ASSAM POWER DISTRIBUTION COMPANY LTD.
LOWER ASSAM REGION
BID DOCUMENT
FOR
CONSTRUCTION OF 33 KV O.H. LINE OF LENGTH 18.0 KM FROM 33/11 KV BAMUNIGAON SUB-STATION TO BARTEZPUR FOR POWER SUPPLY TO M/S ITC LTD, M/S PURE & CURE HEALTH CARE PVT. LTD AND M/S BRITANNIA INDUSTRIES LIMITED UNDER MIRZA ELECTRICAL SUB DIVISION OF GUWAHATI ELECTRICAL CIRCLE-II UNDER DEPOSIT SCHEME ON FULL “TURNKEY” MODE.

SCHEME: “DEPOSIT SCHEME”
NIT No: CGM (D)/APDCL/LAR/INDUSTRIES/DEPOSIT /17-18/ D-29
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SECTION :1
NOTICE INVITING TENDER
ASSAM POWER DISTRIBUTION CO. LTD  
Lower Assam Region  

SHORT E-TENDER NOTICE  

NIT No: CGM (D)/APDCL/LAR/INDUSTRIES/DEPOSIT/17-18/D-29  

E-tenders are invited for construction of 33 KV O.H line (18.0 KM) from 33/11 KV Bamunigaon Sub-Station to Bartezpur for power supply to M/S ITC Ltd, M/S Pure & Cure Health Care Pvt. Ltd and M/S Britannia Industries Limited under Mirza Electrical Sub division of Guwahati Electrical Circle-II, under Deposit scheme on "Full Turnkey" mode.

**KEY Dates:**
- Tender download start date & time: 11.00 Hrs on 30-01-2018
- Pre-Bid meeting date & time: 11.30 Hrs on 05-02-2018
- Bid submission start date & time: 13.00 Hrs on 10-02-2018
- Bid Submission End date & time: 11.00 Hrs on 16-02-2018
- Technical Bid opening date & time: 11.30 Hrs on 17-02-2018

For details please visit [www.apdcl.org](http://www.apdcl.org) & [https://www.assamtenders.gov.in](https://www.assamtenders.gov.in)

Chief General Manager (D),  
APDCL (LAR), BijuleeBhawan (5th Flr.)  
Paltanbazar, Guwahati-781001

Memo No.CGM(D)/APDCL(LAR)/Industries(PalashbariMirza)/2016-17/ Date:25-01-2018

Copy to:  
1. The PS to Chairman, APDCL, BijuleeBhawan, Guwahati-1, for kind appraisal of the Chairman.  
2. The PS to MD, APDCL, BijuleeBhawan, Guwahati-1 for kind appraisal of the MD.  
3. The GM, Guwahati Zone, APDCL (LAR), Sixmile, Guwahati-22 - for information.  
4. The CEO, Guwahati EI Circle-II, APDCL (LAR), Jalukbari, GU Bypass, Guwahati-12 for information.  
5. The PRO, APDCL/AEGCL/APGCL, BijuleeBhawan, Paltan Bazar, Guwahati-1. He is requested to arrange for publication of the above NIT in “The Assam Tribune” and one vernacular daily on **29-01-2018.**  
6. The OSD to Chairman, APDCL/AEGCL/APGCL, BijuleeBhawan, Guwahati-1, for uploading the above Notice in the APDCL’s Website on **29-01-2018.**  
7. The AGM, MirzaEl. Division, APDCL (LAR), Mirza - for information.  
8. The SDE, MirzaEl. Sub division, APDCL (LAR), Mirza - for information.

Chief General Manager (D),  
APDCL (LAR)
E-tenders are invited from the experienced Contractors/Firms having valid electrical contractor license up to 33KV, issued by the competent authority of Govt. of Assam, subject to the electrical supervisors certificate of competency and workman permit & having sufficient experience of construction of 33KV Line in last 5 years for the Package in the State of Assam for the following works under Deposit Scheme on “Turnkey” mode.

Name of the Work:

CONSTRUCTION OF 33 KV O.H. LINE OF LENGTH 18.0 KM FROM 33/11 KV BAMUNIGAON SUB-STATION TO BARTEZPUR FOR POWER SUPPLY TO M/S ITC LTD, M/S PURE & CURE HEALTH CARE PVT. LTD AND M/S BRITTANIA INDUSTRIES LIMITED UNDER MIRZA ELECTRICAL SUB DIVISION OF GUWAHATI ELECTRICAL CIRCLE-II UNDER DEPOSIT SCHEME ON FULL “TURNKEY” MODE.

The entire work will be executed as per direction of field Engineers of APDCL.

**Scheme of work:** Deposit head of APDCL (LAR).

**Completion period:** 90 (Ninety) days from the date of issue of Work Order. Parties capable of completing the work within 90 (Ninety) days should only participate in the bid.

**Bid Validity:**

The validity of the bid shall be at least 180 (one hundred eighty) days.

**Earnest Money:**

The earnest money for the work is **Rs 15,00,00,000.00** (Rupees fifteen lakh) only. EMD should be submitted along with Techno-Commercial bid in the form of A/C payee Demand Draft/Fixed Deposit receipt/Bankers Cheque/Bank Guarantee from any Nationalized Bank or scheduled bank of RBI, pledged in favour of “ASSAM POWER DISTRIBUTION COMPANY LIMITED”. Any tender without EMD will be rejected outright.

**Eligibility Criteria:**

1. The tenderer must have valid electrical contractors and supervisor’s license (HT up to 33KV) from the statutory body, Govt. of Assam.

2. The bidder must have successfully erected and commissioned at least 20 (twenty) km of 33KV line in last 5 years in the State of Assam as on the date of bid opening and which must be in satisfactory operation for at least 1 (one) year as on the date of bid opening. Experience & performance certificate from the concerned Engineer not below the rank of DGM/CEO are to be furnished.

3. The bidder must not be involved in any litigation with ASEB/APDCL or any other successor company of ASEB. The bidder should submit a declaration to that effect.

4. The bidder must be financially solvent so as to execute the proposed work. Financial solvency certificate from the concerned Bank is to be submitted.

5. The average financial turnover of the bidder in each financial year should be more than **Rs 15,00,00,000** (fifteen crore) for best of 3 (three) years out of five consecutive financial years for the Package and a certificate from a Charter Accountant to that effect must be furnished along with the Techno-commercial bid of the offer.

6. Past & present performance of a bidder in execution of awarded work under ASEB or any of the successor companies shall be taken into Account in deciding the eligibility of the bidder.
The bidder should have adequate experience in similar nature of work and to be substantiated through certificate issued by an Engineer not below the rank of Superintending Engineer/DGM/CEO along with supporting copies of the works executed under any department.

Cost of Tender paper:
The complete tender papers can be downloaded from our official website www.apdcl.org and also from e-tendering portal https://www.assamtenders.gov.in. Interested bidders can download the Bidding Documents and commence preparation. Download of bidding document is free of cost. However, bidders must deposit tender participation fee of Rs. 10,000.00 (Rupees ten thousand ) only in the form A/C payee DD/Banker's Cheque (which is non-refundable) duly pledged in favour of "CGM (F&A), APDCL" along with their bid and provide the DD details in the web documents.

Submission of Bids:
The Techno-commercial bid must be submitted through online mode only. A copy of Technical Bid has to besubmitted in sealed envelope along with the Bid Security and Cost of Bid document super scribing the following on the covers:
(i) Name of bidder with full address
(ii) NIT No.
(iii) Name of the bid i.e. “Technical bid with Earnest Money” for envelope containing Technical bid addressed to Chief General Manager (D), APDCL (LAR), BijuleeBhaban, Paltanbazar, Guwahati-1.

The tender (bid) will be received up to 11:00 Hrs on 16-02-2018.

The bids are to be submitted to the O/O the Chief General Manager (D), APDCL (LAR), BijuleeBhaban, 5th floor, Paltanbazar, Guwahati-781001.

The Technical bid will be opened on 17-02-2018. Intending tenderers or their representative may be present at the time of bid opening. The price bids of the eligible bidders will be opened on a subsequent date to be notified later.

The company reserves the right to accept or reject any tender in part or in full or split the work without assigning any reasons thereof.

Chief General Manager (D),
APDCL (LAR), BijuleeBhaban, 5th floor,
Paltanbazar, Guwahati-781001.

Memo No.CGM (D)/ APDCL(LAR)/Industries(PalashbariMirza)//2016-17/
Date:
Copy to:-
1. The MD, APDCL, BijuleeBhaban, Paltanbazar, Guwahati - 781001, for favour of information.
2. The Public Relation Officer, APDCL/AEGCL/APGCL, 4th floor, BijuleeBhaban, Paltanbazar, Guwahati-781001.
3. The General Manager, Guwahati Zone, APDCL (LAR), Guwahati-22-for information
4. The Chief Executive Officer,Guwahati Elect. Circle-II,APDCL (LAR),Jalukbari, GU Bypass, Ghy-12 - for information.
5. Concerned File.

Chief General Manager (D),
APDCL (LAR).
SECTION: 2

TENDER INVITING PROPOSAL
TENDER INVITING PROPOSALS WITH TERMS & CONDITIONS FOR

ASSAM POWER DISTRIBUTION CO. LTD
(LOWER ASSAM REGION)

Intent of the Tender Enquiry
The intent of the Tender Enquiry is to invite proposals from the prospective and relevantly experienced and financially sound contractor(s) (individual or joint venture)/firms to carry out the works as mentioned above on turnkey mode.

1. Scope of Work
   The various activities under the scope of work shall among other related aspects cover the following.
   i. Procurement and supply of those materials as specified for the Turn Key Contractor for the work.
   ii. Arrange inspection / testing of any/all items ordered at manufacturer’s works for officer deputed by APDCL for such inspection/testing.
   iii. Site unloading, storage and handling of all materials supplied including watch and ward for safe custody.
   iv. Site fabrication work as per requirement.
   v. Submission of implementation schedule from the date of award of contract for:
      - Route survey for laying new line.
      - Erection, testing installation and commissioning of all materials/equipment supplied by Turn Key Contractor & APDCL
   vi. Project management and site organization.
   vii. Obtaining clearance from Statutory Agencies, Government Departments, Village Panchayats etc. wherever necessary
   viii. Submission of technical specification/Test Certificate/Drawings/ GTPs etc. of all materials supplied.
   ix. A list of various items normally involved in proposed type of work is provided in this document. This, however, is not to be considered as limiting but only typical. Vendors’ scope will include all other items and materials as may be required to effectively complete the work.
   x. Mapping of electric works awarded at all voltage levels on Geographical Information System (GIS).

Above all, the scope of work of the vendor/contractor will include all items and facilities as may be necessary to complete the work on turnkey basis and as binding requirement.

2. Basic specification of the various equipment/ works to be supplied /carried out.
   i. All equipment/materials supplied shall conform to the requirement of relevant ISS (BIS) as approved by ASEB or its successor Company and that of APDCL specification and construction standards.
   ii. All materials supplied shall be erected, protected as per approved standard practice for proposed type of electrical work so as to supply the electricity to the consumers most effectively and in an intrinsically safe manner.
   iii. All equipment supplied and installed shall provide easy and effective:
      - Maintainability
      - Reliability
      - Availability
      - Long life
   iv. All items, which may require frequent opening up/ dismantling for maintenance, shall be adequately sealed against any tampering/ theft etc.
   v. General supply and erection of materials and system shall meet the requirement of construction standard being followed in the electrification work.
   vi. All materials shall be supplied from the latest vendor list of APDCL issued by the CGM( PP&D),APDCL

3. Basic qualifying requirement:
   To be qualified for the package the bidder must compulsorily meet the following minimum criteria
   A. Technical.
      The prospective bidder must fulfill the following qualifying requirements.
      a. The bidder must have valid electrical Contractor’s and Supervisor’s License (HT) issued by the Licensing Authority of Govt. Of Assam.
      b. The bidder must have successfully erected and commissioned at least 20(twenty)km. of 33KV linein last 5 yearsas on date of bid opening and which must be in satisfactory operation for at least 1(one) year as on the date of bid opening in the State of Assam. Experience & performance certificate from the concerned Engineer not below the rank of DGM/CEO are to be furnished.
      c. The bidder shall furnish details of the work / works along with its value already in hand either of APDCL, or in any other successor companies of ASEB along with date of completion as per Letter of Award and likely date of completion duly certified by the competent authority as per format enclosed as Annexure-I(A). This shall
be treated as one of the major qualifying criteria for technical evaluation of the bid. The bidder must also fill up the format as per Annexure-I (B), (C), I (D).

B. Financial

a. Average annual turnover of the bidder for the last three consecutive financial years should be as per NIT and the annual turnover must be certified by a registered Chartered Accountant. This should be supported by the copy of the income tax return submitted by the firm for the last three previous years. In case of joint venture firms, the figures of average annual turnovers for each Joint Venture partners shall be added together to determine the bidder’s compliance with the minimum average turnover requirement for the bid. However, the lead partner must meet at least 40% and each of the other partners must meet at least 25% of the minimum average annual turnovers criteria required for the bid.

If any bidder for certain valid reason did not undertake sufficient work in the previous three years, then APDCL, if satisfied with the reasons, may take into account the financial turnover & experience of best of three years out of previous five consecutive years.

b. If the total work in hand against the works of APDCL or any successor companies of ASEB and other agencies exceed more than 3(three) times the average annual turnover of the bidder, the bid shall be treated as non-responsive.

c. The bidder shall furnish latest GST Registration certificate, Employee - Provident Fund and valid Labour License (wherever applicable).

d. The bidder shall furnish copy of their Pan Card. The card must be in the name of the firm if the bidder is a firm. If it is a joint venture copy of Pan Card of both the partner must be submitted.

e. Joint venture agreement should be a registered one or certified by Notary.

f. Power of attorney should be a registered one.

g. Formal authority, Registered / Notarized for signing the tender or other documents on behalf of the firm / individual must be submitted along with the bid. In case of registered company Board’s resolution of the company for authorized signatory should be furnished.

h. Notwithstanding anything stated herein above, APDCL reserves the right to assess the capacity and capability of the bidder to execute the work, should the circumstance warrant such assessment in the overall interest of APDCL

4. Joint Venture Requirement

i. The Bid and, in case of successful Bid, the form of agreement shall be signed so as to be legally binding both the partners.

ii. One of the partners shall be authorized to be as the lead partner and this authorization shall be evidenced by submitting a Power of Attorney signed by legally authorized signatories of the partners. Also the lead partner must have valid electrical Contractor’s and Supervisor’s License (HT) issued by the Licensing Authority of Govt. Of Assam

iii. The lead partner shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture and the entire execution of the contract.

iv. All the partners of the joint venture shall be jointly and severally liable for the execution of the contract in accordance with the contract terms and a relevant statement to this effect shall be included in the authorization mentioned under (ii) above as well as in the bid form and the form of agreement (in case of successful bidder).

v. A copy of the agreement entered into by the joint venture partners shall be submitted with the bid.

vi. The figure of average annual turnovers for the joint venture partners shall be added together to determine the bidder’s compliance with the minimum average turnover requirement for the package. However, the lead partner must meet at least 40% and other partner must meet the at least 25% of the minimum average annual turnover criteria given in the Tender.

vii. The bidder must fill up Financial format as per FIN-I, FIN-II, FIN-III

5. Other requirements:
The Bidder

i) Should be acquainted himself / herself / themselves with relevant conditions of the local geography and socio economic setup of the different location of the State and being capable accordingly to mobilize, organize and expedite the activities.
ii) Should have adequate working personnel comprising of Electrical/ Mechanical engineers, electrical supervisor, skilled and unskilled labour to be deputed to the proposed assignment.

iii) Should be conversant with the code/ standards applicable to proposed type of work. ISS / APDCL guidelines.

6. Submission of bid

The bidder shall submit the bid in e-tendering portal https://www.assamtenders.gov.in using their own Digital Signature Certificate.

Techno-commercial bid

Techno-commercial bid should be submitted in online mode. However, a copy of the submitted bid has to be submitted in a sealed envelope, superscripting “Techno-commercial bid with EMD” with name of bidder, full address and NIT reference, Name of Package and under this shall include defined vendors scope of work, responsibilities, guarantees, specification of equipment, commercial terms and conditions, vendor’s company credentials, experience of similar assignments, registration details, etc. as per requirement. Bidding format for techno-commercial Bid is enclosed as Annexure-I (A).

a. Earnest Money Deposit (EMD):

The Tender must be accompanied with earnest money as mentioned in the NIT against the work, to be deposited in the form of Bank Guarantee (BG) of Nationalized Bank/ Bank Call Deposit/ Term Deposit pledged in favour of “ASSAM POWER DISTRIBUTION COMPANY LIMITED”. The EMD should be submitted along with Techno- Commercial bid. The earnest money will be released to the unsuccessful bidders on finalization of the tenders. The EMD to the successful bidder will be released on submission of performance Security Deposit at the time of execution of the agreement as per clause 14

Submission of documents with technical bids.

i) Detail list of makes and materials offered with catalogues, technical specification ,type tests certificate , performance certificate from utilities, authorization letter from manufacturer, customer list etc.

ii) Certificates and testimonials in support of credentials of the bidder’s organization.

iii) Details of past experience along with present works in hand with awarded amount and progress report.

iv) Brief write-up on methodology to carry out the assignment, if awarded.

v) Details of manpower to be engaged for the assignments.

vi) Any other information, the vendor may feel facilitative in evaluating the bid.

vii) Copies of bidder and supervisor’s license, etc.

viii) Certificate from Registered Charted Accountant in support of Annual turn over

ix) Solvency certificate from Bank

x) Certificate in support of performance of the bidder

xi) If the bidder is involved in any litigation with ASEB/ or any successor company of ASEB. The bidder should furnish the information to that effect.

xii) The bidder should submit the list of materials that are to be brought from outside the state

xiii) GTP’S of major items as described in BOQ. Such as poles, conductors, insulators, surge arrester, D.O,GOAB Stay Set, Earth pipe etc as per bid requirements should invariably be submitted along with the tender otherwise tender is liable to be rejected.

b. Price Bid

Price bid should be submitted online only in the prescribed format. The bidding format for price Bid is enclosed as Annexure-II (A).

c. Submission of bid

Techno-commercial bid should be submitted online. However, a copy of the submitted bid has to be submitted in a sealed envelope and addressed to CGM (D), APDCL (LAR), BijuleeBhawan, Paltanbazar, Guwahati-1.

Note:-

a. If there is discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and total price should be corrected. If there is a discrepancy between the words and figures, the amount in word should prevail. If the bidder does not accept the correction of the errors as above, his bid will be rejected and the amount of bid guarantee/security will be forfeited.

b. No separate declaration offering discount on price will be allowed. Offered price in the price schedule will be final.

c. All taxes whichever are applicable shall be included in the tender price and no claim of any account of any of the above shall be entertained by APDCL.
7. **Estimation of material requirement:** The total quantity of materials required is indicated in the BOQ.
   a. **Quantity Variation:** There may be increase or decrease in quantity of individual item subject to the condition that the corresponding change in total contract value does not increase or decrease by more than 10% keeping the unit rate of individual material and labour unchanged.
   b. **A maximum of 5% wastage/damage on dismantled items shall be allowed on the total quantity dismantled and deposited to departmental store against conversion works if any.**

8. **Award of work:**
   i) The evaluation of bids will be carried out, first of techno-commercial bid and thereafter opening the price bid of only those who qualify and meet the technical requirement.
   ii) Company reserves the right not to order/award the job to the price-wise lowest party if the party during evaluation is found technically non-responsive.
   iii) Work should be started within fifteen 15 (fifteen) days from the date of issue of the work order, failing which order will be cancelled without further correspondence.
   iv) The successful bidder must have to complete survey works within 2 (two) days from date of issue of LOI & submit quantity variation within that period.
   v) The Sub-station equipments installed shall be under custody of the contractor till the date of commissioning and charging. The properties will be taken over by APDCL, LAR after satisfactory commissioning and charging.

9. **Period of completion:** 90 (Ninety) days from the date of issue of LOA.

10. **Implementation schedule:**

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</tbody>
</table>

11. **Terms of Payment:**
   a) During the currency of the contract, maximum of 2(two) nos. of progressive payment on the actual work done (i.e. supply +erection of the particular one item) can be made against the claims preferred by the contractor subject to 80% of the claimed amount. 20% will be retained as security deposit which will be released along with final bill on satisfactory completion including commissioning.

   All payment shall be made from the office of the CGM (F &A), APDCL on recommendation of the CGM (D), APDCL, LAR after due verification by the concerned SDE and duly passed by the Asstt. General Manager concerned and countersigned by the concerned CEO and on submission of work progress report (as per format enclosed herewith). Bills whether progressive or final shall be entertained only after completion of both supply and erection of works of specified items.

   b) The right of the contractor/supplier to have payment or reimbursement of any cost for execution of works.Supply of materials as the case may be, against this order will be forfeited or deemed to have been relinquished if the claim for it is not preferred to the appropriate authority within 6 (Six) months from the date of completion or deemed completion as per cause No. 25.0 of Company's General Conditions of Supply and Erection.

12. **Agreement and Security deposit**

   The successful bidders shall have to make an agreement with the CGM (D), APDCL, LAR and shall have to deposit security money in the form of Bank Guarantee issued by any Nationalized Bank or scheduled bank of RBI in
Company’s standard Performa on non-judicial stamp of appropriate value for an amount equal to 2.5% of the contract value at the time of execution of agreement in favour of “CGM (F&A), APDCL”. The security deposit is liable to be forfeited in case of non-execution of contract / work order. The security deposit will be released on successful commissioning and testing of the materials ordered and after depositing performance B/G for an amount equal to 10% of the contract value in the form of Bank Guarantee issued by any Nationalized Bank or scheduled bank of RBI in Company’s standard Performa with validity of 18(eighteen) months beyond the completion period in favour of “CGM (F&A), APDCL”.

a. If the contractor fails or neglects to perform any of his obligations under the contract within the guarantee period, APDCL shall have the right to forfeit the BG submitted against performance either in full or in part at its absolute discretion.
b. No interest shall be payable on such deposits.

All Bank Guarantees (BG) submitted along with the bid or to be submitted later should be from those branches of nationalized or scheduled Bank of RBI having their regional offices in Assam or at least a branch office at Guwahati (In case of those, whose regional office is not located in the state of Assam) with a certificate from the Bank to the effect that the verification or any confirmation in regard to the BG issued by the bank can be taken up with the Branch office at Guwahati.

13. Project Management and site Organizations:
In Consideration of the tight schedule of the project, the successful bidder(s) /Contractor(s) shall exercise systematic closely controlled project management system with the aid of commonly used soft tools. Following are the major activities/deliverables to be organized/generated for submission to the Board.
(I) Liaison/Construction offices will be established in each Circle of APDCL, LAR.
(II) Work Progress Report:
   • Progress monitoring by the contractor as per implementation schedule and approved milestones.
   • Fortnightly progress report will be submitted to the concern Deputy General Manager, Asstt. General Manager & Sub-Divisional Engineers.
   The progress report will highlight the points like, work completion vis-à-vis planned, plan for next working period, delay analysis vis-à-vis committed schedule with reasons and remedies, etc.
(III) Site Organization.

The vendor at each working site shall establish the following.
• Store house
• Site fabrication facilities
• Construction supervision office

All offices shall be adequately furnished and staffed so as to take all site decisions independently without frequent references to head Work’s/offices.

14. Guarantees and Penalties
a) Liquidated Damages (LD) The proposed work is on top priority of Department of Science & Technology, Government of India and therefore has to be completed within stipulated/agreed schedule. Any delay beyond that will attract penalty as per Company’s General condition of supply and erection.
b) Equipment and system supplied & installed shall be guaranteed individually for integrated operations for a period of 18 (Eighteen) months from date of commissioning of a system in general.
c) Warranty from the manufacturer shall be produced along with manufacturer’s test certificate for all equipment/materials covered under Manufacturer’s warranty.

15. Approvals/Clearances:
1. APDCL, concerned DGM shall approve all site/location and documents prepared by the contractor for construction of the S/S.
2. GTP and drawings of all equipment/materials shall be submitted to the CGM (D), APDCL, LAR, for approval from the concerned authority.
3. The contractor shall obtain all statutory approvals and clearances from the statutory authorities before charging the system at his/her own cost.

16. **Testing & Inspection:**
All the equipments / materials to be supplied and erected shall be tested / inspected at manufacturer's works by authorized officer/ Engineers of APDCL before dispatching them to worksite. The contractor shall intimate the concerned CEO, sufficiently in advance regarding the date of inspection of materials/equipments at manufacturer's works. The materials are to be dispatched to site only after receipt of dispatch clearance to be issued by the concerned CEO for works under his control after satisfactory testing of the same. The materials & equipment to be supplied should be from the vendors as per the latest Vendors’ list of APDCL.

17. **Environmental Considerations:**
While carrying out the assignment, no damage to environment / forests will be caused by the contractor. If so done, the contractor will have to compensate the same to the satisfaction of the concerned Authority.

18. **Submission of documents.**
   a) With bids. -----As per clause 7c
   b) During project execution
      i) All documents for approval shall be submitted in 6 copies.
      ii) All final documents to be submitted to statutory organizations will be furnished as per requirement of the Authority.

19. **Funding of the project.** The proposed work is funded by deposit head of APDCL (LAR).

20. **Ceiling on acceptance of bid value**
As a deterrent for cartel formation APDCL at its discretion have the right to scrap the tender if values quoted by all the bidders is above 25% of the estimated cost. Also the price bids whose total quoted value is below 15% of the estimated cost, the bid is liable to be rejected by APDCL.

21. **Termination of contract on Contractor's default**
If the Contractor shall neglect to execute the Works with due diligence and expertise or shall refuse or neglect to comply with any reasonable order given to him, in the Contract by the Engineer in connection with the works or shall contravene the provisions of the Contract, the owner may give notice in writing to the contractor to make good the failure, neglect or contravention complained of. Should the contractor fail to comply with the notice within thirty (30) days from the date of serving the notice, then and in such case the Owner shall be at liberty to employ other workmen and forthwith execute such part of the works as the Contractor, may have neglected to do or if the owner shall think fit, without prejudice to any other right he may have under the Contract to take the work wholly or in part out of the contractor’s hands and re-contract with any other person or persons to complete the works or any part thereof and in that event the Owner shall have free use of all Contractor’s equipment that may have been at the time on the site in connection with the works without being responsible to the Contractor for fair wear and tear thereof and to the exclusion of any right of the contractor over the same, and the Owner shall be entitled to retain and apply any balance which may otherwise be due on the Contract by him to the contractor, or such part thereof as may be necessary, to the payment of the cost of executing the said part of the work or of completing the Works as the case may be. If the cost of completing of Works or executing a part thereof as aforesaid shall exceed the balance due to the contractor, the contractor shall pay such excess. Such payment of excess amount shall be independent of the liquidated damages for delay which the contractor shall have to pay if the completion of works’ is delayed. In addition, such action by the Owner as aforesaid shall not relieve the Contractor of his liability to pay liquidated damages for delay in completion of works as defined in clause no.26 of GCSE. Such action by the Owner as aforesaid, the termination of the Contract under this clause shall neither entitle the contractor to reduce the value of the contract Performance Guarantee nor the time thereof. The contract Performance Guarantee shall be valid for the full value and for the full period of the contract including guarantee period.

