un-priced Commercial Part will be opened in the office of the General Manager (Gen), NTPS, APGCL, Namrup.

ii) In the event the specified date of bid opening is declared a holiday for APGCL, the bid shall be opened on the next working day at the specified time and location.

iii) EMD shall be submitted by all bidders.

b) Opening of Priced part of the Bid:

Only Technically qualified bidders shall be considered for price bidding.

7. BID Evaluation Criteria:

a) Techno-commercial Part:

i) The Techno-commercial Part of bid shall be evaluated as per clauses stipulated in this tender document and also if required as per instructions laid down in the document "General Conditions for Supply and Erection, 2014" of APGCL.
EMD must be paid by Bidder.

i) Bidders must ensure that complete bid along with all details & documents as sought are submitted as per requirements of this tender document.

ii) If any of the clauses of the Tender contradict the clauses of the document- "General Conditions for Supply & Erection, 2014" of APGCL, then those stated in this Tender shall prevail.

b) Price Part (BOQ1):

The final **total** of quoted price and inclusive of all components shall be considered during price bid evaluation. The bidder must clearly specify all tax & duties levied, freight, transit insurance, etc., in the absence of which the same shall be at bidder's scope. L-1 bidder shall be selected based on the lowest final **total offered price** (inclusive of all GST, Freight, Transit Insurance, P&F) in price BoQ1.

8. Corrigendum, if any, would be published online on the E-tender portal - **https://assamtenders.gov.in** and will be deemed to be a part of the APGCL bid document and binding on all the bidders.

9. Consignee:

The General Manager,
Namrup Thermal Power Station
Namrup, P.O. NTPS,
Dist.: Dibrugarh,
State: Assam. PIN: 786622.
Contact No.: 9435597454(M).
Email Id: jadupran.borgohain@apgcl.org

Enclo.

1. **Bidding Forms (B1 to B7)**
2. **Proforma (Annexure 1)**
3. **EMD BG Format (Annexure II)**
4. **Performance BG Format (Annexure III)**
5. **CT Specifications and Standards (Annexure IV)**
6. **VCB Specifications and Standards (Annexure V)**
7. **Other Technical Specifications & Instructions.**

--Sd--
General Manager,
NTPS, APGCL, Namrup

H. GENERAL REQUIREMENTS:

The bidder shall comply with the following general requirements along with other specifications.

QUALITY ASSURANCE PLAN

1.1 The bidder shall invariably furnish the following information along with his offer failing which the offer shall be liable for rejection. Information shall be separately given for individual type of equipment 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 confirm to the relevant requirement of ISO 9001 on ISO 9002 as applicable.
vi) Statement giving list of important raw materials, names of sub-supplies for the raw materials, list of standards according to which the raw material are tested, list of tests normally carried out on raw material in the presence of suppliers' representative, copies of test certificates.
vii) Information and copies of test certificates as on (i) above in respect of bought out items
viii) List of manufacturing facilities available
ix) Level of automation achieved and list of areas where manual processing exists.
x) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such test and inspection.
xi) List of testing equipment available with the bidder for final testing of equipment specified and test plant limitation, if any vis-à-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 the specified test requirement.

1.2 The contractor shall within 30 days of placement of order, submit the following information to the purchaser.

i) List of the raw material as well as bought out accessories and the names of sub-suppliers selected from those furnished along with the offer.
ii) Type test certificated of the raw material and bought out accessories if required by the purchaser.
iii) Quality Assurance Plant (QAP) withhold points for purchaser's inspection. QAP 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 subcontractor.

1.3 The Quality Assurance Programmed shall give a description of the Quality System and Quality Plans with the following details

i) Quality System
- The structure of the organization.
- The duties and responsibilities assigned to staff ensuring quality of work.
- The system of purchasing, taking delivery of verification of materials
- The system of ensuring of quality workmanship.
- The system of control of documentation.
- The system of retention of records.
- The arrangement of contractor internal auditing.

ii) A list of administrator and work procedures required to achieve contractor's quality requirements.

iii) Quality Plans
- An outline of the proposed work and program sequence.
- The structure of contractor's organizations for the contract.
- The duties and responsibilities ensuring quality of work.
- Hold and notification points.
- Submission of engineering documents required by this specification.
- The inspection of the materials and components on request.
- Reference to contractor's work procedures appropriate to each activity.
- Inspection during fabrication /construction.
- Final inspection and test.

2.0 Inspection

2.1 The Owner's representative or third-party nominee shall at all times be entitled to have access to the works and all places of manufacture, where insulator, and its component parts shall be manufactured

and the representatives shall have full facilities for unrestricted inspection of the Contractor's and sub-Contractor's works, raw materials, manufacture of the material and for conducting necessary test as detailed herein.
2.2 The material for final inspection shall be offered by the Contractor only under packed condition as detailed in the specification. The Owner shall select samples at random from the packed lot for carrying out acceptance tests. Insulators shall normally be offered for inspection in lots not exceeding 5000 nos. the lot shall be homogeneous and shall contain insulators manufactured in the span of not more than 3-4 consecutive weeks.
2.3 The Contractor shall keep the Owner informed in advance of the time of starting and the progress of manufacture of material in their various stages so that arrangements could be made for inspection.
2.4 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 Owner in writing. In the latter case also, the material shall be dispatched only after satisfactory testing for all tests specified herein have been completed.
2.5 The acceptance of any quantity of material shall be no way relieve the Contractor of his responsibility for meeting all the requirements of the specification and shall not prevent subsequent rejection, if such material is later found to be defective.

3.0 Additional Tests

3.1 The Owner reserves the right of having at his own expense any other test(s) of reasonable nature carried out at Contractor's premises, at site, or in any other place in addition to the type, acceptance and routine tests specified in these bidding documents against any equipment to satisfy himself that the material comply with the Specifications.
3.2 The Owner also reserves the right to conduct all the tests mentioned in this specification at his own expense on the samples drawn from the site at Contractor's premises or at any other test center. In case of evidence of noncompliance, it shall be binding on the part of the Contractor to prove the compliance of the items to the technical specifications by repeat tests or correction of deficiencies, or replacement of defective items, all without any extra cost to the Owner.

4.0 Test Reports

4.1 Copies of type test reports shall be furnished in at least six (6) copies along with one original. One copy shall be returned duly certified by the Owner only after which the commercial production of the concerned materials shall start.
4.2 Copies of acceptance test reports shall be furnished in at least six (6) copies. One copy shall be returned duly certified by the Owner, only after which the material shall be dispatched.
4.3 Record of routine test reports shall be maintained by the Contractor at his works for periodic inspection by the Owner's representative.
4.4 Test certificates of test during manufacture shall be maintained by the Contractor. These shall be produced for verification as and when desired by the Owner.

5.0 List of Drawings and Documents:

5.1 The bidder shall furnish the following along with bid.
i) Two sets of drawings showing clearly the general arrangements, fitting details, electrical connections etc.
ii) technical leaflets (user’s manual) giving operating instructions.
iii) Three copies of dimensional drawings of the box for each quoted item. The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk. Approval of drawings/work by purchaser shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the specification.
5.2 The requirements of the latest revision of application standards, rules and codes of practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have the power to reject any work or materials which, in his judgment is not in full accordance therewith.
5.3 The successful Bidder shall within 2 weeks of notification of award of contract submit three sets of final versions of all the drawings as stipulated in the purchase order for purchaser's approval. The purchaser shall communicate his comments/approval on the drawings to the supplier within two weeks. The supplier shall, if necessary, modify the drawings and resubmit three copies of the modified drawings for their approval. The supplier shall within two weeks. Submit 30 prints and two good quality report copies of the approved drawings for purchaser's use.
5.4 Eight sets of operating manuals/technical leaflets shall be supplied to each consignee for the first instance of supply.
5.4.1 One set of routine test certificates shall accompany each dispatch consignment.
5.4.2 The acceptance test certificates in case pre-dispatch inspection or routine test certificates in cases where inspection is waived shall be got approved by the purchasers.

6.0 Any Item specification if not available in this document Contractor shall supply and

execute the items meeting the relevant IS specification with the approval of the purchaser.

7.0 SAFETY PROVISIONS:

The contractor is responsible for noncompliance of the safety measures, implications, injuries, fatalities and compensation arising out of such situations or incidence as per regulation 7(4) of the Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric lines) Regulations, 2011.

1. All the electrical installation works including additions, alternations, repairs and adjustments to existing installations shall be carried out by an electrical contractor licensed in this behalf by the state government and under direct supervision of a person holding a valid certificate of electrical competency and by a person holding a valid workman permit issued or recognized by the Government.
2. All the aforesaid electrical works at site shall be carried by engaging competent & designated person having valid electrical workman permit issued or recognized by the Govt. of Assam.
3. The Contractor shall furnish list of designated and competent persons having valid electrical workman permits before execution of the electrical works at site to APGCL.
4. The contractor shall maintain a register of designated persons wherein the names of the designated persons and purpose for which they are designated shall be entered along with their valid registered electrical workman permit or certificate number.
5. The register of designated persons shall be produced before competent officials of APGCL/Electrical Inspector when required by him for verification or removal of names from the aforesaid register on direction by an electrical Inspector.
6. No person shall work on lines and apparatus and no person assist such person unless he is designated in this behalf and takes safety precautions as per the safety Regulations of CEA.
7. Only persons designated in this behalf by the APGCL shall be allowed to carry out works on live lines and apparatus of APGCL.
8. In the event of any electrical accident occurring due to use of poor quality/sub-standard material/item or due to poor workmanship on the part of the contractor/supplier leading to death or injury of any person or livestock/animal, the contractor/supplier shall be held responsible and shall be liable to pay compensation for the same. In such, APGCL may at its discretion debar the concerned contractor/supplier from participating in any future bid for such period deemed fit without prejudice to its authority to take any other legal action.

Bidding Forms:

[Bidders shall fill-up and submit these Forms (B1, B2, B3, B4, B5, B6 & B7) along with Technical Bid.]

FORM-B1

Letter of Bid (the bidder must prepare the Letter of Bid on its letterhead clearly showing the Bidder's complete name and address.)

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

Tender Ref. No.:

To:
The General Manager
Namrup Thermal Power Station,
APGCL, Namrup-786622

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued to Bidders;

(b) We meet the eligibility and qualification criteria as set out in this Bidding Document;

(c) We have submitted the required bid security and bid processing fee as stated in the bid document.

(d) We offer to supply the following tendered item(s) in conformity with all terms and conditions as specified in the Bidding Documents including the quantity, quality standard and delivery conditions, etc., as specified in the bid document under scope of work :

Sl. No.	Name of the Item(s)	Description	Remarks
1			
2			
3			
4			

(e) We have submitted both technical and price bid for above mentioned items and our bid shall be valid for a period of …… days beyond the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

(f) If our bid is accepted, we commit to obtain a performance security in accordance with the **Performance Security Deposit** Clause of the Bidding Document.

(g) We are not participating, as a Bidder, in more than one bid in this bidding process.

(h) We, along with any of our, suppliers, OEM are not debarred by any procuring entity under the State Government, the Central Government or any State Government or any Public Undertaking, Autonomous Body, Authority by whatever name called under them;

(i) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any activities which is in contravention of the Code of Integrity proscribed in the Bidding Documents;

(j) We hereby certify that we are neither associated nor has been associated directly or indirectly with any personnel/official or any other entity that has prepared the specifications and other documents for the subject matter of procurement;

(k) We hereby certify that we have fulfilled our obligations to pay all such taxes as payable to the Central Government or the State Government or any local authority;

(l) We hereby certify that we are not insolvent, in receivership, bankrupt or being wound up, not have its affairs administered by a court or a judicial officer, not have its business activities suspended and must not be the subject of legal proceedings for any of the foregoing reasons;

(m) We hereby certify that our directors and officers have not been convicted of any criminal offence related to their professional conduct or the making of false statements or misrepresentations as to their qualifications to enter into a procurement contract within a period of three years preceding the commencement of the procurement process, or not have been otherwise disqualified pursuant to debarment proceedings;

(n) We understand that this bid shall constitute a binding contract between us, until a formal contract is prepared and executed; and

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

Name of the Bidder _____

Name of the person duly authorized to sign the Bid on behalf of the Bidder _____

Title of the person signing the Bid _____

Signature of the person named above _____

FORM-B2

Bidder Information

[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]

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

Tender Ref. No.: _____

1. Bidder's Name *[insert Bidder's legal name]*

2. Bidder's year of registration/incorporation: *[insert Bidder's year of registration]*

3. Bidder's Address: *[insert Bidder's legal address]*

4. Activities Undertaken by the Bidder:

5. Bidder's Authorized Representative Information

   a) Name: *[insert Authorized Representative's name]*

   b) Address: *[insert Authorized Representative's Address]*

   c) Telephone/Fax numbers: *[insert telephone/fax numbers]*

   d) Email Address: *[insert Authorized Representative's email address]*

6. Details of the Manufacturer and the Production/Processing facility from where the offered goods/item(s) have been produced and processed.

Sl. No.	Name of the Goods/Item(s) offered	Name of the Manufacturer	Details of the Production Facility	Details of the Manufacturing License
1				
2				
3				
4				
5				
6				
7				

7. Years of experience in similar line of activity:

8. List of clients in Govt/Public Sector to whom supply has been done in last three years
9. Details of the Bank Account: (i) Name of the Bank: (ii) Type of Account: (iii) Account Number: (iv) IFSC:

Signature of the Bidder/Authorized Signatory

(Name, Address & Designation)

FORM-B3

Manufacturer's Authorisation Letter

Date: *[insert date (as day, month, and year) of Bid Submission]*
Tender Ref. No.: _____

To: *[insert complete name of Bid Inviting Entity]*

WHEREAS

We *[insert complete name & address],* who are manufacturer of *following items*, do hereby authorize *[insert complete name of Bidder]* to submit a bid, the purpose of which is to provide the following item(s), produced/manufactured by us*,* and to subsequently negotiate and sign the Contract.

S. No	Name of the Item(s)	Quality Certifications	Details of the Mfg. License	Details of Production Facility
1				
2				
3				
4				

We have been manufacturing product(s) of similar in nature as stated above since last three financial years ended on 31st March 2025.

We shall stand guarantor with respect to the quality and genuineness for the goods manufactured or produced by us and supplied by *<insert the name of the bidder>* to <insert name of the procuring entity>, on the award of the contract.

We also stand guaranteed to fulfil the warranty and maintenance obligations with respect to the goods manufactured by us as per the bid terms and conditions either directly or through our authorized representatives.

Signed: *[insert signature(s) of authorized representative(s) of the Producer]*

Name: *[insert complete name(s) of authorized representative(s) of the Producer]*

Designation: *[Designation]*

Dated on_____day of_____,*[insert date of signing]*

Note: The Bidder (if not the manufacturer of the goods offered) shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization **should be on the letterhead of the Manufacturer** of the Goods offer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its bid]

FORM- B4

Details of Work Orders

Name of the Bidder: _____

Tender Reference No._____

Name of the Client	Order No. and Date	Description of the Goods Supplied & Work Executed	Value of Order	Quantity	Reason for delay in delivery, if any.
1	2	3	4	5	6

Signature

(Bidder/Authorised Representatives)

The Bidder shall also furnish the following documents in connection with their past performance:

i) **Copy of Orders.**
(i) **Documentary evidence (Client's certificate) in support of satisfactory completion of contract. Work Completion Report.**

FORM-B5

Certificate on Financial Strength

*(**On the letterhead of Chartered Accountant/Statutory Auditor**)*

We/I have verified the Audited Financial Statement of Accounts and other documents of……having registered office at ……pertaining to the financial year 2022-23, 2023-24 and 2024-25. Based on our verification of the aforesaid statements and records, we certify that the following details are true to the best of our information and according to the explanation given to us.

(*Amount in INR Lakhs)*

Financial Information	**Financial Year**			**Average**
	2022-23	2023-24	2024-25	
	Audited	Audited	Audited	
Total Turnover				
Turnover from Similar Business				
Net worth				

I/We also certify that the Bidder is in similar business for more than three years as on due date of submission of bid.

Date:
Place:

Signature and seal of the CA firm

UDIN :……

Note:

a) *The bidder must furnish audited/CA certified financial statements for the above-mentioned financial years.*
b) *Similar business/activity shall include ……*

FORM-B6

Format for Power of Attorney for Signing of Application

(On a Stamp Paper of Rs 100/-)

Power of Attorney

We, ……. [*name and address of the registered office*] do hereby constitute, appoint and authorize Mr. / Ms. ……(*name and residential address*) who is presently employed with us and holding the position of ……as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our response to the Tender for _____ including signing and submission of all documents and providing information to the Client (i.e. [*insert name of the Bid Inviting Entity*]) and its officials or representatives, representing us in all matters before Client, and generally dealing with Client in all matters in connection with our bid response.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Dated this the _____day of _____2025

For _____

(Signature)

(Name, Designation and Address)

Accepted

_____(Signature)

(Name, Title and Address of the Attorney)

Date: _____

Note:

i. *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, as laid down by the applicable law and the charter documents of the executants(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure*.

ii. In case an authorized Director or key officials of the Applicant signs the Application, a certified copy of the appropriate resolution/ document conveying such authority may be enclosed in lieu of the Power of Attorney.

iii. In case the Application is executed outside India, the Applicant must get necessary authorization from the Consulate of India. The Applicant shall be required to pay the necessary registration fees at the office of Inspector General of Stamps.

FORM-B7 (Undertaking by the Bidder)

Affidavit

(*To be submitted on non-judicial stamp paper of minimum Rs 50/- duly certified by Notary*)

We, M/s. …… (the Bidder), (the names and addresses of the registered office) hereby certify and confirm that:

(i) We or any of our promoter(s) / director(s) / partner(s) are not blacklisted or otherwise disqualified pursuant to any debarment proceedings by any Central or State Government, Local Government or Public Sector Undertaking in India from participating in any bidding process, either individually or as member of a consortium as on the_____ (Date of Signing of Bidder).

(ii) We are not insolvent, in receivership, bankrupt, being wound up, having our affairs administered by a court or a judicial officer, having our business activities suspended or subject of legal proceedings for any of the foregoing reason;

(iii) We or any of our promoter(s), director(s), partner(s) and officers are not convicted of any criminal offence related to their professional conduct or the making of false statements or misrepresentations as to their qualifications to enter into a procurement contract within a period of *three years* preceding the commencement of the procurement process.

(iv) There is no conflict of interest in submitting this Bid.

(v) We shall abide by the clauses/conditions of Bidding Documents issued by the Procuring Entity and any amendment made thereafter.

We further confirm that, we are aware of the fact that, our Bid submitted in response of the Tender Ref. No. _____ for the work of _____, would be liable for rejection in case any material misrepresentation is made or discovered at any stage of Bid evaluation or thereafter during the agreement period.

Signature of the Bidder/Authorized Representatives

Name of the Bidder/Authorized Representatives

Annexure-I

PROFORMA

Sr. No.	Clause No.	Description/Clauses of APGCL Tender	Bidders Response/Acceptance/Deviation (Use extra sheet, if required)
1	NA	Bidder Name	
2	NA	Bidder Address	
3	NA	Contact no.	
4	NA	E-mail:	
5	C & D	Whether all documents related to Eligibility & Experience of Bidder Clauses submitted?	
6	E	Whether the Offered Scope of Work of bidder is as per tender requirement under Clause E?	
7	F (9)	Validity of bidder's bid	
8	F (12b)	Whether Copy of PAN Card, EPF Registration & ESI Certificate submitted?	
9	F (12c)	Whether GST registration copy furnished?	
10	F (12e)	Bidder's Firm/Organization details and whether requisite documents furnished?	
11	F (12f)	Whether Documents related to bidder's average annual turnover submitted?	
12	F (12g)	Signed and sealed confirmation from bidder stating that they had quoted for all items required as per tender Clause No. E (Scope of Work)/BoQ1 Submitted?	
13	F (12h)	Whether Technical details of the offered product submitted? (GTP of Energy Meters, CT/PT Set, Control and Power Cables, Type Test Report of CT/PT Set.)	
14	F (12i)	Proof of Earnest Money deposited?	
15	F (12j)	Whether Authorization Letters submitted?	
16	F (12k)	Whether all **Bidding Forms**, duly filled submitted?	
17	NA	**Whether bidder accepts all clauses/terms & conditions of this Tender?**	
18	NA	**Bidder's Declaration: "I accept that all details filled by me and submitted in the Tender are correct to my knowledge." (write 'Yes')**	

Sign & Seal of Bidder

Annexure-II

Format of BG for EMD

(IN STAMP PAPER of Minimum Rs 100/-)

Bank Guarantee No: _____, Date: _____

Bank Details:

Guarantor:

Tender No:

Name of Work:

Name of Bidder/Applicant:

Beneficiary: Assistant General Manager (F&A),

Namrup Thermal Power Station

Assam Power Generation Corporation Ltd. (APGCL)

Whereas *……..(Name and address of the bidder)* is willing to submit their bid against the above mentioned tender no: ……. for *…….(Name of Work)* invited by the beneficiary on behalf of Assam Power Generation Corporation Ltd. and as per tender/bid conditions, the applicant is required to submit a Bank Guarantee as Earnest Money Deposit.

At the request of the applicant, we as Guarantor, hereby irrevocably undertake to pay the beneficiary any sum or sums not exceeding in total an amount of Rs*……..(in numeric) (Rupees …….only- In words)* if:

1) The bidder withdraws or amends, impairs or derogates from the bid in any respect within the period of validity of the bid.
2) The bidder fails to furnish the Performance Security for the due performance of the contract/Work Order against this tender.
3) The bidder fails or refuses to execute the contract.

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

This guarantee will remain in force for 01 (one) Year from the start date of online submission of bid up to amount Rs……. *(in numeric) (Rupees …….only- In words)* and any demand in respect thereof should reach the bank not later than the above date.

Not withstanding anything contrary contained in any law for the time being in force or banking practice, this guarantee shall not be assignable or transferable by the beneficiary, notice or invocation by any person such as assignee, transferee or agent of beneficiary shall not be entertained by the bank. Any invocation of guarantee can be made only by the beneficiary directly.

Notwithstanding anything to the contrary contained herein :

1. Our liability under this bank Guarantee shall not exceed Rs.....*(in numeric) (Rupees ……..only- In words)*.

2. This Bank Guarantee shall be valid up to 01 (one) Year from the start date of online submission of bid.

3. The beneficiary' s right as well as the Bank's liability under this guarantee shall stand extinguished unless a written claim or demand is made under this guarantee up to a period of 01 (one) Year from the start date of online submission of bid.

4.

Dated at_____this ____ day of _____,2025

(Signature on behalf of the Nationalized/Scheduled Bank) (Seal of the Nationalized/Scheduled Bank)

Address of the main Branch of the Bank…… Address of the BG issuing Bank……

Annexure-III

STAMP PAPER

BANK GUARANTEE FOR PERFORMANCE

(To be stamped)

Bank Guarantee No. ----------.

Date: _____

Whereas the Assam Power Generation Corporation Ltd. (hereinafter called APGCL) which expression shall unless repugnant to the context or meaning thereof include its successor administrators, executors and assigns has entered into a contract Agreement_____ No. _____ Dated _____ with M/s _____ (herein called the 'contractor') which expression shall unless repugnant to the context or meaning thereof include its successor administrators, executors and assigns for procurement of _____ and place a work order No. _____ Dated _____.

Whereas the terms of the contract between the parties are contained in the Work Order aforementioned and subsequent correspondences between the parties, if any.

Whereas by the virtue of the clause "Performance Security Deposit" of the Work Order aforementioned, the Firm is required to furnish a Bank Guarantee from a Nationalized/Scheduled Bank of RBI fora sum of Rs. _____ (Rupees) _____only as security for the satisfactory performance of Contract by the Contractor.

Whereas the Firm has requested APGCL to accept the guarantee of _____ (Name of any Nationalized Bank with address) and APGCL has agreed to accept the same.

In consideration of APGCL entering into contract aforementioned, we _____ (Name of the Nationalized Bank with address) take into indemnity and keep indemnify APGCL from any damage, injury or loss occasion to it by breach or violation of the contract and shall pay APGCL all sums demanded by it towards such injury, loss or damage or penalties as and when demanded, provided that the total liability under the guarantee shall not exceed **Rs. _____(Rupees _____).**

Provided that this guarantee shall remain in force for a period of _____months from the date of receipt of materials at site.

Provided further that this guarantee shall not continue in force beyond_____**.** All claims under this guarantee shall be preferred to the executant's bank before_____**.**

We _____ (Name of the Nationalized Bank with address details) hereby undertake not to revoke this guarantee during the period it is in force without obtaining the prior written consent of APGCL & notwithstanding anything contained herein before, our liability under this guarantee is restricted to **Rs. _____(Rupees _____).**

Our guarantee shall remain in force until _____ unless a claim in writing is presented to us and if unpaid, a suit or action to enforce such claims is filed against us within 12 (twelve) months from the date i.e., within _____**.** All rights under said guarantee shall be forfeited and we shall be

released and discharged from all liabilities there under.

Notwithstanding anything contrary contained in any law for the time being in force or banking practice, this guarantee shall not be assignable or transferable by the beneficiary. Notice or invocation by any person such as assignee, transferee or agent of beneficiary shall not be entertained by the Bank. Any invocation of guarantee can be made only by the Beneficiary directly.

Notwithstanding anything to the contrary contained herein:

1. Our liability under this bank Guarantee shall not exceed **Rs.** _____ **(Rupees** _____**)**
2. This Bank Guarantee shall be valid up to _____**.**
3. The beneficiary's right as well as the Bank's liability under this guarantee shall stand extinguished unless a written claim or demand is made under this guarantee on or before _____**.**
4. The BG confirmation letter no. _____ is an integral part of the BG no._____dt. _____

The Bank Guarantee will be governed and construed in accordance with Indian laws and subject to exclusive jurisdiction of courts of India**.**

Dated at_____this ____ day of _____**,** 2024.

(Signature on behalf of the Nationalized/Scheduled Bank)

(Seal of the Nationalized/Scheduled Bank)

Address of the main Branch of the Bank……

Address of the BG issuing Bank……

I. TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION FOR TUBULAR STEEL POLES FOR OVERHEAD LINES

1 SCOPE:

This specification covers the general requirements towards design, manufacture, testing at manufacturers works, supply and delivery for tubular steel poles of circular cross section (swaged type) for overhead lines.

2 STANDARD:

The tubular steel poles shall conform to the latest edition of Indian Standard specification IS: 2713 (Part – I, III): 1980 or any other authoritative standards (as amended up-to- date) except where specified otherwise in this specification.

3 Topography and Climatic Condition:

The materials offered, shall be suitable for operation in tropical climate and will be subjected to the sun and inclement weather and shall be able to withstand wide range of temperature variation. For the purpose of design, average atmospheric temperature may be considered to be 50ºC with humidity nearing saturation.

4 Materials:

4.1 The materials used in construction of tubular steel poles shall be of the tested quality of steels of minimum tensile strength 540 MPa (: 55 Kgf/mm^2).

4.2 The materials, when analysed in accordance with IS: 228 (Part-III: 1972) and IS : 228 (Part-IX) shall not show Sulphur and phosphorous contents of more than 0.060 percent each.

5 Types, Size and construction:

5.1 Tubular Steel Poles shall be swaged type.

5.2 Swaged poles shall be made of seamless or welded tubes of suitable lengths swaged and jointed together. No circumferential joints shall be permitted in the individual tube lengths of the poles. If welded tubes are used they shall have one longitudinal weld seam only: and the longitudinal welds shall be staggered at each swaged joint.

5.3 Swaging may be done by any mechanical process. The upper edge of each joint shall be chamfered if at an angle of about 45^o. The upper edge need not be chamfered if a circumferential weld is to be deposited in accordance with clause No. 5.3 2 of IS: 2713 (Part-I):1980.

5.4 The length of joints on swaged poles shall be in accordance with clause No. 5.4 of IS: 2713 (Par-I): 1980.

5.5. Poles shall be well-finished, clean and free from harmful surface defects. Ends of the poles shall be cut square. Poles shall be straight, smooth and cylindrical. The weld joints, if any, shall be of good quality, free from scale, surface defects, cracks, etc.

5.6. Tolerances for outside diameter, thickness, length, weight and straightness shall be in accordance with IS: 2713 (Part-I) : 1980.

5.7. The poles shall be coated with black bituminous paint conforming to IS: 158-1968 throughout, internally and externally, upto the level which goes inside the earth. The remaining portion of the exterior shall be painted with one coat of red oxide primer as specified in IS: 2074-1979.

6 Earthing Arrangements:

For earthing arrangement a through hole of 14mm diameter shall be provided in each pole at a height of 300mm above the planting depth.

7 Tests and Test Certificates:

7.1 The following tests shall be conducted on finished poles :

A. Tensile test and chemical analysis for Sulphur and phosphorous,
B. Deflection test,
C. Permanent set test, and
D. Drop test.

7.2 In addition to above verification of dimensions as per IS: 2713 (Part-III) : 1980 shall be carried out during acceptance lots.

7.3 Number of poles selected for conducting different tests shall be in accordance to clause No. 10.1.1 and No. 10.1.12: of IS: 2713 (Part-I) 1980.

7.4 Tests shall be carried out before supply of each consignment at the manufacturers woks and test certificates should be submitted to the purchaser for approval prior to delivery.

7.5 Re-tests, if any, shall be made in accordance with IS: 2713 (Part-I) 1980.

7.6 Purchaser reserves the right to inspect during manufacturing and depute his representative to inspect/test at the works.

7.7 If any extra cost is required for carrying out the above specified tests, the same shall be borne by the manufacturer.

8 Marking:

8.1 The poles shall be marked with designation, manufacturer's identification, year of manufacture and name of the purchaser: Employer Name; IPDS

8.2 The poles may also be marked with the ISI certification mark.

9 Guaranteed technical particulars:

9.1 The manufacturer shall furnish all necessary guaranteed technical particulars in the prescribed Performa enclosed hereinafter.

10 Performance:-

10.1 The manufacturer shall furnish a list of the major supplies effected during the last 3 (three) years indicating the volume of supply and actual delivery dates.

10.2 Manufacturer may not be considered if the past manufacturing experience is found to be less that 3 (three) years.

11 Deviation:-

Any deviation in technical specification shall be clearly indicated with sufficient reasons thereof. Purchaser shall however reserve the right to accept and/or reject the same without assigning any reasons what-so-ever.

ANNEXURE –'A'

SPECIFIC TECHNICAL REQUIREMENTS FOR TUBULAR STEEL POLES : SWAGED TYPE

	8.5 meters long	**11 meters long**	**14.5 meters long**	**12 meters long**
1) Standard	IS: 2713 (Pat-I and III): 1980 as amended upto date			
2) Type of Pole	Swaged Type			
3) Designation	540 SP 22	540 SP-56	540 SP 76	410 SP 60
4) Overall Length	8.5 meters	11 meters	14.5 meters	12 meters
5) Planting depth	1.5 meters	1.8 meters	2.0 meters	2.0 meters
6) Height above ground	7.0 meters	9.2 meters	12.5 meters	10.0 meters
7) Effective length of Each section.				
a) Bottom	5.0 meters	5.6 meters	6.50 meters	5.80 meters
b) Middle	1.75 meters	2.7 meters	4.00 meters	3.10 meters
c) Top	1.75 meters	2.7 meters	4.00 meters	3.10 meters
8) Outside diameter and Thickness of each Section.				
a) Bottom	165.1x 4.50 mm	165.1x4.50 mm	219.1x5.90 mm	165.1x5.40mm
b) Middle	139.7x4.50 mm	139.7x4.50 mm	193.7x4.85 mm	139.7x4.50 mm
c) Top	114.3x3.65 mm	114.3x3.65 mm	165.1x4.50 mm	114.3x3.65 mm
9) Joint Length (in cm.):				
a) Bottom (J2)	35 cm.	35 cm.	45 cm.	35 cm.
b) Top (J1)	30 cm.	30 cm.	40 cm.	30 cm.
10) Approximate weight of Pole	141 Kg.	175 Kg.	380 Kg.	208 Kg.
11)Point of application of load below/top (mtr.)	0.3 mtr.	0.6 mtr.	0.6 mtr	0.6 mtr
12) Breaking load (inKgf)	728	567	947	469
13) Working load with factor of Safety : 2.5 (in Kgf)	291	227	379	188
14) Crippling load (inKgf)	517	403	672	333
15) Load for permanent set Not exceeding 13mm (in Kgf)	354	276	460	228
16) Load for Temporary Deflection of 157.5 mm (in Kgf)	176	74	81	61
17) Tolerance	As per IS : 2713 (Part-I & Part-III): 1980			
18) Finish	-do-			
19) Manufacturing clause	-do-			

TECHNICAL SPECIFICATION FOR ACSR CONDUCTORS

A. ACSR CONDUCTOR

1. SCOPE

This section covers design, manufacture, testing before dispatch, packing, supply and delivery for destination of Kms of "WEASEL" " RABBIT", "RACOON", "DOG", "WOLF" and "PANTHER" ACSR Conductor of size 6/1/2.59mm, 6/1/3.35mm, 6/1/4.09 mm, 6/4.72mm, 7/1.57mm, 30/7/2.59 mm and 30/7/3.00mm respectively.