22. **Termination of contract on owners' initiative**
The Owner reserves the right to terminate the Contract either in part or in full due to reasons other than those mentioned under clause entitled “Contractor's Default.” The Owner shall in such an event give fifteen (15) days notice in writing to the Contractor of his decision to do so. The Contractor upon receipt of such notice shall discontinue the work on the date and to the extent specified in the notice, make all reasonable efforts to obtain cancellation of all orders and contracts to the extent they are related to the...
work terminated and terms satisfactory to the Owner, stop all further sub-contracting or purchasing activity related to
the work terminated, and assist the Owner in maintenance, protection, and disposition of the Works acquired under the
Contract by the Owner.
In the event of such a termination, the Contractor shall be paid compensation, equitable and reasonable, dictated by
the circumstances prevalent at the time of termination.
If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies and if the contractor
is a partnership concern and one of the partners dies then unless the Owner is satisfied that the legal representatives
of the individual contractor or of the proprietor of propriety concern and in the case of partnership, the surviving
partners, are capable of carrying out and completing the Contract, the Owner shall be entitled to cancel the Contract
as to its uncompleted part without being in any way liable to payment of any compensation to the estate of deceased
Contractor and/or to surviving partners of the contractor’s firm on account of the cancellation of the contract. The
decision of the owner that the legal representatives of the deceased contractor or surviving partners of the contractor’s
firm cannot carry out and complete the contract shall be final and binding on the parties. In the event of such
cancellation, the Owner shall not hold the estate of the deceased Contractor and/or the surviving partner of the
Contractor’s firm liable to. Damages for not completing the Contract

23. Frustration of contract
In the event of frustration of the contract of supervening impossibility in items of Section 56 of the Indian Contract Act,
parties shall be absolved of their responsibility to perform the balance portion of the contract.
In the event of non-availability or suspension of funds for any reasons whatsoever (except for reason of willful or
flagrant breach by the Owner and/or contractor) then the Works under the contract shall be suspended. Furthermore, if
the Owner is unable to make satisfactory alternative arrangements for financing to the contractor in accordance with
the terms of the Contract within three months of the event, the parties hereto shall be relieved from carrying out further
obligations under the Contract treating it as frustration of the Contract. In the event Performance Bank Guarantee,
the parties shall mutually discuss to arrive at reasonable on all issues including amounts due to either party for the work
already done on “Quantum merit” basis which shall be determined by mutual agreement between the parties.

24. Disclaimer:
While the Company will make every endeavor to extend necessary facilitation in expediting the work, the contractor
shall be responsible to organize and arrange all necessary inputs right from mobilization activities up to completion
of the project. Company will not entertain any failure / delay on such accounts. Also, Company will not be responsible for
any compensation, replenishment, damage, theft etc. as may be caused due to negligent working, insufficient
coordination with Government / non Government / Local Authority by the contractor and/ or his personnel deputed for
work. The contractor shall take necessary insurance coverage under LIC/GIC etc. for his working personnel and the
goods in store as well as in transit. The contractor will be deemed to have made him acquainted with the local working
conditions at site(s) and fully provide for into the bid submitted.

25. If for any reason the last date of receiving and opening of tender or the date of pre-bid discussion is a declared holiday
the next working day will be considered for receiving and opening of bid or pre bid discussion.

26. In case any clause mentioned in the bid document contradicts or differ any clause of theAPDCL’s General condition of
Supply and Erection the clauses appended in this document will prevail.

27. The intending bidders are requested to physically survey the location of the line and Sub-Station. The BOQ shown in
the bid document are only indicative and in case the bidder feel that some additional item are required to complete
the work in totality they may indicate the same separately with unit rate along with the price bid but in a separate sheet.
The evaluation of the bid shall however be done on the basis of materials stated in the BOQ of the bid. Also Before
submitting the tender the bidder should have discussion with concerned Sub-divisional Engineer /Asstt. General
Manager of APDCL.

28. The quantity mentioned in the bill of quantity (BOQ) and price bidding schedule are purely provisional and shall be
finalized on completion of detailed survey work and submission of bill of materials thereof subject to quantity variation
clause mentioned in clause 8

Terms and conditions, which are not specified, herein above will be governed by
Company’s General Conditions of supply and erection in force.
Annexure –I(A)

Tender Format part – I (Techno-commercial Bid)

NIT No: CGM (D)/APDCL/LAR/INDUSTRIES/DEPOSIT/17-18/ D-29

1. Name and full address of the Bidder: 

2. Particulars of payment made for Purchase of Tender document in the shape of: 

3. Amount of earnest money paid in the shape of: 

4. GST Registration No: 

5. Acceptance of guarantee clause of Materials /equipment and system Installed individually and for integrated Operation: 

6. Acceptance of penalty clause: 

7. Acceptance of terms of payment: 

8. Certificate/ documents regarding adequate Experience of doing similar job: 

9. Details of work presently in hand with amount (Awarded by APDCL and other successor Companies of ASEB) - a separate sheet if Required may be enclosed: 

10. Details of manpower and T&Ps including Vehicles available with the firm to be enclosed separately: 

11. List of documents enclosed: 
   a) ....
   b) ....
   c) ....

Signature with full name and designation of bidder or his/her authorized representative with seal
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Qualification Requirement</th>
<th>Furnished at Annexure</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>LEGAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Document in support of legal status of firm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Memorandum of Association &amp; Registered/Notarized Joint venture Agreement if JV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Registered/Notarized power of attorney of the signatory of the Bidder to participate in the Bid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Board resolution of the company to authorizing the signatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Information regarding any litigation, current or during the last five years, in which the Bidder is involved, the parties concerned, and disputed amount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Valid Electrical Contractor's License</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Valid Electrical &amp; Supervisory License</td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>GST registration certificate</td>
<td></td>
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<tr>
<td>9</td>
<td>Provident Fund Registration Certificate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Valid Labour license</td>
<td></td>
<td></td>
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<tr>
<td>B</td>
<td>Financial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Audited Balance sheet, Profit &amp; Loss account, Auditor’s report for last three years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CA Certified Turnover of bidder during the last 3(three) years.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Evidence of adequacy of working capital for this contract (access to line(s) of credit and availability of other financial resources)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Authority to seek references from the Bidder's Bankers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Income Tax return for last 3(three) years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Value of similar work performed by the bidder in each of the last five years – Statement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Details of the Bank Guarantee as EMD(BG/TD/Bank Call Deposit)</td>
<td></td>
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</tr>
<tr>
<td>C</td>
<td>Technical ability and experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Experience in works of a similar nature and volume for each of the last 5(five) years and details of works under way or contractually committed including full address of client for communication - Statement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Certificates issued by an Engineer not below the Cadre of Deputy General Manager/SE along with supporting photo-copies of agreements for the works executed in any one year (12 months)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Detailed activity plan and methodology supported with layout and necessary drawings and calculations (detailed) to allow the employer to review their proposals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Quality Assurance plan with Bar Chart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>List of technical personnel and their qualification and experience with organization chart</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Proof of availability of the tools, tackles, spare parts, etc. for carrying out the works.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Technical particulars of equipments and Materials offered in the Bill of Material and their GTPs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Annexure-I(B)
### LIST OF ONGOING & COMPLETED PROJECTS

List of ongoing & completed projects of APDCL & Other successor companies of ASEB

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Name of the work</th>
<th>Order No</th>
<th>Contract value</th>
<th>Scheme</th>
<th>Stipulated date of completion</th>
<th>Present Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
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<tr>
<td>3</td>
<td></td>
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</tbody>
</table>

### BIDDER’S INFORMATION SHEET:

**Bidder’s Information**

Bidder’s legal name

In case of JV, legal name of each partner

Bidder’s country of constitution

Bidder’s year of constitution

Bidder’s legal address in country of constitution

Bidder’s authorized representative
(name, address, telephone numbers, fax numbers, e-mail address)

Attached are copies of the following original documents.
FINANCIAL SITUATION (FIN-1)

Each bidder or member of JV must fill in this form

<table>
<thead>
<tr>
<th>Financial Data for Previous 3 Years [Rs in lakhs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1:</td>
</tr>
<tr>
<td>Year 2:</td>
</tr>
<tr>
<td>Year 3:</td>
</tr>
</tbody>
</table>

Information from Balance Sheet

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Liabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Worth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Liabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Information from Income Statement

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Revenues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profits Before Taxes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profits After Taxes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

☐ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last three years, as indicated above, complying with the following conditions

Form FIN - II: Average Annual Turnover

Each Bidder or member of a JV must fill in this form

<table>
<thead>
<tr>
<th>Annual Turnover Data for the Last 3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

The information supplied should be the Annual Turnover of the Bidder or each member of a JV in terms of the amounts billed to clients for each year for contracts in progress or completed in ₹ (Rupees).
Form FIN – III: Financial Resources

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in Section 3 (Evaluation and Qualification Criteria)

<table>
<thead>
<tr>
<th>No.</th>
<th>Source of financing</th>
<th>Amount (Rs. in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ABSTRACT OF TECHNO COMMERCIAL INFORMATION

NIT NO. CGM(D)/APDCL/LAR/INDUSTRIES/DEPOSIT/17–18/D - 29

Name of the Bidder _____________________________________________________________
Address ______________________________________________________________________

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Particulars</th>
<th>Document submitted</th>
<th>Page No. / Sheet No. of the Bid Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Payment against purchase of Bid Document</td>
<td>DD / BC No. etc.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Earnest Money Details</td>
<td>BG / DD No, Issuing Bank, Date etc.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Contractor’s License</td>
<td>License No. with validity</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Supervisor’s Certificate</td>
<td>Name, No. with validity</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>No Litigation Certificate</td>
<td>Declaration</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Solvency Certificate from Bank</td>
<td>Photocopy to be attached</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Avg. Annual Turn Over Certificate from CA</td>
<td>Photocopy to be attached</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Experience Certificate</td>
<td>Photocopy to be attached</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Works undergoing / in hand</td>
<td>Details to be attached</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Manpower and T&amp;P</td>
<td>Details to be attached</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>GTP</td>
<td>Details to be attached</td>
<td></td>
</tr>
</tbody>
</table>

________________________________________
Signature of the Bidder

Name :

Mobile / Fax / email ID :
SECTION: 3

BILL OF QUANTITIES

&

PRICE BIDDING SCHEDULE
**BILL OF QUANTITY**

**WORK**

CONSTRUCTION OF 33 KV O.H. LINE OF LENGTH 18.0 KM FROM 33/11 KV BAMUNIGAON SUB-STATION TO BARTEZPUR FOR POWER SUPPLY TO M/S ITC LTD, M/S PURE & CURE HEALTH CARE PVT. LTD AND M/S BRITANNIA INDUSTRIES LIMITED UNDER MIRZA ELECTRICAL SUB DIVISION OF GUWAHATI ELECTRICAL CIRCLE-II UNDER DEPOSIT SCHEME ON FULL “TURNKEY” MODE.

**Bill of Quantity**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>List of Materials</th>
<th>Unit</th>
<th>Total Qty required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33 KV VCB with GI Mounting Structure</td>
<td>Set</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>33 KV C&amp;R Panel for feeder (with numerical relay &amp; static TVM)</td>
<td>No</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>GI Steel tubular Pole SP-76 with grouting as per specification</td>
<td>No</td>
<td>772</td>
</tr>
<tr>
<td>4</td>
<td>GI Ch. Cross Arm (100x50x6x3200mm)</td>
<td>No</td>
<td>364</td>
</tr>
<tr>
<td>5</td>
<td>GI Ch. Cross Arm (100x50x6x2200mm)</td>
<td>No</td>
<td>918</td>
</tr>
<tr>
<td>6</td>
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<td>Installation of earthing system with MS flats 50x10 mm(for earthing mat) with GI flat riser 25x6 mm (for earthing conductor) and GI pipe 50 mm dia. of length 3000 mm (for earth electrodes)</td>
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### Annexure –II(A)

Tender Proforma Part-II (PRICE BID) NIT No CGM(D)/APDCL/LAR/INDUSTRIES/DEPOSIT/17-18/D-29

Construction of 33 KV O.H.line (18.0 KM) from 33/11 KV Bamunigaon Sub-Station to Bartezpur for power supply to M/S ITC Ltd, M/S Pure & Cure health care Pvt. Ltd and M/S Britannia Industries Limited under Mirza Electrical Sub division of Guwahati Electrical Circle-II, under Deposit scheme on “Full Turnkey” mode.

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<th>Unit Erection/Installation charges (Rs)</th>
<th>GST@18%</th>
<th>Total Erection cost (including GST) (Rs)</th>
<th>Total cost of supply &amp; erection (including GST) (Rs)</th>
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<td>Installation of earthing system with MS flats 50x10 mm(for earthing mat) with GI flat riser 25x6 mm (for earthing conductor) and GI pipe 50 mm dia. of length 3000 mm(for earth electrodes)</td>
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**Total Value for the Package inclusive of GST etc:-Rs. …………………….. (In words)**

**Signature of the bidder with seal**

_Name of Signatory:_
_Mobile No/Telephone No:_
_Email address:_
SECTION: 4

GENERAL REQUIREMENTS
GENERAL REQUIREMENTS

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

1.0 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 of manufacturing facilities available
viii) Level of automation achieved and list of areas where manual processing exists.
ix) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such test and inspection.
x) 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) with hold points for purchasers 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 sub-contractor.

1.3 The Quality Assurance Programme 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.
• A list of administrator and work procedures required to achieve contractor’s quality requirements. These procedures shall be made readily available to the purchaser for inspection on request.

ii) 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 should be homogeneous and should 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 are 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 equipments 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.
SECTION :5

FORMS OF BID
PROFORMA OF BANK GUARANTEE FOR BID GUARANTEE/SECURITY
(To be stamped in accordance with Stamp Act)
The non-Judicial stamp paper should be in the name of issuing bank

Ref………………………….. Bank Guarantee No…………..
Date……………………..

To
The Chief General Manager (D)
Assam Power Distribution Company Ltd (LAR)
BijuleeBhawan, Paltanbazar
Guwahati-1

Dear Sir/ Madam,

In accordance with invitation to bid under your Bid No………………. M/s………………. having its
Registered/ Head Office at ...............( hereinafter called the ‘Bidder’) wish to participate in the
said Bid or ..................... and you, as a special favour have agreed to accept an irrevocable
and unconditional Bank Guarantee for an amount of .................... validupto.........................

On behalf of Bidder in lieu of the Bid deposit required to be made bythe bidder, as a condition
precedent for participation in the Said Bid.

We, the ....................... Bank at ....................... have our Head Office at............( local
address) guarantee and undertake to pay immediately on demand by , the Amount of ...............................

………………………………………………………………………………………………..( in words &
figures) without any reservation, protest, demur and recourse. Any such demand made by said
‘Owner’ shall be conclusive andbinding on us irrespective of any dispute or difference raised by
the Bidder.

The Guarantee shall be irrevocable and shall remain valid up to and including ............
@......................... if any further extension of this guarantee is required, the same shall be
extended to such required period ( not exceeding one year) on receiving instruction from M/s
................... .... .... on whose behalf this guarantee is issued.

In witness whereof the Bank, through its authorized office, has set its hand and stamp on this
..................... day of ....................... 20........... at ..........................

WITNESS

.............................. ..............................
(Signature) ( Signature)

.............................. ..............................
(Name) (Name)

.............................. ..............................
( Official Address) (Official Address)

@ This date shall be thirty (30) days after the last date for which the bid is valid.
PROFORMA OF BANK GUARANTEE FOR CONTRACT PERFORMANCE
(To be stamped in accordance with Stamp Act)

Ref………………………….. Bank Guarantee No…………..
Date……………………

To
The Chief General Manager (D)
Assam Power Distribution Company Ltd (LAR)
BijuleeBhawan, Paltanbazar
Guwahati-1

Dear Sir/Madam,

In consideration of Assam Power Distribution Company Ltd., (herein after referred to as the ‘Owner’ which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s…………………………………….with registered/ Head office at ………………. (hereinafter referred to as “ Contractor” which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns), a Contract by issued of Owner’s Letter of Award No…………… dated……………….. and the same having been acknowledged by the contractor, resulting in a contract bearing No…………….. dated contractor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to……………… being(%) (percent *) of the said value Contract to the Owner.

We………………………………………………………………………………………….. (Name & Address) having its Head Office at ………………. (hereinafter referred to as the “ Bank”, which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the owner, on demand any all monies payable by the contractor to be extent of …………………. As aforesaid at any time up to ………………….*( day/month/year) without any demur, reservation , contest, recourse or protest and / or without any reference to this contractor. Any such demand made by the owner on the bank shall be conclusive and binding notwithstanding any difference between the Owner the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. The bank undertakes not to revoke this guarantee during its currency without previous consent of the owner and further agrees that the guarantee herein contained shall continue to be enforceable till the owner discharges this guarantee.

The Owner shall have the fullest liberty without affecting in any way the liability of the Bank under the guarantee, from time to time to extend the time for performance or the contract by the contractor. The owner shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any power vested in them or of any right which they might have against the contractor, and to exercise the same at any time in any matter, and either to enforce or to for bear to enforce any covenants, contained or implied, in the contract between the owner and the contractor or any other course or remedy or security available to the owner. The Bank shall not be released to its obligations under these presents by any exercise by the owner of its liberty with reference to the matters aforesaid or any of them or by reason of any other act of omission or commission on the part of the owner or any other indulgences shown by the owner or by any other matter or thing whatsoever which under law would, but for this provision have the effect of relieving the Bank.
The bank also agrees that the owner at its option shall be entitled to enforce this guarantee against the Bank as a principal debtor, in the first instance without proceeding against the contractor and not withstanding any security or other guarantee the owner may have in relation to the Contractor's liabilities.

Notwithstanding anything contained herein above our liability under this guarantee is restricted to ……………………… And it shall remain in force up to an including ………………………. and shall be extended from time to time for such period( not exceeding 1 year) as may be desired M/s……………………………………………………………………………………………………on whose behalf this guarantee has been given.

Dated this…………………… Day of ……………………….. 20……………… at…………

WITNESS

………………………………………..………………………………………..
(Signature) (Signature)

………………………………………..………………………………………..
(Name) (Name)

………………………………………..………………………………………..
(Official address) (Official address)

Attorney as per power
Of Attorney No……………….
Date…………………………

Notes
* This sum shall be 2.5%( two & half) of the Contract price.
** The date will be 90(Ninety) days after the end of the Warranty Period as specified in the contract.
1. The stamp paper of appropriate value shall be purchased in the name of issuing bank.
PROFORMA OF EXTENSION OF BANK GUARANTEE

Ref: --------------------------------------------  Date: -----------------------------

To

The Chief General Manager (D)
Assam Power Distribution Company Ltd (LAR)
BijuleeBhawan, Paltanbazar
Guwahati-1

Dear Sir/ Madam,

Sub: Extension of Bank Guarantee No……………….. for Rs…………………. Favouring
yourselves, expiring on …………………. On account of M/S………………………….. in
respect of contract no……………………. dated …………….. (Hereinafter called original
Bank Guarantee).

At the request of M/s ……………………… we …………………… bank, branch office at
………………….. and having its Head Office at ………………………. Do hereby extend our
liability under the above mentioned Bank Guarantee
No…………………dated………………………for a further period of ………………………
(Years/ Months) from………………….. to expire on………………….. expect as provided above, all other
terms and conditions of the original Bank Guarantee No…………………. dated
………………. Shall remain unaltered and binding.

Please treat this as an integral part of the original Bank Guarantee to which it would be attached.

Yours faithfully

For………………………………
Manager/ Agent/Accountant …………………..
Power of attorney No……………………
Dated……………………………………
SEAL OF BANK

Note: The non-judicial stamp paper of appropriate value shall be purchased in the name of the
Bank who has issued the Bank Guarantee.
PROFORMA OF BANK GUARANTEE FOR ADVANCE PAYMENT
(To be stamped in accordance with Stamp Act)

Ref…………………….. Bank guarantee No…………………..

Date……………………

To

The Chief General Manager (D)
Assam Power Distribution Company Ltd (LAR)
BijuleeBhawan, Paltanbazar
Guwahati-1

Dear Sir/Madam,

In consideration of Assam Power Distribution Company Ltd.(hereinafter referred to as the ‘Owner’, which expressions shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s…………………………… hereinafter referred to as the ‘Contractor’ which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns, a Contract by issue of Owner’s letter of Award No…………………… Dated……………………….and the same having been acknowledged by the contractors, resulting in a Contract bearing no…………………… Dated…………………… Valued (at………………………………( in words and figures). For …………………………Contract (space of work)………………………………….. (hereinafter called the ‘Contract’) and the Owner having agreed to make an advance payment to the Contractor for performance of the above contract amounting……………………..(in words and figures) as an advance against Bank Guarantee to be furnished by the Contractor.

We…………………………..( Name of the Bank) having its Head Office at……………………………… (hereinafter referred to as the ‘Bank’, which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the owner, immediately on demand any or, all monies payable by the contractor to the extent of ………………..as aforesaid at any time upto…………………….. (a…) without any demur, reservation, contest, recourse or protest and/or without any reference to the contractor. Any such demand made by the Owner on the Bank shall be conclusive and binding notwithstanding any difference between the Owner and the Contractor or any dispute pending before any Court, Tribunal, Arbitrator or any other authority. We agree that the guarantee herein contained shall be irrevocable and shall continue to be enforceable till the owner discharges this guarantee.

The Owner shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee, from time to time to vary the advance or to extent the time for performance of the contract by the Contractor. The Owners shall have the fullest liberty without affecting this guarantee, to postpone from time to time the exercise of any power vested in them or of any right which they might have against the Contractor and to exercise the same at any time in any manner, and either to enforce any covenants, contained or implied, in the contact between the Owner and the Contractor or any other course or remedy or security available to the Owner. The Bank shall not be released of its obligations under this presents by any exercise by the owner of its liberty with reference to the matter aforesaid of any of them or by reason of any other act or forbearance or other acts of omission or commission on the part of the owner or any other indulgence shown by the owner or by any other matter or thing whatsoever which under law would be for this provision have the effect of relieving the Bank.
The Bank also agrees that the Owner at its option shall be entitled to enforce this guarantee against the Bank as a principal debtor, in the first instance without proceeding against the contractor and notwithstanding any security or other guarantee that the owner may have in relation to the contractors liabilities.

Notwithstanding anything hereinabove our liability under this guarantee is limited to……….. and it shall remain in force upto an including …………………( @ and shall be extended from time to time for such period ( not exceeding 1 year as may be desired by M/s………………………………………………………………………………dated this ……. Day of …………………. 20……. At…………………………..

WITNESS……………………………………..

………………. …………………. (Signature) (Signature)

…………………………………….. …………………………….. (Name) (Name)

…………………………………….. (Designation)

(Official Address) (With Bank Stamp)

Attorney as per Power of attorney No………………………….. Dated……………………

Strike whichever is not applicable

@ The date will be 90(ninety) days after the date of completion of the Contract.
This Agreement made this ……………. day of …………. two thousand……………. Between Assam Power Distribution Company Ltd. having its head office at BijuleeBhawan, Paltanbazar, Guwahati-1 (hereinafter referred to as ‘Owner’ or ‘‘), which expression shall include its administrators, successors and assign on one part and (hereinafter referred to as the ‘Contractors ‘X’ ( Name of the contracting Co.) which expression shall include its administrators, successors, executors and permitted assigns) on the other part.

WHEREAS desirous of …………………….. in ……………. Circle associated with at ………………. (District) invited Bids for……………………………………………..

………………………………. (Briefly describe scope of works) for the first state of the project as per its Bid Specification No………………………………

AND WHEREAS……………………….‖X‖ ………………………. Had participated in the above referred Bidding vide their proposal No…………………. dated………………. And awarded the Contract to……………..‖ X‖…………….. on terms and conditions documents referred to therein which have been acknowledged by……………….‖X‖…………………..resulting into a “Contract”

NOW THEREFORE THIS DEED WITNESS AS UNDER:-

1.0 Article
1.1 Award of Contract
Awarded the contract to……………..‖X‖……………… for the work of …………… on the terms and conditions contained in its letter of Award No…….. ………. Dated…………… and the documents referred to therein. The award has taken effect from aforesaid letter of award.

The terms and expression used in this agreement shall have the same meaning as are assigned to them in the ‘Contract Documents’ referred to in this succeeding Article.

2.0 Documentation
2.1 The contract shall be performed strictly as per the terms and condition stipulated herein and in the following documents attached herewith( hereinafter referred to as “Contract Documents”.)
   i. Section 1-11 of the Bidding Document.
   ii. Proposal Sheets, Data Sheets, Drawing work schedule submitted by “X”.

Letter of Award No…………….. dated……………….duly acknowledged by “X”.

Quality Plans for manufacturing and field activities entitled as Quality Plan.

All the aforesaid Contract Documents shall form an integral part of this agreement , in so far as the same or any part conform to the bidding documents and what has been specifically agreed to by the Owner in its letter of Award. Any matter inconsistent therewith, contrary or repugnant thereto or any deviations taken by the Contractor in its ‘Proposal’ but not agreed to specially by the Owner in its Letter of Award shall be deemed to have been withdrawn b y the Contractor. For the sake of brevity, this agreement along with its aforesaid Contract Documents shall be referred to as the ‘Agreement’.

3.0 Conditions & Covenants
3.1 The scope of Contract, Consideration, Terms of Payment, Price Adjustments, Taxes wherever applicable, Insurance, Liquidated Damage, Performance Guarantees and all other terms and conditions are contained in ‘s Letter of Award No…………….. dated………………. read in conjunction with other aforesaid contract documents. The contract shall be duly performed by the Contract Documents, but which are needed for successful, efficient, safe
and reliable operation of the equipment unless otherwise specifically excluded in the specification under ‘exclusion’ or Letter of Award.

3.2 The scope of work shall also include supply and installation of all such items which are not specifically mentioned in the contract Documents, but which are needed for successful, efficient, safe and reliable operation of the equipment unless otherwise specifically excluded in the specifications under ‘exclusions’ or ‘Letter of Award’.

3.3 Time Schedule

3.3.1 Time is the essence of the Contract and schedules shall be strictly adhered to “X” shall perform the work in accordance with the agreed schedules.

3.4 Quality Plans

3.4.1 The Contractor is responsible for the proper execution of the Quality Plans mentioned in Section 4.8 of GTC. The work beyond the customer's hold points will progress only with the owners consent. The Owner will also undertake quality surveillance and quality audit of the Contractor’s /Sub-contractor’s works, systems and procedures and quality control activities. The Contractor further agrees that any change in the Quality Plan will be made only with the Owner's approval. The contractor shall also perform all quality control activities, inspection and tests agreed with the Owner to demonstrate full compliance with the contract requirements.

3.4.2 The contractor also agrees to provide the Owner with the necessary facilities for carrying out inspection, quality audit and quality surveillance of contractors and its Subcontractor’s Quality Assurance Systems and Manufacturing Activities.

These shall include but not limited to the following:

- Relevant plant standards, drawing and procedures;
- Detailed Quality Assurance System manuals for manufacturing activities.
- Storage procedures and instructions weld, NDT, heat treatment prior to commencement of manufacture;
- Complete set of log sheets (blank) mentioned in the Quality Plans.

It is expressly agreed to by the contractor that the quality test and inspection by the owner shall not in any way relieve the contractor of its responsibilities for quality standards and performance guarantee and their other obligations under the Agreement. 3.4.4 “X’ agrees to submit quality Assurance Documents to for review and record after completion and within 3 weeks of dispatch of material.

The package will include the following:
- Factory test result, inspection report for testing required by this contract or applicable codes and standards.
- Two copies of inspection reports duly signed by Quality Assurance personnel of both APDCL and “X” for the agreed customer hold points.
- Report of the rectification works where and if applicable.

3.5 It is expressly agreed to by the Contractor that notwithstanding the fact that the Contract is termed as Supply-cum-Erection Contract or indicates the break-up of the Contract consideration, for convenience of operation and for payment of sale tax on supply portion, it is in fact one composite Contract on single source responsibility basis and the Contractor is bound to perform the total Contract in its entirely and non-performance of any part or portion of the Contract shall be deemed to be breach of the entire Contract.

3.6 The Contractor guarantees that the equipment package under the Contract shall meet the ratings and performance parameters as stipulated in the technical specifications (Section10) and in the event of any deficiencies found in the requisite performance figures, the Owner may at its option reject the equipment package or alternatively accept it on the terms and conditions and subject to levy of the liquidated damages in terms of Contract documents. The amount of liquidated damages so leviable shall be in accordance with the contract document and without any limitation.

3.7 It is further agreed by the contractor that the contract performance guarantee shall in no way be constructed to limit or restrict the owner’s equipment right to recover the damages/compensation due to shortfall in the equipment performance figures as stated in
Para 3.6 above or under any other clause of the agreement. The amount of damages/compensation shall be recoverable either by way of deduction from the contract price, contract performance guarantee and or otherwise. The contract performance guarantee furnished by the contractor is irrevocable and unconditional and the owner shall have the power to invoke it notwithstanding any dispute or difference between the owner and the contractor pending before any court tribunal, arbitrator or any other authority.