2. STANDARDS

The Conductor shall also comply in all respects with the IS: 398 (Part-II) - 1996 with latest amendments unless otherwise stipulated in this specification or any other International Standards which ensure equal or higher quality material.

Sl. No.	Indian Standards	Title	International
1	IS:209-1979	Specification for Zinc	BS-3436-1961
2	IS:398-1996	Specification for Aluminum conductors for overhead transmission purposes.	
	Part-II	Aluminum conductors	IEC-209-1966
		Galvanized steel reinforced	BS-215(Part-II)
3	IS:1521-1972	Method of Tensile Testing of Steel wire	ISO/R89-1959
4	IS:1778-1980	Reels and Drums for Bare conductors	BS-1559-1949
5	IS:1841-1978	E.C. Grade Aluminum rod produced by rolling	
6	IS:2629-1966	Recommended practice for Hot Dip Galvanizing of iron and steel	
7	IS:2633-1986	Method of testing uniformity of coating of zinc coated articles.	
8	IS:4826-1968	Galvanized coatings on round steel wires.	ASTM A472-729
9	IS:5484-1978	E.C. Grade Aluminum rod produced by continuous casting and rolling.	
10	IS:6745-1972	Methods of determination of weight of zinc-coating of zinc coated iron and steel articles	BS-443-1969

The ACSR Conductor shall also conform to the following standards: Offer Conforming to standards other than IS-398 shall be accompanied by the English version of relevant standards in support of the guaranteed technical particulars to be furnished as per format enclosed.

3. GENERAL TECHNICAL REQUIREMENTS

The General Technical Requirements are given in Section-II. The Conductor shall conform to these technical requirements.

The Bidder shall furnish guaranteed technical particulars.

3.1. MATERIALS/WORKMANSHIP

3.1.1. The material offered shall be of best quality and workmanship. The steel cored Aluminum conductor strands shall consist of hard drawn Aluminum wire manufactured from not less than 99.5% pure electrolytic Aluminum rods of E.C. grade and copper content not exceeding 0.04%. They shall have the same properties and characteristics as prescribed in IEC: 889-1987. The steel wire shall be made from material produced either by the acid or basic open hearth process or by electric furnace process or basic oxygen process. Steel wire drawn from Bessemer process shall not be used.

3.1.2. The steel wires shall be evenly and uniformly coated with electrolytic high grade, 99.95% purity zinc complying

with the latest issue of IS-209 for zinc. The uniformity of zinc coating and the weight of coating shall be in accordance with Section-II and shall be tested and determined according to the latest IS-2633 or any other authoritative standard.

3.1.3. The steel strands shall be hot dip galvanized and shall have a minimum zinc coating of 250 gm/sq.m after stranding. The coating shall be smooth, continuous, and of uniform thickness, free from imperfections and shall withstand minimum three dips after stranding in standard preece test. The steel strands shall be preformed and post-formed in order to prevent spreading of strands in the event of cutting of composite core wire. The properties and characteristics of finished strands and individual wires shall be as prescribed in IEC: 888-1987.

4. CONDUCTOR PARAMETERS

The Parameters of individual strands and composite steel coredaluminium conductor, shall be in accordance with the values given in Section-II.

Creep in a conductor is attributed partly due to settlement of strands and partly due to non-elastic elongation of metal when subjected to load. The manufacturer of conductor shall furnish the amount of creep which will take place in 10, 20, 30, 40 and 50 years along with the supporting calculations. The calculations shall be based on everyday temperature of 32 ºC and everyday tension of 25% of UTS of conductor of 11/33 KV Lines.

5. TOLERANCES

The tolerances on standard diameter of Aluminum and Steel wires shall be as detailed in specific technical requirements.

The cross-section of any wire shall not depart from circularity by more than an amount corresponding to the tolerance on the standard diameter.

The details of diameters, lay ratios of Aluminum and steel wires shall be in accordance with the Section-II "Technical Requirements".

6. SURFACE CONDITIONS

All Aluminum and steel strands shall be smooth, and free from all imperfections, spills/and splits. The finished conductor shall be smooth, compact, uniform and free from all imperfections including spills and splits, die marks, scratches, abrasions, scuff marks, kinks (protrusion of wires), dents, pressmarks, cut marks, wire cross-over, over-riding looseness, pressure and/or unusual bangle noise on tapping, material inclusions, white rust, powder formation or black spots (on account of reaction with trapped rain water etc.,), dirt, grit, etc. The surface of conductor shall be free from points, sharp edges, abrasions or other departures from smoothness or uniformity of surface contour that would increase radio interference and corona losses. When subjected to tension upto 50% of the ultimate strength of the conductor, the surface shall not depart from the cylindrical form nor any part of the component parts or strands move relative to each other in such a way as to get out of place and disturb the longitudinal smoothness of the conductor.

7. JOINTS IN WIRES

7.1. Aluminum wires

During stranding, no Aluminum wire welds shall be made for the purpose of achieving the required conductor length.

No joint shall be permitted in the individual Aluminum wires in the outer most layer of the finished Conductor. However, joints in the 12 wire & 18 wire inner layer of the conductor are permitted but these joints shall be made by the cold pressure butt welding and shall be such that no two such joints shall be within 15 meters of each other in the complete stranded conductor.

7.2. Steel wires

There shall be no joints in finished steel wires forming the core of the steel reinforced Aluminum conductor.

8. STRANDING

The wires used in construction of the stranded conductor, shall, before stranding, satisfy all requirements of IS-398 (Part-II) 1996.

In all constructions, the successive layers shall be stranded in opposite directions. The wires in each layer shall be evenly and closely stranded round the underlying wire or wires. The outer most layer of wires shall have a right hand lay. The lay ratio of the different layers shall be within the limits given under Section-II.

9. PACKING

9.1. The conductor shall be supplied in non-returnable strong wooden drums provided with lagging of adequate strength constructed to protect the conductor against any damage and displacement during transit, storage and subsequent handling and stringing operations in the field. The drums shall generally conform to IS-1778-1980 and latest version except as otherwise specified hereinafter. The conductor drums shall be adequate to wind one standard length of 2500 meters of WEASEL/RABIT/RACOON/DOG/PANTHERACSR conductor.

9.2. The drums shall be suitable for wheel mounting and for letting off the conductor under a minimum controlled tension of the order of 5KN. The conductor drums shall be provided with necessary clamping arrangements so as to be suitable for tension stringing of power conductor.

9.3. The bidders shall submit their drawings of the conductor drums along with the bid. After placement of letter of intent the Manufacturer shall submit four copies of fully dimensioned drawing of the drum for Employer's approval. After getting approval from the Employer, Manufacturer shall submit 30 more copies of the approved drawings for further distribution and field use.

9.4. All wooden components shall be manufactured out of seasoned soft wood free from defects that may materially weaken the component parts of the drums. Preservative treatment for anti-termite/anti fungus shall be applied to the entire drum with preservatives of a quality which is not harmful to the conductor.

9.5. All flanges shall be 2-ply construction with 64 mm thickness. Each ply shall be nailed and clenched together at approximately 90 degrees. Nails shall be driven from the inside face of the flange, punched and then clenched on the outer face. Flange boards shall not be less than the nominal thickness by more than 2 mm. There shall not be less than 2 nails per board in each circle.

9.6. The wooden battens used for making the barrel of the conductor shall be of segmental type. These shall be nailed to the barrel supports with at least two nails. The battens shall be closely butted and shall provide a round barrel with smooth external surface. The edges of the battens shall be rounded or chamfered to avoid damage to the conductor.

9.7. Barrel studs shall be used for construction of drums. The flanges shall be holed and the barrel supports slotted to receive them. The barrel studs shall be threaded over a length on either end, sufficient to accommodate washers, spindle plates and nuts for fixing flanges at the required spacing.

9.8. Normally, the nuts on the studs shall stand protruded of the flanges. All the nails used on the inner surface of the flanges and the drum barrel shall be countersunk. The ends of the barrel shall generally be flushed with the top of the nuts.

9.9. The inner cheek of the flanges and drum barrel surface shall be painted with bitumen based paint.

9.10. Before reeling, card board or double corrugated or thick bituminized waterproof bamboo paper shall be secured to the drum barrel and inside of flanges of the drum by means of a suitable commercial adhesive material. The paper shall be dried before use. Medium grade craft paper shall be used in between the layers of the conductor. After reeling the conductor the exposed surface of the outer layer of conductor shall be wrapped with thin polythene sheet across the flanges to preserve the conductor from dirt, grit and damage during transportation and handling and also to prevent ingress of rain water during storage/transport.

9.11. A minimum space of 75 mm shall be provided between the inner surface of the external protective lagging and outer layer of the conductor. Outside the protective lagging, there shall be minimum of two binders consisting of hoop iron/galvanized steel wire. Each protective lagging shall have two recesses to accommodate the binders.

9.12. Each batten shall be securely nailed across grains as far as possible to the flange edges with at least 2 nails per end. The length of the nails shall not be less than twice the thickness of the battens. The nail shall not protrude above the general surface and shall not have exposed sharp edges or allow the battens to be released due to

corrosion.

9.13. The conductor ends shall be properly sealed and secured with the help of U-nails on one side of the flanges.

9.14. Only one standard length of conductor shall be wound on each drum. The method of lagging to be employed shall be clearly stated in the tender.

9.15. As an alternative to wooden drum Bidder may also supply the conductors in non-returnable painted steel drums. The painting shall conform to IS:9954-1981,reaffirmed in 1992. Wooden/ steel drum will be treated at

SECTION - II

SPECIFIC TECHNICAL REQUIREMENTS

1. SCOPE

This section of the specification covers climatic and isoceraunic conditions, specific technical particulars, schedule of requirements & desired deliveries, for conductor for 11/33 kV lines.

2. CLIMATIC & ISOCERAUNIC CONDITIONS:

	2.1 Maximum Temperature	
	a) Conductor	ºC.
	2.2Minimum Temperature	ºC.
	2.3 i)Max. ambient temperature	ºC
	ii) Mean annual / every day temperature	ºC
	2.4Basic wind speed m/s	
	2.5Relative humidity	
	i) Maximum	%
	ii) Minimum	%
	2.6Average Rainfall (Max.) mm per annum	
	2.7a)Rainy months	May to Sept. 15 Rainy days in a year (days)

CONDUCTOR 1. Conductor:	Raccoon ACSR
2. IS applicable:	IS-398 (part-II) 1996 latest revision
3. Wire Diameter	**Raccoon**
Aluminum (mm)	6/4.09
Steel(mm)	1/4.09
4. Number of strands:	
Steel centre	1
1st steel layer	
1st Aluminum layer	6
2nd Aluminum layer	
5. Sectional Area of Aluminum (sq. mm.)	78.83
6. Total Sectional Area(sq.mm.)	91.97
7. Overall diameter(mm)	12.27
8. Approximate weight(Kg./Km.)	319
9. Calculated D.C resistance at 20 degrees C., maximum. (Ohms/Km)	0.371
10. Ultimate tensile strength (KN)	26.91
11. Final modulas of elasticity (GN/sq.m)	79
12. Coefficient of linear expansion x 10-6 per◦C	19.1
13. Lay ratio	Max /Min
Steel core 6 wire layer	

AluminiumIst layer	14 10	
2nd layer		
14. Technical Particulars		
a. Diameter-mm	Al	Steel
Standard(mm)	4.09	4.09
Maximum (mm)	4.17	4.17
Minimum (mm)	4.01	4.01
b. Cross-sectional area of nominal diameter wire ($mm^{2)}$	13.14	13.14
c. Weight (Kg./Km)	102.48	35.51
d. Min. breaking load (KN)		
Before stranding	17.27	2.08
After Stranding	16.4	1.98
e. D.C resistance at 20°C min. (Ohm/Km)	0.371	

15. Zinc coating of steel core:

(i) Number of 1 minute dips: 3

(ii) Minimum weight of Zinc: 260 gms/sqm Coating

(iii) Process of Galvanizing: Hot dip.

(iv) Quality of Zinc: IS-209/1979 or latest edition.

16. Joints in strands

16.1 Steel : Not permitted

16.2 **Aluminium:** No joint shall be permitted in the Aluminium wires in the outer most layer of the ACSR conductor. But permitted in the inner layers such that no two such joints are within 15 meters of each other in the complete stranded conductor.

17 Chemical composition of high carbon steel wire:

Element	**% Composition**
i) Carbon	0.5 to 0.85
ii) Manganese	0.5 to 1.10
iii) Phosphorus	Not more than 0.035
iv) Sulphur	Not more than 0.045
v) Silicon	0.10 to 0.35

TECHNICAL SPECIFICATION FOR 33 KV STATION CLASS LIGHTNING ARRESTOR & 33 KV DISTRIBUTION CLASS SURGE ARRESTORS

1.0 DISTRIBUTION CLASS SURGE ARRESTORS

Distribution class surge arrestors are generally used in distribution Transformer Substations only.

1.1 INTRODUCTION

This section covers the specification of Distribution class Surge Arrestor for 11kV transmission lines, transformers etc.

1.2 STANDARDS

The design, manufacture and performance of Surge Arrestors shall comply with IS: 3070 Part-3 and other specific requirements stipulated in the specification. Unless otherwise specified, the equipment, material and processes shall conform to the latest applicable Indian/International Standards as listed hereunder:

IS:2071- 1993 (Part-1)	Methods of High Voltage Testing General Definitions & Test
IS:2071-1974 (part-2)	Test Procedures
IS:2629-1985	Recommended Practice for hot dip galvanizing on Iron & Steel
IS:2633-1986	Method for Testing uniformity of coating of zinc coated Articles.
IS3070-1993 (Part–3)	Specification for surge arrestor for alternating current systems. Metal-Oxide lightening arrestors without gaps
IS:4759-1996	Specification for hot dip zinc coating on Structural Steel and Other allied products.
IS:5621-1980	Hollow Insulators for use in Electrical Equipment.
IS:6209-1982	Methods of Partial discharge measurement.
IS:6745	Method for determination of mass of zinc coating on zinc coated iron and steel articles
ANSI/IEEE-C.62.11 :	Metal oxide, Surge Arrestor for AC Power(1982) Circuits.
IEC –60099-4	Surge Arrestors

1.2.1 The equipment complying with any other internationally accepted standards shall also be considered if it ensures performance equivalent to or superior to the Indian Standards.

1.3 GENERAL REQUIREMENT

1.3.1 The metal oxide gap less Surge Arrestor without any series or shunt gap shall be suitable for protection of 33 kV side of Distribution Transformers, associated equipment and 33 kV lines from voltage surges resulting from natural disturbance like lightning as well as system disturbances.

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

1.3.3 The surge arrestor shall consist of non-linear metal oxide resistor elements placed in series and housed in electrical grade porcelain housing / silicon polymericof specified Creepage distance.

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

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

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

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

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

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

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

1.4 **ARRESTOR HOUSING**

1.4.1 The arrestor housing shall be made up of **silicon polymeric** housing and shall be homogenous, free from laminations, cavities and other flaws of imperfections that might affect the mechanical and dielectric quality. The housing shall be of uniform **Grey (for silicon polymeric)** colour, free from blisters, burrs and other similar defects.

1.4.2 Thehousing shall be so coordinated that external flashover shall not occur due to application of any impulse or switching surge voltage upto the maximum design value for arrestor. The arrestors shall not fail due to contamination.

1.4.3 Sealed housings shall exhibit no measurable leakage.

1.5 ARRESTOR MOUNTING

The arrestors shall be suitable for mounting on 4 pole/2 pole structure used for pole mounted transformer and for incoming and outgoing lines.

1.6 FITTINGS & ACCESSORIES

1.6.1 The surge arrestor shall be complete with disconnector and terminal connectors and all other accessories.

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

1.7 TESTS

1.7.1 Test on Surge Arrestors

The Surge Arrestors offered shall be type tested and shall be subjected to routine and acceptance tests in accordance with IS : 3070 (Part-3)-1993. In addition, the suitability of the surge arresters shall also be established for the following :

a) **Acceptance tests:**

i) Measurement of power frequency reference voltage of arrester units.

ii) Lightning impulse residual voltage on arrester units (IEC clause 6.3.2).

iii) Internal ionization or partial discharge test.

b) **Special Acceptance tests:**

i) Thermal stability test (IEC clause 7.2.2)

c) **Routine tests :**

Measurement of reference voltage

i) Residual voltage test of arrester unit.

ii) Internal ionization or partial discharge test.

iii) Sealing test.

iv) Verticality check on completely assembled surge arresters as a sample test on each lot if applicable.

d) **Type tests:** Following shall be type test As per IS 3070 (Part 3)-/IEC;60094 or its latest amendment :

1.	Insulation Withstand test a) Lightning Impulse voltage test b) Power Frequency (Dry & Wet)
2.	Residual Voltage Test a) Steep current impulse residual voltage test b) Lightning Impulse Residual Voltage Test
3.	Long duration current impulse withstand test
4.	High current impulse operating duty test
5.	Power frequency voltage Vs. Time characteristics
6.	Accelerated Ageing test
7.	Artificial pollution test (for porcelain housing)
8.	Partial discharge test
9.	Visual Examination (for porcelain housing)
10.	a) Temperature cycle test (for porcelain housing)
11.	Mechanical Failing Load test(Bending Strength test)
12.	Uniformity of Zinc coating, Mass of zinc coating
13.	Time versus current curve (for disconnector)
14.	Weather ageing test (for polymer housing)

1.7.2 The maximum residual voltages corresponding to nominal discharge current of 5 kA for steep current, impulse residual voltage test, lightning impulse protection level and switching impulse level shall generally conform to Annex-K of IEC-99-4.

1.7.3 The contractor shall furnish the copies of the type tests and the characteristics curves between the residual voltage and nominal discharge current of the offered surge arrestor and power frequency voltage v/s time characteristic of the surge arrestor subsequent to impulse energy consumption as per clause 6.6.7 of IS:3070 (Part-3) offered alongwith the GTP.

1.7.4 The surge arrestor housing shall also be type tested and shall be subjected to routine and acceptance tests in accordance with IS: 5621

1.7.5 GALVANIZATION TEST

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

1.7.6 TEST ON SURGE ARRESTOR DISCONNECTORS

The test shall be performed on surge arrestors which are fitted with arrestor disconnector or on the disconnector assembly alone if its design is such as to be un-affected by the heating of adjacent parts of the arrestor in its normally installed portion in accordance with IS:3070 (Part-3).

1.8 NAME PLATE

1.8.1 The name plate attached to the arrestor shall carry the following information:

- Rated Voltage

- Continuous Operation Voltage
- Normal discharge current
- Manufacturers Trade Mark
- Year of Manufacturer
- Name of the manufacture
- Name of Client
- Purchase Order Number along with date

1.9 DRAWINGS AND INSTRUCTION MANUALS

The successful bidder shall furnish to the purchaser the following drawings and literature for approval:

(i) Outline dimensional drawings of Surge Arrestor and all accessories.
(ii) Assembly drawings and weights of main component parts.
(iii) Drawings of terminal clamps.
(iv) Arrangement of earthing lead.
(v) Minimum air clearance to be maintained of line components to ground.
(vi) Name plate
(vii) Instructions manual
(viii) Drawing showing details of pressure relief valve
(ix) Volt-time characteristics of surge arrestors
(x) Detailed dimensional drawing of porcelain housing/Silicon polymeric i.e. internal diameter, external diameter, thickness, height, profile, creepage distance, dry arcing distance etc.

1.10 TECHNICAL PARTICULARS

1.10.1 The surge arrestors shall conform to the following standard technical requirements. The Insulation values shall be enhanced considering the altitude of operation & other atmospheric conditions.

System Parameters

i)	Nominal system voltage	33 kV
ii)	Highest system voltage	36 kV
iii)	System earthing	Solidly earthed system
iv)	Frequency (Hz)	50
v)	Lightning Impulse withstand	75 Voltage (kVP)
vi)	Power frequency withstand	28 Voltage (kV rms)
vii)	Arrestor duty	
	-- Connection to system	Phase to earth
	-- Type of equipment to be protected	33 kV transformers & switchgear

1.10.2 Surge Arrestors

i)	Type	Gapless Metal oxide outdoor
ii)	Arrestor rating (kV rms)	9
iii)	Continuous Operating voltage (kV rms)	7.65
iv)	Nominal Discharge Current	5 Rating (kA) (8x20 micro impulse shape)
v)	Long Duration discharge class	Distribution class
vi)	Maximum residual voltage (kV peak)	
	a) at 5 kA	27
vii)	Partial discharge at 1.05 COV not greater than	50 (PC)
viii)	High current impulse withstand voltage at 5 kA (kVp)	65

1.11 INSULATOR HOUSING

i)	Power frequency withstand test voltage (Wet) (kV rms)	28
ii)	Lightning impulse withstand/tests voltage (kVP)	75
iii)	Creepage distance not less than (mm)	300

1.12 GALVANISATION

2	Fabricated Steel Articles	
2.0	5 mm thick cover	610 g/m^2
2.1	Under 5 mm but not less than 2 mm thickness	460 g/m^2
2.2	Under 2 mm but not less than 1.2 mm thickness	340 g/m^2
3	Castings	
	Grey Iron, malleable iron	610 g/m^2
4	Threaded works other than tubes & tube fittings	
4.0	Under 10 mm dia	270 g/m^2
4.1	10 mm dia& above	300 g/m

TECHNICAL SPECIFICATION FOR GALVENISED CHANNEL CROSS ARM ANGLE AND FLAT

1.0 SCOPE :

This specification covers the design, manufacture, testing at manufacturer's works, transport to site, insurance, storage, erection and commissioning of Galvanized Cross Arm and channel used for 33 KV & line complete with all accessories as specified.

2.0 Standards

The M.S Cross Arm and channel supplied under this specification shall conform the latest issue of the relevant Indian Standards IS – 226:1975, Regulations etc. except where specified otherwise.

The rolling and cutting tolerance for steel product conforming to IS: 266 shall be those specified in the IS: 1852-1973 with latest revision.

Galvanization conforming to latest version of 1S:2629

In the event of conforming to any standards other than the Indian Standards, the salient features of comparison shall be clearly set out separately

3.0 **GENERAL REQUIREMENT** :

i. The cross arm shall be fabricated grade of mild steel of channel section as per requirement.

ii. All steel members and other parts of fabricated material as delivered shall be free of warps, local deformation, unauthorized splices, or unauthorized bends.

iii. Bending of flat strap shall be carried out cold. Straightening shall be carried out by pressure and not by hammering. Straightness is of particular importance if the alignment of bolt holes along a member is referred to its edges.

iv. Holes and other provisions for field assembly shall be properly marked and cross referenced. Where required, either by notations on the drawing or by the necessity of proper identification and fittings for field assembly, the connection shall be match marked.

v. A tolerance of not more than 1mm shall be permitted in the distance between the center lines of bolt holes. The holes may be either drilled or punched and, unless otherwise stated, shall be not more than 2mm greater in diameter than the bolts.

vi. When assembling the components force may be used to bring the bolt holes together (provided neither members nor holes are thereby distorted) but all force must be removed before the bolt is inserted. Otherwise strain shall be deemed to be present and the structure may be rejected even though it may be, in all other respects, in conformity with the specification.

vii. The back of the inner angle irons of lap joints shall be chamfered and the ends of the members cut where necessary and such other measures taken as will ensure that all members can be bolted together without strain or distortion. In particular, steps shall be taken to relieve stress in cold worked steel so as to prevent the onset of embitterment during galvanizing.

viii. Similar parts shall be interchangeable.

ix. Shapes and plates shall be fabricated and assembled in the shop to the greatest extent practicable. Shearing flame cutting and chipping shall be done carefully, neatly and accurately. Holes shall be cut, drilled or punched at right angles to the surface and shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges, and burrs resulting from drilling or reaming operations shall be removed with the proper tool.

x. Shapes and plates shall be fabricated to the tolerance that will permit fielderection within tolerance, except as otherwise specified. All fabrication shall be carried out in a neat and workmanlike manner so as to facilitate cleaning,
painting, galvanizing and inspection and to avoid areas in which water and other matter can lodge.

xi. Contact surfaces at all connections shall be free of loose scale, dirt, burrs, oil and other foreign materials that might prevent solid seating of the parts.

xii. Welded joints not permissible.

xiii. The rolling and cutting tolerance for steel product conforming to IS: 266 shall be those specified in the IS: 1852-1973 with latest revision.
All dimensions are subject to the following tolerances:
a) Dimensions up to and including 50mm:+1mm: and
b) Dimensions greater than 50mm: +2%

xiv. The channel cross arm shall be properly brushed to make it free from rust.

xv. For galvanized channel :

All ferrous parts including all sizes of nuts, bolts, plain and spring washers, support channels, structures, shall; be hot dip galvanized conforming to latest version of 1S:2629 or any other equivalent authoritative standard. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spot and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives

to the galvanic bath which could have a detrimental effect on the durability of the zinc coating.

Before picking, all welding, drilling, cutting, grinding and other finishing operations must be completed and all grease, paints, varnish, oil, welding slag and other foreign matter completely removed. All protuberances, which would affect the life of galvanizing shall also be removed.

The weight of zinc deposited shall be in accordance with that stated in Standard IS 2629 and shall not less than 0.61kg/m² with a minimum thickness of 86 microns for items of thickness more than 5mm, 0.46kg/m² (64 microns) for items of thickness between 2mm and 5mm and 0.33kg/m² (47 microns) for items less than 2mm thick.

xvi. The raw materials and fabrication thereof in respect of cross arm shall be furnished along with dimension.

xvii. The hole for fixing of insulator and pole clamp shall be provided as per requirement.

xviii. One copy of the drawing of cross arm for each size shall be furnished along with the technical bid.

a. REQUIRED TECHNICAL SPECIFICATION FOR GI CHANNEL CROSS ARM[100x50x6x3200]

Sl No.	Description	Particular
1	Type of cross arm	G.I Channel cross arm
2	Size	100 x 50x 6 x 3200 mm
3	Material	Mild Steel channel
4	Length	3200 mm
5	Breath	100 mm
6	Width	50 mm
7	Thickness	6 mm
8	Hole for fixing of insulator	26 mm
9	Center to center distance of hole	1525 mm
10	Hole for pole clamp	18 mm
11	Weight	29.5 kg (approx)
12	Galvanization	The cross arm shall be properly brushed to make it free from rust and hot dip galvanized confirming to IS: 2629.
13	Standard applicable	IS: 266; IS: 1852-1973:

Sl No.	Description	Particular
1	Type of cross arm	GI Channel cross arm
2	Size	75 x 40x 40x6 x 2200 mm
3	Material	Mild Steel channel(galvanized)
4	Length	2200 mm
5	Breath	75 mm
6	Width	40 mm
7	Thickness	6 mm
8	Hole for foxing of insulator	20 mm
9	Center to center distance for hole	1070mm
10	Weight	16 kg (approx)
11	Galvanization	The cross arm shall be properly brushed to make it free from rust and hot dip galvanized confirming to IS: 2629.

TECHNICAL SPECIFICATION FOR POLYMERIC 33 KV AND 11 KV PIN INSULATOR

1.0 Scope

This specification covers design, manufacture, testing at manufacturer's works, transport to site, storage, insurance, erection and commissioning of polymeric 33 KV pin insulator for 33 kV lines.

2.0 Standard

Polymeric compact insulator with suitable groove in upper pin and long threads in lower part of the pin with nuts, suitable for 33 KV lines shall be conforming to IEC : 1109 with its latest amendments and revision and having minimum mechanical failing load of 10 K.N. Insulators conforming to any other internationally accepted standards which ensure equal or higher quality than the standard mentioned would also be acceptable. A high class quality, corrosion resistant, fiberglass reinforced rod is the core of every insulator with ultimate mechanical strength at least twice the maximum working load.

3.0 General Requirements

4.0 The composite polymer insulator should be uni-body design and injection molded directly to the rod and sealed to the end fittings with bead of silicon to give the insulator high dielectric strength and protect it from all environmental conditions. The design of the insulator shall be such that stress due to expansion and contraction in any part of the insulator shall not lead to deterioration.

The dimensions of the pins insulator shall be as follows:

		33 KV	11KV
a)	Composite insulator length	310 mm	210 MM
b)	Failing minimum load	10 KN	5 KN
c)	Creepage distance (min) mm	925 mm	580 mm
d)	Dry power frequency 1 min withstand voltage 70 kV (RMS)		70 kV(RMS)
e)	Wet power frequency 1 min withstand voltage70 kV (RMS)		70 KV(RMS)
f)	Dry lightning impulse withstand voltage	170 Kvp	145 Kvp

5.0 Tests

Pin shall comply with the following tests.

a) Type test: Visual examination test, Verification of dimensions, Checking of threads, Galvanizing test, Mechanical strength tests

1.1 Routine test: Visual examination test

a) Acceptance test: Galvanizing test, Mechanical test

6.0 Inspection

All tests and inspections or shall be carried out at the place of manufacturers unless otherwise agreed by the purchaser and the manufacturers at the time of purchase. A manufacturer shall afford the inspector or third party nominee representing the purchaser all reasonable facilities, without charge to satisfy that the materials are being purchased as per specification. The purchaser reserved the right to have the test carried out at his co.st by an independent agency, whenever there is dispute regarding the quality of the materials supplied.

7.0 Marking

The pins shall be marked with name of manufacturer, year and name of project.

9.0 The temperature withstanding capacity as per IS for general electrical equipment

TECHNICAL SPECIFICATION FOR HARDWARE FITTING FOR DISC INSULATOR, 90 KN(B& S)

1.0 Scope: -

The fitting shall consist of the following component :

a) Cross arm strap conforming to IS: 2486 (Pt-II)-1989.

b) Forged steel ball eye for attaching the socket end of the strain insulator to the cross arm strap. Forging shall be made of steel as per IS : 2004-1978.

c) Aluminium alloy thimble socket made out of permanent mould cast , high strength aluminium alloy for attaching to the strain insulator on one end and for accommodating the loop of the helically formed dead-end fittings at the other end in its smooth internal contour. The thimble socket shall be attached to the strain insulator with the help of locking pin as per the dimension given in IS: 2486(PT-II)-1989

d) Helically formed dead-end grip having a pre-fabricated loop to fit ito the grooved contour to the thimble on one end and for application over the conductor at the other end. The formed fitting shall conform to the requirement of IS:12048-1987.