3.8 This Agreement constitutes full and complete understanding between the parties and terms of the payment. It shall supersede all prior correspondence terms and conditions contained in the Agreement. Any modification of the agreement shall be effected only by a written instrument signed by the authorized representative of both the parties.

4.0 SETTLEMENT OF DISPUTES:
4.1 It is specifically agreed between parties that all the differences or disputes arising out of the agreement or touching the subject matter of the agreement shall be decided by process of settlement and Arbitration as specified in clause 41 of the General Condition of the Contract and provision of the Indian Arbitration Act, 1996 shall apply. Guwahati Courts alone shall have exclusive jurisdiction over the same.

4.2 NOTICE OF DEFAULT
Notice of default given by either party to the other under agreement shall be in writing and shall be deemed to have been duly and properly served upon the parties hereto if delivered against acknowledgement or by telex or by registered mail with acknowledgements due addressed to the signatories at the addresses mentioned at Guwahati.

IN WITNESS WHEREOF, the parties through their duly authorized representatives have executed these presents (execution where of has been approved by the competent authorities of both the parties) on the day, month and year first above mentioned at Guwahati.

WITNESS:
1. ……………………… (Owner’s signature) (Printed Name)
2. ……………………… (Designation)(Company’s Stamp)
3. ……………………… (Contractor’s Signature)(Company’s Name)
4. ……………………… (Designation)(Company’s Stamp)

- Applicable in case of single award is placed on one party on Supply-cum-Erection basis. In two separate awards are placed on single party/two different parties this clause is to be modified suitably while signing the contract agreement to be signed separately for two awards to incorporate cross fall breach clause.
FORM OF POWER OF ATTORNEY FOR JOINT VENTURE
(On Non-judicial Stamp Paper of Appropriate value to be Purchased in the Name of Joint Venture)

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Partners whose details are given hereunder ............................................................... have formed a Joint Venture under the laws of .............................................. and having our Registered Office(s)/Head Office(s) at ..........................................................(hereinafter called the 'Joint Venture' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting thorough M/S ................................................................. being the Partner in-charge do hereby constitute, nominate and appoint M/S ................................................................. as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorized Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of, the Joint Venture in respect of .................................................................(Name of the Package) (Specification No. ................................. ) of Assam Power Distribution Company Ltd. Bijulee Bhawan, Paltan Bazaar, GUWAHATI (hereinafter called the "Owner"). and the bids for which have been invited by the Owner, to undertake the following acts:

i) To submit proposal and participate in the aforesaid Bid Specification of the Owner on behalf of the "Joint Venture".
ii) To negotiate with the Owner 'the terms and' conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the Owner for and on behalf of the "Joint Venture'.
iii) To do any other act or submit any document rated to the above.
iv) To receive, accept and execute .the Contract for and on behalf of the "Joint Venture".

It is clearly understood that the Partner In-charge (Lead Partner) shall ensure performance of the Contract(s) and if one or more Partner fail to perform their respective portion of the Contract(s), the same shall be deemed to be a default by all the Partners.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Defect Liability Period in terms of the Contract.

The Joint Venture hereby agrees and undertakes to ratify and confirm all the above whatsoever the said Attorney/ Authorized Representative/Partner In-charge quotes in the bid, negotiates and signs the Contract with the Owner and/or proposes to act on behalf of the joint Venture by virtue of this Power of Attorney and the same shall bind the Joint Venture as if done by itself.

* Strike which is not applicable.

IN WITNESS THEREOF the Partners Constituting the Joint Venture as aforesaid have executed these presents on this .................... day of .................... under the Common Seal(s) of their Companies.
for and on behalf of
the Partners of Joint
Ventures

The Common Seal of the above Partners of Joint Venture:
The Common Seal has been affixed there unto in the presence of :

WITNESS

1. Signature ______________________
   Name___________________________
   Designation_______________________
   Occupation ______________________

2. Signature ______________________
   Name___________________________
   Designation_______________________
   Occupation ______________________
TECHNICAL SPECIFICATION
TECHNICAL SPECIFICATIONS FOR 36 KV VACUUM CIRCUIT BREAKER

1.0 SCOPE

1.1 This section of specification covers the design, manufacture, assembly under stringent quality control at every stage of manufacturing, testing at manufacturer’s works before dispatch, supply and delivery at destination store and supervision of erection, testing and commissioning of 36 KV outdoor type vacuum circuit breakers at various substations in SEB.

1.2 The scope of supply shall also include necessary special tools and plants required for erection, maintenance and necessary spares, - required for normal operation and maintenance of the circuit breakers for a period of five years.

1.3 The circuit breakers should be complete in all respects with insulators, bimetallic connectors, interrupting chamber, operating mechanism control cabinet, interlocks, auxiliary switches indicating devices, supporting structures, accessories, etc., described herein and briefly listed in the schedule of requirements. The spares/attachments which are meant necessary for the smooth functioning of the equipment and specifically are not mentioned here shall be assumed to be included the scope of supply.

2.0 STANDARDS

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

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

<p>| IEC-56 | High Voltage A.C. Circuit Breakers |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC-137</td>
<td>Bushing for alternating voltage above 1000 volts</td>
</tr>
<tr>
<td>IEC-71</td>
<td>Insulation Co-ordination</td>
</tr>
<tr>
<td>IEC-694</td>
<td>Common clauses for high voltages switchgear and control gear</td>
</tr>
<tr>
<td>IEC-815</td>
<td>Insifications for Creepage distance</td>
</tr>
<tr>
<td>13118</td>
<td>Specifications for high voltage alternating current</td>
</tr>
<tr>
<td>2099</td>
<td>Porcelain bushings</td>
</tr>
<tr>
<td>4379</td>
<td>Identification of the contents of industrial gas cylinders</td>
</tr>
<tr>
<td>3072</td>
<td>Tallation and maintenance of switchgear</td>
</tr>
<tr>
<td>IEC-267</td>
<td>Guide for testing of circuit breakers with respect to out</td>
</tr>
<tr>
<td>802</td>
<td>Code of practice for use of structural steel in overhead</td>
</tr>
<tr>
<td>IEC-17A</td>
<td>Sealing of interrupters / breakers</td>
</tr>
<tr>
<td>1554</td>
<td>PVC insulated cables upto and including 1000 volts</td>
</tr>
<tr>
<td>5</td>
<td>Colors for ready mixed paints and channels</td>
</tr>
</tbody>
</table>

3.0 CLIMATIC CONDITIONS

The breakers and accessories to be supplied against this specification shall be suitable for satisfactory continuous operation under the tropical conditions specified in this bidding document.

4.0 AUXILIARY POWER SUPPLY

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

- a. Power Devices (like drive motors) 415 V, 3 phase 4 wire 50 hz, neutral grounded AC supply
- b. DC Alarm, Control and Protective Devices 110 V DC,
- c. Lighting 240 V, single phase 50 Hz AC supply

4.2 Each of the foregoing supplies shall be made available by the Purchaser at the terminal point for each circuit breaker for operation of accessories and auxiliary equipment. Bidder’s scope includes supply of interconnecting cables, terminal boxes, etc. The above supply voltage may vary as indicated below and all devices shall be suitable for continuous operation over the entire range of voltages.

1) AC Supply
   - Voltage + 10% /-- 15%
   - Frequency ± 5%

2) DC Supply
   - 15% to + 10%

5.0 GENERAL REQUIREMENT OF 36 KV/OUTDOOR VACUUM CIRCUIT BREAKERS
5.1 The vacuum type circuit breaker shall have vacuum interrupters, designed to provide a long contact life at all currents up to rated making and breaking current during switching operation. The vacuum interrupters sealed for life shall be encapsulated by porcelain insulators for outdoor installation requirement of the circuit breakers. The offered breakers shall be suitable for outdoor operation under climatic conditions specified without any protection from sun, rain and dust storm.

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

i. The performance of breakers shall be adequately proven by type tests for the designed rating at internationally reputed independent testing station.

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

iii. All mechanical parts and linkages shall be robust in construction and maintenance free, over at least 30,000 switching operations except for lubrication of pins/articulated joints at interval of 5 years or 5000 operations.

iv) Similar parts shall be strictly interchangeable without special adjustment of individual fittings. Parts requiring maintenance shall be easily accessible, without requiring extensive dismantling of adjacent parts.

v) The operating mechanism will be self maintained and of proper operation endurance not less than the mechanical life of circuit breaking unit. It shall be spring operated type described hereinafter.

vi) The circuit breaker shall be supplied complete with all auxiliary equipment meant necessary for the safe operation, routine and periodic maintenance. All internal wiring including those of spare auxiliary contacts shall be complete and wired upto terminal blocks situated near cable gland plate.

vii) The breaker shall be totally restrike free under all duty conditions and shall be capable of performing the duties without opening resistor. The details of any device incorporated to limit or control the rate of rise of restriking voltage across the circuit breaker contacts shall be stated.

viii) The breaker shall be reasonably quiet in operation and the noise level shall not exceed 140 decibels.

ix) The breaker shall be suitable for three phase reclosing operation.
x) An operation counter, visible from the ground level even with the mechanism housing closed shall be provided.

6.0 VACUUM INTERRUPTER ASSEMBLY

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

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

6.3 The manufacturer of VCB should use their own Vacuum interrupter so that the drive mechanism is matched perfectly with that of the requirement of Vacuum Interrupter.

6.4 The vacuum bottles should be capable of withstanding minimum 100 full short circuit operations as per test duty 1 to 5 of IEC-56. The vacuum bottles, capable of withstanding less than 100 full short circuit faults, would not be considered and therefore should not be offered.

6.5 A manufacture’s type test reports / literature for vacuum bottles, may, therefore be supplied along with tender in duplicate.

6.6 Vacuum Interrupters of China make should not be offered.

7.0 FIXED AND MOVING CONTACT

7.1 The fixed and moving contacts of the breaker have to ensure permanent full contact during closing without unusual maintenance. All making and breaking contacts shall be hermetically sealed and free from atmospheric effects.

7.2 The contacts metallurgy and geometry shall be such that there is minimum contact burning and wear. Main contact shall have ample area and contact pressure for carrying the rated current and rated short time current without excessive temperature rise which may cause pitting or welding of the contacts.
7.3 The main contacts should have low contact resistance. The contact should be self cleaning type, i.e., the layer of copper oxide should be cleaned during rubbing of contacts. The contact area should be well defined, spring used for contact shall be of gradually rising characteristic i.e., they should be soft. The contacts should not provide contact grip, ie., electro-magnetic forces should not grip the contacts and oppose the opening process. It would be desirable to have separate main contacts and arcing contacts in order to have longer life of the contacts. The contours of the energized metal parts of the breaker shall be such as to eliminate areas or points of high electrostatic flux concentration. Surfaces shall be smooth with no projection or irregularities which may cause visible corona. No corona shall be visible in complete darkness when the equipment is subjected to the specified test voltage.

7.4 The circuit breaker units shall be suitable for installation on outdoor R.C.C. foundations. Ground clearance of the live parts of the breakers should be 3700 mm from foundation. The circuit breakers shall be spring operated.

8.0 RECOVERY VOLTAGE AND POWER FACTOR

8.1 The circuit breaker shall be capable of interrupting rated power with recovery voltage equal to the rated maximum line to line service voltage at rated frequency and at a power factor equal to or exceeding 0.15.

9.0 RESTRIKING RECOVERY and LINE CHARGING INTERRUPTING CAPACITY

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

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

9.3 The maximum permissible switching over voltage shall not exceed 2.5 p.u. The guaranteed over voltage, which will not be exceeded while interrupting the rated line charging current for which the breaker is designed to interrupt shall also be stated. The results of the tests conducted along with the copies of the oscillographs to prove ability of the breakers to interrupt the rated as well as lower values of the line charging current shall be furnished with the tender.

10.0 TRANSFORMER CHARGING CURRENT BREAKING CAPACITY
10.1 The breaker shall be capable of interrupting inductive currents, such as those occurring while switching off unloaded transformers, without giving rise to undue over voltage and without restrikes. The maximum over voltage value, which will not be exceeded under such conditions, shall be stated in the tender.

11.0 BREAKING CAPACITY FOR SHORTLINE FAULTS

11.1 The interrupting capacity of the breaker for short line faults shall be stated in the tender. The details of the test conducted for proving the capability of the breaker under a short line fault occurring from one phase to earth conditions shall also be stated in the tender. The rated characteristics for short line faults shall be in accordance with stipulation contained in clause 8.0 of IEC-56(2)-1971.

12.0 AUTOMATIC RAPID RECLOSING and OUT OF PHASE SWITCHING

12.1 36 KV circuit breaker shall be suitable for 3 pole rapid reclosing. The dead time of the breaker shall be adjustable and the limits of the adjustment shall be stated in the tender.

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

13.0 TEMPERATURE RISE

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

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

14.0 INSULATORS SUPPORTS AND HOUSING

14.1 The basic insulation level of the external insulator supporting shall be as stated in the "Technical Parameters" and these shall be suitable for use under climatic conditions as stated elsewhere in the specification. The porcelain used shall be homogenous, free from cavities and other flaws.
14.2 The insulators shall be designed to have ample insulation, mechanical strength and rigidity for satisfactory operation under conditions specified above.

14.3 All bushings of identical rating shall be interchangeable. The puncture strength of bushing shall be greater than the flash over value. The design of bushing shall be such that the complete bushing in a self-contained unit and no audible discharge shall be detected at a voltage upto a working voltage (Phase Voltage) plus 10%. The support insulator shall conform to IEC-137.

14.4 Minimum clearance between phases, between live parts and grounded objects shall be as per IS-3072-1975 and should conform to Indian Electricity Rules-1956. The minimum creepage distance for severely polluted atmosphere shall be 27 mm/KV.

14.5 The air clearance of bushing should be such that if the bushings were tested at an altitude of less than 1000 meters, air clearance would withstand the application of higher voltages (IS-2099-1973 para 6.1). In order to avoid breakdown at extremely low pressures the support insulators should not be covered by moisture and conducting dust. Insulators should therefore be extremely clean and should have anti-tracking properties. Sharp contours in conducting parts should be avoided for breakdown of insulation. The insulators shall be capable to withstand the seismic acceleration of 0.5 g in horizontal direction and 0.6g in vertical direction.

15.0 OPERATING MECHANISM GENERAL REQUIREMENTS

15.1 The operating mechanism shall be stored energy type and capable of giving specified duty of the breaker. The breaker shall also pass the operational test which ascertain the capabilities of operating mechanism. The operating mechanism shall be capable to perform the following functions efficiently.

i) To provide means where the circuit breaker can be closed rapidly, without hesitation at all currents from zero to rated making current capacity.

ii) To hold the circuit breaker in closed positions by toggles or latches till the tripping signal is received.

iii) To allow the circuit breaker to open without delay immediately on receiving tripping signal.

iv) Operating mechanism should also be suitable for three phase auto
reclose duty. The closing spring shall be automatically charged by motor immediately after closing operation.

v) In case of failure of supply to the spring charging motor, the spring shall be chargeable by hand crank.

vi) The contact pressure spring and tripping spring shall be chargeable during closing operation to ensure the breaker is ready to open.

vii) Mechanically ON/OFF indicator, spring charged indicator and operation counter shall be provided on the front of the control cubicle. For tripping, the spring provided shall ensure the trippings.

16.0 Tripping/Closing Coils

16.1 The circuit breakers shall be provided with two trip coils and one closing coil per breaker. First trip coil shall be utilized for tripping the breaker on main protection fault detection. Whereas second trip coil shall be used to trip the breaker when first trip coil fails to trip the breaker and backup protection comes into operation and shall also be used to trip the breaker on command.

16.2 The trip coils shall be suitable for pre-closing and after closing trip circuit supervision. All the breakers shall have provision for independent electrical operation of trip coils from local as well as remote through local/remote selector switch. The breaker shall be provided with suitable protection device against discrepancies in the operation of individual pole.

16.3 Closing coil shall operate correctly at all value of voltage between 85% and 110% of the rated voltage. Shunt trip coils shall operate correctly under all operating conditions of the circuit breaker upto the rated breaking capacity and at all values of supply voltage between 70% and 110% of rated voltage.

16.4 Trip Free Features

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

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

17.0 Controls

17.1 The circuit breaker shall be controlled by a control switch located in the control room. The control arrangement shall be such as to disconnect the remote control circuits of the breaker, when it is under test.

17.2 Local control devices, selector switch and position indicator shall be located in weather and vermin-proof cabinet.

17.3 The circuit breaker control scheme shall incorporate trip circuit supervision arrangement. Local/remote selector switch shall be provided for all breakers for selection of "Local" control/remote control. Provision shall be made for local manual, electrical and spring controls. Necessary equipment's for local controls shall be housed in the circuit breaker cabinet of weather-proof construction. In addition to this, a hand closing device for facilitating maintenance shall also be provided.

17.4 Each circuit breaker shall have a mechanical open/closed and spring charge indicator in addition to facilities for provisions for semaphore indicators for breakers which are required for the mimic diagram in the control room.

17.5 Lamps for indicating, 'close/open' position of the breaker shall also be provided.

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

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

18.0 SPRING OPERATED MECHANISM and MOTOR

18.1 The motor compressed spring mechanism shall consist of a closing spring which is wound or compressed by an electric motor immediately after the breaker closes. The closing action shall also wind or compress a tripping springs shall be wound.
18.2 After the breaker has tripped, the tripping spring shall remain in the released position as long as the breaker is open, but the closing spring shall remain wound and ready for closing operation. Spring charging motor shall be standard single phase universal motor suitable for 220 volts supply.

i) Operating voltages for closing/tripping coils shall be 110 Volts DC.

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

18.3 The spring operating mechanism shall have adequate energy stored in the operating to close and latch the circuit breaker against the rated making current and also to provide the required energy for tripping mechanism in case the tripping energy is derived from the operating mechanism.

18.4 The mechanism shall be capable of performing the rated operating duty cycle of 0-0.3Sec-CO-3 Min-CO as per IEC-56.

18.5 The spring charging motor shall be AC/DC operated and shall not take more than 30 sec., to fully charge the closing spring made for automatic charging. Charging of spring by the motor should not interfere with the operation of the breakers.

18.6 The motor shall be adequately rated to carry out a minimum of one duty cycle. Also provision shall be made to protect the motor against overloads.

18.7 In case of failure of power supply to spring charging motor, the mechanism shall be capable of performing one open-close-open operation.

18.8 Mechanical interlocks shall be provided in the operating mechanism to prevent discharging of the closing springs when the breaker is already in closed position. Provision shall be made to prevent a closing operation to be carried out with the spring partially charged.

18.9 Facility shall be provided for manual charging of closing springs.

19.0 CONTROL CABINET

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

19.2 The enclosure shall be made out of stretched level steel plates not less than 3.15 mm thick and of light section structural steel. It should be weather proof as well as vermin proof and conforming to IP: 55 degree of protection.

19.3 Each cabinet section shall have full width and full length hinged doors mounted on the front that swing fully open. The doors shall be provided with latches to securely hold it with the cabinet. Doors shall be of sturdy construction, with resilient material covering, to provide dust protection and prevent metal to metal contact except at the latch points. Filtered ventilation shall be provided along with the rigid supports for control and other equipment, measuring instruments, mounting cabinet members and equipment shall not restrict easy access to terminal blocks for terminating and testing external connection or to equipment for maintenance.

19.4 All screws and bolts used for assembling and mounting wire and cable termination, supports, devices and other equipment shall be provided with lock washers or other locking devices. All metal parts shall be clean and free of weld splatter, rust and mill scale prior to application of double coat of zinc chromate primer which should be followed by an Polyurethane paint to serve as base and binder for tile finishing coat. The exterior of the cubicle shall be painted mattly grey to shade NO.692 of IS-5 or shade No.631 and interior to white shade. Sufficient quantity of paints shall also be supplied along with the cubicle to restore at site any damage during transportation. The mounting structure shall be galvanized and shall be as per IS-802-11-1978.

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

19.6 At least one 20 watts fluorescent tube fixture and lamp holder working on 240V, 50 c/s AC supply shall be provided in each switchgear control cubicle section and shall be located to provide adequate interior lighting of the cubicle. Ballasts shall be rated at not less than 0.90 power factor. A single pole 20 Amp. ‘T’ rated lighting switch shall be provided for each cubicle, flush-mounted on the left end. One duplex 220 volt convenience outlet shall be provided inside each door or pair of doors inside each cubicle. The lighting and convenient outlet circuits shall be completely wired in conduit and terminated on cubicle terminal blocks.

19.7 Unless otherwise specified control wire shall be stranded tinned copper stranded wire with 1.1 KV PVC insulation conforming to the requirements of IS-
1554.

All the control circuit and secondary wiring shall be wired completely and brought out preferably to a vertical terminal block ready for external connections in the control cabinet. The control wire shall not be of cross-section less than 2.5 mm$^2$ copper.

19.8 All spare auxiliary contacts of the circuit breaker shall be supplied wired upto terminal block. At least 20 number spare terminals shall be provided over and above the number required. All wiring termination on terminal blocks shall be made through lugs. For current and DC supply circuits disconnecting sturdy type terminal blocks will be provided. For other control circuits, non-disconnecting snap on type terminal blocks shall be provided.

All wires shall be identified with non-metallic sleeve or tube type markers at each terminations.

19.9 Terminal blocks shall be made up of molded non-inflammable plastic material with blocks and barriers molded integrally have white marking strips for circuit identification and moulded plastic covers.

19.10 A ground bus of copper bar not less than 6 mm by 25 mm shall be provided along the inside of the front or rear of the each cubicle and equipment rack. The ground bus shall be bolted to the frame of each panel in such a way as to make good electrical contact with each panel or section. Lugs shall be provided for connection of the ground bus to the station ground bus/earth mat.

20.0 ACCESSORIES

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

i) Line and earthing terminals and terminal connectors.

ii) Control housing with:

a) One auxiliary switch with adequate number of auxiliary contacts, but not less than 12 nos. (6 No + 6 NC) for each breaker. These shall be over and above the No. of contacts used for closing, tripping and ‘reclosing’ and interlocking circuit of the circuit breaker. All auxiliary contacts shall be capable of use as "Normally closed" or "Normally open" contacts. Special auxiliary contacts required for the reclosing circuit if any, shall also be provided. There shall be provision, to add more auxiliary contacts at a later date, if required.

b) Operation counters

c) Position indicator (Close/Open)

d) Necessary cable glands

e) Fuses
f) Manual trip device and local test push buttons

g) Terminal blocks and wiring for all control equipment and accessories

h) Adequate number of heaters for continuous operation to prevent moisture condensation in the housing of operating mechanism

i) Selector switch for local/remote control.

21.0 SUPPORTING STRUCTURE

21.1 The circuit breakers shall be supplied complete with necessary galvanized steel supporting structures, foundation and fixing bolts, etc., the galvanizing shall be as per IS. The mounting of the breaker shall be such as to ensure the safety of the operating staff and should conform to Indian Electricity Rules, 1956. **Minimum ground clearance of live part from ground level shall be 4000 mm inclusive of foundation (300mm above GL).**

21.2 The bidder shall submit detailed design calculations and detailed drawings in respect of supporting structures suitable for the equipment offered. The tenders shall specify the loads which shall be transmitted to the equipment foundation under most adverse operating conditions of the breaker.

21.3 Facility to earth the circuit breaker structure at two points shall be provided.

22.0 GALVANISING

All ferrous parts including all sizes of nuts, bolts, plain and spring washers, support channels, structures, shall be hot dip galvanized conforming to latest version of 18:2629 or any other equivalent authoritative standard.

23.0 CABLE TERMINATION

Suitable cable glands for terminating the multi-core cable shall be provided wherever required.

24.0 TERMINAL CONNECTIONS AND EARTH TERMINALS

24.1 Each circuit breaker connected with incoming and outgoing feeders shall be provided with solder less clamp type bimetallic connectors suitable for ACSR/AAAC conductor mentioned in ‘Technical Parameter’

25.0 INTERTERLOCKS
25.1 Necessary interlocks to prevent closing or opening of the breaker under low pressure of the contact spring and devices for initiating alarm shall be provided. Provision shall also be made to enable electrical interlocking with the isolators associated with the breaker to prevent opening or closing of the isolators.

26.0 TYPE TESTS

26.1 Type test certificates for the following tests, as per IS:13118 or IEC 62271-100 with latest amendment thereof, from any of the NABL accredited Laboratory shall invariably be furnished

a. Short circuit duties test
b. Short time withstand current and peak withstand current tests
c. Temperature rise test
d. Mechanical endurance test
e. Lightning impulse voltage withstand test
f. Power Frequency withstand voltage test (dry & wet)
g. Single Capacitor bank switching test
h. Degree of protection IP-55 as per IS:13947:93(Part-I)/IEC 60529:89

26.2 Type test certificates must accompany drawing of type tested equipment, duly sealed & signed by type testing authority.

26.3 Type tests should not have been conducted on the equipment earlier than 3 years from the date of opening of bids.

26.4 In case of any change in design/type of breaker already type tested and the one being offered against this specification, the Employer reserves the right to demand repetition of some or all tests without any extra-cost at NABL accredited lab.

27.0 ACCEPTANCE AND ROUTINE TEST :-

27.1 Employer shall have access at all times to the works and all other places of manufacture where the Circuit Breakers are being manufactured and the Bidder shall provide all facilities for unrestricted inspection of the Bidder/manufacturer’s works, raw materials, manufacture of all the accessories and for conducting necessary tests as detailed herein. The Employer reserves the right to insist for witnessing acceptance/routine testing of the bought out items. The Bidder/manufacturer shall submit the routine test certificates of bought out items and raw material also, at the time of routine testing of the fully assembled breaker.
27.2 No material shall be dispatched from its point of manufacture unless the material has been satisfactorily inspected and tested.

27.3 Bidders shall indicate the inspections and checks carried out at various stages of manufacture of the circuit breakers. Complete record of stage inspection would be kept by the Bidder/manufacturer and this record should be made available for inspection by the representative of the Employer. Bidder/manufacturer should indicate the manufacturing programme and the Employer will have a right to depute inspecting officers during the manufacture of the equipment. The Employer reserves the right to carry out stage inspections at all stages, for which advance intimation shall be given and all necessary cooperation shall be rendered by the manufacturer.

27.4 At the time of inspection, Bidder/manufacturer shall identify each and every item/accessories of the particular Circuit Breaker under testing. Unless all the items are identified, the manufacture will not be treated as complete. Various tests stipulated in IS/IEC shall be performed in the presence of the Employer’s engineers or when the inspection waiver has been given, in such a case, testing shall be done at the manufacturer’s works as per IS/IEC stipulations and same should be confirmed by documentary evidence by way of Test Certificate which shall be got approved by the Employer.

27.5 It is expected that before circuit breaker is finally offered for inspection, internal testing of the same for various important parameters are already done. Routine test report for such tests shall also accompany the letter of inspection call so that the Inspecting Officer at the time of inspection may verify the parameters brought out in the preliminary report. Details of all tests should be clearly brought out.

27.6 In case for any reason, inspection is not completed or equipment is not found to be complete with all accessories as per confirmation given with the letter of inspection call, the Employer will reserve the right to recover complete cost of deputation of inspecting team to the works of the manufacturer.

27.7 Acceptance of any quantity of circuit breaker & its accessories shall in no way relieve the successful bidder of his responsibility for meeting all the requirement of this specification and shall not prevent subsequent rejection if such equipments are later found to be defective.
28.0 RATING PLATES & SURFACE FINISH PAINTING & GALVANISING:-

28.1 Each circuit breaker shall be provided with a detailed rating plate. Details on the rating plate shall be as per ISS and shall also indicate manufacturer name, serial no., order no. and month & year of dispatch.

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

28.3 All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner or hot dip galvanized or two packs of aliphatic polyurethane finished paint. All metal parts not accessible for painting shall be made of corrosion resistant material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. Paints shall be carefully selected to withstand tropical heat and extremes of weather within the limits specified.

28.4 Paint shall not scale off or wrinkle or be removed by abrasion due to normal handling. All external paintings shall be as per shade no. 697 or any other suitable shade of IS:5 or polyurethane paint.

28.5 All ferrous parts & steel structure including all sizes of nuts, bolts, plain and spring washers, support channels, structures, etc. shall be hot dip galvanized or stainless steel or electro-galvanized.

29.0 DOCUMENTATION:

29.1 List of Drawings and Documents: Bidders shall furnish four sets of relevant descriptive and illustrative published literature, pamphlets and following drawings for preliminary study;

(a) General outline drawings showing dimensions and shipping weights.

(b) Sectional views showing the general constructional features of the circuit breaker including operating mechanism, arcing chambers, contacts with lifting dimensions for maintenance.
(c) All drawings & data typical and recommended schematic diagram for control supervision & reclosing shall be annotated in English.

(d) Schematic diagrams of breaker offered for control supervision and reclosing.

(e) Structural drawing, design calculations and loading data for support structures.

(f) Short circuit oscillogram& certificates for similar type tested breakers. General arrangement of foundation and structure mounting plan including weights of varnish components and impact loading data for foundation design.

(g) Type test reports.

29.2 Successful bidders shall, within two weeks of placement of order, submit four sets of final version of all the above drawings for the Employer's approval. The Employer shall communicate his comments/approval on the drawings to the Bidder/manufacturer within two weeks. Bidder/manufacturer shall, if necessary, modify the drawings and resubmit four copies of the modified drawings for the Employer's approval within two weeks from the date of comments. After receipt of the Employer's approval, the Bidder/manufacturer shall, within three weeks, submit 4 prints per breaker and two set of good qualities reproducible of the approved drawings for the Employer's use.

29.3 Successful bidders shall also furnish two sets each of bound manuals covering erection, commissioning, operation and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices along with each breaker. Marked erection drawings shall identify the component parts of the equipment as shipped to enable erection by the Employer's own personnel. Each manual shall also contain one set of all the approved drawings, type test reports as well as acceptance reports of the corresponding consignment dispatched.

29.4 Manufacturing of equipments shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the Employer.

29.5 Approval of drawings/work by the Employer shall not relieve the bidders of any of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting
the requirements of the latest revision of the applicable standards rules and codes of practices. Equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of supply and the Employer reserves the right to reject any equipment or material which, in his judgment, is not in full accordance therewith.

30.0 PACKING AND FORWARDING:
30.1 Equipment shall be prepared for ocean shipment (foreign equipment) or rail road transport (local equipment). Equipment shall be packed in suitable crates in such a manner to protect it from damage and withstand handling during transit. Bidder/manufacturer shall be responsible for and make good at his own expense any or all damage to the equipment during transit, due to improper and inadequate packing and handling. Easily damageable materials shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by the Bidder/manufacturer without any extra cost. Each consignment shall be accompanied by a detailed packing list containing the following information:

(a) Name of the consignee.
(b) Details of consignment.
(c) Destination.
(d) Total weight of consignment.
(e) Sign showing upper/lower side of the crate.
(f) Handling and unpacking instructions.
(g) Bill of material indicating contents of each package and spare material.

31.0 COMPLETENESS OF EQUIPMENT AND BOUGHT OUT ITEMS:
31.1 Bidders must furnish following information along with technical bid. A list of all the accessories which will be supplied with the breakers should be furnished. While furnishing the list of accessories, items which will be manufactured by the Bidders and balance items, which will be procured from sub-Bidder/manufacturers should be clearly identified and stipulated in the bid.
32.0 GUARANTEED TECHNICAL PARTICULARS:

32.1 It is obligatory on the part of bidders to furnish Guaranteed Technical Particulars enclosed with the bid document duly filled in complete in all respects. In case Guaranteed Technical Particulars duly filled in complete in all respects is not furnished, the bid may be treated as non-responsive.
1.4 TECHNICAL SPECIFICATION FOR 33 KV CONTROL AND RELAY PANELS FOR TRANSFORMERS & FEEDERS

1.0 SCOPE

1.1. This specification provides for design, engineering, manufacture, assembly, shop testing, inspection and testing at works, transport to site, insurance, storage, erection and commissioning of Control, Relay, Alarm and Annunciation Panels for 33/11 KV, Substations.

1.2. It is not the intent to specify completely herein all details of the design and construction of equipments. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation acceptable to the purchaser, who will interpret in a manner the meanings of drawings and specifications and shall have the power to reject any material which in his judgment is not in accordance therewith. The equipment offered shall be complete with all components necessary for its effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply, irrespective of whether these are specifically brought out in this specification and/or the commercial order or not.

2.0 STANDARDS

All equipment provided under this specification shall in general conform to the latest revision/amendment etc. of the following:

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<thead>
<tr>
<th>SI No.</th>
<th>Standard</th>
<th>Title</th>
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<tbody>
<tr>
<td>1</td>
<td>IS: 3231, IEC 255 Part-I to III, BS: 89</td>
<td>Electrical relays for power system protection.</td>
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<tr>
<td>2</td>
<td>IS: 1248; IS: 2419; BS: 89</td>
<td>Indicating instruments</td>
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<td>3</td>
<td>IS: 1301 0; IS: 722( Part-I to IX) IEC 521;</td>
<td>Energy meters</td>
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<td>BS 3T</td>
<td>Details</td>
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<td>4</td>
<td>IS: 4237</td>
<td>General requirement of switchgear and control gear for voltages not exceeding 1 KV</td>
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<tr>
<td>5</td>
<td>IS: 375</td>
<td>Marking arrangement for switchgear, busbars, main connection &amp; auxiliary wiring.</td>
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<tr>
<td>6</td>
<td>IS: 8686, IEC-255 Part V &amp;VI, IEC 801-4</td>
<td>Specification for static protective relays and tests</td>
</tr>
<tr>
<td>7</td>
<td>IEC 337; IEC: 337-1; IS: 6875</td>
<td>Control switches (LV switching devices for control and auxiliary circuits)</td>
</tr>
<tr>
<td>8</td>
<td>IS: 2516</td>
<td>MCCB sand load break switches having a break capacity of 30 KVA rms at 415 V.</td>
</tr>
<tr>
<td>9</td>
<td>IS: 4047</td>
<td>Fuse switching units</td>
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<td>10</td>
<td>IS: 2208</td>
<td>HRC fuse links</td>
</tr>
<tr>
<td>11</td>
<td>IS: 2705; IEC-185</td>
<td>Current transformers</td>
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<td>12</td>
<td>IS: 3156; IEC: 186</td>
<td>Potential transformers</td>
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<tr>
<td>13</td>
<td>IS: 8623</td>
<td>Factory built assemblies of switchgear &amp; control gear for voltages upto &amp; including 1000V AC &amp; 1200 V DC</td>
</tr>
<tr>
<td>14</td>
<td>IEC: 439</td>
<td>Low voltage switchgear and control gear assemblies</td>
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<tr>
<td>15</td>
<td>IS: 4237</td>
<td>General requirement of switchgear &amp; control gear for voltages not exceeding 1000V</td>
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<tr>
<td>16</td>
<td>IS: 2147</td>
<td>Degree of protection provided by enclosures for low voltage switchgear and control gear</td>
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<tr>
<td>17</td>
<td>IS: 5028</td>
<td>Aluminium alloy bars</td>
</tr>
<tr>
<td>18</td>
<td>IS: 1897</td>
<td>Copper strips for electrical purpose</td>
</tr>
<tr>
<td>19</td>
<td>IS: 3618; IS: 6005</td>
<td>Code of practice for phosphate</td>
</tr>
<tr>
<td>20</td>
<td>IS: 4064</td>
<td>Air break switches, air break disconnectors, air break disconnectors &amp; fuse combination units for voltages not exceeding 1000 V AC or 1200 V DC.</td>
</tr>
</tbody>
</table>
2.1. Equipment meeting with the requirements of other authoritative Standards, which ensure equal or better performance than the standards mentioned above, shall also be considered. When the equipment offered by the Bidder conforms to other standards, salient points of difference between standards adopted and the standard specified in this specification shall be clearly brought out in the relevant schedule. Four copies of such standards with authentic translation in English shall be furnished along with the offer.

3.0 CLIMATIC CONDITIONS

3.1. The climatic and isoceranunic conditions at site under which the equipments shall operate satisfactorily under the tropical conditions specified in this bidding documents.

3.2. The reference ambient temperature assumed for the purpose of this specification are as follows:
   i. Maximum ambient temperature : 40° C
   ii. Maximum average daily ambient temperature : 35° C
   iii. Maximum average yearly ambient temperature : 30° C

4.0 PRINCIPAL PARAMETERS

4.1. The details of Current Transformer are given below:

<table>
<thead>
<tr>
<th>C</th>
<th>Burden</th>
<th>Minimum knee</th>
<th>Purpose</th>
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33 KV side Transformer CT Ratio: 400-200/5-5 A

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<tr>
<td>1</td>
<td>5</td>
<td>20 VA</td>
<td></td>
<td>O/L &amp; E/L Protection</td>
</tr>
<tr>
<td>2</td>
<td>P</td>
<td>----</td>
<td>Min. ( V_k = 250 \text{ V} )</td>
<td>Transformer differential protection</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>15 VA</td>
<td>----</td>
<td>Metering</td>
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33 KV side Feeder CTs Ratio: 400-200/5-5 A

11 KV side Transformer CT Ratio: 400-200/5-5 A

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<td>3</td>
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<td>15 VA</td>
<td>----</td>
<td>Metering</td>
</tr>
</tbody>
</table>

11 KV side Feeder CT Ratio: 400-200/5-5 A

4.2. Breakers for HV & LV sides of transformer

- **HV side breaker**: VCB, Outdoor
- **LV (11KV) side breaker**: Vacuum type, Indoor/Outdoor
- **Rating of closing coil & Trip coil**: 110 V DC
- **Number of auxiliary contact**: 6 N/O and 6 N/C

Both HV & LV breakers are provided with two sets of trip coils (Each set common to all...
three phases)

5.0 Drawing, Manuals, Literatures etc.

5.1. The tenderer shall furnish along with his tender fully dimensioned drawings of the equipments offered, along with illustrated and descriptive literatures, for various component parts like relays, meters, control switches etc. to enable the purchaser for proper evaluation of the offer. The tenders shall also be accompanied with the schematic drawings showing protection, indicating metering schemes etc.

5.2. Soon after the award of the contract and before proceeding with the manufacturing works, the successful tenderer shall furnish drawings in quadruplicate which shall include but not limited to the followings for approval of the purchaser:

i) Principal layout drawings for the Boards showing the equipments on the panels with dimensions. A list of the equipments mounted on each panel shall be prepared and tabulated in the same drawings. The drawings shall also show the constructional details, foundation details indicating foundation bolts, cable entries etc.

ii) Elementary control drawings and other schematics for the equipments furnished, including protection, metering, annunciating and indicating circuit, breaker control, circuits etc. All wires terminals shall be clearly marked and numbered as per general practice.

iii) Single line and three line diagrams showing all AC and D.C power connections and all secondary connectors for relays, meters etc.

iv) Internal wiring diagrams of all the panels and boards giving internal wiring connections for all the equipments in the panels. The drawings shall also clearly indicate the connections to be made at site or to the external equipments or between boards etc. with wires terminals marked properly.

v) After approval of the drawings the tenderer shall furnish six copies of the each of the final drawings along with the literatures, instruction manuals etc. for purchaser's reference.

5.3. In addition to the above the successful bidders shall supply three sets each of the following relevant equipments supplied to each substation:

a. All final drawings mentioned above.

b. Literature describing construction, operation, adjustment, testing, calibration, maintenance of all protective and auxiliary relays, instruments, control switches etc.

c. List of spare parts giving identification numbers of the parts.
6.0 GENERAL TECHNICAL REQUIREMENT

6.1. **Control & Relay panels: Detailed Description**

The control and relay panels shall be of Simplex type. Each Simplex panel shall consist of a vertical front panel with equipment mounted thereon and having wiring access from the rear. It shall have double leaf door with lift off hinges at the back for panels of width more than 800 mm. Doors shall have handles with built-in locking facility.

7.0 Constructional Features

7.1. Panels shall be completely metal enclosed and shall be dust, moisture and vermin proof. The enclosure shall provide a degree of protection not less than IP-51 in accordance with IS:2147.

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

7.3. All doors, removable covers and panels shall be gaskets all around with neoprene gaskets. Ventilation louvers to be provided having screens and filters. The screens shall be made of brass wire mesh.

7.4. Design, materials selection and workmanship shall be such as to result in neat appearance inside and outside with no welds, rivets or bolt head apparent from outside, with all exterior surfaces true and smooth.

7.5. All necessary anchor bolts and other materials required for foundation of panels shall be supplied.

7.6. Cable entries to the panel shall be from the bottom. The plates of the panel shall be fitted with removable gland plates for fixing the cable glands. Necessary number of cable glands of sizes to suit owner's external cables to the panels shall be supplied by the bidder. Cable glands shall be screwed type, and shall be suitable for PVC cables. Cable gland plate fitted in the bottom of the panel shall be connected to the earthing Panel / Station through a flexible braided copper conductor rigidly.

7.7. Relay panels of modern, modular construction would also be acceptable.

7.8. The total height of the panel shall be 2250 mm. The depth of the panel shall be 600 mm. The panels shall have suitable width required for mounting of all the equipments on the front panel.

7.9. The panels shall match with the existing panels in APDCL substations, the details of which will be furnished to the successful bidder. Matching includes height, depth of the panels, colour matching and mimic matching and arrangement of equipment on the front.
8.0 Mounting

8.1. All equipment on and in panels shall be mounted and completely wired to the terminal blocks ready for external connection. The equipment on front of panel shall be mounted flush.

8.2. Equipment shall be mounted such that removal and replacement can be accomplished individually without interruption of service to adjacent devices and are readily accessible without use of special tools. Terminal marking shall be clearly visible.

8.3. The contractor shall carry out cutouts, mounting and wiring of the free issue items supplied by others, if any which are to be mounted in this panel in accordance with the corresponding equipment manufacturer’s drawings. Cutouts if any, provided for future mounting of equipment shall be properly blanked off.

8.4. The center lines of switches, push buttons and indicating lamps shall be not less than 750 mm from the bottom of the panel. The center lines of relays, meters and recorders shall be not less than 450 mm from the bottom of the panel.

8.5. The center lines of switches, push buttons and indicating lamps shall be matched to give a neat and uniform appearance. Likewise the top lines of all meters, relays and recorders etc., shall be matched.

8.6. No equipment shall be mounted on the doors.

8.7. All the equipment connections and cabling shall be designed and arranged to minimize the risk of fire and damage which may be caused by fire.

9.0 Panel Internal Wiring and Other Accessory Equipment

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

9.2. All wiring shall be carried out with 1100 V grade, single core, stranded copper conductor wires with PVC insulation and shall be heat resistant grade and vermin and rodent proof. The minimum size of the stranded copper conductor used for internal wiring shall be as follows:

i) All circuits except current transformer and potential transformer circuits one multi strand 2.5 Sq. mm per lead

ii) Current transformer circuit : one 4.0 Sq. mm per lead. The minimum number of
strands per conductor shall be three.

9.3. All internal wiring shall be securely supported, neatly arranged, readily accessible and connected to equipment terminals and terminal blocks. Wiring gutters and troughs shall be used for this purpose.

9.4. Auxiliary bus wiring for AC and DC supplies, voltage transformer circuits, annunciation circuits and other common services shall be provided near the top of the panels running throughout the entire length of the panels.

9.5. Wire termination shall be made with solder less crimping type and tinned copper ring type lugs which firmly grip the conductor and insulation. Insulted sleeves shall be provided at all the wire terminations. Engraved core identification plastic ferrules marked to correspond with panel wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wire and shall not fall off when the wire is disconnected from terminal blocks.

9.6. All wires directly connected to trip circuit of breaker or device shall be distinguished by the addition or red coloured unlettered ferrule. Number 6 and 9 shall not be included for ferrule purposes.

9.7. Longitudinal troughs extending throughout the full length of the panel shall be preferred for inter panel wiring. Interconnections to adjacent panel shall be brought out to a separate set of terminal blocks located near the slots or holes meant for taking the inter connecting wires. Arrangements shall permit easy inter connections to adjacent panels at site and wires for this purposes shall be provided by contractor looped and bunched properly inside the panel.

9.8. The Successful bidder shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.

10.0 Terminal Blocks

10.1. All internal wiring to be connected to the external equipment shall terminate on terminal blocks preferably vertically mounted on the side of each panel. Terminal blocks shall be 1100 V grade and have 10 amps continuous rating, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts. Terminal block design shall include a white fibre markings strip with clear plastic slip-on terminal covers. Markings on the terminal strips shall correspond to wire number and terminal numbers on the wiring diagrams.

10.2. Terminal blocks for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. Also current transformer secondary leads shall be provided with short-circuiting and earthing facilities.

10.3. At least 20% spare terminals shall be provided on each panel and these spare terminals shall be uniformly distributed on all terminal blocks.
10.4. Unless otherwise specified, terminal blocks shall be suitable for connecting the following conductors of purchasers cable on each side
   i. All circuits except current and potential transformer circuits: minimum of one of 2.5 sq.mm copper.
   ii. All CT and PT circuits: minimum of two of 4.0 mm square copper.

10.5. There shall be a minimum clearance of 250 mm between the first row of terminal blocks and associated cable gland plate. Also the clearance between two rows of terminal blocks shall be minimum, of 150 mm.

10.6. Arrangement of the terminal block assembles and the wiring channel within the enclosure shall be such that a row of terminal blocks is run parallel and in close proximity along each side of wiring duct to provide for convenient attachment of internal panel wiring. The side of the terminal block opposite the wiring duct shall be reserved for purchaser's external cable connection. An adjacent terminal block shall also share this fired wiring corridor. A steel strip shall be connected between adjacent terminal block rows at 450 mm intervals for support of incoming cables.

10.7. The number and sizes of the Purchaser's multi-core incoming cable will be furnished to the Contractor after placement of the order. All necessary cable terminating accessories such as gland plates, packing glands, crimp type tinned copper lugs supporting clamps and brackets, wiring troughs and gutters etc., for purchaser's cable shall be included in contractor's scope of supply.

11.0 Painting

11.1. All sheet steel work shall be phosphated, in accordance with the 18:6005 "Code of Practice for phosphating iron and steel". Oil, grease, dirt and sweat shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by picking with dilute acid followed by washing with running water rinsing with a slightly alkaline hot water and drying.

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

11.3. After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after completion of tests. The exterior Colour of the paint shall be selected by the purchaser at a later date.

11.4. Each coat of primer and finished paint shall be of a slightly different shade to enable inspection of the painting. The powder coat paint shade should Air Craft Grey (IS : 5) and thickness of 50-60 microns.

A small quantity of finished paint shall be supplied for minor touching up required at
site after installation of the panels.

11.5. In case the bidder proposes to follow any other established painting procedure like electrostatic painting, the procedure shall be submitted along with offer/bid for purchaser's review and approval.

12.0 Mimic Diagram

12.1. Coloured mimic diagram and symbols showing the exact representation of the system shall be provided in the front of control panels.

12.2. Mimic diagram shall be made preferably of anodized aluminum or plastic of approved fast Colour material which shall be screwed on to the panel and can be easily cleaned. Painted overlaid mimic is also acceptable. The mimic bus shall be 2 mm thick. The width of the mimic bus shall be 10 mm for bus bars and 7 mm for other connections.

12.3. Mimic bus Colour will be decided by the Purchaser and shall be obtained from the Purchaser by the successful Bidder.

12.4. When semaphore indicators are used for isolator position they shall be so mounted in the mimic that the isolator closed position shall complete the continuity of mimic.

12.5. Indicating lamp, one for each phase for each bus shall be provided on the mimic to indicate bus charged condition.

13.0 Name Plates and Markings

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

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

13.3. Nameplates shall be made of non-rusting metal or any other suitable material. Nameplates shall be black with white engraving lettering. The nameplates inscription and size of nameplates and letters shall be submitted to the purchaser for approval.

13.4. Each instrument and meter shall be prominently marked with the quantity measured e.g. kV, A, MW, etc. All relays and other devices shall be clearly marked with manufacturer's name, manufacturer's type, serial number and electrical rating data.

13.5. Each switch shall bear clear inscription, identifying its function e.g. “BREAKER” ,”52 A”, “AMMETER” etc. Similar inscriptions shall also be provided on each device whose function is not otherwise identified. If any switch
device does not bear this inscription separate name plate giving its function shall be provided for it. Switch shall also have clear inscription for each position indicating e.g. "TRIP-NEUTRAL-CLOSE", "ON-OFF", "R-Y-B-N:-OFF", etc.

14.0 Miscellaneous Accessories and Supporting Steel

14.1. Plug point- An AC 240 Volts, single phase, 5A, 50 HZ AC plug point shall be provided in the interior of each cubicle with "ON-OFF" Switch for connection of hand lamps.

14.2. Interior lighting: Each panel shall be provided with a CFL lighting fixture rated for 240 volts, single phase, 50 HZ supply for the interior illumination of the panel during maintenance. The fittings shall be complete with switch fuse unit and switching of the lighting shall be controlled by the respective panel door switch.

14.3. One DC emergency lamp is to be fitted and should be complete with switch fuse unit.

14.4. Each control panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control signaling, lighting and space heater circuits. MCBs for the incoming circuits and fuses for sub-circuits shall be provided. Selection of the main and sub-circuit fuse rating shall be such as to ensure selective clearance of sub-circuit faults. Potential circuit for relaying and metering shall be protected by fuses. All fuses shall be HRC cartridge type conforming to IS : 2208 mounted on plug-in type fuse bases. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.

14.5. Supporting Steel: All necessary foundation anchor bolts and other parts of supporting and fastenings, of the panels shall be supplied by the contractor.

15.0 Earthing

15.1. All panels shall be equipped with an earth bus securely screwed. Location of earth bus shall ensure no radiation interference for earth systems under various switching conditions of isolators and breakers. The material and the sizes of the bus bar shall be at least 25 x 6 mm copper flat.

15.2. When several panels are mounted adjoining each other, the earth bus shall be made continuous and necessary connectors and clamps for this purpose shall be included in the scope of supply of contractor. Provision shall be made for extending the earth bus bars to future adjoining panels on either side.

15.3. Provision shall be made on each earth bus bars of the end panels for connecting purchaser’s earthing grid. Necessary terminal clamps and connectors for this purpose shall be included in the scope of supply of
contractor. The wire or screens should be clearly bonded and earthed at the gland plate.

15.4. All metallic cases of relays, instruments and panel mounted equipment shall be connected to the earth bus preferably by independent copper wires of size not less than 2.5 Sq.mm. The colour code of earthing wires shall be green. Earthing wire shall be connected on terminals with suitable clamp connectors and soldering shall not be permitted.

15.5. Looping of earth connections which would result in loss of earth connection to other devices where the loop is broken shall not be permitted. However, looping of earth connections between equipment to provide alternative paths to earth bus shall be provided.

15.6. VT and CT secondary neutral or common lead shall be earthed at one place only at the terminal blocks where they enter the panel. Such earthing shall be made through links so that earthing may be removed from one group without disturbing continuity of earthing system for other groups.

16.0 Metering Instruments: Instruments and Meters

16.1. All instruments, meters, recorders and transducers shall be enclosed in dust proof, moisture resistant, black finished cases and shall be suitable for tropical use. They shall be calibrated to read directly the primary quantities. They shall be accurately adjusted and calibrated at works and shall have means of calibration, check and adjustment at site. All accessories including test switches and test plugs, where applicable shall be furnished. Their elements shall be shock resistant and shielded from external magnetic fields.

16.2. Ammeters:

16.2.1. All ammeters shall be of digital type and provided with direct reading triple range scale. Scale value of ammeters shall be equal to 1 to 1.3 times the rated primary current of the associated current transformer feeding it. The rated current shall be 5.0 Amp. Accurate reading of ammeter shall be possible at the lowest limit of 5% of the rated current. Accuracy class 1.0 as per IS: 1248.

16.3. Voltmeter:

16.3.1. All voltmeters shall be of digital type direct reading scale. The maximum scale value of voltmeters shall be 50% in excess of the primary voltage of the associated PTs. The rated voltage of the voltmeter shall be 110 volts A.C., accuracy class 1.0 as per IS: 1248.

16.4. Watt meters

16.4.1. Digital watt meters wherever specified shall be 3 phase, 4 wire three element type provided with direct reading scales. The scale values of wattmeter shall be as per ratio of the measuring cores of respective CTs and PTs. The current coils shall be rated for 5/1 ampere and voltage coils for 110
volt continuous. The wattmeters shall be suitable for circuits with unbalanced loads to be usually met with in commercial service. Accuracy class will be 1.0 as per IS: 1248.

16.5. Energy Meters:

16.5.1. Energy meters shall be static type conforming to IEC 687 and suitable for bi-directional power flow. The static meter shall measure active and reactive energy both import and export, by 3 phases 4 wire principle suitable for balanced / unbalanced 3 phase load. Accuracy of meter shall be 0.2 for active energy and 0.5 for reactive energy. The active and reactive energy shall be directly computed in CT & VT primary values and stored in four different registers as MWH (E), MWH(I), MVARH (E) and MVARH (I) along with a plus sign for export and minus sign for import. CT secondary is 5 A the appropriate ratios of meters shall compute the energy sent out/received, from/to the station bus bar during each successive 15 minute block and store in the respective registers. Meter shall display on demand the energy sent out! received during the previous 15 minute block. Further the meter shall continuously integrate the energy readings of each register upto that time. All these readings shall be displayed on demand. Cumulative reading of each register shall be stored in non-volatile memory at the end of each hour of day starting from 01 hours. These readings shall be stored for a period of 40 days before being erased. The static meter shall have built in clock and calendar having an accuracy of 1 minute per month or better. Date / time shall be displayed on demand.

16.5.2. Each meter shall have a unique identification code provided by purchaser and shall be marked permanently on the front and also on the non-volatile memory. The voltage monitoring of all the three voltages shall be provided.

16.5.3. The meter shall normally operate with power drawn from VT supplies. Power supply to the meter shall be healthy even with a single phase VT supply. An automatic back up shall be provided by a built in life time battery and shall not need replacement for at least ten years with a continuous VT interruption of even two years. Date and time of VT interruption and restoration shall be automatically stored in non-volatile memory.

16.5.4. The meter shall have an optical port at the front of the meter for data collection by a hand held device. The meter shall have means to test MWH accuracy and for connecting it to time of day tariff equipment.

16.5.5. The meter should have optical port for local communication. RS 232 and RS 485 port should be incorporated along with Ethernet port.

16.5.6. The bidder is to provide the software for meter for downloading and uploading to base computer along with one hand held common meter reading instrument along with software.
16.5.7. The meter should preferably be either Secure or L & T make as per APDCL’s specification.

17.0 Relays:

17.1. All relays shall conform to the requirements of 18:3231 or other applicable approved standards. Relays shall be suitable for flush or semi flush mounting on the front with connections from the rear. Relays shall be rectangular in shape and shall have dust tight, dull' black or egg shall black enamel painted cases with transparent cover removable from the front.

17.2. All protective relays shall be in draw out or plug-in type / modular cases with proper testing facilities. The testing facilities provided on the relays shall be specifically stated in the bid. Necessary test plugs shall be supplied loose and shall be included in Contractor's scope of supply. Test block and switches shall be located immediately below each relay for testing. As an alternative to test block and test plug arrangements the Bidder shall also quote alternative testing facility of protective relays by providing a push button which when pressed connects the testing equipment to the relay coils and injects current in the coil and automatically disconnects the trip circuits and on operation of relay gives a signal that the equipment and the circuits are correct.

17.3. The purchaser reserves the right for accepting anyone of the above two testing facilities. Unless otherwise specified all auxiliary relays and timers shall be supplied in non-draw out cases/plug in type modular cases.

17.4. All AC relays shall be suitable for operation at 50 Hz AC Voltage operated relays shall be suitable for 110 Volts VT secondaries and current operated relays for 5 Amp CT secondaries as specified in this specification. DC auxiliary relays and timers shall be designed for 110 V DC voltage and shall operate satisfactorily between 70 % and 110% of rated voltage. Voltage operated relays shall have adequate thermal capacity for continuous operation.

17.5. The protective relays shall be suitable for efficient and reliable operation of the protection scheme described in the specification. Necessary auxiliary relays and timers required for interlocking schemes for multiplying of contacts/suiting contact duties of protective relays and monitoring of control supplies and circuits, lockout relay monitoring of circuits etc., and also required for the complete protection schemes described in the specification shall be provided.