2.0 Tests:

The helically formed fittings for strain insulators shall be subjected to tests as per IS:12048-1987. The other hardware fittings shall be tested as per IS:2486 (Part-I)

3.0 Inspection:

All tests and inspections shall be made at the place of manufactur unless otherwise especially agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities, without charge, to satisfy him that the material is being furnished

TECHNICAL SPECIFICATION FOR 33 KV ISOLATORS

1. SCOPE

This specification provides for design, manufacture, testing at manufactures works, inspection, packing and delivery of outdoor station type 36kV (Local) manual operating mechanism air break disconnects (Isolators) with/without earthing blades and complete in all respect with bi-metallic connectors and other accessories and auxiliary equipment for installations in various substations in Assam. Operating mechanism, fixing details etc. shall be as described herein.

2. SERVICE CONDITIONS

The Isolators to be supplied against this Specification shall be suitable for satisfactory continuous operation under the following climatic conditions.

1	Location	At various locations within the state of Assam
2	Maximum ambient air temperature (°C)	45
3	Minimum ambient air temperature (°C)	2
4	Maximum average daily ambient air temperature (°C)	35
5	Maximum yearly weighted average ambient temperature(°C)	32
6	Maximum altitude above mean sea level (Metres)	1000
7	Maximum Humidity	93%
8	Average number of thunderstorm days	45->50
9	Average numbers of dust storms per annum	10
10	Maximum rainfall/annum	3500 mm
11	Average rainfall	2280 mm
12	Wind Pressure	97.8 Kg/Sq.mm
13	Altitude above MSL	100 m to 1000 m
14	Seismic Level	0.24g to 0.48g

Note:

The equipment shall generally be for use in moderately hot and humid tropical climate, conducive to rust and fungus growth unless otherwise specified.

3. SYSTEM CONDITIONS

The isolators shall be suitable for outdoor installation with 3-phase 50 Hz, 11 kV/33kV systems and they should be designed suitable for service under fluctuations in supply voltage up to ±12%. Permissible under Indian Electricity Supply Act and rules made there under.

4. STANDARDS

The isolators and isolator-cum-earthling switches shall comply with the requirements of IS 9921 (as amended up to date) and the latest edition of IEC 62271-102 (IEC 60129). The Insulators shall comply with the requirement of latest edition of IS 2544/1973 and IEC 60168/1988 (as amended up to date)

Sr.No.	Standard No.	Title
2	IS 9921 (Part 1 to 4)	Alternating Current Disconnectors (Isolators) and Earthing Switches for Voltages Above 1000 V - Part I
3	IEC 62271-102 (IEC/ 60129)	Alternating current disconnectors and earthing switches
	IEC 62271-1 (IEC 60694)	High-voltage switchgear and controlgear - Part 1: Common specifications
4	IS 2544/ IEC 60168	Porcelain post insulators for systems with nominal voltage greater than 1000 Volts
	IS 5350	Dimensions of Indoor and Outdoor Porcelain Post Insulators and Post Insulator Units for Systems with Nominal Voltages Greater than 1000 V
	IS 2629	Recommended Practice for Hot-Dip Galvanizing of Iron and Steel
	IS 4736	Hot-dip Zinc Coatings on Mild Steel Tubes
	IS 4759	Hot-dip zinc coatings on structural steel and other allied products
	IS 6745	Method for determination of mass of zinc coating on zinc coated iron and steel articles
	IS 2633	Methods for testing uniformity of coating of zinc coated articles
	IS 9530/1980	Recommended practice for silver plating
	IS 5925/1970	Recommended practice for silver plating for general engineering purposes
	BS 2816/1964	Testing of silver plating thickness
	IS 6735/1994	Spring lock washers
	IS 2016	Plain washers
	IS 1161	Steel tubes for structural purposes
	IS 1239	GI pipe('B' class or Medium class)
5	IS 2147	Degree of protection provided for enclosures for low voltage control gear
6	IS:4691	Degree of protection provided by enclosures for rotating electrical machinery
17	IS: 5561	Electrical Power Connectors

5. KEY TECHNICAL PARAMETERS

The equipment covered in this specification shall meet the technical requirements listed below. The Isolator must be Double Break, center pole rotating type

Sl. No.	Parameter	Unit	Requirements for (33kV)
1	Rated Freq.	Hz.	50
2	System Neutral Earthing		Solidly earthed
3	No. of phase(poles)	No.	3
4	Temp. rise	Deg. C	As per standards IS/IEC
5	Safe duration of overload	Minutes	
	a) 150 % of rated current		5
	b) 120 % of rated current		30
6	Rated voltage	KV rms	36
7	Type of isolator (AB)		DBCR
8	Rated normal current	Amps.	800 / 1250
9	Rated short time withstand current for 3 second	KA rms	25
10	Rated peak current	KA peak	63
11	Rated short circuit make current	KA peak	63
12	Derating factor		unity
13	Basic Insulation Level		
	1) Lightning Impulse withstand voltage		
	a) Pole to earth & between poles	KV peak	170
	b) Across isolating distance	KV peak	195
	2) Rated power freq. withstand voltage		
	a) Pole to earth & between poles	KV rms	70
	b) Across isolating distance	KV rms	80
14	Min. creepage distance (The protected creepage distance shall not be less than 50% of total)	mm	900
15	Phase to phase spacing for installation	mm	1500
16	**Min. clearances**	mm	
	a) Phase to earth		430
	b) Between rotating		485

Sl. No.	Parameter	Unit	Requirements for (33kV)
	post and fixed post on one phase		
17	Height of centre line of terminal pad above ground level	mm	3700
18	Special Requirements: Isolator main switch (MS) shall be required to make or break the line charging current when no significant change in voltage occurs across the isolating distance on account of make or break. The isolator required is not with "Turn and twist mechanism". It must be rotating type.		

6. GENERAL TECHNICAL REQUIREMENTS

6.1. TYPE & RATING

Isolators shall have three posts per phase, triple pole single throw, gang operated out- door type silver plated contacts with horizontal operating blade and isolators posts arranged vertically. The isolators will be double break type. Rotating blade feature with pressure relieving contacts is necessary i.e. the isolator shall be described in detail along- with the offer. All isolators shall operate through 90 degree from their fully closed position to fully open position, so that the break is distinct and clearly visible from the ground level.

The equipment offered by the tenderer shall be designed for a normal current rating of 1250 A for 33 KV suitable for continuous service at the system voltage specified herein. The isolators are not required to operate under load but they must be called upon to handle magnetization currents of the power transformers and capacitive currents of bushings, bus-bars connections, very short lengths of cables and current of voltage transformers.

The rated insulation strength of the equipment shall not be lower than the levels specified in IS 9921 IEC publication No. IEC 62271-102 (IEC 60129), which are reproduced below:

Standard declared voltage kv/rms	Rated voltage of the Isolator	Standard withstand positive kV (peak)	Impulse Voltage polarity	One minute power frequency withstand voltage KV (RMS)	
		Across the isolating distance	To earth and between poles	Across the isolating distance	To earth and between poles
33 KV	36	195	170	80	70

The 11 KV and 33 KV isolators are required with post insulators but with mounting structures. The isolators should be suitable for mounting on the Boards standard structures. The isolators shall be supplied with base channels along with fixing nuts, bolts

and washers for mounting on the structured.

6.2 TEMPERATURE RISE

The maximum temperature attained by any part of the equipment when in service at site under continues full load conditions and exposed to the direct rays of Sun shall not exceed 45 degree centigrade above ambient temperature.

6.3 ISOLATOR INSULATION

Isolation to ground, insulation between open contacts and the insulation between phases of the completely assembled isolating switches shall be capable of withstanding the dielectric test voltage specified above.

6.4 MAIN CONTACTS

All isolators shall have heavy duty self-aligning and high pressure line type fixed contacts of modern design and made of hard drawn electrolytic copper. The fixed contact should be of reverse loop type. The various parts shall be accordingly finished to ensure inter- changeability of similar components.

The fingers of fixed contacts shall be preferably in two pieces and each shall form the reverse loops to hold fixed contacts. The fixed contacts would be placed in 'c' clamp. The thickness of 'C' clamp shall be adequate. This channel shall be placed on a channel of adequate thickness. This channel shall be welded on an insulator mounting plate of 8mm thickness. The spring of fixed contact shall have housing to hold in place. This spring shall be made of stainless steel with adequate thickness. The pad for connection of terminal connector shall be of Aluminium with thickness not less than 12 mm.

The switch blades forming the moving contacts shall be made from tubular section of hard drawn electrolytic copper having outer diameter not less than 38 mm and thickness 3 mm. These contacts shall be liberally dimensioned so as to withstand safely the highest short circuit and over voltage that may be encountered during service. The surfaces of the contacts shall be rendered smooth and silver plated. **The thickness of silver plating shall not be less than 25 microns for 33 KV**. In nut shell, the male and female contact assemblies shall be of robust construction and design of these assemblies shall ensure the same.

a) Electro-dynamic withstand ability during short circuit without any risk of repulsion of contacts.
b) The current density in the copper parts shall not be less than 2 Amp/sq.mm and aluminium parts shall be less than 1 Amp / sq.mm.
c) Thermal withstand ability during short circuit.
d) Constant contact pressure even when the live parts of the insulator stacks are subjected to tensile stresses due to linear expansion of connected bus bar of flexible conductors either because of temperature verification or strong winds.
e) Wiping action during closing and opening.
f) Self-alignment assuring closing of the switch without minute adjustment.

The earthing switch should be provided with three sets of suitable type of fixed contacts below

the fixed contacts assemblies of the main switch on the incoming supply side and the sets of moving contacts having ganged operation. These contacts shall be fabricated out of electrolytic copper for 33 KV isolators with earth switch and designed to withstand current on the line.

Arcing contacts/Horn: Arcing contacts are not required.

6.5 AUXILIARY SWITCHES :

Auxiliary switches are to be provided both for main and earth switches and shall be mechanically actuated by the corresponding, operating mechanism, Four (4) number of each normally 'Open' and normally 'Close' contacts shall be provided purchaser's interlocking and protection scheme.. Design which permits the change of normally
'close' contact to normally 'open' contact or vice versa with minimum modification would be preferred. Switches shall be provided for indication of switch position, electrical interlocking, remote semaphores etc.

Each auxiliary switch shall be equipped with four (4) numbers of spare auxiliary contacts in addition to mention above.

Auxiliary switches shall be mounted in a weatherproof housing, which shall have provision for entry of cables of proper size and for fixing of cable glands. The auxiliary switch and auxiliary circuits shall be capable of carrying a current of atleast 10 Amps continuously.

6.6 CONNECTORS

The connectors for 11KV isolator shall be made of Aluminium alloy LM-9 or LM-25 and shall be suitable for Raccoon/Dog ACSR Conductors for 11KV and Wolf conductors for 33 KV with horizontal and vertical takeoff arrangement. The details in regard to dimensions, the number of bolts to be provided, material and manufacture shall be furnished by the bidder for owner approval before manufacturing. The groove provided in the connection should be able to accommodate conductor size mentioned above smoothly.

The clamps to be offered should be manufactured by gravity die-casting method only and not by sand casting process. It is necessary that suitable clamps are offered along with the isolator and also it is obligatory to give complete technical particular of clamps along with the drawing, as per details given above and also as per following detail:

a) The terminal connector shall be manufactured and tested as per IS: 5561.

b) All castings shall be free from blow holes, surface blisters, cracks and cavities.

c) All the sharp edges shall be blurred and rounded off.

d) No part of the clamp shall be less than 12 mmthick.

e) All current carrying parts shall be designed and manufactured to have minimum contact resistance.

f) Connectors shall be designed to be corona free in accordance with the requirement of IS: 5561.

g) All nuts and bolts shall be made of stainless steel only. Bimetallic sleeve/liner shall be 2 mm thick

Wherever necessary, bi-metallic strip of standard quality and adequate dimension shall be used.

6.7 POST INSULATOR

33KV insulators shall be of reputed make subject to owner approval. The post insulators for the above 33 KV isolators shall comprise of two numbers 33 KV insulators per stack and 9 stacks shall be supplied with each isolator. The insulator stack shall conform to the latest applicable Indian or IEC standard and in particulars to the IS; 2544 specification for porcelain post insulators. The porcelain used for manufactures of insulators shall be homogeneous, free from flaws or imperfections that might affect the mechanical or dielectric quality, and they shall be thoroughly vitrified, tough and impervious to moisture. The glazing of the porcelain shall be uniform brown colour, free from glisters, burns and other similar defects. Insulators of the same rating and type shall be interchangeable.

The porcelain and metal parts should be assembled in such a manner that any thermal expansion differential between the metal and the porcelain parts throughout the range of temperature variation shall not loosen the parts or create undue internal stresses which may affect the electrical or mechanical strength and rigidity. Each cap and base shall be of high- grade cast steel or malleable steel casting and they shall be machine faced and smoothly galvanized. The cap and base of the insulators shall be interchangeable with each other.

The tenders shall in variably enclose with the offer, the type test certificate and other relevant technical guaranteed particulars of insulators offered by them. Please note that isolators without type test certificates will not be accepted.

Each 33KV Post Insulators used in the isolators should have technical particulars as detailed below:

Sl.No.	**Particulars**	**11KV**	**33KV**
1	Nominal system voltage KV (rms)	11	33
2	Highest system voltage KV (rms)	12	36
3	Dry P.F. One minute with stand KV (rms)	35	75
4	Wet PF one minute withstand KV (rms)	35	75
5	P.F. Puncture withstand test voltage KV	1.3 times the actual dry flash over voltage of the unit	
6	Impulse voltage withstand test KV (peak)	75	170
7	Visible discharge test KV voltage	9	27
8	Creepage distance mm (min)	300	900
9	Tensile strength in KN	10	16
10	Short time current rating for 3 Secs KA	25	25

For 33 KV Isolators: In place of 33 KV Post Insulator the composition of 2 units of 22KV Post Insulators per stack complying with the following parameters are acceptable:

a	Nominal system voltage	33 KV
b	Highest system voltage	36 KV

c	Impulse voltage withstand	170 KV
d	Power frequency wet withstand voltage	75 KV
e	Height of stack	500 mm
f	Creepage distance (Minimum)	900 mm

g	Tensile Strength	30KN
h	Bending strength	4.5KN

6.7 OPERATING MECHANISM FOR 33KV ISOLATORS:

All Isolators and earthing switches shall have separate dependent manual operation. The Isolator should be provided with padlocking arrangements for locking in both end position to avoid unintentional operation. For this purpose Godrej make 5 lever brass padlocks having high neck with three keys shall be provided. The isolating distances should be visible for isolators.

The Isolators and Isolators with earth switch inclusive of their operating mechanism should be such that they cannot come out of their open or close position by gravity wind pressure, vibrations reasonable shocks or accidental touching of connecting rods of the operating mechanism. Isolators should be capable of resisting in closed position, the dynamic and thermal effects of maximum possible short circuit current at the installation point. They shall be so constructed that they do not open under the influence of the short circuit current. The operating mechanism should be of robust construction and easy to operate by a single person and conveniently located for local operation in the switchyard. Provision for earthing of operating handle by means of 8 SWG GS wire must be made.

6.8 PIPES

Tandem pipes operating handle shall be class BIS marked type having atleast 24mm internal diameter for 11KV/33KV isolator. The operating pipe shall also be class B ISI marked with internal diameter of atleast 32 mm and 38 mm for 11 KV and 33KV isolators respectively.

The pipe shall be terminated in to suitable universal type joints between the insulator bottom bearing and operating mechanism.

6.9 BASE CHANNEL

The Isolator shall be mounted on base fabricated from steel channel section of adequate size not less than 75x40x6 mm for 11KV and 100x50x6 mm for 33KV.

To withstand total weight of isolator and insulator and also all the forces that may encounter by the isolator during services, suitable holes shall be provided on this base channel to facilitate it's mounting on our standard structures. The steel channel in each phase shall be mounted in vertical position and over it two mounting plates atleast 8mm thick with suitable nuts and bolts shall be provided for minor adjustment at site.

6.10 CONTROL CABINET

The control cabinet of each operating mechanism shall be made out of 12 SWG (2.64 mm thick) sheet steel in the form of plate or casting. Control cabinet shall be provided with hinged doors alongwith pad locking arrangement. Sloping rain hood shall be provided to cover all sides. 15 mm thick neoprene or better type of gaskets shall be provided to ensure degree of protection of at least IP55 as per IS: 2147. The cabinet shall be suitable for fixing on support structure with adjustment for vertical, horizontal and longitudinal alignment. Details of the arrangement provided for such adjustment as well as for sealing shall be furnished along with the tender.