17.6. All protective relays shall be provided with at least two pairs of potential free isolated output contacts. Auxiliary relays and timers shall have pairs of contacts as required to complete the scheme. Contacts shall be silver faced with spring action. Relay cases shall have adequate number of terminals for making potential free external connections to the relay coils and contacts including spare contacts. Relay case size shall be so chosen as not to introduce any limitations on the use of available contacts on the relay due to in-adequacy of terminals. Paralleling of contacts, if any, shall be done at the terminals on the casing of the relay.
17.7. All protective relays, auxiliary relays and timers except the lock out relays and interlocking relays specified shall be provided with self-reset type contacts. All protective relays and timers shall be provided with externally hand reset positive action operation indicators, provided with inscription, subject to purchaser’s approval. All protective relays which do not have built in hand reset operation indicators shall have additional auxiliary relays with operating indicators for this purpose. Similar separate operating indicator (auxiliary relays) shall also be provided in the trip circuits of protections located outside the board such as bucholz relays, temperature protection, fire protection, etc.,

17.8. Timers shall be done of the electromagnetic or solid state type. Pneumatic timers are not acceptable. Short time delays in terms of milliseconds may be obtained by using copper slugs on auxiliary relays. In such case it shall be ensured that the continuous rating of the relay is not affected. Time delay in terms of milliseconds obtained by the external capacitor resistor combination is not acceptable.

17.9. No control relay which shall trip the power circuit breaker when the relay is de-energized shall be employed in the circuits.

17.10. Provision shall be made for easy isolation of trip circuits of each relay for the purpose of testing and maintenance.

17.11. All relays shall withstand a test voltage 2.5 kVrms voltage, 50Hz for one second.

17.12. Auxiliary seal-in-units provided on the protective relays shall preferably be of shunt reinforcement type. If series relays are used the following, shall be strictly ensured:

i. The operating time of the series seal-in-unit shall be sufficiently shorter than that of the trip coil or trip relay in series with which it operates to ensure definite operation of the flag indicator of the relay.

ii. Seal-in-unit shall obtain adequate current for operation when one or more relays operate simultaneously.

iii. Impedance of the seal-in-unit shall be small enough to permit satisfactory operation of the trip coil on trip relays when the DC supply voltage is minimum.

17.13. All protective relays and alarm relays shall be provided with one extra isolated pair of contacts wired to terminals exclusively for purchaser’s use.

17.14. For numeric relays the following requirements shall be met with:

17.14.1. Numerical relay shall have both RS 485 and RS 232 communication ports. And ten numbers digital IO. Relay software is required.

17.14.2. The numerical relays shall be completely numerical with protection elements realized using software algorithm.
17.14.3. The relay should have high immunity to electrical and electromagnetic interference. Relay should confirm to following mandatory type test for safe operation of relay:

a. High frequency disturbance test as per IEC 610 – 4-1
b. Fast transient disturbance test as per IEC 61000 – 4-4
c. Electrostatic discharge as per IEC 61000 – 4-2
d. Radio frequency interference as per ANSI C 37.90.2
e. Impulse test as per IEC 6100 – 4-3

18.0 Annunciation System:

18.1. Alarm annunciation system shall be provided for the control board by means of visual and audible alarm in order to draw the attention of the operator to the abnormal operating conditions or the operation of some protective devices. The annunciation equipment shall be suitable for operation with 110 V DC voltage.

18.2. The visual annunciation shall be provided by\ annunciation facia, mounted flush on the top of the panels. The audible alarm shall be provided by alarm buzzer and bell for trip and non-trip alarm respectively.

18.3. The annunciator fascia shall be provided with translucent plastic window for alarm point with minimum size of 35 mm x 50 mm. The facia plates shall be engraved in black lettering with respective inscriptions which will be furnished to the Bidder by the purchaser.

Alarm inscriptions shall be engraved on each window in not more than three lines and size of the lettering shall not be less than 5 mm.

18.4. Each annunciation window shall be provided with two white lamps in parallel to provide safety against lamp failure. Long life lamps shall be used. The lamp circuit shall include series resistor of adequate rating. The cover plate of the facia windows shall be flush with the panel and shall be capable of easy removal to facilitate replacement of lamps. The transparency of cover plates and wattage of the lamps provided in the facia windows shall be adequate to ensure clears visibility of the inscriptions in the control room having high illumination intensity (500 lux) from the location of the operator's desk.

18.5. TRIP AND NONTRIP facia shall be differentiated. All TRIP facia shall have red colour and all NONTRIP facia shall have white colour.

<table>
<thead>
<tr>
<th>Alarm condition</th>
<th>Fault contact</th>
<th>Visual annunciator</th>
<th>Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip</td>
<td></td>
<td>Trip</td>
<td></td>
</tr>
<tr>
<td>Nontrip</td>
<td></td>
<td>Nontrip</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Normal</td>
<td>Abnormal</td>
<td>Acknowledge push button is pressed</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------</td>
<td>----------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Status</td>
<td>Open</td>
<td>Close</td>
<td>Open</td>
</tr>
<tr>
<td>Action</td>
<td>Off</td>
<td>Flashing</td>
<td>Steady on</td>
</tr>
<tr>
<td>Action</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
</tbody>
</table>

18.6. Visual and audible annunciation for the failure of DC supply to the annunciation system shall also be provided and this annunciation shall operate on 240 volts AC supply with separate fuses. On failure of the power supply to the annunciation system for more than 3 seconds (adjustable setting) an indicating lamp shall light up and a bell shall sound. A separate push button shall be provided for cancellation of this audible alarm alone but the indicating lamp shall remain steadily lighted till the supply to the annunciation system is restored. The sound of the audible alarm (bell) provided for this annunciation shall be different from the audible alarm provided for this annunciation system.

18.7. A separate voltage check relay shall be provided to monitor the failure of supply (240 V AC) to the scheme mentioned above. If the failure of supply exists for more than 2 to 3 seconds, this relay shall initiate visual and audible
annunciation. The annunciation system described above shall meet the following additional requirements.

18.8. The annunciation system shall be capable of catering to all simultaneous signals at a time.

i) One self resetting push button shall be provided on each panel for testing in fascia window lamps. Push buttons for testing flasher and audible alarm circuit of annunciation supply failure monitoring shall also be provided. These testing circuits shall be so connected that while test is being done it shall not prevent the registering of any new annunciation that may land during the test.

iii) One set each of the following push buttons shall be provided on each panel.

a) Reset push button for annunciation system;

b) Accept push button for annunciation system.

di) The annunciation shall be repetitive type and shall be capable of registering the fleeting signal. For fault contacts which open on a fault, it shall be possible at site to change annunciators from "close to fault" and vice versa.

dv) The annunciator shall be suitable for operation with normally open fault contacts which close on a fault. For fault contacts which open a fault, it shall be possible at site to change annunciators from "close to fault" and vice versa.

vi) Only electro-magnetic relay type alarm and annunciation relay schemes are acceptable and static type annunciation schemes are not acceptable. Contactors are not acceptable for annunciation system.

19.0 Switches

19.1. Control and Instrument switches shall be rotary operated type with escutcheon plates clearly marked to show operating position and circuit designation plates and suitable for flush mounting with only switch front plate and operating handle projecting out. Handles of different shapes and suitable inscriptions on switches as per clause 6.8 shall be provided as aid switch identification.

19.2. The selection of operation handles for the different types of switches shall be as follows:

<table>
<thead>
<tr>
<th></th>
<th>Breaker &amp; isolator switches</th>
<th>Pistol grip, black</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Selector switches</td>
<td>Oval or knob, black</td>
</tr>
<tr>
<td>3</td>
<td>Instrument switches</td>
<td>Round, knurled, black</td>
</tr>
<tr>
<td>4</td>
<td>Protection transfer switch</td>
<td>Pistol grip, lockable &amp; black</td>
</tr>
</tbody>
</table>
19.3. The control switch of breaker and isolator shall be of spring return to neutral type. The spring return type shall be provided with target which shall indicate the last operation of the switch. The control springs shall be strong and robust enough to prevent inadvertent operation due to light touch. The spring return type switch shall have spring return from close and trip positions to "after close" and "after trip" positions respectively.

19.4. Instrument selection switches shall be of maintained contact (stay put) type. Ammeter selection switches shall make-before-break type contacts so as to prevent open circuiting of CT secondaries when changing the position of the switch. They shall be of 5 position type viz R-Y-B-N-Off. Voltmeter transfer switches for AC shall be suitable for reading all line-to-line and line-to neutral voltages for non-effectively earthed systems and for reading all line to line voltages for effectively earthed systems.

19.5. Lockable type of switches which can be locked in particular positions shall be provided when specified. The key locks shall be fitted on the operating handles.

19.6. The contacts of all switches shall preferably open and close with snap action to minimize arcing. Contacts of switches shall be spring assisted and contact faces shall be with rivets of pure silver. Springs shall be used as current carrying parts.

19.7. The contact combination and their operation shall be such as to give completeness to the interlock and function of the scheme. The contact rating of the switches shall be as follows:

<table>
<thead>
<tr>
<th>Contact Type</th>
<th>110 V DC</th>
<th>240 V AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Make and carry continuously</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>b) Make and carry for 0.5 Sec.</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>c) Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Resistive load</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>ii) Inductive load with L/R= 40</td>
<td>0.2</td>
<td>7</td>
</tr>
</tbody>
</table>

20.0 Indicating Lamps

20.1. Indicating lamps shall be panel mounting type with rear terminal connections. Lamps shall be of LED type. Lamps shall have translucent lamp covers to diffuse light coloured red, green, amber, dear white or blue as specified. The lamp cover shall be of screwed type, un-breakable and moulded from heat resisting material. 20% of lamps actually used on the boards and 10% of the lamp bases of various colour actually used shall be supplied in excess to serve as spares.

20.2. The wattage and resistance of the lamps shall be as follows:

110 V -5 to 7 W - 1000 to 2000 Ohms
20.3. Bulbs and lenses shall be interchangeable and easily replaceable from the front of the panel. Tools, if required for replacing the bulbs and lenses shall also be included in the scope of supply.

20.4. The indicating lamps with resistors shall withstand 120% of rated voltage on a continuous basis.

21.0 Position Indicators

21.1. Position indicators of ‘SEMAPHORE’ type shall be provided when specified as part of the mimic diagrams on panels for indicating the position of circuit breakers, isolating/earthing switches etc. The indicator shall be suitable for semi-flush mounting with only the front disc projecting out and with terminal connection from the rear. Their strips shall be of the same colour as the associated mimic.

21.2. Position indicator shall be suitable for either AC or DC operation as specified. When the supervised object is in the closed position, the pointer of the indicator shall take up a position in line with the mimic bus bars, and at right angles to them when the object is in the open position. When the supply failure to the indicator occur the pointer shall take up an intermediate position to indicate the supply failure. The rating of the indicator shall not exceed 2.5 W.

21.3. The position indicators shall withstand 120% of rated voltage on a continuous basis.

22.0 Trip Circuit Supervision Relays

22.1. Trip circuit shall be supervised by means of relays. The scheme shall continuously monitor each trip coil in both pre-close and after-close of the breaker. The scheme shall detect. i) Failure of DC supply to each trip coil. ii) Open circuit of trip circuit wiring and iii) Failure of mechanism to complete the tripping operation.

22.2. Also 2 Nos. indicating lamps to act in conjunction with trip circuit supervision relays for healthy trip indication of 2 sets of trip coils shall be supplied.

22.3. Necessary external resistors for trip circuit supervision relays shall be supplied.

23.0 Flag Relays Shall Have

i) Hand reset flag indication

ii) Two elements

iii) Have necessary NO/NC contacts for each element/coil to meet scheme requirements.

24.0 Detailed Description of Protections
The protection, auxiliary relay and timers and other equipment that are required to be provided are included in the detailed equipment schedule of panels vide Annexure.-1 of this specification. The detailed description of Back up protection and the associated equipment is described below:

The setting ranges of relays given in specification are indicative. The setting ranges of the equipment offered, if different from the ones specified, shall also be acceptable if they met the functional requirements.

The bidder shall quote the protection equipment, meeting the following requirements.

**33/11 KV, TRANSFORMER**

a) **Differential Protection**

It shall have

i) Triple pole high speed percentage biased differential type.

ii) An operating time not more than 30 milliSecs. At 5 times operating current setting of 20%.

iii) Three instantaneous high set over current units

iv) Second harmonic restraint feature and fifth harmonic by pass/restraint feature and also be stable under normal over fluxing conditions.

v) An operating current setting of 20% or less,

vi) Suitable for rated current of 5A and 1 Ampere

vii) Adjustable bias setting range of 20% to 50%

viii) Two bias windings per phase

ix) Stable on heavy through faults

x) Include necessary separate interposing CTs for angle and ratio correction or have internal features in the relay to take care of angle and ratio correction.

xi) Shall be of numerical type.

b) **Over current and earth fault protection 33 KV 2.5 MV A transformer**

The relay should be triple pole non-directional with IDMT characteristics. It should either be numeric or electromagnet type, however offer for Areva make Micom series of relay will be preferred.

c) **Auxiliary relays for transformer protection devices**

Auxiliary relay required for Bucholtz trip and alarm, HV winding temperature trip & alarm, LV winding temperature trip & alarm, oil temperature alarm & trip and low oil level alarm, PRV trip, shall be provided. Each auxiliary relay shall have 2 pairs of contacts and one hand reset flag indicators. The auxiliary relays may be of non-draw out type.

d) **Inter Tripping Relays**
1 No. inter trip relay to trip HV and LV breakers of the transformer and to isolate the transformer from supply shall be supplied. The inter trip relay shall be of high speed and shall be provided with hand reset operation indicator and 4 NO + 2 N/C hand reset contacts for 33 KV breaker and 13 NO + 3 N/C hand reset contacts for 11 KV breaker.

The protection scheme shall function as follows:

a) Differential relays operated: both HV, and LV breakers trip.

b) O/C & E/F on HV operated: both H.V and LV breakers trip.

c) Buchholz Relay Operated: both H.V & L.V. breakers trip.

d) Winding temperature trip contact closed: both HV & LV. breakers trip.

e) Oil temperature - alarm only.

f) PRV Operated: both H.V & L.V. breakers trip.

24.1. **Relay and Control Panels for 33 kV Feeders**

Following meters, relays etc shall be provided in the feeder panel, However. any other items which are not specifically mentioned in this specification but are required to complete the scheme and for satisfactory operation of scheme shall also be deemed to be included in this specification.

1) **PROTECTIVE RELAYS:**

   Over current relay  2 Nos
   Earth fault relay  1 No

   Relays for O/C and E/F protection shall
   I. be of numeric non-directional type
   II. be of triple pole type with two outer elements for O/C and the other for E/F protection.
   III. be with IDMT characteristics with a definite minimum time of 3 sec at 10 times settings.
   IV. have a variable setting range of 50-200% for over current and 20-80% for earth fault.
   V. be rated for 5/1 ampere
   VI. include hand reset flag indicator

2) **INSTRUMENTS AND METERS**

   Following meters and instruments shall be provided in the panel:
   a) One no. Ammeter Digital Type
   b) One no. Voltmeter Digital Type
c) One no Watt meter of digital type

d) Electronic Trivector meter (as per specification)

3) CONTROLS

Following control switches shall be provided in the panel:

a) One no., three position (i.e. trip-neutral-close) breaker control switch.

b) One no. Ammeter-selector switch.

c) Push button for trip circuit healthy indication.

d) Selector switch for voltmeter

4) INDICATION AND ALARMS

Following indicating arrangement shall be provided in the feeder panel:

a) Indicating lamps for CB ON/OFF positions 2 nos.

b) Indicating lamp for TRIP CIRCUIT HEALTHY CONDITION 2 No

c) Indicating lamp labeling Breaker Spring changed 1 No

d) Indicating lamp for low SF\(_6\) 1 No

e) Indicating lamp for SF\(_6\) CB lockout 1 No

f) Mimic diagram indicating the relevant position of the single

Line diagram of the sub-station incorporating the semaphore

Indicators for circuit breakers 1 No.

Isolators 2 Nos.

and Earth switch 1 No.

g) Indicating lamp for Auto-trip indication with accept push button 1 No.

25.0 AUXILIARY SUPPLY

Auxiliary supplies which shall be made available in substation are as follows:

a) A.C. supply 415 V/240 volts, 50Hz three/single phase

b) D.C. supply: 110 Volts

26.0 INSPECTION

Inspection may be carried out by the purchaser or third party nominee at any stage of manufacture. The supplier shall grant free access to the purchaser’s representative or third party nominee at a reasonable time when the work is in progress. 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 defective.

1. TECHNICAL SPECIFICATION FOR STEEL TUBULAR POLES

SCOPE: 1.1 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. 1.0 STANDARD: 1.1. The tubular steel poles shall conform to the latest edition of

The Steel Tubular Poles conforming to other internationally accepted, which ensure equal or higher quality than the standards, mentioned above also be acceptable. In case the bidder who wish to offer material conforming to the other standards, salient points of difference between adopted and specific standards with authentic English Translation shall be furnished.

2.0 Topography and Climatic Condition:
2.1. 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 50°C with humidity nearing saturation.

3.0 Materials:
3.1. 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/mm²). Or 410 MPa as the case may be. 3.2. 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. 4.0 Types, Size and construction:
4.1. Tubular Steel Poles shall be swaged type. 4.2. 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. 4.3. Swaging may be done by any mechanical process. The upper edge of each joint shall be chamfered if at an angle of about 45°. 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. 4.4. The length of joints on swaged poles shall be in accordance with clause No. 5.4 of IS: 2713(Par-I): 1980. 4.5. 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. 4.6. Tolerances for outside diameter, thickness, length, weight and straightness shall be in accordance with IS: 2713 (Part-I) : 1980. 4.7. 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 or equivalent international specifications.

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

### SPECIFIC TECHNICAL REQUIREMENTS FOR TUBULAR STEEL POLES: SWAGED TYPE

<table>
<thead>
<tr>
<th></th>
<th>16 meters long</th>
<th>14.5 meters long</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Standard</td>
<td>IS: 2713 (Part-I and III): 1980 as amended upto date</td>
<td></td>
</tr>
<tr>
<td>2) Type of Pole</td>
<td>Swaged Type</td>
<td></td>
</tr>
<tr>
<td>3) Designation</td>
<td>410 SP-80</td>
<td>410 SP 76</td>
</tr>
<tr>
<td>4) Overall Length</td>
<td>16 meters</td>
<td>14.5 meters</td>
</tr>
<tr>
<td>5) Planting depth</td>
<td>2.3 meters</td>
<td>2.0 meters</td>
</tr>
<tr>
<td>6) Height above ground</td>
<td>13.7 meters</td>
<td>12.5 meters</td>
</tr>
<tr>
<td>7) Effective length of Each section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Bottom</td>
<td>7.0 meters</td>
<td>6.50 meters</td>
</tr>
<tr>
<td>b) Middle</td>
<td>4.5 meters</td>
<td>4.00 meters</td>
</tr>
<tr>
<td>c) Top</td>
<td>4.5 meters</td>
<td>4.00 meters</td>
</tr>
<tr>
<td>8) Outside diameter and Thickness of each Section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Bottom</td>
<td>219.1x5.90mm</td>
<td>219.1x5.90 mm</td>
</tr>
<tr>
<td>b) Middle</td>
<td>193.7x4.85 mm</td>
<td>193.7x4.85 mm</td>
</tr>
</tbody>
</table>
2. TECHNICAL SPECIFICATION FOR GALVANISED 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 33KV, 11KV & 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 IS:2629

| 1. | Base Plate | A Mild Steel base plate of size 400 mm x 400 mm x 8 mm shall be welded at the bottom of the pole. |
| 2. | Painting | The inner side & outer underground portion of the pole is to be painted with black bituminous paint conforming to IS : 158-1968 throughout,[ internally and externally, up to the level which goes inside the earth]. The remaining portion of the exterior shall be galvanized as per clause No |

c) Top

| 9) Joint Length ( in cm.): |
| a) Bottom (J2) | 45 cm. | 45 cm. |
| b) Top (J1) | 40 cm. | 40 cm. |

10) Approximate weight of Pole

| 11) Point of application of load below/top (mtr.): |
| 0.6 mtr. | 0.6 mtr |

12) Breaking load ( inKgf )

| 13) Working load with factor of Safety : 2.5 ( in Kgf ) |
| 291 | 379 |

14) Crippling load ( inKgf )

| 15) Load for permanent set Not exceeding 13mm (in Kgf) |
| 319 | 460 |

16) Load for Temporary Deflection of 157.5 mm (in Kgf)

| 17) Tolerance As per IS:2713(partI&partIII):1980 |
| 18) Finish -do- |
| 19) Manufacturing clause -do- |
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 field erection 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.

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 IS: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

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

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Description</th>
<th>Particular</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type of cross arm</td>
<td>GI Channel cross arm</td>
</tr>
<tr>
<td>2</td>
<td>Size</td>
<td>75 x 40 x 40 x 6 x 2200 mm</td>
</tr>
<tr>
<td>3</td>
<td>Material</td>
<td>Mild Steel channel( galvanized)</td>
</tr>
<tr>
<td>4</td>
<td>Length</td>
<td>2200 mm</td>
</tr>
<tr>
<td>5</td>
<td>Bread</td>
<td>75 mm</td>
</tr>
</tbody>
</table>
3. 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, 7/4.72mm, 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.

The ACSR Conductor shall also conform to the following standards:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Indian Standards</th>
<th>Title</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Part-II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Aluminium conductors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Galvanized steel reinforced</td>
<td>BS-215(Part-II)</td>
</tr>
<tr>
<td>3</td>
<td>IS:1521-1972</td>
<td>Method of Tensile Testing of Steel wire</td>
<td>ISO/R89-1959</td>
</tr>
<tr>
<td>4</td>
<td>IS:1778-1980</td>
<td>Reels and Drums for Bare conductors</td>
<td>BS-1559-1949</td>
</tr>
<tr>
<td>5</td>
<td>IS:1841-1978</td>
<td>E.C. Grade Aluminium rod produced by rolling</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>IS:2629-1966</td>
<td>Recommended practice for Hot Dip Galvanizing of iron and steel</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>IS:2633-1986</td>
<td>Method of testing uniformity of coating of zinc coated articles.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>IS:4826-1968</td>
<td>Galvanized coatings on round steel wires.</td>
<td>ASTM A472-729</td>
</tr>
<tr>
<td>9</td>
<td>IS:5484-1978</td>
<td>E.C. Grade Aluminium rod produced by continuous casting and rolling.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>IS:6745-1972</td>
<td>Methods of determination of weight of zinc-coating of zinc coated iron and steel articles</td>
<td>BS-443-1969</td>
</tr>
</tbody>
</table>

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.
OfferConforming 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 in Section-III.

3.1. **MATERIALS/WORKMANSHIP**

3.1.1. The material offered shall be of best quality and workmanship. The steel cored Aluminium conductor strands shall consist of hard drawn Aluminium wire manufactured from not less than 99.5% pure electrolytic Aluminium 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 precees 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 cored aluminium 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 should 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 Aluminium 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 Aluminium and steel wires shall be in accordance with the Section-II "Technical Requirements".

6. **SURFACE CONDITIONS**

All Aluminium 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 up to 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. **Aluminium wires**

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

No joint shall be permitted in the individual Aluminium 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 Aluminium 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 should 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 should 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/galvanised 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 par for evaluation purpose and accordingly the Bidder should quote the package.

10. **LABELLING AND MARKING**

    The drum number shall be branded or gauged or stencilled into the flange. An arrow shall be marked on the sides of the drum, together with the words "Roll this way". Each drum shall have the following information provided on the outside of the flange stencilled with indelible ink.

    i) Manufacturer's name and address.
    iii) Size and type of conductor.
    iv) Net weight of the conductor.
    v) Gross weight of the conductor and drum.
    vi) Length of the conductor.
    vii) Position of the conductor end.
    viii) Drum and lot number.
    ix) Name and address of the consignee.
x) Month and year of manufacture.

xi) The drum may also be marked with standard specification as per which the conductor is manufactured.

11. STANDARD LENGTHS

11.1. The standard length of the conductor shall be 2500 metres. Bidder shall indicate the standard length of the conductor to be offered by them. A tolerance of plus or minus 5% on the standard length offered by the bidder shall be permitted. All lengths outside this limit of tolerance shall be treated as random lengths.

11.2. Random lengths will be accepted provided no length is less than 70% of the standard length and total quantity of such random length shall not be more than 10% of the total quantity order. When one number random length has been manufactured at any time, five (5) more individual lengths, each equivalent to the above random length with a tolerance of +/-5% shall also be manufactured and all above six random lengths shall be dispatched in the same shipment. At any point, the cumulative quantity supplied including such random lengths shall not be more than 12.5% of the total cumulative quantity supplied including such random lengths. However, the last 20% of the quantity ordered shall be supplied only in standard length as specified.

11.3. Bidder shall also indicate the maximum single length, above the standard length, he can manufacture in the guaranteed technical particulars of offer. This is required for special stretches like river crossing etc. The Employer reserves the right to place orders for the above lengths on the same terms and conditions applicable for the standard lengths during the pendency of the Contract.

12. QUALITY ASSURANCE PLAN

A Quality Assurance Plan including customer hold points covering the manufacturing activities of the material shall be required to be submitted by the tenderer to the Employer along with the tender. The Quality Assurance Plan after the same is found acceptable, will be approved by the Employer.

The contractor shall follow the approved Quality Assurance Plan in true spirit. If desired by the Employer, he shall give access to all the documents and materials to satisfy the Employer that the Quality Assurance Plan is being properly followed.

13. TESTING

13.1. SELECTION OF TEST SAMPLES FOR TYPE TESTS

13.1.1. The samples shall be taken from a continuous length of conductor and subjected to all the tests specified in clause 14.

13.2. SELECTION OF TEST SAMPLES FOR ACCEPTANCE TESTS

13.2.1. Before dispatch from the works individual wire and finished steel cored Aluminium conductor shall be subjected to the tests as specified in IS:398 or any other authoritative standard.

13.2.2. Sample for individual wires for test shall be taken before stranding from outer ends of not less than ten per cent of the spools in the case of Aluminium wire and ten per cent of the wire coils in the case of steel wires. If samples are taken after stranding, they shall be obtained by cutting 1.2 meters from the outer ends of the finished conductor from not more than 10 per cent of the finished reels.

13.2.3. The routine tests shall be same as acceptance test and shall be carried out on each coil.

14. TESTS

The following tests shall be carried out on sample/samples of conductor:

14.1 Type Tests

(i) Visual examination

(ii) Measurement of diameters of individual Aluminium and steel wires.
(iii) Measurement of lay ratio of each layer
(iv) Breaking load test
(v) Ductility test
(vi) Wrapping test
(vii) Resistance test on Aluminium wires.
(viii) DC resistance Test on Composite Conductor.
(ix) Galvanizing test
(x) Surface condition test
(xi) Stress Strain test
(xii) Procedure qualification test on welded joint of Aluminium Strands.

**NOTE:** The type test reports shall not be older than FIVE years and shall be valid up to expiry of validity of offer.

The above additional lists if not conducted earlier, shall be done under the subject project package at no extra cost.

### 14.2 Acceptance tests and Routine tests

(i) Visual and dimensional check on drum.
(ii) Visual examination
(iii) Measurement of diameters of individual Aluminium and steel wires.
(iv) Measurement of lay ratio of each layer
(v) Breaking load test
(vi) Ductility test
(vii) Wrapping test
(viii) Resistance test on Aluminium wires.
(ix) DC resistance Test on Composite Conductor.
(x) Galvanizing test

### 14.3 Tests During Manufacture

The following tests during manufacture shall be carried out.

(i) Chemical analysis of zinc used for galvanising,
(ii) Chemical analysis of Aluminium used for making Aluminium strands,
(iii) Chemical analysis of steel used for making steel strands,

### 14.4 Visual examination

The conductor shall be examined visually for good workmanship and general surface finish of the conductor. The conductor drums shall be rewound in the presence of Inspecting Officer. The Inspector will initially check for Scratches, Joints etc., and that the conductor shall generally conform to the requirements of the specifications/IS 398 (Part-II)-1996.