6.11 CLEARANCES

We have adopted the following minimum clearance for isolators in our system .The bidder should therefore keep the same in view while submitting their offers:

Description	Center distance between Poles (Center to Center) i.e. Phase to Phase clearance	Distance between center lines of outer posts on same pole
33 KV Isolator	12 cm	96 cm

7. TYPE TESTS

7.1 The equipment offered, shall be fully type tested as per the relevant standards. The tenderer shall furnish one set of the type test reports along with the offer. The purchaser reserves the right to demand repetition of some or all the type tests in the presence of purchaser's representative. For this purpose the tenderer may quote unit rates for carrying out each type test.

7.2 If type tests are carried out beyond 5 years, then the offer may be considered for placement of order however, successful bidders have to carry out the said type tests before commencement of the supply at their own expense.

7.3 During the type test the isolator shall be mounted on its own support structure or equivalent support structure and installed with its own operating mechanism to make the type tests representative. Drawing of equivalent support structure if any and mounting arrangements made for type tests shall be furnished for purchaser's approval before conducting the type tests.

7.4 The type tests shall be conducted on the isolator along with approved insulators and terminal connectors.

7.5 Mechanical endurance test shall be conducted on the main switch as well as earth switch on one disconnect of each type.

7.6 The isolators shall be subjected to the following type test in accordance to with IS: 9920. Dielectric test (impulse and one minute) power frequency withstands voltage.

a) Temperature rise test
b) Rated off load breaking current capacity
c) Rated active load breaking capacity
d) Rated line charging breaking capacity
e) Rated short time current
f) Rated peak withstand current
g) Mechanical and Electrical Endurance

The equipment shall be subjected to the following routine test.

a) Power frequency voltage dry test.
b) Measurement of resistance of the main circuit
c) Operating test.

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

8. PRE-COMMISSIONING TESTS

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

(a) Insulation resistance of each pole.

(b) Manual operation and interlocks.

(c) Insulation resistance of control circuits and motors.

(d) Ground connections.

(e) Contact resistance.

(f) Proper alignment so as to minimize the vibration during operation to the extreme possible.

(g) Measurement of operating Torque for isolator and Earth switch.

(h) Resistance of operating and interlocks coils.

(i) Functional check of the control schematic and electrical & mechanical interlocks.

(j) 50 operations test on isolator and earth switch.

9. INSTRUCTION MANUALS:

Twenty five copies of the erection, operation and maintenance manuals in English shall be supplied for each type of the disconnect one month prior to dispatch of the equipment. The manual shall be bound volume and shall contain all drawings and information required for erection, operation and maintenance of the isolator including but not limited to the following particulars:

a. Marked erection prints identifying the component parts of the disconnect as shipped with assembly drawings.

b. Detailed dimensions and description of all auxiliaries.

c. Detailed views of the insulator stacks, metallics, operating mechanism, structure, interlocks, spare parts etc.

10. SPARES

The tenderer shall furnish in his offer, a list of spares with unit rates for disconnect that may be necessary for maintenance of the isolator for a period of five years. The purchaser reserves the right for selection of items and quantities of these spares to be ordered.

The cost of following spares shall be quoted separately.

a. Insulators

b. Contacts

c. Moving blades

d. Springs

e. Bearings

In addition list of optional spares may be enclosed.

GUARANTEED TECHNICAL PARTICULARS OF 33KV ISOLATORS

S. No.	Particulars	33KV ISOLATORS
1	Manufacturer's Type/Designation/Installation	
2	Manufacturer's Name and works address of Manufacture	
3	Standard(s) according to which the isolators are manufactured	
4	Type of Disconnector	
5	Maximum design voltage at which the isolator can operate (kV)	
6	Rated Frequency (Hz)	
7	Rated Voltage (KV)	
8	Max. current that can be safely interrupted by the isolator	
	i) Inductive (A & % PF)	
	ii) Capacitive (A & % PF)	
9	Continuous current rating	
	i) Nominal (Amps)	
	ii) Under site conditions (Amps)	
10	Rated short time withstand current	
	i) For 3 seconds (KA rms)	
	ii) For 1 second (KA rms)	
	iii) Rated peak withstand current (kAp)	
10	Milli Volt drop test voltage between :	
11	i) Contacts	
	ii) Terminals of each phase	
12	Current density at the minimum cross- section of:	
	a) Moving blade (Amps/Sq.mm.)	
	b) Terminal pad (Amps/sq.mm.)	
	c) Male Contacts (Amps/sq.mm.)	
	d) Female Contacts (Amps/sq.mm.)	
	e) Terminal Connector (Amp/sq.mm)	
13	Max. temp. rise of following current carrying parts when carrying rated current continuously (deg.C) over an ambient of 50 deg.C instead of 40 deg.C mentioned in relevant IS.	
	i) Moving blades	
	ii) Contacts with silver plating	
	iii) Terminal pad.	
	iv) Bi-metallic terminal connector	
	v) Springs	
14	Class (outdoor or indoor)	

15	Derating factor for specified site conditions	
16	No. of operations the isolator can make without deterioration of contacts.	
17	15) Insulation levels	
	i) Lightning Impulse withstand voltage (kV peak)	
	a) Phases to Earth	
	b) Isolating Distance	
	ii) Power frequency withstand voltage (kVrms)	
	a) Phases to Earth	
	b) Isolating Distance	
18	Minimum clearance in air (mm):	
	i) When switch is closed:	
	a) Between adjacent poles of different phases (centre to centre)	
	b) Between live parts and earth	
	ii) When switch is open:	
	a) Between poles of same phase (centre to centre)	
	b) Between adjacent poles of different phases (centre to centre)	
19	Design and Construction	
	i) No. of insulators per pole	
	ii) No. of breaks per pole	
	iii) Type of closing/opening mechanism (Horizontal/Vertical break straight etc.) should be GANG operated thorugh hand	
	iv) Contacts (Male):	
	a) Material and grade	
	b) Dimensions & Cross-sectional area in sq.mm.	
	v) Contacts(Female):	
	a) Material and grade	
	b) Dimensions & Cross-sectional area in sq.mm.	
	vi) Moving Blades:	
	a) Material and grade	
	b) Dimensions & Cross-sectional area in sq.mm.	
	vii) Terminal pad:	
	a) Material and grade	
	b) Dimensions & Cross-sectional area in sq.mm.	
	viii) Arching horns :	
	a) Material and grade	
	b) Dimensions & Cross-sectional area in sq.mm.	
	ix) Springs	
	a) Material and grade	

	b) Dimensions & Cross-sectional area in sq.mm.	
	x) Contact Support:	
	a) Material, size and length of plate	
	b) Material and size of plate	
	xi) Rain hood - Material grade and size	
	xii) Nuts and Bolts	
	a) Size, material and grade in live parts	
	b) Size, material and grade in other parts	
	xiii) Insulator base plate	
	Material and size & min. thickness of plate below insulators.	
	xiv) Bearings:	
	a) Make, Type and No. of bearings for:	
	i) Rotating insulator base assembly	
	ii) Operating mechanism	
	iii) Whether lubricating nipple is provided	
	b) Make, and size of bearing housing	
	xv) Size of GI pipes (medium class) used for :	
	a) Down operating pipe (mm)	
	b) Connecting pipe for same phase (mm)	
	c) Connecting Pipe for adjacent poles(mm)	
	xvii) Tandem pipe	
	a) Size class and No. of pipes	
	b) Size of shackle, screw	
	c) No. of bearings/bush and its material and size.	
	xvii) Type of interlock	
	xviii) Type of universal/swived joint	
	a) Between bearing and down pipe	
	b) Between down pipe and operating mechanism	
	xix) Insulators	
	a) Type.	
	b) No. of units per insulator	
	c) Rating of insulators(KV)	
	d) Height of each insulator stack (mm)	
	e) Bolt circle diameter(mm)	
	f) Tensile strength (kg).	
	g) Compressive strength(Kg.)	
	h) Torsional strength (kg.m.)	

	i) Cantilever strength upright	
	j) Power frequency dry flash- over voltage (KV) rms.	

	k) Power frequency wet flash-over voltage(KV) rms.	
	l) Impulse flash-over voltage(positive wave) (KV) peak.	
	m) Impulse withstand voltage (kv) peak	
	n) Power frequency puncture voltage (KV) rms.	
	o) Visual discharge voltage level (KV) rms.	
	p) Creepage distance : Total(mm)	
	q) Dry arcing distance (mm)	
	xx) Base:	
	a) Size ,Nos. & length of steel sections used	
	b) Overall size(mm)	
	c) Total weight (Kgs)	
	xxi) Terminal Connectors:	
	a) Clamp Body:	
	i) Alloy Composition	
	ii) Plating if any	
	iii) Dimension	
	b) Bolts and nuts size	
	i) Alloy composition	
	ii) Tensile strength	
	a) Type of washers used	
	b) Materials of braids	
	c) Temperature rise when carrying rated current at 50 deg.C ambient (deg.C)	
	d) Weight of each type of clamp (Kg.)	
20	Mass of isolator hardware in Kg.	
	A) Without earth blade	
21	Type of contacts	
22	Nuts & Bolts	
	a) Size, material & grade in live parts	
	b) Terminal connectors.	
	c) Other parts.	
23	Locking arrangement of Isolators and earth switch operating mechanism	
24	Whether isolator hardware is complete with all accessories	
25	Details of type test reports furnished:	
	Item IS:Type test Testing	
	Report No. authority & date	
	i) Isolator	

	ii) Terminal connector	
	iii) Degree of protection	
26	List of brought out items	
27	List of drawing furnished	
28	Marking	

Seal and Signature of the bidder

ANNEXURE IV

33kV Current transformer for Namrup Thermal Power Plant (NTPS), APGCL, Dibrugarh.

Sl No.	Item	Unit	Qty.
1	33kV,0.5 Class 1Ph Outdoor CT with GI mounting Structure , Marshaling Box and bimetallic terminal connector(for panther conductor) (Set comprising of three units) 50/5-5, 25kA for 3 sec	Set	1

The offered products of the bidder must conform to the technical specification given below:

TECHNICAL SPECIFICATION FOR 33 KV OUTDOOR TYPE CURRENT TRANSFORMER

1. APPLICABLE STANDARDS

Unless otherwise modified in this specification, the Current Transformer shall comply with the latest version of relevant standards (IS 2165, IS 2705(I-IV), IS 2099, IS 5621, IS 2071, IS 335, IS 13947(part I), IEC 185, IEC 270, IEC 44(4), IEC 171, IEC 60, IEC 8263, IEC 815, Indian electricity Rules 2003) or better international standards. This list of standards is for guidance only. The contractor shall be solely responsible to design & manufacture the CT suitable for 33kV system.

2. SERVICE CONDITIONS

The CT supplied against these specifications shall be suitable for satisfactory continuous operation under the tropical conditions, as mentioned for power transformers.

Maximum altitude above sea level	100m
Minimum ambient air temperature	45°C
Maximum daily average ambient air temperature	40° C
Minimum ambient air temperature	2° C
Maximum temperature attainable by an object exposed to the sun	60° C
Maximum yearly weighted average ambient temperature	32° C

Maximum relative humidity	98%
Average number of thunderstorm days per annum (isokeraunic level)	45→50(MV)
Average number of rainy days per annum	120
Average annual rainfall	2200 mm
Maximum annual rainfall	3500 mm
Maximum wind pressure	260Kg/m²
Seismic level(Horizontal acceleration)	0.24g to 0.48g
Climatic condition Moderately hot and humid tropical climate conducive to rust and fungus growth.	

3. SYSTEM PARTICULARS

a)	Nominal System Voltage	33kV
b)	Highest system Voltage	36kV
c)	Rated Frequency	50Hz
d)	No of phases	Three
e)	System neutral earthing	Solidly grounded
f)	One minute Power Freq. voltage (rms)	70kV withstand
g)	Lighting Impulse withstand Voltage	170kVp
i)	System fault level	-26.3 kA for 3sec-

4. TECHNICAL PARAMETERS OF CT

a)	Type	Single phase, dead tank, outdoor, oil filled & hermetically sealed
b)	Type of mounting	Pedestal type
c)	Rated primary current	As per BPS
d)	Rated Continuous thermal current Primary current	120 % of rated
e)	Rated short time withstand Requirement for sec. Winding	As per IS 2705 Pt. I 25kA(RMS)
f)	Rated short time withstand Current	
	i) Duration (for primary current of 150amps and above)	3Sec

ii)	Duration (for primary current 150amps)	1Sec below	
g)	Rated dynamic withstand Current (KA rms)	62.5	
h)	Max temp rise	As per IEC-185/ IS 2705	
i)	Minimum creepage distance porcelain housing(mm)	25 mm /KV of	
j)	One minute power frequency voltage between Secondary terminal & earth	3 kV Withstand	
k)	Detail of Secondary Cores ratio :	Metering (33kV Side: 50/5,	Protn. Current 50/5-5A)

Accuracy class	0.5	5P20, PS
Burden (VA)	50	50
Instrument security Factor	≤5	-
Accuracy Limit Factor	-	≥20

ANNEXURE-V

33kV Vacuum Circuit Breaker for New Dillighat Feeder bay,NTPS, APGCL, Dibrugarh.

Sl No.	Item	Unit	Qty.
1	33 KV VCB 1250 A with GI Mounting Structure and bimetallic terminal connector(for panther conductor) , Short circuit Breaking capacity: 26.3 kA, Impulse withstand voltage: 170 kVp	Set	1

The offered products of the bidder must conform to the technical specification given below:

TECHNICAL SPECIFICATION FOR 33 KV OUTDOOR VACUUM CIRCUIT BREAKERS SPECIFICATION

1. SCOPE

1.1. This specification covers design, manufacturing, assembly, testing at manufactures works, supply of 33 KV Vacuum Circuit Breakers complete with all accessories required for their satisfactory operation for the sub-transmission system. The Breakers shall be used for Feeder Control in the system. The Vacuum Circuit Breakers shall be complete with all the accessories and auxiliary equipment required for their satisfactory operation in switchyard of NTPS, APGCL.

1.2. The breaker shall conform, in all respects to highest standards of engineering, design and workmanship as per recent Indian or International standards. It shall be capable of performing in continuous commercial operation up to the supplier's guaranteed life in a manner acceptable to the purchaser

1.3. The equipment offered shall be complete with all parts necessary for their effective and trouble-free operation. Such parts shall be deemed to be within the scope of the supply irrespective of whether they are specifically indicated in this bid document/work order or not.

1.4. The Bidder/supplier shall bind himself to abide by the considerations of the technical specifications to the entire satisfaction of the purchaser and shall be required to adjust such details at no extra cost to the purchaser over and above the tendered rates and prices.

2. SYSTEM CONDITIONS

The Vacuum Circuit Breakers shall be designed for the power system having the following parameters.

a) Nominal system voltage: 33KV

b) Highest system voltage: 36KV

c) Number of phases: 3

d) Frequency: 50 Hz ± 3%.

e) System earthing: Solidly earthed neutral

f) Short Current Rating: 26.3kA for 3 sec for 33kV (Minimum)

3. SERVICE CONDITIONS:

Maximum altitude above sea level	100m
Minimum ambient air temperature	45°C
Maximum daily average ambient air temperature	40° C
Minimum ambient air temperature	2° C
Maximum temperature attainable by an object exposed to the sun	60° C
Maximum yearly weighted average ambient temperature	32° C
Maximum relative humidity	98%
Average number of thunderstorm days per annum (isokeraunic level)	45→50(MV)
Average number of rainy days per annum	120
Average annual rainfall	2200 mm
Maximum annual rainfall	3500 mm
Maximum wind pressure	260Kg/m^2
Seismic level(Horizontal acceleration)	0.24g to 0.48g
Climatic condition Moderately hot and humid tropical climate conducive to rust and fungus growth.	

4. STANDARDS

4.1. The design, manufacture and performance of the Vacuum circuit breaker shall comply with all currently applicable statutes, regulations and safety codes.