### 14.5 Measurement of diameters of individual Aluminium and Steel Wires.

The diameters of individual Aluminium and Steel Wires shall be checked to ensure that they conform to the requirements of this specification.

### 14.6 Measurement of lay-ratios

The lay-ratios of each layer of the conductor shall be measured and checked to ensure that they conform to the requirements of this specification and IS:398 (Part-II)-1996.
14.7  **Breaking load test**

a)  **Breaking load test on complete conductor.**

Circles perpendicular to the axis of the conductor shall be marked at two places on a sample of conductor of minimum 5m length between fixing arrangement suitably fixed on a tensile testing machine. The load shall be increased at a steady rate up to 50% of minimum specified UTS and held for one minute. The circles drawn shall not be distorted due to relative movement of strands. Thereafter the load shall be increased at steady rate to 100% of UTS and held for one minute. The Conductor sample shall not fail during this period. The applied load shall then be increased until the failing load is reached and the value recorded.

b)  **Breaking load test on individual Aluminium and Galvanized steel wires.**

This test shall be conducted on both Aluminium and Galvanized steel wires. The breaking load of one specimen cut from each of the samples taken shall be determined by means of suitable tensile testing machine. The load shall be applied gradually and the rate of separation of the jaws of the testing machine shall be not less than 25 mm/min. and not greater than 100 mm / min. The ultimate breaking load of the specimens shall be not less than the values specified in the Section-II.

14.8  **Ductility Test**

For the purpose of this test both torsion and elongation tests shall be carried out on galvanized steel wires only.

14.9  **Torsion Test**

One specimen cut from each of the samples taken shall be gripped in two vices exactly 15 cms. apart. One of the vices shall be made to revolve at a speed not exceeding one revolution per second and the other shall be capable of moving longitudinally to allow for contraction or expansion during testing. A small tensile load not exceeding 2 (two) percent of the breaking load of the wire shall be applied to the samples during testing. The test shall be continued until fracture occurs and the fracture shall show a smooth surface at right angles to the axis of the wire. After fracture, the specimen shall be free from helical splits. The sample shall withstand a number of twists equivalent to not less than 18 on length equal to 100 times the diameter. When twisted after stranding the number of complete twists before fracture occurs shall be not less than 16 on a length equal to 100 times the diameter of the wire. In case test sample length is less or more than 100 times the stranded diameter of the strand, the minimum number of twists will be proportioned to the length and if number comes in the fraction then it will be rounded off to the next higher whole number. The fracture shall show a smooth surface at right angles to the axis of the wire.

14.10  **Elongation Test**

The elongation of one specimen cut from each of the samples taken shall be determined. The specimen shall be straightened by hand and an original gauge length of 200 mm. shall be marked on the wire. A tensile load shall be applied as described in 1.1.4.6.2.1 and the elongation shall be measured after the fractured ends have been fitted together. If the fracture occurs outside the gauge marks, or within 25 mm. of either mark and the required elongation is not obtained, the test shall be disregarded and another test conducted. When tested before stranding, the elongation shall be not less than 4 percent and when tested after stranding, the elongation shall be not less than 3.5 percent.

14.11  **Wrapping Test**

This test shall be conducted on both Aluminium and Galvanized steel wires.

14.11.1  Aluminium wires
One specimen cut from each of the samples of Aluminium wires shall be wrapped round a wire of its own diameter to form a close helix of 8 turns. Six turns shall then be unwrapped and closely wrapped in the same direction as before. The wire shall not break or show any crack.

14.11.2 Galvanized steel wires

One specimen cut from each of the samples of galvanized steel wire taken shall be wrapped round a mandrel of diameter equal to 4 times the wire diameter to form a close helix of 8 turns. Six turns shall then be unwrapped and again closely wrapped in the same direction as before. The wire shall not break.

14.12 Resistance Test

This test shall be conducted on Aluminium wires only, conforming to procedure as per IEC:889. The electrical resistance of one specimen of Aluminium wire cut from each of the samples taken shall be measured at ambient temperature. The measured resistance shall be corrected to the value corresponding to 20 degrees C. by means of following formula.

\[ R_{20} = \frac{R_T}{[1 + \alpha \times (T-20)]} \]

Where

- \( R_{20} \) = Resistance corrected at 20 degrees C.
- \( R_T \) = Resistance measured at T degrees C.
- \( \alpha \) = Constant mass temperature coefficient of resistance 0.004.
- \( T \) = Ambient temperature during measurement

This resistance calculated to 20 degrees C. shall be not more than the maximum value specified in section-II.

14.13 Galvanizing Test

This test shall be conducted on galvanized steel wires only. The uniformity of Zinc coating and the weight of coating shall be in accordance with IS 4826-1979.

14.14 Surface Condition Test

A sample of the finished conductor for use in 11/33 KV system having a minimum length of 5 meters with compression type dead end clamps compressed on both ends in such manner as to permit the conductor to take its normal straight line shape, shall be subjected to a tension of 50 percent of the UTS of the conductor. The surface shall not depart from its cylindrical shape nor shall the strands move relative to each other so as to get out of place or disturb the longitudinal smoothness of conductor. The measured diameter at any place shall be not less than the sum of the minimum specified diameters of the individual Aluminium and steel strands as indicated in Section-II.

14.15 Stress-Strain Test

The test is contemplated only to collect the creep data of the conductor from the manufacturer. A sample of conductor of minimum 10 meters length shall be suitably compressed with dead end clamps.

15. TEST SET-UP

15.1. The test sample shall be supported in a trough over its full length and the trough adjusted so that the conductor will not be lifted by more than 10mm under tension. This shall be ascertained by actual measurement.

15.2. The distance between the clamp and the sleeve mouth shall be monitored with callipers during the test to ensure that, after the test, it does not change by more than 1mm + 0.1mm from the value before the test.
15.3. The conductor strain shall be evaluated from the measured displacements at the two ends of the gauge length of the sample. The gauge reference targets shall be attached to the clamps which lock the steel and Aluminium wires together. Target plates may be used with dial gauges or displacement transducers and care shall be taken to position the plates perpendicular to the conductor. Twisting the conductor, lifting it and moving it from side-to-side by the maximum amounts expected during the test should introduce no more than 0.3mm error in the reading.

16. TEST LOADS FOR COMPLETE CONDUCTOR

The loading conditions for repeated stress-strain tests for complete conductor shall be as follows:

16.1. 1KN load shall be applied initially to straighten the conductor. The load shall be removed after straightening and then the strain gauges are to be set at zero tension.

16.2. For non-continuous stress-strain data, the strain readings at 1KN intervals at lower tensions and 5 KN intervals above 30% of UTS shall be recorded.

16.3. The sample shall be reloaded to 30% of UTS and held for 1 hour. Readings are to be noted after 5, 10, 15, 30, 45 and 60 minutes during the hold period. The load shall be released then after the hold period.

16.4. The sample shall be reloaded to 50% of UTS and held for 1 hour. Readings are to be noted after 5, 10, 15, 30, 45 and 60 minutes during the hold period. The load shall be released then after the hold period.

16.5. Reloading upto 70% of UTS shall be done and held for 1 hour. Readings are to be noted after 5, 10, 15, 30, 45 and 60 minutes. The load shall be released.

16.6. Reloading upto 85% of UTS shall be done and held for 1 hour. Readings are to be noted after 5, 10, 15, 30, 45 and 60 minutes and the load shall be released then.

16.7. Tension shall be applied again and shall be increased uniformly until the actual breaking strength is reached. Simultaneous readings of tension and elongation shall be recorded up to 90% of UTS at the intervals described under Clause 16.6.

17. TEST LOADS FOR STEEL CORE ONLY

The loading conditions for repeated stress-strain tests for the steel core of ACSR shall be as follows:

17.1. The test shall consist of successive applications of load applied in a manner similar to that for the complete conductor at 30%, 50%, 70% and 85% of UTS.

17.2. The steel core shall be loaded until the elongation at the beginning of each hold period corresponds to that obtained on the complete conductor at 30%, 50%, 70% and 85% of UTS respectively.

18. STRESS-STRAIN CURVES

The design stress-strain curve shall be obtained by drawing a smooth curve through the 0.5 and 1 hour points at 30%, 50% and 70% of UTS loadings. The presence of any Aluminium slack that can be related to any observed extrusion entering the span from the compression dead ends shall be removed from the lower ends of the design curves. Both the laboratory and standard stress-strain curves shall be submitted to the Employeralongwith test results. The stress-strain data obtained during the test shall be corrected to the standard temperature i.e. 20 deg.C.

19. DC RESISTANCE TEST ON COMPOSITE CONDUCTOR

On a conductor sample of minimum 5m length, two contact clamps shall be fixed with a pre-determined bolt torque. The resistance of the sample shall be measured by a Kelvin double bridge by placing the clamps initially zero meter and subsequently one meter apart. The test shall be repeated at least five times and the average value recorded. The value obtained shall be corrected to the value at 20 deg C as per clause no. 12.8 of IS:398 (Part-II)-1982/1996. The corrected resistance value at 20 deg.C shall conform to the...
requirements of this specification.

20. **PROCEDURE QUALIFICATION TEST ON WELDED ALUMINIUM STRANDS.**

   Two Aluminium wires shall be welded as per the approved quality plan and shall be subjected to tensile load. The breaking strength of the welded joint of the wire shall not be less than the guaranteed breaking strength of individual strands.

21. **CHEMICAL ANALYSIS OF ALUMINIUM AND STEEL**

   Samples taken from the Aluminium and Steel ingots / coils/ strands shall be chemically/ spectrographically analyzed. The same shall be in conformity with the requirements stated in this specification.

22. **CHEMICAL ANALYSIS OF ZINC**

   Samples taken from the zinc ingots shall be chemically / spectrographically analyzed. The same shall be in conformity with the requirements stated in this specification.

23. **VISUAL AND DIMENSIONAL CHECK ON DRUMS**

   The drums shall be visually and dimensionally checked to ensure that they conform to the requirements of this specification.

24. **REJECTION AND RETEST**

   24.1. In case of failure in any type test, the Manufacturer is either required to manufacture fresh sample lot and repeat all the tests successfully once or repeat that particular type test three times successfully on the sample selected from the already manufactured lot at his own expenses. In case a fresh lot is manufactured for testing then the lot already manufactured shall be rejected.

   24.2. If samples are taken for test after strandling and if any selected reel fails in the retest, the manufacturer may test each and every reel and submit them for further inspection. All rejected material shall be suitably marked and segregated.

25. **CHECKING AND VERIFICATION OF LENGTH OF CONDUCTOR**

   The contractor should arrange for inspection by the representative of the Employer specially authorised for this purpose. At least 50% of the total number of drums of conductor subject to minimum of two taken at random should be checked to ascertain the length of conductor. Arrangements should be made available in the works of the manufacturer for transferring the conductor from one reel to another at the same time measuring the length of the conductor so transferred by means of a meter.

26. **ADDITIONAL TESTS**

   The Employer reserves the right of having at his own expenses any other test(s) of reasonable nature carried out at Bidder’s premises, at site, or in any other standard Laboratory in addition to the aforesaid type, acceptance and routine tests to satisfy himself that the materials comply with the specifications.

27. **TESTING EXPENSES**

   27.1. The breakup of the testing charges for the type tests specified shall be indicated separately.

   27.2. Bidder shall indicate the laboratories in which they propose to conduct the type test. They shall ensure that adequate facilities are available in the laboratories and the tests can be completed in these laboratories within the time schedule guaranteed by them.

   27.3. The entire cost of testing for the acceptance and routine tests and tests during manufacture specified herein shall be treated as included in the quoted unit price of the conductor, except for the expenses of the
27.4. In case of failure in any type test, if repeat type tests are required to be conducted then all the expenses for deputation of Inspector/Employer's representative shall be deducted from the contract price. Also if on receipt of the Manufacturer's notice of testing, the Employer's representative does not find 'plant' to be ready for testing, the expenses incurred by the Employer for redeputation shall be deducted from contract price.

28. TEST REPORTS

28.1. Copies of type test reports shall be furnished in at least six copies along with one original. One copy will be returned duly certified by the Employer only after which the commercial production of the material shall start.

28.2. Record of Routine test reports shall be maintained by the Manufacturer at his works for periodic inspection by the Employer's representative.

28.3. Test certificates of Tests during manufacture shall be maintained by the Manufacturer. These shall be produced for verification as and when desired by the Employer.

29. TEST FACILITIES

The following additional test facilities shall be available at the Manufacturer's works:

(i) Calibration of various testing and measuring equipment including tensile testing machine, resistance measurement facilities, burette, thermometer, barometer, etc.

(ii) Standard resistance for calibration of resistance bridges.

(iii) Finished Conductor shall be checked for length verification and surface finish on separate rewinding machine at reduced speed (variable from 8 to 16 meters per minute). The rewinding facilities shall have appropriate clutch system and be free of vibrations, jerks etc with traverse laying facilities.

30. INSPECTION

30.1. The Employer's representative shall, at all times, be entitled to have access to the works and all places of manufacture where conductor shall be manufactured and the representative shall have full facilities for unrestricted inspection of the Bidder's works, raw materials and process of manufacture and conducting necessary tests as detailed herein.

30.2. The Bidder shall keep the Employer informed in advance of the time of starting and of the progress of manufacture of conductor in its various stages so that arrangements can be made for inspection.

30.3. The contractor will intimate the Employer about carrying out of the tests at least 45 days in advance of the scheduled date of tests during which the Employer will arrange to depute his representative/s to be present at the time of carrying out of the tests. Six (6) copies of the test reports shall be submitted.

30.4. 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 employer in writing. In the later case also, the conductor shall be dispatched only after satisfactory testing for all tests specified herein has been completed and approved by the employer.

30.5. The acceptance of any quantity of material shall in no way relieve the Bidder of any of his responsibilities for meeting all requirements of the specification, and shall not prevent subsequent rejection if such material is later found to be defective.

30.6. At least 50% of the total number of drums subject to minimum of two in any lot put up for inspection, shall be selected at random to ascertain the length of conductor by the following method:

"At the works of the manufacturer of the conductor, the conductor shall be transferred from one drum to another at the same time measuring its length with the help of a graduated pulley and Cyclometer. The
difference in the average length thus obtained and as declared by the Bidder in the packing list shall be applied to all the drums if the conductor is found short during checking”.

31. **SCHEDULE OF DEVIATIONS/VARIATIONS**

If the tenderer has any exceptions to any of the clause/s laid down in this specification, these should be clearly stated in the schedule of deviations / variations.

**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 °C.
2.2 Minimum Temperature °C.
2.3 i) Max. ambient temperature °C
   ii) Mean annual / every day temperature °C
2.4 Basic wind speed m/s
2.5 Relative humidity
   i) Maximum %
   ii) Minimum %
2.6 Average Rainfall (Max.) mm per annum
2.7 a) Rainy months May to Sept.
     15 Rainy days in a year (days)
2.8 Average number of thunder storm
2.9 Altitude varying from sea level
2.10 Basic horizontal Seismic Co-efficient (horizontal)
    Basic vertical Seismic Co-efficient
2.11 System Particulars
   a) Line Voltage (KV)
   b) Highest System Voltage (KV)
   c) Number of Circuits
   d) Frequency HZ
   e) Neutral
   f) Short circuit level (KA)

2. **SPECIFIC TECHNICAL REQUIREMENTS**

<table>
<thead>
<tr>
<th>CONDUCTOR:</th>
<th>Rabbit/Raccoon/Dog/Weasel/Panther ACSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conductor:</td>
<td>Rabbit/Raccoon/Dog/Weasel/Panther ACSR</td>
</tr>
<tr>
<td>2. IS applicable:</td>
<td>IS-398 (part-II) 1996 latest revision</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wire Diameter</th>
<th>Aluminium (mm)</th>
<th>Steel (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6/3.35</td>
<td>1/3.35</td>
</tr>
<tr>
<td></td>
<td>6/4.06</td>
<td>1/4.09</td>
</tr>
<tr>
<td></td>
<td>6/2.59</td>
<td>7/2.59</td>
</tr>
<tr>
<td></td>
<td>6/2.59</td>
<td>1/2.59</td>
</tr>
<tr>
<td></td>
<td>30/3.00</td>
<td>7/3.00</td>
</tr>
<tr>
<td>4. Number of strands:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Steel centre</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1st steel layer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1st Aluminium layer</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2nd Aluminium layer</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>12th Aluminium layer</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

| 5. Sectional Area of Aluminium (sq. mm.) |  
|----------------------------------------|--------|
| Steel Centre                          | 52.88  |
| 1st Steel layer                       | 78.83  |
| 1st Aluminium layer                   | 158.1  |
| 2nd Aluminium layer                   | 31.61  |
| 12th Aluminium layer                  | 212.1  |

| 6. Total Sectional Area (sq. mm.) |  
|-----------------------------------|--------|
| Steel Centre                      | 61.7   |
| 1st Steel layer                   | 91.97  |
| 1st Aluminium layer               | 194.9  |
| 2nd Aluminium layer               | 36.88  |
| 12th Aluminium layer              | 261.5  |

| 7. Overall diameter (mm) |  
|-------------------------|--------|
| Steel Centre            | 10.05  |
| 1st Steel layer         | 12.27  |
| 1st Aluminium layer     | 18.13  |
| 2nd Aluminium layer     | 7.77   |
| 12th Aluminium layer    | 21     |

| 8. Approximate weight (Kg./Km.) |  
|---------------------------------|--------|
| Steel Centre                    | 10.05  |
| 1st Steel layer                 | 12.27  |
| 1st Aluminium layer             | 14.15  |
| 2nd Aluminium layer             | 7.77   |
| 12th Aluminium layer            | 21     |

| 9. Calculated D.C resistance at 20°C maximum (Ohms/Km) |  
|--------------------------------------------------------|--------|
| Steel Centre                                           | 0.552  |
| 1st Steel layer                                       | 4.371  |
| 1st Aluminium layer                                   | 0.1828 |
| 2nd Aluminium layer                                    | 0.9289 |
| 12th Aluminium layer                                   | 0.139  |

| 10. Ultimate tensile strength (KN) |  
|-----------------------------------|--------|
| Steel Centre                       | 18.25  |
| 1st Steel layer                    | 26.91  |
| 1st Aluminium layer                | 69.2   |
| 2nd Aluminium layer                | 11.12  |
| 12th Aluminium layer               | 89.67  |

| 11. Final modulus of elasticity (GN/sq.m) |  
|-----------------------------------------|--------|
| Steel Centre                            | 79     |
| 1st Steel layer                         | 79     |
| 1st Aluminium layer                     | 75     |
| 2nd Aluminium layer                     | 79     |
| 12th Aluminium layer                    | 80     |

| 12. Coefficient of linear expansion x 10^-6 per°C |  
|--------------------------------------------------|--------|
| Steel Centre                                     | 19.1   |
| 1st Steel layer                                  | 19.1   |
| 1st Aluminium layer                              | 19.8   |
| 2nd Aluminium layer                              | 19.1   |
| 12th Aluminium layer                             | 17.8   |

<table>
<thead>
<tr>
<th>13. Lay ratio</th>
<th>Max Min</th>
<th>Max Min</th>
<th>Max Min</th>
<th>Max Min</th>
<th>Max Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel core 6 wire layer</td>
<td>28</td>
<td>13</td>
<td>28</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Aluminium 1st layer</td>
<td>14</td>
<td>10</td>
<td>14</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2nd layer</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 14. Technical Particulars |  
|---------------------------|--------|
| a. Diameter-mm            |  
| Standard (mm)             | 3.35   |
| Maximum (mm)              | 3.42   |
| Minimum (mm)              | 3.28   |
| b. Cross-sectional area of nominal diameter wire (mm²) |  
|                           | 8.814  |
| c. Weight (Kg./Km)        | 68.75  |
| d. Min. breaking load (KN) |  
| Before stranding          | 11.58  |
| After Stranding           | 11.00  |
| e. D.C resistance at 20°C min. (Ohm/Km) |  
|                           | -3.265 |
|                           | -2.194 |
|                           | 1.65   |
|                           | -5.49  |
|                           | -4.079 |
15. Zinc coating of steel core:

(i) Number of 1 minute dips: 3
(ii) Minimum weight of Zinc: 260 gms/sqm Coating
(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.

15. Chemical composition of high carbon steel wire:

<table>
<thead>
<tr>
<th>Element</th>
<th>% Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Carbon</td>
<td>0.5 to 0.85</td>
</tr>
<tr>
<td>ii) Manganese</td>
<td>0.5 to 1.10</td>
</tr>
<tr>
<td>iii) Phosphorus</td>
<td>Not more than 0.035</td>
</tr>
<tr>
<td>iv) Sulphur</td>
<td>Not more than 0.045</td>
</tr>
<tr>
<td>v) Silicon</td>
<td>0.10 to 0.35</td>
</tr>
</tbody>
</table>

1 TECHNICAL SPECIFICATION FOR POLYMERIC 33 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.

5.0 The insulator shall be in one piece.

The dimensions of the pins insulator shall be as follows:

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

6.0 Tests

Pin shall comply with the following tests.

1.1 Type test:

a) Visual examination test
b) Verification of dimensions
c) Checking of threads
d) Galvanizing test
e) Mechanical strength tests

1.2 Routine test:
   a) Visual examination test

1.3 Acceptance test:
   Checking of threads on heads
   a) Galvanizing test
   b) Mechanical test

7.0 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 cost by an independent agency, whenever there is dispute regarding the quality of the materials supplied.

8.0 Marking

The pins shall be marked with name of manufacturer, year and name of project.
2 TECHNICAL SPECIFICATION FOR 33 KV COMPOSITE POLYMERIC DISC INSULATORS 90 KN

1.0 SCOPE
This specification cover the design, manufactures, testing at manufacturer's works, transport to site, insurance, storage, erection and commissioning of 33 kV composite polymeric disc insulator for 33 kV line.

2.0 STANDARD
Strain insulators Tongue and Clevis type/ ball and socket type, suitable for 33 KV lines shall be conforming to IEC : 1109 with its latest amendments and revision and having mechanical failing load of 90 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.

Where the material is offered according to the inter-national accepted standard a copy of the specification shall be attached with the tender.

2.1 GENERAL REQUIREMENT:
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.

2.2 The insulator shall be in one piece.

2.3 CLIMATIC CONDITIONS:
   i. Maximum ambient temperature in shade : 40°C
   ii. Minimum daily average ambient air temperature : 35°C
   iii. Maximum yearly average ambient air temperature : 30°C
   iv. Maximum ambient temperature : 2°C
   v. Maximum relative humidity : 93%
   vi. Average number of thunder storms days per annum : 45 days
   vii. Average number of rainy days per annum : 150 days
   viii. Average annual rainfall : 2280 mm
   ix. Number of months of tropical monsoon conditions : 5 months
   x. Maximum wind pressure : 150 Kg/sq.m
   xi. Altitude not exceeding : 1000 M

2.4 BASIC INSULATION LEVEL
The test voltage (minimum requirement) of the insulator shall be as follows:

   a) Highest system voltage : 36 KV(rms)
   b) Min. Creepage distance : 1050mm
   c) Section length : 680mm
   d) Rated mechanical tensile load : 70 KN
   e) Wet frequency 1 min. withstand voltage : 85Kv
   f) Dry lightning impulse withstand voltage : 230KV

2.5 MARKING
Each insulator shall be legibly and indelibly marked to show the following:

   a) Name or trade mark of the manufacturer
   b) Month and year of manufacture
   c) Minimum failing load in KN
   d) Country of manufacture
3 TEST
3.1 Type test

The following type tests shall be conducted on a suitable number of individual insulator unit, components, materials or complete strings:

3.2 Verification of dimensions
3.3 Thermal mechanical performance test
3.4 Power frequency voltage withstand and flashover test (i) dry (ii) wet
3.5 Impulse voltage withstand and flashover test (dry)
3.6 Visible discharge test (dry)
3.7 RIV test (dry)
3.8 Mechanical failing Load Test (for pin insulator only)

3.9 24 hrs. Mechanical strength test (for strain I string insulator only)

4.0 Acceptance Tests

a) Visual examination
b) Verification of dimensions
c) Temperature cycle test
d) Galvanizing test
e) Mechanical performance test
f) Test on locking device for ball and socket coupling
g) Eccentricity test
h) Metallurgical test
i) Grain size
j) Inclusion rating
k) Chemical analysis
l) Microstructure
m) Mechanical failing load test (for Pin Insulator only)
n) Electro-mechanical strength test (for Strain insulator only)
o) Porosity test
p) Puncture test (for strain Insulator only)

4.1 Routine Tests

a. Visual Inspection
b. Mechanical routine test for Strain Insulator only
c. Electrical routine test (for Strain Insulator only)

4.2 Tests During Manufacture

On all components as applicable

a) Chemical analysis of zinc used for galvanizing
b) Chemical analysis, mechanical, metallographic test and magnetic particle inspection for malleable castings.
c) Chemical analysis hardness tests and magnetic particle inspection for forgings
d) Hydraulic Internal Pressure tests On disc insulator shells

4.3 Test Reports

4.4 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.

4.5 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 despatch.

4.6 Record of routine test reports shall be maintained by the Contractor at his works for periodic inspection by the Owner's representative.

4.7 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 INSPECTION

5.1 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.

5.2 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.

5.3 After placement of award, the Contractor shall submit fully dimensioned insulator drawings containing all the details, in four (4) copies to Owner for approval. After getting approval from Owner and successful completion of all the type tests, the Contractor shall submit 20 more copies of the same drawing to the Owner for further distribution and field use at Owner's end.

9.0 INSPECTION

All tests and inspection shall be made at the place of manufacture. The manufacturer shall afford the inspection representing the purchaser or third party nominee all reasonable facilities without charge to satisfy him that the material is being furnished in accordance with this specification.

Routine test shall be carried out for each drum of cables of all types and sizes. Following shall constitute routine tests:

- Conductor Resistance Test
- Resistance Test
- High Voltage Test at Room Temperature

1.1 While preparing cable schedules for control/protection purpose following shall be ensured:

i. Separate cables shall be used for AC & DC.

ii. For different cores of CT & PT/CVT separate cable shall be used.

iii. At least one (1) cores shall be kept as spare in each copper control cable of 4C, 5C or 7C size whereas minimum no. of spare cores shall be two (2) for control cables of 10 core or higher size.

iv. For control cabling, including CT/PT circuits, 4.0 sq.mm. size copper cables shall be used per connection

9. TECHNICAL SPECIFICATION FOR CAST IRON EARTH PIPE

1.0 Scope

This specification covers design, manufacture, testing, transport to site, insurance, storage, erection and commissioning of the cast iron earth pipe for use on line & substation as earthing pipe.

2.0 Standard

The Earth pipe shall comply with the Indian Standard specification IS: 1729/1964 and as amended from time to time.
except where they conflict with the specific requirements in this specification.

3.0 Manufacture

Metal used for the manufacture of pipes shall be good quality cast iron.

Casting shall be stripped with all precautions necessary to avoid wrapping and shrinkage defects. They shall be free from defects which affect the use of castings. By agreement between the purchaser and the manufacturer, minor defects may be rectified.

Pipes shall be such that they could be cut, drilled or machines.

Bolts, buts & washers shall be made of Steel and well galvanized. The bolts shall be of 200 mm length, 16 mm diameter with 2(two) nos. plain washers, one locknut & one check nut. Threaded length of the bolts should be 50 mm.

4.0 Sizes

Dimensions of pipe & socket shall be conform to the sizes shown below and as per drawing enclosed:

- Nominal length of the pipe with socket: 1800 mm
- Nominal diameter of pipe: 100 mm
- External diameter of pipe: 110 mm
- Thickness of pipe: 5 mm
- Projection of spigot bead: 3 mm
- Width of spigot bead: 15 mm
- Internal dia of socket: 129 mm
- Thickness of socket: 6 mm
- Internal depth of socket: 70 mm
- Internal Radius of socket: 5 mm
- Width of grooves of socket: 10 mm
- External dia of grooves socket: 155 mm
- Depth of grooves of socket: 5 mm
- Nominal weight of pipe (Exclusive of ear): 21.67 Kg

5.0 Tolerance

The Tolerance of the 100 mm nominal diameter pipe shall be ±3.5 mm

- The Tolerance of pipe thickness shall be: -15 percent
- The Tolerance of length of the pipe shall be: ±20 mm
- The Tolerance of weight of the pipe shall be: -10 Percent

Pipes weighing more than the nominal weight may be accepted provided they comply in every other respect with the requirements of this standard.