4.2. Equipment, meeting any other authoritative standard, which ensures equal or better quality then the standard mentioned above, would also be acceptable. The bidders shall clearly indicate the applicable standards to which their equipment complies-with. A copy of such standard may also be enclosed.

Sl.no	Standard	Item
1	IS 13118/ IEC 62271 -100 amended upto date	High-voltage alternating-current circuit-breakers.
2	IEC 694	Common clauses for switchgear
3	IS 2099/IEC:815 IS 5621:1980	Porcelain Bushings
4	IS 2544	Porcelain Post Insulators
5	IE C-2331	High Voltage porcelain bushings.
6	IS 325 -	Specification for 1phase induction motor
7	IS 12063/ 1987 IEC: 529	Degree of protection provided by enclosures of electrical equipment.
8	IS 5	Colour for ready mixed paints and enamels.
9	IEC - 60 -	High voltage test techniques
10	IS 5578 & IS:11353	Marking and arrangements for switchgears, busbars, main connections and auxiliary wiring.
11	IS 4794	Push button switches.
12	IEC - 71 Part-I & II -	Insulation co-ordination, Terms, definitions, principles and rules
13	IEC 270-	Partial discharge measurements.
14	IS 2629 -	Recommended practice for hot dip galvanizing of iron and steel.
15	Indian Electricity Rules 2005	

5. KEY TECHNICAL PARAMETERS

5.1. The circuit breakers shall be Porcelain clad pole mounted for outdoor operation under the climatic conditions, as specified under 'Service Conditions' for feeder control.

5.2. The circuit breakers shall have the following rating :

S.No.	Particulars	Rating
i)	Number of Poles	3 Nos.
ii)	Frequency	50 Cycles
iii)	Nominal System Voltage	33 KV
iv)	Highest System Voltage	36 KV
v)	Interrupting Capacity at nominal system voltage	1800 MVA
vi)	Rated Continuous Current	1250 Amps
vii)	Short-time Current Rating for 3 Secs.	26.3 KA
viii)	Basic Insulation Level	170 KV
ix)	Power Frequency Withstand Voltage for one Minute	70 KV
x)	Total Break-time for any Current up to the rated breaking current	3 cycles (max.)
xi)	Control Circuit Voltage	250 Volt D.C.

xii)	System Neutral Earthing	Solidly Earthed
xiii)	Operating duty for gang operation	O – 0.3 Sec – CO – 3 Min – CO
xiv)	Mechanical Endurance	M2 class
xv)	Electrical Endurance	E2 class
xvi)	Capacitor Switching Duty	C2 class
xvii)	Minimum clearances	
a)	Between Phases	430 mm
b)	Between Live Parts & Ground	4000 mm
c)	Creepage Distance	980 mm

The above are minimum requirements. The manufacturers may offer their standard design, keeping in view our minimum requirements.

6. GENERAL TECHNICAL REQUIREMENTS

6.1. The circuit breaker shall be of porcelain clad, arc interruption in vacuum type. The breaker, complete in all respects, shall be supplied with all accessories in-place and all internal wiring installed and terminated in the mechanism of housing and the equipment shall be complete in all respects.

6.2. The circuit breakers provide rapid and smooth interruption of current under all conditions, completely suppressing all undesirable phenomena, even under the most severe and persistent short-circuit conditions or when interrupting small currents or leading / lagging reactive currents. The details of any device incorporated to limit or control the rate of rise of re-striking voltage (R.R.R.V.) across the circuit breaker contacts shall be stated. The over voltage caused by the circuit breaker switching on inductive or capacitive load shall not exceed 3.2 times the normal phase to neutral voltage.

6.3. The breakers shall be provided with 'trip free' mechanism.

6.4. The circuit breakers shall be suitable for mounting on steel structures. The cost of necessary frames for mounting the circuit breakers shall be included in the offered prices. **Strongly supported bracket or frame, for mounting associated 3 nos. 33 KV CTs, shall also be provided.** All the structures shall be hot dip galvanized with 3 dips. Please note that cantilever type supports for mechanism box are not acceptable. The mechanism box shall have firm supports from bottom. This is necessary to minimize vibration of mechanism box, which in turn may disturb various settings. The agency shall indicate clearly the vibration level and dynamic load of the breaker during fault / normal ON OFF operations in all three directions.

6.5. The circuit breakers shall consist of three identical phase units with a common operating mechanism. While offering the circuit breaker, the following details should be confirmed and furnished with the tender:

a) Complete construction details of the equipment offered. It should be noted that the breakers should be suitable for out-door duty. Indoor breakers accommodated in out-door kiosks are not acceptable.
b) Type, make & source of vacuum interrupters with relevant details shall be indicated in the offer, clearly.
c) The capacity of breaker to interrupt inductive and capacitive currents shall be indicated in the offer (rating of capacitor bank should be stated and type test report shall be furnished).
d) Spare availability of vacuum interrupter should be confirmed by the bidder for the designed expected life of the breakers being offered.
e) Items inside the cabinet made of organic material shall be coated with a fungus resistant varnish.

6.6 VACUUM INTERRUPTER

a) Interrupters shall be rated for minimum 30,000 mechanical or load operations
b) The design of the vacuum interrupter shall be such that it gives trouble free operation under normal load and fault conditions throughout the life of the equipment. As the efficiency of the breaker depends on the degree of vacuum inside the interrupter, manufacturer shall ensure that the same is maintained consistently during service. To know the residual life of vacuum interrupter, an indicator to indicate the status of contact erosion shall be provided.
c) The insulating ceramic body of the interrupter should have high mechanical strength and it should be capable of withstanding high temperature without any significant deterioration in its mechanical and electrical properties.
d) The metal / alloy used for the fixed and moving contacts shall have very low resistivity and low gas content. They should be resistant to arc erosion and the contact should have no tendency to get cold-welded under the high vacuum in the interrupter. Silicone encapsulated Interrupters to avoid tracking due to condensation
e) The interrupter design should ensure rapid de-ionization of the gap so that normal electrical strength of the gap is restored instantaneously.
f) The metallic bellow or any other similar vacuum sealing arrangement should be provided at the moving contact and should have a long fatigue life.
g) Manufacturer's catalogue on vacuum interrupter, indicating all the details shall essentially be submitted with the tender.

6.7 MOUNTING OF 33 KV CTs

The offered steel structures for breakers to be supplied by the bidders should have provision and adequate strength to accommodate 3 nos. 33 KV CTs on it after provision of suitable supports from ground.

6.8 TEMPERATURE RISE

The maximum temperature attained by any part of the equipment, when in service at site, under continuous full load conditions, exposed to the direct rays of the sun, shall not exceed 45° Centigrade, above maximum daily average ambient temperature. The limits of temperature rise shall be as per relevant standards. The corrections proposed shall be stated in the tender and shall be subject to approval of the owner.

6.9 INSULATION OF THE CIRCUIT BREAKER

The insulation to ground, the insulation between open contacts and the insulation between phases of the completely assembled circuit breaker shall be capable of withstanding satisfactorily di-electric test voltage corresponding to specified basic insulation level in the standard.

6.10 INSULATORS

a) The basic insulation level of the Insulator and insulating porcelains shall be as specified and porcelain shall be homogenous and free from cavities and other flaws. They shall be designed to have ample insulation, mechanical strength and rigidity for satisfactory operation under conditions specified above. All insulators of identical ratings shall be inter-changeable. The puncture strength of the insulators shall be greater than the flash over value. The insulators shall be type tested from independent Govt. Laboratory as per relevant standards or at any recognized and reputed international laboratory or testing institutions.

b) The porcelain housing for the interrupter shall be of a single piece construction without any joint. It shall be made of homogeneous, vitreous porcelain of high mechanical and dielectric strength. Glazing of porcelain shall be of uniform brown or dark brown colour with a smooth surface arranged to shed away rain water or condensed water particles (fog).

6.11 OPERATING MECHANISM

a) The circuit breakers shall be designed for remote control from the control room and in addition there shall be provision for manual operation of circuit breakers during maintenance and for local tripping and closing by the normal means.

b) The circuit breakers shall have operation control and mechanical “open” “close” indicator, in addition to facilities for remote electrical indication.

c) All metal parts in the mechanism shall be of corrosion resistant material. All bearings which require greasing shall be equipped with pressure grease fittings.

d) The design of the operating mechanism shall be such that it shall be practically maintenance free. The guaranteed number of years in maintenance free operation, the number of possible full load and full rated short circuit current breaking operations without requiring any maintenance or overhauling shall be clearly stated in the tender bid. As far as possible, the need for lubricating the operating mechanism shall be kept to the minimum and eliminated altogether, if possible.

e) The operating mechanism shall be of the spring charging type, by electric control under normal operation. The mechanism shall be trip free and operable electrically and mechanically. The mechanism shall be capable of performing satisfactorily, the reclosing duty cycles indicated above, within the time specified. All working parts in the mechanism shall be of corrosion resistant material and all bearings, which require greasing, shall be equipped with pressured grease fittings. The mechanism shall be strong positive quick in action and shall be removable without disturbing the other parts of the circuit breaker. The mechanism and breaker shall be such that the failure of any spring will not prevent tripping and at the same time will not cause any false tripping or closing. The operating Mechanism should be motor operated spring charged type preferably without chain drive. The motor for spring charging shall be suitable to perform satisfactorily for input supply voltage of 240 Volt A.C with a variation of **plus / minus 10 per cent**. Provision should also be made for mounting of mechanism box at an adequate height and gear ratios shall be so chosen that one man should be able to charge the spring, without any additional efforts. Provision shall be available for charging the springs manually as well, and to close CB mechanically.

f) The time taken for charging of closing spring shall not exceed 30 seconds. The spring charging shall take place automatically preferably after a closing operation. Breaker operation shall be independent of the spring charging motor which shall only charge the closing spring. Opening spring shall get charged automatically during closing operation. As long as power supply is available to the charging motor, a continuous sequence of closing and opening operations (CO) shall be possible.

g) In each circuit breaker, one potential free contact of the limit switch of spring charging motor shall be provided for remote indication of spring charged. This contact shall be wired up and brought to the terminal block.

h) Electrical anti-pumping device shall be provided for breaker.

6.12 CONTROL CUBICLE

a) A common control cubicle shall be provided to house electrical, controls, monitoring devices and all other accessories, except those which must be located on individual poles. The cubicle shall be gasketed and shall have weather-proof construction, fabricated from sheet steel of minimum 3 mm thickness. The type test report on degree of protection test (IP-55) shall also be furnished.

b) There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. Control cubicles shall be provided with double hinged door and padlocking arrangement. The door hinges shall be of union joint type to facilitate easy removal and the distance between hinges shall not exceed 350 mm. Door shall be properly braced to prevent wobbling.

c) It shall have backwards slanting rain hood of 2 mm thick (14 SWG) sheet for protection against rain water.

d) The cubicle shall have front access door with lock and keys, space heater, internal illumination lamp, 3 pins 5 Amp socket with individual ON-OFF switches shall be provided in the cubicle.

e) For local operation following shall be provided :
   i) LOCAL / REMOTE selector switch
   ii) TRIP / NORMAL / CLOSE control switches with pistol grip handle

f) The control circuits shall be designed to operate on 250 Volt DC, as indicated in the schedule and it shall be possible to adopt to work on other voltages by simply changing the operating coils. The shunt tripping coils shall be designed to operate satisfactorily within 110% and 70% of the rated DC supply voltage and the shunt closing coils should operate up to 85% of the rated DC voltage. These checks shall be repeated during pre-commissioning checks at site before putting the breakers in service.

g) Necessary double compression type cable glands for the cables of the operating mechanism shall be provided. The cables used for operation are all un-armoured 2.5 sq. mm copper control cables of 1100 V grade. The cable glands shall be suitable for 1 no. 8 core and 2 nos. 4 core cables and cables as per site requirements. The gland plate should be made of non-magnetic materials and suitably drilled at site to suit the cable entry.

h) The Circuit breaker shall be provided with trip free Mechanism so that tripping instructions could over-ride the closing instructions. An additional tripping coil shall also be provided in the trip circuit. The second coil shall have separate tripping lever arrangements in the mechanism, so as to avail full advantage of second trip coil. Also the two trip coils shall have separate fuses in the DC circuit, so that in the event of any short circuit/damage in any one of the trip coils, the supply is available to the other one.

i) The circuit diagram of Control circuit of VCB along with operating instructions (DOS/ DON'T) shall be embossed on metallic plate duly laminated and the same shall be fixed on the rear door of the control cubicle from inside.

6.13 WIRING

a) Wiring shall be completed in all respects to ensure proper functioning of the control, protection, monitoring and interlocking schemes.

b) All the wiring shall be carried out with 1100 V grade, PVC insulated stranded copper conductor of 2.5 sq. mm as per IS: 1554.

c) Each wire shall be identified at both ends with permanent markers bearing wire numbers as per wiring diagram.

d) Wire termination shall be done with crimping type connectors with insulating sleeves. Wires shall not be spliced between terminals.

e) All spare contacts of auxiliary switches etc. shall be wired up to terminal blocks in the control cubicle.

6.14 TERMINAL BLOCKS

a) Terminal blocks shall be of 1100 V grade, box clamp type ELMEX 10 sq. mm or approved equivalent. Not more than two wires shall be connected to any terminal. Spare terminals, equal in number to 20% of active terminals, shall be provided.

b) Terminal block shall be such located to allow easy access. Wiring shall be so arranged that individual wires of an external cable can be connected to consecutive terminals.

6.15 TERMINAL CONNECTORS

6 Nos. Terminal bi-metallic connector suitable for Panther conductors shall be supplied with each breaker. For ensuring quality and uniformity, the owner may decide to specify the design of terminal connector, the material of terminal connector and thickness of clamps. Further compliance of which will have to be done by the agency without any extra cost. Suitable earth connector for earthing connections shall also be supplied. The connector drawing shall be got approved from the owner.

6.16 AUXILIARY CONTACTS

a) Eight numbers each of auxiliary contacts both of the normally open and normally closed types shall be provided in each circuit breaker for use in the remote indication and control scheme of the circuit breaker and for providing safety interlocking. Special contacts for use with trip coils, which permit for relative adjustment with respect to the travel of the circuit breaker contact, shall also be provided, wherever required. There shall be provision to add more auxiliary contacts at a later date, if required.

b) The normally open and normally closed contacts for the control and operation of the equipment shall have continuous current rating of 10 Amp. The Breaking capacity of the contacts shall be minimum 2 Amp with circuit time constant less than 20 milli seconds at the rated D.C. voltage.

c) Insulation level of auxiliary contacts shall be 1100 volts, 2.5 kV for 1 min.

6.17 ACCESSORIES

The vacuum circuit breaker shall be supplied as a complete unit with internal wiring installed and terminated in mechanism box and equipped with the following accessories:

1	Motor operated spring charged mechanism (nominal motor voltage – 240 V AC)	1 No.
2	Trip coil suitable for 250 V DC	2 Nos.
3	Closing Coil suitable for 250 V DC	1 No.
4	Pistol grip C.B. Control switch having Trip/ Normal/ Close	1 No.
5	Local / Remote selector switch	1 No.
6	Spring Charged indicator	1 No.

7	Manual operating handle for maintenance	1 No.
8	Facility for manual charging of spring	1 No.
9	Operation counter	1 No.
10	Auxiliary contacts (8 N/O + 8 N/C)	1 Set
11	Anti-pumping device suitable for 250 V DC	1 No.
12	Terminal connectors suitable for connecting Panther Conductor	6 Nos.
13	Cubicle illuminating lamp with cage and switch	1 No.
14	Spare terminals connectors	20% of Total Terminals
15	Mechanical ON/OFF Indicator	1 No.
16	MCB for both AC and DC supply	1 No. each
17	Space heater and ON-OFF switch in the mechanism box	1 No.
18	Power Type 3 Pin Socket with ON-OFF switch	1 Set
19	Earthing Terminals	2 Nos.
20	LED indicating lamps	Complete set

6.18 INDICATING LAMPS

The indicating LED lamps should have in-built low voltage protection Circuit (LVGP) and surge suppressor circuit. Lamp assembly should be of fire – retardant glass epoxy PCB, industrial heat resistant, fire resistant, non- Hygroscopic DMC material , chrome – plated corrosion resistant solid brass bezel , polycarbonate lens in desired colour shades of Red , Green, Amber, Yellow etc. the intensity of light should be minimum 100 mcd at 20 mA . Indication lamp should be suitable to operate on 250 V Direct Current supply source.