6.0 TEST

Hammer test: Each pipe when tested for soundness by striking with a light hand hammer shall emit a clear ringing sound.

Hydraulic test: If so required by the purchaser, pipe shall be tested hydraulically at a pressure of 0.4 kg/cm² without showing any sign of leakage, sweating or other defect of any kind. The pressure shall be applied internally and shall be maintained for not less than 15 seconds. The tests shall be conducted before coating of pipe.

7.0 Inspection

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

8.0 Coating

Normally pipes, unless specially ordered, shall be supplied free of coating on surfaces.

9.0 Marking

Each pipe shall have the Trade mark of the manufacturer and nominal size suitably marked on it. The pipe marked with the ISI certificate mark, shall be preferred. The equipments shall be marked with name of manufacturer, year and name of project.
10. **TECHNICAL SPECIFICATION FOR G.I. WIRE**

a) **Scope**

This specification covers the manufacturing, testing at works, transport to site, insurance, storage, erection and commissioning of Galvanized Iron Wire of sizes 4 mm and 5 mm diameter.

1.0 **General requirements**

It relating to the supply of mild steel wire shall be as per IS: 1387/1967 and the wire shall be drawn from the wire rods conforming to IS: 7887/1975.

The requirements for chemical composition for the wires shall conform to IS:7887/1975.

Mild steel wire for General Engineering purpose shall be of following sizes:

I) 4mm - diameter (8 SWG)
II) 5mm - diameter (6 SWG)

Tolerance permitted on the diameter of wire shall be as per Table -1 of IS:280/1978.

7.0 **Climatic Conditions**

The cross arms should be suitable for the climatic condition mentioned in these bidding documents:

8.0 **Mechanical Properties**

4.1 Tensile Test: Tensile strength of wire when tested in accordance with IS: 1521-1972, shall be within the limits given in Table-2 of IS: 280/1978.

4.2 Wrapping Test: Wires shall be subjected wrapping test in accordance with IS: 1755-1961. The wire shall withstand without breaking or splitting, being wrapped eight times round its own diameter and subsequently straightened.

9.0 **Surface finish**

a. The wire shall have galvanized finishes. The galvanized coating of steel wire shall conform to the requirements for anyone of the types of coatings given in IS: 4826-1968 as per agreement with the purchaser.

b. The coating test for finishes other than galvanized, copper coated or tinned shall be subject to between the purchaser and the manufacturer.

c. Unless otherwise agreed to the method of drawing representative samples of the material and the criteria for conforming shall be as prescribed in Appendix (A) of IS: 280/1978.

d. All finished wires shall be well and cleanly drawn to the dimensions specified. The wire shall be sound, free from splits, surface flaws, rough jagged and imperfect edges and other harmful surface defects.

e. Each coil of wire shall be suitably bound and fastened compactly and shall be protected by suitably wrapped.

10.0 **Marking**

Each coil of wire shall be marked legibly with the finish size of wire, lot number and trade mark of the name of the manufacturer. The material may also be marked with the ISI certification mark and name of the project TDF.

11.0 **INSPECTION**

Inspection may be carried out by the purchaser or third party nominee at any stage of manufacture. The supplier shall grant free access to the purchaser's representative or third party nominee at a reasonable time when the work is in progress. 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 defective.
11. TECHNICAL SPECIFICATION FOR DANGER NOTICE PLATE 33 kV

1.0 SCOPE:
This specification covers Danger Notice Plates to be displayed in accordance with rule No.35 of Indian Electricity Rules, 1956.

2.0 APPLICABLE STANDARDS.

Unless otherwise modified in this specification, Danger Notice Plates shall comply with IS: 1982 or the latest version thereof.

3.0 DIMENSIONS.

Size of Danger Notice Plates as follows are recommended
For display at 33KV installation - 250 x 200 mm.

The corners of the plate shall be rounded off.
The location of fixing holes as shown in Figs. 1 to 4 is provisional and can be modified to suit the requirements at site.

4.0 LETTERINGS

All letterings shall be centrally spaced. The dimensions of the letters, figures and their respective position shall be as shown in figs. 1 to 4. The size of letters in the words in each language and spacing between them shall be so chosen that these are uniformly written in the space earmarked for them.

5.0 LANGUAGES

I. Under Rule No. 35 of Indian Electricity Rules, 1956, the owner of every medium, and extra high voltage installation is required to affix permanently in a conspicuous position a danger notice in Hindi or English and in addition, in local language, with the sign of skull and bones.

II. The type and size of lettering to be done in Hindi is indicated in the specimen danger notice plates shown in fig: 2 and 4 and those in English are shown in fig. 1 and 3.

III. Adequate space has been provided in the specimen danger notice plates for having the letterings in local language for the equivalent of Danger, 33000 ‘Volts’

6.0 MATERIAL AND FINISH

The plate shall be made from mild sheet of at least 1.6 mm thick and vitreous enameled white, with letters, figures and the conventional skull and cross-bones in signal red colour (refer IS: 5-1978) on the front side. The rear side of the plate shall also be enameled.

7.0 TESTS.
The following tests shall be carried out.


ii) Dimensional check as per IS: 2551-1982.

iii) Test for weather proofness as per IS: 8709-1977 (or its latest version).

8.0 MARKING.

Maker’s name and trade mark and the purchaser’s name shall be marked in such a manner and position on the plates that it does not interfere with the other information.

9.0 PACKING.
The plates shall be packed in wooden crates suitable for rough handling and acceptable for rail/road.

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SECTION : 7

GUARANTEED TECHNICAL PARTICULARS
1. GUARANTEED TECHNICAL AND OTHER PARTICULARS FOR
GALVANIZED IRON STEEL TUBULAR POLE
14.5M=Sp-76 (380kg)]

(TO BE FILLED IN BY THE BIDDER)

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>DESCRIPTION</th>
<th>UNIT</th>
<th>SP-76 (380 KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the bidder</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1</td>
<td>Name of Manufacturer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Place of manufacture</td>
<td></td>
<td></td>
</tr>
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<td>3</td>
<td>Country in origin</td>
<td></td>
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<tr>
<td>4</td>
<td>IS Standards Application</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Type of Pole</td>
<td></td>
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<tr>
<td>6</td>
<td>Total length</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Outside diameter and thickness of section</td>
<td></td>
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</tr>
<tr>
<td>a</td>
<td>Bottom</td>
<td>mm</td>
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</tr>
<tr>
<td>b</td>
<td>Middle</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Top</td>
<td>mm</td>
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<tr>
<td>8</td>
<td>Minimum Guaranteed weight of pole (without base plate)</td>
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<tr>
<td>9</td>
<td>Effective length of Section</td>
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<tr>
<td>a</td>
<td>Bottom</td>
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<td>Middle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Top</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Minimum Guaranteed weight of Base plate</td>
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<tr>
<td>11</td>
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<td>12</td>
<td>Crippling load</td>
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<tr>
<td>13</td>
<td>Galvanization—gm/sqm</td>
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<td>14</td>
<td>PERFORMANCE GAURANTEE</td>
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<tr>
<td>Particulars</td>
<td>unit</td>
<td>33kV</td>
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<td>1. Manufacturer's name &amp; address</td>
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<td>2. Guaranteed delivery schedule</td>
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<td>3. System Voltage</td>
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<tr>
<td>4. Maximum permissible service voltage</td>
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<td>5. Continuous current rating</td>
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<td>6. Short time current rating</td>
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<td>ii) for 3 sec</td>
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<td>7. Rated peak short circuit current</td>
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<td>8. Rated peak short circuit current of earthing blade</td>
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<td>9. Temperature with corresponding to</td>
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<tr>
<td>i) Short time current rating</td>
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<td>10. Fault current which can be made by earth switch</td>
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<td>11. Maximum current that can be safely interrupted between equi-potential busbars</td>
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<td>12. Clearance in air (minimum) in mm</td>
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<td>i) between phases</td>
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<tr>
<td>ii) between live parts and earth</td>
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<tr>
<td>iii) distance between centres of outer stacks of insulators</td>
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<td>13. Power frequency withstand voltage test for complete assembled switches</td>
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<td>i) Against ground</td>
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<tr>
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<td>b) Wet, KV</td>
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<td>ii) Across open contacts</td>
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<tr>
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<td>b) Wet, KV</td>
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<tr>
<td>iii) Between phases</td>
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<tr>
<td>a) Dry, KV</td>
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<tr>
<td>b) Wet, KV</td>
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<td>14. Particulars of main contacts in fixed (main and earthing switch) and moving contacts (main and earthing switch)</td>
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<td>i) Type</td>
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<td>ii) Material</td>
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<td>iii) Surface treatment</td>
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<td>iv) contact area</td>
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<td>15. Current density of minimum cross section of switch blade</td>
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<td>16. No. of operations without need for inspection</td>
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<td>17. Type and materials of connectors</td>
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<td>18. Whether arcing contacts provided and if yes, give materials used</td>
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<td>19. Whether adjustable gap type arcing horns provided and if yes, give materials used</td>
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<td>20. Insulators</td>
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<td>i) Creepage distance of insulators in mm</td>
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<tr>
<td>ii) Bending strength of insulators in KN</td>
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<tr>
<td>21. location and type of bearings</td>
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<td>22. Weight of complete isolators with insulator</td>
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<tr>
<td>i) With earthing blade, Kg</td>
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2. GUARANTEED TECHNICAL PARTICULARS OF COMPOSITE 33 KV POLIMERIC DISC INSULATOR

<table>
<thead>
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<th>Unit</th>
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<td>Type of Insulator</td>
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<tr>
<td>2.</td>
<td>Standard according to which the Insulator manufacture and tested</td>
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<tr>
<td>3.</td>
<td>Name of material used in manufacture of the insulator with class/grade</td>
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</tr>
<tr>
<td></td>
<td>(a) Material of core (FRP rod)</td>
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<td></td>
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<tr>
<td></td>
<td>i) E-glass or ECR-glass</td>
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<td></td>
<td>ii) Boron content</td>
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<tr>
<td></td>
<td>(b) Material of housing &amp; Weather sheds silicon content by weight</td>
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<td></td>
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<tr>
<td></td>
<td>(c) Material of end fitting</td>
<td></td>
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<tr>
<td></td>
<td>(d) Sealing compound for end fittings</td>
<td></td>
<td></td>
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<tr>
<td>4.</td>
<td>Colour</td>
<td></td>
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<tr>
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<td>Electrical characteristics</td>
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</tr>
<tr>
<td></td>
<td>(a) Normal system voltage</td>
<td>KV(rms)</td>
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<tr>
<td></td>
<td>(b) Highest system voltage</td>
<td>KV(rms)</td>
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</tr>
<tr>
<td></td>
<td>(c) Dry power frequency withstand voltage</td>
<td>KV(rms)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) Wet power frequency withstand voltage</td>
<td>KV(rms)</td>
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</tr>
<tr>
<td></td>
<td>(e) Dry flash over voltage</td>
<td>KV(rms)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(f) Wet flash over voltage</td>
<td>KV(rms)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(g) Dry lightning impulse withstand voltage</td>
<td>KV(peak)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Positive</td>
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<td></td>
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<tr>
<td></td>
<td>b) Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(h) Dry lightning impulse flash over voltage</td>
<td>KV(peak)</td>
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</tr>
<tr>
<td></td>
<td>a) Positive</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>b) Negative</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(i) R/V at 1 MHz when energized at 10KV/30KV (rms) under dry condition</td>
<td>Microvolt</td>
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</tr>
<tr>
<td></td>
<td>(j) Creepage distance</td>
<td>(mm)</td>
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<tr>
<td>6.</td>
<td>Mechanical characteristics</td>
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<td></td>
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<tr>
<td></td>
<td>(a) Minimum failing load</td>
<td>KN</td>
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<tr>
<td>7.</td>
<td>Dimension of insulator</td>
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<tr>
<td></td>
<td>(i) Weight</td>
<td>kg</td>
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### GUARANTED TECHNICAL PARTICULARS OF 33 KV COMPOSITE POLYMER PIN INSULATORS

<table>
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<th>Sl. No.</th>
<th>Description</th>
<th>33 kV, 10 KN</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Name of Manufacturer</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Address:</td>
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</tr>
<tr>
<td>(a)</td>
<td>Registered Office</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>factory</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Type of Insulators</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Standard specification to which the insulators manufactured and tested</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Name of Material used in manufacture of the Insulator (With class/Grade)</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Material of core rod</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Material of Housing &amp; Weather sheds (silicon content by weight)</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Material of end fittings: tongue/clevis</td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Sealing compound for end fitting</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Colour Glaze of Insulator</td>
<td></td>
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<tr>
<td>7</td>
<td>Electrical Characteristics:</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Nominal System Voltage (kV RMS)</td>
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<tr>
<td>(b)</td>
<td>Highest System Voltage (kV RMS)</td>
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</tr>
<tr>
<td>(c)</td>
<td>Dry power frequency withstand (kV RMS)</td>
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<tr>
<td>(d)</td>
<td>Wet power frequency withstand (kV RMS)</td>
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<tr>
<td>(e)</td>
<td>Dry flash over voltage (kV RMS)</td>
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<tr>
<td>(f)</td>
<td>Wet flash over voltage (kV RMS)</td>
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<tr>
<td>(g)</td>
<td>Dry lightening impulse withstand voltage (kV Peak)</td>
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<tr>
<td>(h)</td>
<td>Dry lightening impulse flashover voltage (kV Peak)</td>
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<tr>
<td>(i)</td>
<td>RIV at 1MHz when energised at 10kV/30kV(rms) under dry condition (microvolt)</td>
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<tr>
<td>(j)</td>
<td>Creepage distance (mm)</td>
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<td>8</td>
<td>Mechanical Characteristics:</td>
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</tr>
<tr>
<td>9</td>
<td>dimensions of insulator</td>
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<tr>
<td>(i)</td>
<td>Weight (kg)</td>
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<tr>
<td>(ii)</td>
<td>dia of FRP rod (mm)</td>
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</table>

### Notes
- **Dim**: Dimension drawing of insulator including weight with clearances in weight enclosed. Yes/No.
- **M**: Method of fixing of sheds to housing (specify single moulder Modular construction moulding).
- **N**: No. of Weather sheds

**Manufacturer Details**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
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</thead>
<tbody>
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<tr>
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<td>(b)</td>
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<tr>
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<td>Type of Insulators</td>
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<tr>
<td>(g)</td>
<td>Dry lightening impulse withstand voltage (kV Peak)</td>
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<td>(h)</td>
<td>Dry lightening impulse flashover voltage (kV Peak)</td>
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<tr>
<td>(i)</td>
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<td>8</td>
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<td>9</td>
<td>dimensions of insulator</td>
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<tr>
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<td>Weight (kg)</td>
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<td>dia of FRP rod (mm)</td>
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<tr>
<td>12</td>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>Ref. Drawing</td>
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</tr>
</tbody>
</table>

1. **Galvanized Channel Cross Arm [100x50x6x2200 mm]**

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Description</th>
<th>Particular</th>
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</tr>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>Type of cross arm</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Size</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Material</td>
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<td></td>
</tr>
<tr>
<td>4</td>
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<td></td>
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<tr>
<td>5</td>
<td>Length</td>
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<tr>
<td>6</td>
<td>Breath</td>
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<td>7</td>
<td>Width</td>
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<tr>
<td>8</td>
<td>Thickness</td>
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<tr>
<td>9</td>
<td>Hole</td>
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<tr>
<td>10</td>
<td>Center to center distance for hole</td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>Weight</td>
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<tr>
<td>12</td>
<td>Galvanization</td>
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<tr>
<td>13</td>
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1. Galvanized Angle Cross Arm [50x50x6x5000 mm]

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<tr>
<th>Sl No.</th>
<th>Description</th>
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<td>Name of Manufacturer</td>
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<tr>
<td>1</td>
<td>Type of cross arm</td>
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<tr>
<td>2</td>
<td>Size</td>
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<tr>
<td>3</td>
<td>Material</td>
<td>Applicable Standard</td>
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<tr>
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<td>Length</td>
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<tr>
<td>5</td>
<td>Breath</td>
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<td>6</td>
<td>Width</td>
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<td>9</td>
<td>Center to center distance for hole</td>
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<td>10</td>
<td>Weight</td>
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<td>11</td>
<td>Galvanization</td>
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<tr>
<td>12</td>
<td>Ref. Drawing</td>
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</table>

5. **GUARANTEED TECHNICAL PARTICULARS FOR G.I. WIRE**

(TO BE FURNISHED BY BIDDER)

<table>
<thead>
<tr>
<th>Manufacturer’s Name &amp; Address</th>
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</thead>
<tbody>
<tr>
<td>A. G.I.Wire (4 mm dia)</td>
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</tr>
<tr>
<td>1. Size of Wire</td>
<td>:</td>
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<tr>
<td>2. Tolerance in size of wire</td>
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</tr>
<tr>
<td>3. Tensile strength</td>
<td>:</td>
</tr>
<tr>
<td>4. Wrapping list</td>
<td>:</td>
</tr>
<tr>
<td>5. Galvanising conforming to IS 4826 – 1968</td>
<td>:</td>
</tr>
<tr>
<td>6. Guarantee</td>
<td>:</td>
</tr>
<tr>
<td>B. G.I.Wire (5 mm dia)</td>
<td>:</td>
</tr>
<tr>
<td>1. Size of Wire</td>
<td>:</td>
</tr>
<tr>
<td>2. Tolerance in size of wire</td>
<td>:</td>
</tr>
<tr>
<td>3. Tensile strength</td>
<td>:</td>
</tr>
</tbody>
</table>
4. Wrapping list :  
5. Galvanising conforming to IS 4826 – 1968 :  
6. Performance guarantee : 

3 GUARANTEED TECHNICAL PARTICULARS FOR C.I. PIPE (EARTH)  
(TO BE FURNISHED BY BIDDER)

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Manufacturer’s Name &amp; Address</th>
<th>G.I.Wire (4 mm dia)</th>
<th>Length of Pipe</th>
<th>Diameter of Pipe</th>
<th>External Dia of Pipe</th>
<th>Thickness of Pipe</th>
<th>Internal Dia of Socket</th>
<th>Thickness of Socket</th>
<th>Internal Depth of Socket</th>
<th>Internal Radius of Socket</th>
<th>Width of Grooves of Socket</th>
<th>External Dia of Grooves Socket</th>
<th>Weight of Pipe</th>
<th>Hydraulic Test</th>
<th>Guarantee</th>
</tr>
</thead>
</table>
SECTION:8

General Conditions of Supply & Erection of APDCL
GENERAL CONDITIONS
OF SUPPLY AND ERECTION

1.0 INTRODUCTION:

1.1 Assam Power Distribution Company Limited was constituted under the provisions of Electricity Act, 2003 and is a public sector company registered under ‘Company Act,1956’. It was formed out of Assam State Electricity Board in 2003 and was notified as the State Electricity Distribution Utility. It is entrusted with the responsibility of promoting the co-ordinated development of power distribution and its efficient management in the entire state of Assam.

1.2 Assam Power Distribution Company Limited hereinafter referred to as APDCL, has its Corporate Office at BijuleeBhawan, Paltanbazar, Guwahati, Assam. For further information, one may refer to APDCL’s official web site: www.laedcl.gov.in.

1.3 Assam is one of the seven states of North East India and its boundary encompasses almost the entire valleys of Brahmaputra and Barak rivers. The state is well connected with rest of the country by broad gauge railways and several national highways, one of which is a part of the four lane east-west corridor. It also has important airports at Guwahati, Jorhat, Silchar, Tezpur&Dibrugarh.

1.4 Relevant guidelines and rules connected with all departmental supply and erection works have been laid down in this document General Conditions of Supply & Erection of Assam Power Distribution Company Limited adopted in 2009. This document supersedes earlier conditions of contract. It is intended that contractual clauses of this document will be generally followed in all contractual works. Any modification of a contractual clause considering requirement of a particular project shall be made in the NIT/ Tender document for the specific project.

2.0 DEFINITION OF TERMS:

2.1 The following terms appearing in the General Conditions of Supply & Erection of Assam Power Distribution Company Limited shall have the meaning herein indicated unless there is anything repugnant in the subject or context.

2.2 “Purchaser/ Employer” shall mean the Assam Power Distribution Company Limited (in short APDCL) and its assignees.

2.3 “Contractor/Supplier/Owner” shall mean the tenderer/ bidder whose tender/ bid has been accepted by the “Purchaser/ Employer” and shall include the bidder's/ tenderer's legal personal representatives, successors and assignees.

2.4 “Engineer” shall mean the Officer in-Charge of Project/ Work/ purchase for the supply and/ or erection contract or such other Officer or Offices as may be duly authorized and appointed in writing by the Purchaser to act as “Engineer” for the purpose of the contract.

2.5 “Sub-Contractor” shall mean the person named in the contract for any part of the work or any person to whom any part of the contract has been sublet with the consent in writing of the “Purchaser/ Employer” and the legal representatives, successors and assignees of such person.

2.6 “Materials” or “Works” shall mean and include plant and materials to be provided and work to be done by the contractor under contract.

2.7 “Contract” shall mean and include the general conditions, specifications, schedules, drawings, tender forms, bidding schedules, covering letter, schedule of prices, any special conditions applying to the particular contract specification, amendments if any, letter of acceptance and contract agreement to be entered into.

2.8 “Contract period” means the period from the contract commencement date to the date on which the warranty period is over. Date of acceptance of ‘Purchase/ Work Order’ shall be treated as the “date of commencement of contract”.

CGM(D)/APDCL/LAR/INDUSTRIES/DEPOSIT/17-18/D-29
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2.9 “Specification” shall mean the relevant ISS/ IEC specification with up to date amendments and revisions and/or APDCL specification wherever applicable.

2.10 “Site” shall mean the site of the station, where proposed work is to be executed under the contract and to which the plant and machinery are to be delivered and any other places as may be specifically designated in the contract as forming part of the site.

2.11 “Consignee” shall mean the Executive Engineer/ Senior Manager or any other authorized Officer performing the duty of the consignee as specified in the Order.

2.12 “Commercial use” shall mean use in the work which the contract contemplates or to which it is to be commercially capable.

2.13 “Day” shall mean a calendar day.

2.14 “Month” shall mean a calendar month.

2.15 “Writing” shall include any manuscript, type written or printed statement properly signed.

2.16 “Persons” shall include firm, company, corporation and other body of persons whether incorporated or not.

2.17 “Word” indicating in the singular only shall also include the plural and vice versa where the context requires.

2.18 “Bid” will mean “Tender”

3.0 PREPARATION OF TENDER I BID:

3.1 DEFINITION OF TENDERER / BIDDER:

3.1.1. When the tenderer is a firm, the names and addresses of the partners must be indicated and a copy of the certificate of registration with the concerned Registrar of firms should be enclosed.

3.1.2. When the tenderer is a Company, the company registration document along with Memorandum of Association shall be submitted.

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

3.1.4. When the tenderer is a Joint Venture (JV) of two or more firms as partners, one of the partners shall be legally authorized as the lead partner for the purpose of submitting the tender, incur liabilities; receive payments and instructions on behalf of the others. A copy of the registered agreement, executed on Non judicial stamp paper, shall be submitted with the tender. However, in case of a successful tender, the agreement shall be signed by all the partners, so as to be legally binding on all the partners.

3.2 PURCHASE OF TENDER / BIDDING DOCUMENTS:

3.2.1. Tenderer may purchase the tender document by paying the requisite fee as stipulated in the NIT. Alternatively, the tenderer may download tender document from the company’s website: www.laedcl.gov.in and pay the above requisite fee by way of a demand draft separately along with earnest money. Tenderer shall be responsible for any error etc., on the downloaded tender document.

3.2.2. The General Conditions of Supply & Erection of Assam Power Distribution Company Limited will be treated as a part of the NIT. The Contractor shall be deemed to have carefully examined the aforesaid general conditions of supply & erection besides all specifications.

3.2.3. The tender should be complete in all respects so as to eliminate further correspondences and clarifications. A tender which is not complete in all respects, will be liable for rejection. However the Purchaser, in its discretion, may seek clarification from the tenderer where necessary. The discretion of the Purchaser in this regard shall be final.
3.3. **LANGUAGE AND SIGNING OF TENDER:**

3.3.1. The tender, and all correspondence and documents related to the tender, exchanged between the Tenderer and the Purchaser shall be written in English. Supporting documents and printed literature furnished by the tenderer shall also be in English.

3.3.2. Tender shall be written in ink or typed. No tender filled in pencil or otherwise shall be considered. The tender shall be signed by a responsible and authorized person and the designation and authority of the signatory shall be stated in the tender. All corrections in the proposal will have to be signed with date and seal of the tenderer. Such correction even though signed, may make the tender liable for rejection.

3.3.3. Any printed document promoting sales may not be accepted by the Purchaser.

3.4. **DOCUMENTS COMPRISING TECHNO-COMMERCIAL BID:**

The particulars and supporting documents required in respect of the techno-commercial bid should be strictly as per following sub-clauses (clauses 3.4.1 to 3.4.10). In case, any of the details are either not furnished or inadequately furnished, the entire tender may be rejected without informing the tenderer. A techno-commercial bid may have to be submitted under separate sealed cover if so stipulated in the NIT. *The price bid may not at all be opened for examination in case the techno-commercial bid, which shall be opened first is not found substantially responsive.*

3.4.1. **EARNEST MONEY OR BID SECURITY:**

(a) Every tender must be accompanied with Earnest Money of value as stipulated in the NIT. Mode of depositing the earnest money shall be clearly indicated in the NIT. Earnest money or Bid security may be furnished in the shape of Bank Call Deposit/ Bank Draft as may be prescribed in the NIT. Without this, the tender may be deemed to be incomplete and liable for rejection. The earnest money shall be pledged in favour of the Officer as indicated in the NIT.

(b) In case of unsuccessful tenderer, earnest money will be released on request from the tenderer on a date subsequent to contract agreement with the successful tenderer.

(c) In case of successful tenderer, the earnest money will be retained until submission of the performance security deposit referred to in *clause 9.0.*

(d) No interests shall be payable on such deposit

(e) The Purchaser/ Employer reserve the right to forfeit the earnest money or part thereof, in circumstances which according to him indicate that the tenderer is not earnest in accepting/ executing any order placed under specification.

3.4.2. **GUARANTEED TECHNICAL PARTICULARS:**

The GTP (Guaranteed Technical Particulars) of the materials offered along with their complete technical description supported by drawings shall be furnished by the tenderer. Relevant specifications like IS/ BS/ IEC etc. will be mentioned.

3.4.3. **TEST REPORTS:**

(a) A list showing various type tests and routine tests as required under the relevant specifications shall be furnished by the tenderer and all such tests shall be carried out on the materials and the components offered for supply in the event of award of contract. Against each such test, the results of test performance shall be mentioned along with the name of laboratories/ testing houses, where tests were
so conducted. In support of the results whether type tests or factory tests, certified copies of the test certificates shall be furnished. In case any of the prescribed tests has not been carried out, the same shall be clearly mentioned in this list stating the reasons for not carrying out the test. The tenderer also shall furnish a separate list of tests which they have carried out on their products for ensuring their better quality, but are not stipulated explicitly, in the relevant ISS or BSS specifications. Type test reports to be acceptable, the tests have to be carried out at an NABL accredited laboratory. Reports of Type test conducted in laboratories other than the above will be acceptable only if witnessed by an officer from a power utility.

(b) Type test reports of equipment of higher capacity or voltage class than those specified shall be acceptable for the purpose of bidding. However, in that case, the successful tenderer shall conduct type tests on the offered equipment free of charge.

(c) Type test reports, conducted 5 years prior to the date of opening of tender, in general, will not be accepted.

3.4.4. SPARE PARTS:
Each tenderer shall indicate the expected life in use of their products. A list of spares which may be necessary for replacement during the maintenance of the equipment in service shall be furnished indicating if these are of proprietary nature or of standard make available in the market. In case these spares are of proprietary nature, their prices and the likely quantities that may be necessary during the useful life of the equipment shall also be mentioned.