6.19 SURFACE FINISH

All metal sheet surfaces exposed to atmosphere shall be given two primer coats of zinc phosphate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limits specified. The paints shall be light admiral grey shade No.627 of IS 5. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.

6.20 GALVANIZING

All ferrous parts including nuts, bolts, plain and spring washers of size M 10 and above, support channels, structures, etc. shall be hot dip-galvanized to conform to latest version of IS 2629 or any other equivalent authoritative standard. All other fixing nuts, bolts, washers of size below M 10 shall be made out of stainless steel.

6.21 EARTHING

earthing terminals for bolted connection to 50 x 8 mm MS flat to be provided by the purchaser for

connection to station earth mat. The connecting point shall be marked with "earth" symbol No.86 of IEC publication 117-1 part 1

6.22 MOUNTING

a) The design and supply of support structure, required for mounting the Circuit Breaker in Purchaser's switch yard, shall be in the bidder's scope. The bidder's scope shall also include foundation bolts, nuts, plain washers, spring washers etc necessary for the support structure. The support structure can be lattice type or tubular type and shall be made out of hot dip galvanized steel. Wheel mounted type support shall not be accepted. The support structure shall be installed on a concrete plinth of 300 mm height to be arranged by the Purchaser. The height of the support structure shall meet the following requirements.
   i) Vertical clearance of lowest live part as specified in clause 6.
   ii) Minimum height of 2950 mm above the top of concrete plinth (This is a Statutory Regulation).

b) The Circuit Breaker shall be connected to adjacent equipment in the switch yard through ACSR conductor.

c) The loading data to be considered by the bidder for design of support structure shall include the following.
   i) Dead weight of the Circuit Breaker, Structure, Bus Bars
   ii) Operational steady state and impact loading
   iii) Wind load on a Circuit Breaker, Structure, Bus Bars
   iv) Short circuit forces

d) The support structure shall be designed on the basis of applicable Indian/ International Standards and codes of practice.

7. Guaranteed Technical parameters and Type Test reports:

7.1. Bidder must submit **GTP** of the Offered Circuit Breaker and must furnish **Type Test Reports** as per IS norms at the time of delivery of material at NTPS site.Type test certificates on VCB for the following tests, strictly as per IS 13118, with latest amendment thereof, from any of the independent Govt. Laboratory, or at any recognized and reputed international laboratory or testing institution, shall invariably furnished:

a) Short Circuit Duty Tests
b) Out of phase making and breaking tests.
c) Short Time Current Rating Tests
d) Mechanical Endurance Test & Electrical operation Test.
e) Temperature Rise Test
f) Lightning Impulse Voltage withstand Test
g) Power Frequency withstand Voltage Test dry & wet
h) Degree of protection IP-55 for control cubicle

7.2. The above type test certificates must accompany drawing of type tested equipment, duly signed by type testing authority.

7.3. The above tests must not have been conducted on the equipment earlier than 5 years from the date of opening of bids.

7.4. In case of any change in design/type of Breaker already type tested and the one offered against this specification, the owner reserves the right to demand repetition of type tests, without any extra cost.

7.5. **ACCEPTANCE AND ROUTINE TESTS**

All acceptance and routine tests, as stipulated in relevant standards, shall be carried out by the manufacturer, in presence of owner's representative. Immediately after finalization of the programme of testing, the manufacturers/supplier shall give, fifteen days advance intimation to the owner, to enable him depute his representative for witnessing the tests.

8. INSPECTION

APGCL reserves the right to witness the acceptance test of the manufactured equipment after completion of manufacturing. The successful Bidder/manufacturer shall grant free access to the purchaser's representative/s at a reasonable notice when the work is in progress. The Contractor shall intimate the General Manager, NTPS, APGCL well in advance (at least 10 days ahead) regarding the time when the materials shall be ready for inspection and testing at manufacturer's works. APGCL may depute its engineers to visit the manufacturer's unit to witness the inspection & testing. Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

9. RATING PLATES

The detailed rating plate shall be as per IS and in addition, shall indicate the following:

a) Circuit Breaker and its operating device shall be provided with rating plate/s made out of corrosion proof metal, marked with the following data. The data shall be either punched or engraved on the plate/s.
b) Manufacturer's name or trade mark by which he may be readily identified.
c) Serial number and type designation of CB & Operating mechanism
d) Year of manufacture
e) Voltage
f) Lightning impulse withstand voltage
g) Normal current
h) Short circuit breaking current
i) Duration of short circuit
j) Mass of circuit breaker with support structure.
k) Auxiliary D.C. supply voltage of closing and opening devices

l) Out of phase making & breaking current
m) A.C. supply voltage of auxiliary circuits.
n) Insulation level
o) Frequency
p) Purchase order reference

The rating plates shall be installed in such positions that the same shall be clearly visible to a man standing on ground. i.e. at the level of eye site.

10. DOCUMENTATION

10.1. All drawings shall conform to international standards organization (ISO) 'A' series of drawing sheet/Indian Standards Specification IS 656. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in System International Units.

10.2. **DRAWINGS:** The bidder shall furnish four sets of relevant descriptive and illustrative published literature/pamphlets and the following drawings for preliminary study:

i) General outline drawings showing outside dimensions, shipping dimensions, weights, quantity of insulating media air receiver capacity and such other prominent details.
ii) Sectional views showing the general constructional features of the circuit breaker including operating mechanism, arcing chambers, contacts, with lifting dimensions for maintenance.
iii) Schematic diagrams of the scheme for control, supervision and reclosing.
iv) Structural drawing, design calculations and loading data for support structures.
v) Foundation drilling plan and loading data for foundation design.
vi) Bill of Materials.
vii) Type test reports of circuit breakers along with a separate list showing all the tests carried out with date & place of test.
viii) Test reports, literatures and pamphlets of bought out items and raw materials.

10.3. The successful bidder shall submit THREE sets of final versions of all the above said drawings in A-3 size, bill of material, packing list & all type test reports for purchaser's approval. The purchaser shall communicate his comments/approval on the drawings to the supplier within reasonable period.

10.4. The successful bidder shall furnish in the form of nicely bound volumes, the manuals covering erection, commissioning, operation and maintenance instructions and all relevant devices. Each manual shall also contain one set of all the approved drawings type test reports as well as acceptance test reports to corresponding consignment dispatched. The total quantity of the operating manuals/approved drawings sets to be supplied by the supplier shall be equal to the number of three phase breakers of rating, ordered.

10.5. The manufacturing of the Vacuum Circuit Breakers shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the Vacuum Circuit Breakers prior to the approval of the drawings shall be at the supplier's risk.

10.6. Approval of drawings/work by the purchaser shall not relieve the supplier of any of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirements of the latest revisions of applicable standards, rules and codes of practices.

Sl.No.	Description	For 33KV
1	Name of Manufacturer	
2	Type of Outdoor switchgear	
3	Designation of outdoor circuit breaker	
4	VCB conforms to IEC 62271- 100 amended upto date / IS: 13118:1991 : Yes/No	
5	Whether offered outdoor circuit breaker is porcelain clad type (yes/no)	
6	Shall outdoor circuit breaker provided 3 number of poles (yes/no)	
7	Rated voltage of outdoor circuit breaker in kV.	
8	Is offered out door circuit breaker suitable for 50 Hz rated frequency.(Yes/No)	
9	Type of operation - Mechanically coupled gang operated : Yes/No	
10	Operating mechanism, A. C. Control & Protective devices, lighting fixtures, space heaters and motor operating on supply single phase, 250 Volts ± 10% A.C., 50 Hz , two pole with one pole grounded : Yes/No	
11	Maximum continuous voltage of outdoor circuit breaker in kV	
12	Rated continuous current of outdoor circuit breaker in amps.	
13	Offered VCB shall be suitable for solid neutral earthing : Yes/No	
14	Rated symmetrical short circuit breaking current (for 3 seconds) of outdoor circuit breaker in ka (rms) 25 kA	
15	Rated operating sequence of outdoor circuit breaker shall be o-0.3 sec-co-3 min - co	
16	Amplitude factor of outdoor circuit breaker on restriking voltage at 100% rated breaking capacity shall be 1.4	
17	First pole to clear factor of outdoor circuit breaker on restriking voltage at 100% rated breaking capacity shall be 1.5	
18	Rate of rise of restriking voltage of outdoor circuit breaker on restriking voltage at 100% rated breaking capacity in kv/microsecs) 50/70	
19	Dry-1 minute power frequency withstand voltage of outdoor circuit breaker between line terminal and earth in kvrms shall be 50/70kV	
20	Dry-1 minute power frequency withstand test voltage for outdoor circuit breaker between terminal with breaker contacts open in kvrms	

21	1.2 / 50 micro second impulse with-stand voltage for outdoor circuit breaker between line terminal and earth in kvp	
22	1.2 / 50 micro second impulse with-stand voltage for outdoor circuit breaker between terminals with breaker contacts open in kvp	
23	Material of main contacts of outdoor circuit breaker	
24	Material of terminal pad of outdoor circuit breaker (copper/Aluminium)	

25	If Terminal Pads are made of metal other than aluminum, thickness of silver plating on terminal pads shall be at least 25 microns.	
26	The current density for copper terminal pad shall not be more than 1.6 A/sq. mm.	
27	The current density for other than copper terminal pad shall not be more than 1 A/sq. mm.	
28	Net cross section of terminal pad of outdoor circuit breaker in sq mm	
29	Material of make –break contacts in Vacuum Interrupter	
30	Material of tips of Main contacts of circuit breaker	
31	Whether electrical anti pumping device provided for outdoor circuit breaker (yes/no)	
32	Size of auxiliary contacts of outdoor circuit breaker in sq. Mm.	
33	Material of auxiliary contacts of outdoor circuit breaker	
34	Continuous current capacity of auxiliary contacts of outdoor circuit breaker in amps.	
35	Breaking current capacity of auxiliary contacts of outdoor circuit breaker in amps.	
36	Insulation level of auxiliary contacts of outdoor circuit breaker in volts.	
37	1 minute p. F. Withstand voltage of auxiliary contacts of outdoor circuit breaker in kvrms.	
38	Whether any contact multiplier are used for outdoor circuit breaker (yes/no) (if *yes* then fill 39 to 42)	
39	Make of contact multiplier used for circuit breaker	
40	Making and breaking capacity of contact multiplier used for outdoor circuit breaker in ka	
41	Voltage rating of contact multiplier used for outdoor circuit breaker in kv	
42	Capacity of coil of contact multiplier used for outdoor circuit breaker in watts	
43	No. Of normally open auxiliary contacts provided for outdoor circuit breaker available for use in remote C&R panels	

44	No. Of normally close auxiliary contacts provided for outdoor circuit breaker available for use in remote C&R panels	
45	Whether potential free contact available for remote indication of spring charged" of outdoor circuit breaker (yes/no)	
46	Voltage rating of bushing used for outdoor circuit breaker in kv.	
47	Dry-1 minute power frequency withstand voltage of bushing used for outdoor circuit breaker in kvrms	

48	Dry flashover voltage of bushing used for outdoor circuit breaker in kvrms	
49	Wet flashover voltage of bushing used for outdoor circuit breaker in kvrms	
50	1.2/50 micro second impulse withstand voltage of bushing used for outdoor circuit breaker shall be 125/170 kvp	
51	Total creepage distance of bushing used for outdoor circuit breaker shall be 300 mm.	
52	Center to center minimum clearances in air between phases of outdoor circuit breaker in mm	
53	Minimum Clearances provided in air between two Phases : in mm	
54	Minimum clearances in air between live part to live part of phases of outdoor circuit breaker shall be 430 mm.	
55	Minimum clearances in air between live part to earth of outdoor circuit breaker shall be 450mm	
56	Minimum clearances in air between live part of outdoor circuit breaker to ground level shall be 3700 mm	
57	Height of the lowest part of the support insulator from ground level	
58	Class of Insulating Material	
59	Max. closing time in ms (Max.150 ms)	
60	Max. total break time at 100 % rated interrupting breaking capacity : 100 ms	
61	Type of closing mechanism of outdoor circuit breaker shall be motor assisted spring charged mechanism.	
62	Type of tripping mechanism of outdoor circuit breaker shall be motor assisted spring charged mechanism with shunt trip coil.	
63	Burden of trip coil of outdoor circuit breaker at 250 V (DC) in watts	
64	Burden of closing coil of outdoor circuit breaker at 250 V (DC) in watts	

65	Whether mechanical on/off and "spring charged" indications for outdoor circuit breaker provided (yes/no)	
66	Whether manual trip/close of outdoor circuit breaker possible (yes/no)	
67	Whether mechanical spring charging for outdoor circuit breaker possible (yes/no)	
68	Voltage rating of spring charging motor of outdoor circuit breaker in volts	
69	Burden of spring charging motor of outdoor circuit breaker in VAmp	
70	Control circuit voltage of outdoor circuit breaker shall be 30 volts d. C. (yes/no)	

71	The surface finish paints of non galvanized metallic part of VCB shall be battleship gray shade No.632 of IS 5.	
72	Process of painting of parts of outdoor circuit breaker	
73	Type of primer used for painting of parts of outdoor circuit breaker	
74	Type of finish paint used for painting of parts of outdoor circuit breaker	
75	Degree of protection of Operating Mechanism enclosure is IP 55 as per IEC529/ IS 2147	
76	Mounting of CB On hot dip galvanized steel support structure or on the operating mechanism box, as the case may be, to be supplied by the tenderer	
77	Whether all type tests are carried out on outdoor circuit breaker at nabl laboratories within five years from date of opening of tender(yes/No)	
78	Whether type tested on offered design of outdoor circuit breaker (yes / no).	
79	A list of recommended spares with unit rates for each circuit breaker that may be necessary for satisfactory operation and maintenance of the circuit breaker for a period of 5 years shall be submitted.	
80	A list and unit rates of all the special tools, equipments and instruments required for erection, testing, commissioning and maintenance of the breaker shall be submitted	
81	The list of necessary tools/equipments which will be supplied free of cost with each CB furnished separately.	
82	Are following Type test reports submitted with offer for offered equipment	
	a. Lightening impulse withstand voltage test. :Yes/No	
	b. Power Frequency Voltage withstand test (dry & wet). :Yes/No	
	c. Temperature rise test. :Yes/No	
	d. Measurement of resistance of Circuit: Yes/No	

	e. Short time and peak withstand current tests. :Yes/No	
	f. Mechanical operation test. :Yes/No	
	g. Degree of protection (IP55) for all cabinets. :Yes/No	
	h. Out of phase making and breaking tests. :Yes/No	
	i. Short Circuit Making and Breaking current Tests a) No load operation before and after test b) Basic test duties no. 1 to 5 c) Single Phase Short circuit test d) Condition of breaker after short circuit tes	
83	Are the following drawing submitted	

	a. General outline drawings showing outside dimensions, shipping dimensions, weights, quantity of insulating media air receiver capacity and such other prominent details. :Yes/No	
	b. Sectional views showing the general constructional features of the circuit breaker including operating mechanism, arcing chambers, contacts, with lifting dimensions for maintenance. :Yes/No	
	c. Schematic diagrams of the scheme for control, supervision and reclosing :Yes/No	
	d. Structural drawing, design calculations and loading data for support structures. :Yes/No	
	e. Foundation drilling plan and loading data for foundation design. :Yes/No	
	f. Type test reports of circuit breakers along with a separate list showing all the tests carried out with date & place of test. :Yes/No	
	g. Test reports, literatures and pamphlets of bought out items and raw materials. :Yes/No	
84	Whether bidder adequate in-house testing facilities for conducting acceptance tests in accordance with relevant IS.	
85	Type of operation shall be suitable for 3 phase reclosing : Yes/No.	

Bidder Seal & Signature.