3.4.5. BIS. CERTIFICATION:
The tenderer shall state clearly if the particular product offered by him is covered by any IS certification mark and if so, the tenderer will furnish the particulars of the IS Specification, the year of obtaining the certification and a copy of the certification.

3.4.6. PAST EXPERIENCE:
A Complete list of supplies/ works/ services in respect of the particular supplies / works / services offered to various parties during the period of last 5 (five) years along with total value of supplies shall be furnished. A separate list of supplies/ works/ services not exactly same as the one offered but similar to it, supplied during the last five years shall also be furnished. The tenderer shall state clearly if they had supplied similar material including the offered product, to Assam Power Distribution Company Limited/ ASEB in the past. If so, reference of the purchase orders, the ordering authority and the consignees shall also be furnished.

3.4.7. SOURCES OF SUPPLIES:
3.4.7.1. The tenderer shall clearly state the names of the manufacturer, the brand name of the product and the place/ places of its manufacture. In case, the components of the product are obtained from ancillary manufacturers, the names and addresses of such manufacturers also shall be furnished. It shall be mentioned clearly how the tenderer ensures quality control over such ancillary components and if manufacturer of such components is covered by any IS/ BS/ IEC or any other relevant specification.

3.4.7.2. The tenderer shall mention clearly whether he is a manufacturer, a sole selling agent or a commission agent of the product.

3.4.7.3. When the tenderer is not a manufacturer, submission of manufacturer’s authorization for supply of the offered materials by the tenderer along with warranty pledged by the manufacturer is compulsory.

3.4.7.4. Further, the manufacturing experience of the manufacturer in respect of the particular product or similar product also shall be furnished, indicating chronological development of the industry or the manufacturing unit.
3.4.7.5. The sources of receipt of the raw material whether indigenous or imported shall be clearly mentioned against each type of such raw materials used. The methods by which quality control of such raw materials being enforced shall be clearly described.

3.4.8. **DELIVERY/ WORK SCHEDULE:**
3.4.8.1. The delivery/ work schedule as stipulated in the NIT or. in the APDCL specification shall be binding on the tenderers. In case the APDCL delivery/ work schedule is not acceptable to the tenderer, then the tenderer may give their own delivery schedule stating clearly the reasons for deviations whether statutory or otherwise. In any case such schedules must satisfy the completion time specified. Acceptance of such deviations in the delivery/ completion schedule is entirely optional to the Purchaser.
3.4.8.2. The commencement period and the quantity of each item to be supplied per month shall be specifically mentioned.
3.4.8.3. Quantities offered ex-stock as well as with earlier delivery schedule shall be mentioned.

3.4.9. **SAMPLES:**
A sample shall be submitted along with the tender if asked for in the NIT and as per its terms. Non-submission or late submission of sample may disqualify the tender.

3.4.10. **TAX CLEARANCE CERTIFICATES AND REGISTRATION:**
3.4.10.1. The tender shall be accompanied with income tax and GST clearance certificates.
3.4.10.2. The Contractor must register for GST with the concerned department of Government of Assam within a reasonable time after award of contract if not already registered.

3.5. **PRICE BID**
3.5.1. The particulars and supporting documents in respect of the price bid should be as follows:
3.5.2. The total FOR destination price of the product offered unit wise and quantity wise both in words and in figures shall be clearly furnished. Such FOR destination price also shall be supported by a breakup of the price indicating separately Ex-works price, station of dispatch, Freight and Insurance Charges. The offer may be straightway rejected if the FOR destination price and its breakup against the components as aforesaid are not furnished. The FOR destination price will be on door delivery basis and shall be inclusive of cost of unloading of materials at site.
3.5.3. The Ex-works price shall not include Sales Tax whether central or state and the same will be indicated separately in words and in figures by the tenderer.
3.5.4. Excise duty on the finished product also shall be indicated separately if applicable. This should be worked out both unit wise and quantity wise indicating the excise rates applicable.
3.5.5. Any other levy, entry tax, excise or otherwise on finished products and of statutory nature also shall be indicated separately stating the reasons for claim of such levies.

3.5.6. **For imported equipment:**
(a) The tenderer shall quote price for:
- i. FOB Port of shipment, inclusive of seaworthy packing.
- ii. CIF Kolkata
- iii. Indian Agent Commission, if any.
(b) When prices quoted are for delivery FOB port of shipment, the Contractor shall agree to arrange for the shipment and insurance of the machinery from the port of shipment to Kolkata on behalf and to the account of the Purchaser should the Purchaser so desires. The actual expenses incurred by the Contractor for Sea freight and insurance will be paid by the Purchaser. The Purchaser shall provide for all incidental and statutory charges beyond the port of shipment such as customs duty clearance, loading and unloading, Railway freight and Octroi or terminal and other taxes.
(c) Firm FOB port of shipment shall be quoted. An alternative price CIF Kolkata shall be quoted separately. The customs duty applicable and the category (Import Trade Control Classification as brought up to date) under which the “applicant’s plant is assessable” shall be stated. If firm FOB price cannot be offered, price subject to contract price adjustment may be quoted, but a ceilings limit must be stated. Any claim for contract price adjustment shall be supported by authentic documents which shall be to the satisfaction of the Purchaser. Preference will be given to the firm offering FOB/ CIF price. The currency in which payments have to be affected shall be clearly mentioned in the tender.

(d) The best delivery FOB port of shipment shall be clearly stated in the tender as it shall have a vital bearing on the selection of the final successful tender.

(e) In either cases of goods supplied from within and outside India, the tenderer will quote separately the freight and insurance for delivery of the goods at site.

3.5.7. Price quoted should be firm. If however a variable price is permitted as per provisions of the NIT, the tenderer shall specifically stipulate the price variation formula by indicating the base price and base date. Normally the price variation formula and indices as per IEEMA and CACMAI will be accepted.

3.5.8. In case the tenderer quotes variable price as per any formula of his own/ other sources, the tenderer will state clearly the reasons for quoting such variable price and submit the source of the formula and indices. However, his offer may be rejected at the discretion of the Purchaser if the Purchaser finds the quoted formula to be complex and it is difficult to compare the outcome with other bids.

3.5.9. In any case, if price variation is allowed, it will be limited to a ceiling of 10% (ten percent) upward only. However, there shall be no limit for downward price variation.

3.5.10. The rate quoted shall remain valid for a minimum period of 180 (one hundred eighty) days from the date of opening of the tender. Any tender offering a shorter validity period than specified in the NIT may be rejected outright. The price quoted shall remain FIRM during the period of validity and any post revision of rate after opening of the tender will make it liable for rejection. The Purchaser, however, reserves the right to negotiate with the tenderer or offer lowest/ reasonable rate to any/ all of the tenderers.

3.5.11. The tenderer shall explain clearly if there is any DGS & D rate contract available for the product offered and if on the positive, copies of such rate contract shall invariably be furnished. For such DGS & D prices, the tenderer should state clearly the period of validity of the rate contract.

3.5.12. The tenderer shall mention clearly if any quantity discount or payment discount is offered.

3.5.13. The price bid shall be furnished clause wise and in the same order as above.

4.0 RIGHT TO REJECT:

4.1. The Purchaser reserves the right to reject any or all the tenders without assigning any reason thereof and the Purchaser further reserves the right to split up the supply order in favour of more than one contractor. The Purchaser also reserves the right to reject the lowest or any other price without assigning any reason.

5.0 ACCEPTANCE OF THE ORDER / CONTRACT:

5.1. Acceptance of the order(s) in writing shall be conveyed by the supplier to the Purchaser/ Employer within 10 (ten) days from the date of issue of the purchase order failing which, it will be presumed that all the terms and conditions of the purchase order are acceptable by him in full.

5.2. Before finalization of the contract, if discussion with the successful tenderer is considered necessary by the Engineer, the tenderer shall turn up for the same within 10 (ten) days from the receipt of intimation by FAX / e-mail at no extra cost to the Purchaser.

5.3. Also, if it is for executing a separate agreement the successful tenderer will turn up for the same within 10 (ten) days from the receipt of intimation at no extra cost to the Purchaser.
6.0 **CONDITION OF CONTRACT: COMMERCIAL & GENERAL:**

6.1. If so required by the Purchaser, a formal agreement with or without guarantee at the option of the Purchaser shall be entered into between the Contractor and the Purchaser for the proper fulfilment of contract.

6.2. Such contracts shall be drawn up in non-judicial stamp paper.

6.3. The expenses of completing and standing the agreement shall be paid by the Contractor and Purchaser shall be furnished free of charge with an executed stamped counterpart of the agreement along with ten copies thereof.

6.4. After the tender has been accepted by the Purchaser, all orders or instructions to the Contractor shall except as wherein otherwise provided, be given by the Engineer on behalf of the Purchaser.

7.0 **CONSTRUCTION OF CONTRACT:**

7.1. The contract shall in all respects be constructed and operated as defined in the Indian Contract Act 1972 and any statutory modification thereof.

8.0 **EXECUTION OF AGREEMENT:**

8.1. The contract agreement to be executed at Guwahati (Assam) by the parties.

9.0 **PERFORMANCE SECURITY DEPOSIT:**

9.1. The successful tenderer shall have to deposit through a Bank Guarantee from a nationalized or scheduled Bank of RBI for an amount equivalent to 10% (ten percent) of the total value of the order as performance security, immediately on acceptance of letter of intent/detailed orders (as the case may be), duly pledged in favour of the Purchaser concerned and such security deposits shall be valid up to 30(Thirty) days beyond the warranty period.

9.2. If the supplier fails or neglects to observe perform any of his obligations under the contract, the Purchaser shall have the right to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the supplier.

9.3. No interest shall be payable on such deposits.

10.0 **RETENTION MONEY:**

10.1. In addition to above performance security deposit, 5% value of each progressive bill will be retained by the Engineer/ Purchaser as ‘retention money’. The amount will be held by the Purchaser till the work under the contract is completed and the completion certificate is issued in pursuance to clause 25.0.

10.2. If the supplier fails or neglects to observe and perform any of his obligations under the contract, the Purchaser shall have the right to forfeit either in full or in part at his absolute discretion, the security deposit furnished by the supplier.

10.3. No interest shall be payable on such deposits.

11.0 **RAW MATERIALS:**

11.1. Raw materials will be arranged by the suppliers from their own quota and the Purchaser does not have any responsibility in this regard. If, however raw materials are obtainable against purchaser’s quota due to statutory compulsion, allotment orders in respect thereof will be issued by the Purchaser. In case of raw materials for which supplier has own quota, no recommendation or advice for release of raw materials shall be issued by the Purchaser. If issue of raw materials from purchaser quota is desired by the tenderer, he must indicate the price of the same raw material considered in the offer. In the event of actual cost of such supply by the Purchaser, being lower than the price stipulated in the tender, the difference will be recovered from the tenderer.
11.2. Where imports are unavoidable, the items shall be imported by the supplier in good time against his import license without affecting the delivery schedule.

12.0 WARRANTY:
12.1. Each tender shall stipulate a warranty clause of products offered covering a minimum period for rectification/free replacement thereof. The term “period of warranty” shall mean the period of 12 (Twelve) months from the date of commissioning and successful operation of the equipment. In any case, this period shall not be less than 18 months from the date the materials are received in the purchaser’s store in good and acceptable conditions. During the period of warranty, the Contractor shall rectify all defects in design, materials and workmanship that may develop under normal use of the equipment upon written notice from the Engineer who shall indicate in what respects the equipment is faulty. This rectification/ free replacement must be carried out within a reasonable period as determined and directed by the Engineer. The cost of rectification/ free replacement will be to the Contractor’s account.

12.2. If the Contractor fails to rectify the defects within the reasonable time, the Purchaser/ Employer may fix a date by which the Contractor would rectify the defects, failing which the Engineer may
   (a) Carry out remedial works himself or through by others, in a reasonable manner and at the contractor’s risk and cost. The costs incurred by the Purchaser/ Employer in remedying the defect shall be recoverable from the Contractor by the Purchaser/ Employer;
   (b) Determine and certify a reasonable reduction in the contract price; or
   (c) May terminate the contract in respect of such parts of the works and the Engineer shall be entitled to recover all sums paid for such parts of the work.

13.0 DETAILS OF AUXILIARIES / MATERIALS:
13.1. Within a reasonable time from the date of acceptance of notification of award of contract, the Contractor shall provide the Purchaser with details of all the auxiliaries/ materials being supplied and also of others, not forming part of the Contractor’s supply but essential for the safe and satisfactory working of the equipment/ system. The Contractor shall send for approval on or before the date indicated by the Engineer, outline drawings of all equipment/ materials to be furnished under the contract, together with weights and sufficient overall dimensions to enable the design of the foundations, structures and associated equipment to be prepared and also for transportation purpose.

14.0 CONTRACTOR’S DRAWINGS:
14.1. All working drawings shall preferably be prepared in AutoCAD 2000 software or its later version. The Contractor shall also submit the soft copies of all working drawings.
14.2. Within 30 days from the date of acceptance of notification of award of contract, the Contractor shall send to the Purchaser a preliminary list of all the drawings with their respective identification numbers, titles and expected date of submission. This list shall be amended or extended by the Contractor as and when necessary during the progress of the work under the contract.
14.3. All titles, notes and inscriptions on the drawings shall be in English.
14.4. All drawings which the Contractor shall send to the Purchaser for approval shall be approved or rejected or returned for modification within 15 days of receipt by the Purchaser. In case of modification or rejection the Contractor shall submit the correct drawings within 15 days from receipt of communication from the Purchaser. Contractor shall be responsible for any delay in the contract processing and its award caused by non conforming technical particulars furnished by the Contractor requiring query, confirmation etc.
14.5. Upon approval by the Engineer, the drawings shall become the contract drawings and thereafter, the Contractor shall not depart from them in anyway whatsoever except with the written permission of the Purchaser.
14.6. **FINAL AS-BUILT DRAWINGS:**
In the final stages of the contract, the Contractor shall submit to the Purchaser hard copies as well as soft copies of complete set of built up drawings.

14.7. **MISTAKES/ ERRORS IN DRAWINGS:**
14.7.1. The Contractor shall be responsible and liable for any change in the work due to any discrepancies, errors, or omissions in the drawings or other particulars which have arisen due to inaccurate information or particulars furnished by the Contractor, even though approved by the Purchaser/Employer.
14.7.2. However, the Purchaser/ Employer shall be responsible for drawings and information supplied by him. The Purchaser/ Employer shall compensate for any change in the work caused due to inaccurate information supplied by him to the Contractor.

15.0 **COPY RIGHT ETC.:**
15.1. The Contractor shall indemnify the Purchaser against all claims, actions, suits and proceedings for the infringement or alleged infringement of any patent, design or copyright protected either in the country of origin or in India 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.

16.0 **SUBLETTING CONTRACT:**
16.1. The Contractor shall not, without the consent in writing of the Purchaser/ Employer assign or sublet his contract, or any substantial part thereof, or interest therein or 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.

17.0 **PACKING & MARKING:**
17.1. The contract shall include provisions for secured/ protective packing of equipment so as to avoid damage in transit, and the Contractor shall be responsible for all loss or damage caused or occasioned by a defect in the packing.
17.2. All bright metal parts shall be thoroughly protected from rust during transit.
17.3. All materials shall be packed in suitable strong cases or crates as per standard practice, unless otherwise specified. Large equipment such as power transformers, circuit breakers etc. which are not packed in cases, shall have all screwed holes plugged with wood and all machined faces shall be properly protected. Each package should be suitably marked with APDCL marking as specified in the purchase order.

18.0 **VARIATION OF QUANTITY:**
18.1. Purchaser/ Employer shall have the right to increase/ decrease the ordered quantity by 20% within 50 days of the period of completion of supply order and the same shall be supplied at the same rates/ prices and terms and conditions stipulated in the order except in regard to delivery schedule, which shall be mutually agreed upon in case of increase in the ordered quantity.
19.0 **CO-OPERATION WITH OTHER MANUFACTURERS:**
19.1. The Contractor shall agree to co-operate with the Purchaser’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 the Purchaser for such technical co-operation.

20.0 **INSPECTION AND TESTING:**
20.1. The Purchaser/ Employer and his duly authorized representative shall have at all reasonable time access to the Contractor’s premises or works and shall have the power to inspect and examine the materials including raw materials used and the workmanship of the product during manufacture. If a part of the goods is manufactured at other’s premises or works the Contractor shall obtain for purchaser’s duly authorized representative, permission to similarly inspect at the other premises/works.

21.0 **INSPECTION AT SITE FOR ERECTION WORK:**
21.1. A representative of the Purchaser shall have access to the Contractor/ Sub- Contractor’s work at site at any time and the Contractor/ Sub-Contractor or his authorized agent shall be present and shall provide facilities for necessary inspection.

22.0 **TESTS AT SITE FOR ERECTION WORK:**
22.1. The Contractor after erection and commissioning of the equipment shall arrange testing to prove correct workmanship as per specification. The Contractor shall give in writing the Purchaser’s representative thirty (30) days notice of the date the equipment would be ready for testing. The Contractor shall bear all testing cost at site of work and shall become responsible for rectification of defects found on testing within reasonable time as decided by the Engineer.

23.0 **INSURANCE:**
23.1. The Contractor shall, unless otherwise specified by the Purchaser, insure the materials through their underwriter at their cost and shall keep it insured against any loss/ damage/ pilferage in transit, destruction or damage by fire/ flood, exposure to vagaries of weather or through riot, civil commotion, war or rebellion, for the full value of the materials until the materials are received at the Purchaser’s destination store.

23.2. The Contractor shall be responsible for safe arrival of the goods at destination, their unloading and their receipt by the consignee. The Assam Power Distribution Company Limited will discharge consignee’s responsibilities only and shall not be responsible for any damage/ loss/ pilferage/ non-delivery by the carriers.

23.3. In case of any loss / damage / pilferage / non-delivery / short delivery by carriers etc. the supplier shall replace free of cost the missing / damaged / lost materials within 30 (thirty) days from the receipt of report thereof from the consignee without waiting for settlement of their claims with their carriers/ under-writers. Normally such reports from the consignee to the supplier shall be initiated within a period of 30 (thirty) days from the date of receipt of each consignment by him.

23.4. If it is considered necessary that the damaged equipment either in part or in full be sent back to the manufacturer’s works for repair, the manufacturers/ suppliers will furnish the Bank Guarantee for the full value of equipment needing repairs and such Bank Guarantee shall remain valid till such time the equipment are repaired and returned to the consignee in good condition. The to and fro freight, handling and insurance charges in such cases will be borne by the Contractor .

23.5. Unless otherwise mutually agreed upon, in case of failure by the supplier to replenish/ make good of the loss/ damage/ short supplied quantities, within the stipulated period, the Purchaser reserves
the right to forfeit the security deposit and/ or adjust any outstanding payment to the Contractor with APDCL or take any other appropriate action.

23.6. All materials will be dispatched against clear door delivery basis unless otherwise agreed by the Purchaser.

24.0 TERMS OF PAYMENT:

24.1. The standard terms of payment of APDCL for supply of equipment/ materials are indicated below: -

(A) 100% payment would be admissible within three (3) weeks from the date of receipt of the materials/ equipment at site in full and good condition less deduction of retention money and advance applicable as per clause 10.0 and 24.2 and as per terms and conditions stipulated in the purchase order

(B) However, in special case, the following terms of payment may be agreed to at the discretion of Purchaser.

(1) Payment of 90% (ninety percent) of the consignment value on receipt of all dispatch and other documents by the consignee through Bank.

(2) Balance 10% (ten percent) on receipt of the equipment/ materials at site in full and in good condition and as per terms & conditions stipulated in the Purchase order.

(3) Payment vide clause (B)(1) & (B)(2) would be made provided the Contractor submits to the Purchaser/ Employer a bank guarantee equivalent to 90% of the consignment value, which will be released after the consignment is received in full and good condition.

(4) Payments as per sub-para (A), (B)(1) & (B)(2) above will be made under the following conditions:

(a) Advance copies of bills in duplicate and other information such as challan packing list etc. are furnished sufficiently in advance.

(b) Any demurrage charges on account of late intimation and/or delivery of documents by the Bank is borne by the supplier.

(c) The supplier intimates the dispatch of each and every consignment to the Purchaser and the Consignee.

(d) All Bank charges are borne by the supplier.

(5) Payment through Bank in respect of material/ equipment dispatched by road transport shall be allowed if required, provided the transport agency is approved by the Banking Association and prior approval thereof is given by the Engineer.

(C) TERMS OF PAYMENTS FOR ERECTION WORK:

Payment up to 100% of erection items will be made against progressive monthly bills within a reasonable time from the date of submission of bills less deduction of retention money and advance applicable as per clause 10.0 and 24.2 respectively.

24.2. ADVANCEPAYMENT:

10% of the contract value as interest free advance against a Bank Guarantee for a sum equivalent may be permitted if specifically provided in the NIT. The advance amount will be gradually adjusted/ amortized by suitable instalments from the progressive bills. Number of instalments will be specified in the NIT.

25.0 TIME FOR COMMENCEMENT AND COMPLETION:

25.1. For the purpose of determining the completion time of supply and/or erection works, the date on which the Contractor accept the purchase/ work order in pursuance to clause 5.0 shall be taken as commencement date of the contract.

25.2. The Contractor shall attain Completion of the supply and/or works (or of a part where a separate time for Completion of such part is specified in the NIT/ Contract), within the time stated in the NIT / Contract.

25.3. As soon as the works, in the opinion of the Contractor, are completed as per requirements of the specification/ contract, the Contractor shall so notify the Engineer in writing.
25.4. The Engineer shall, within fourteen (14) days after receipt of the Contractor’s notice under Sub-Clause 25.3 either issue a Completion Certificate in the form specified by the Engineer, stating that the supply/ works thereof have reached Completion on the date of Contractor’s notice under Sub-Clause 25.3 or notify the Contractor in writing of any defects and/or deficiencies.

25.5. If the Engineer notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in Sub-Clause 25.3.

25.6. If the Engineer is satisfied that the supplies/ works have reached completion, the Engineer shall, within seven (7) days after receipt of the Contractor’s repeat notice, issue a Completion Certificate stating that the supplies/ works have reached Completion on the date of the Contractor’s repeat notice.

25.7. If the Engineer is not so satisfied, then he shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor’s repeat notice, and the above procedure shall be repeated.

25.8. If the Engineer fails to issue the Completion Certificate and fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor’s notice under Sub-Clause 25.4 or within seven (7) days after receipt of the Contractor’s repeat notice under Sub-Clause 25.6 then the supplies/works shall be deemed to have reached completion on the date of the Contractor’s notice or repeat notice, as the case may be.

25.9. **EXTENSION OF TIME FOR COMPLETION:** Should progress be delayed because of delay in approval of drawings or any cause beyond reasonable control of the Contractor, reasonable extension of time may be granted on the application made by the Contractor in writing to the Purchaser but without prejudice to other terms and conditions of the contract. It shall be the duty of the Contractor to notify to the Purchaser the reason for delay which the Contractor considers to be beyond his control. The decision of the Purchaser as to whether the delay was beyond the control of the Contractor shall be final.

25.10. Price variation, if any, applicable as per purchase order shall not apply to any quantity not delivered as per delivery schedule of the purchase order. If, however, the prices in respect of delayed deliveries are found to have gone down, payment will be made at the reduced price or penalty levied at the discretion of the Purchaser.

26.0 **LIQUIDATED DAMAGE FOR DELAY IN DELIVERY / COMPLETION OF WORKS AND PENALTY:**

26.1. The date of delivery/completion of work shall be deemed to be the essence of the contract and shall be completed not later than the date specified in the purchase order/contract. In case of failure to deliver the materials/equipment in full or to complete the delivery within the stipulated delivery period or delay in the erection work beyond completion schedule, the Purchaser/ Employer shall be entitled to:

1. Recover an amount at the rate of 1% (one percent) of the Contract Price per week or part thereof of delay, subject to maximum of 10% (ten percent) of the contract price as liquidated damage to APDCL. However, the payment of liquidated damages shall not in any way relieve the Contractor from any of its obligations to complete the works or from any other obligations and liabilities of the Contractor under the Contract.

2. Purchase the undelivered material/equipment from elsewhere or to complete the balance work giving notice to the supplier and to recover any extra expenditure incurred thereby for having to purchase these materials or complete the work at a higher price, at the risk and responsibility of the Contractor.

3. Cancel the contract wholly or in part and to purchase materials/equipment at the full risk and cost of the supplier and forfeit the security deposit.
27.0 CONTRACTUAL FAILURE:
27.1. In the event of contractual failure of any respect on the part of the supplier, the Purchaser shall be entitled to forfeit the security deposit or any deposit or any payment due to Supplier from this or his other contracts towards the recovery of Purchaser’s claim for damages arising out of the failure. In addition, APDCL may black-list or ban the Contractor or pending enquiry, suspend him or take any other steps considered suitable.

28.0 REJECTION:
28.1. In the event, any of the Equipment supplied by the Contractor is found defective in materials or workmanship or otherwise not in conformity with the requirements of the contract specifications, the Purchaser shall either reject the equipment or request the Contractor in writing to rectify the same. The Contractor, on receipt of such notification shall either rectify or replace the defective equipment free of cost to the Purchaser. If the Contractor fails to do so, the Purchaser may at his option:
(a) Replace or rectify such defective equipment and recover the extra cost so involved from the Contractor plus 15% fifteen percent thereof, or
(b) Terminate the contract for default, or
(c) Acquire the defective equipment at a reduced price as considered equitable under the circumstances. The provision of this article shall not prejudice the Purchaser’s right under clause 26.0

29.0 DEDUCTION FROM CONTRACT PRICE:
29.1. All cost, damages or expenses which the Purchaser may have made for which, under the contract, the Contractor is liable, may be deducted by the Purchaser from any money due or becoming due by him to the Contractor or may be recovered by action at law or otherwise from the Contractor.
29.2. 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 the Purchaser may at the option of the Purchaser be recovered from any money due to the Contractor from LAEDCL under other contracts with the Contractor.

30.0 FORCE MAJEURE:
30.1. 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 supplier, 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 the Purchaser in writing such condition within 10 (ten) days from the beginning of such delay for consideration and acceptance.

31.0 CHANGE OF NAME OF THE TENDERER:
31.1. At any stage after tendering, the Purchaser/ Employer shall deal with the Supplier/ Contractor only in the name and the address under which he submitted the tender. All the liabilities/ responsibilities for due execution of the contract shall be that of the Supplier/ Contractor. The Purchaser may however, in his discretion deal with agents/ representatives/ distributors/ manufacturers/ associates/ principals/ sister concerns and such dealings shall not absolve the Supplier/ Contractor from the responsibilities/ obligations/ liabilities to the Purchaser/ Employer under the contract.
31.2. Any change/ alteration of name/ constitution/ organization of supplier shall be duly notified to the Purchaser/ Employer and the Purchaser/ Employer reserves the right to determine the contract, in case of any such notification.
32.0 **DEATH, BANKRUPTCY ETC.:**

32.1. If the Contractor becomes bankrupt or being a corporation is in the process of winding up, amalgamation or reorganization, the Purchaser 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 the Purchaser.

32.2. In case of death of the Contractor before completion of work and supply, the Engineer or Purchaser 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 the Purchaser/ Engineer commensurate with the incomplete portion of the work/ supply.

The Purchaser will enter into a fresh contract with the legal heir of the Contractor on the same terms and conditions of the earlier contract.

33.0 **ARBITRATION:**

33.1. If at any time, any question, disputes or differences whatsoever shall rise between the Purchaser and the Contractor, upon or in relation to or in connection with the contract, either party may forthwith give notice to the other in writing of the existence of such question of dispute or difference and the same shall be referred to the adjudication of three Arbitrators, one to be nominated by the Purchaser the other by the Contractor and the third by the President of the International Chamber of Commerce in the case of foreign contractors and in case of local contractors by the President of the Institution of Engineers, India/ Retired or Sitting Judge not below the status of a retired Judge of High Court of India. If either of the parties fail to appoint its arbitrators within 60 (sixty) days after receipt of notice of the appointment of arbitrators then President of International Chamber of Commerce or the President of the Institution of Engineers retired or sitting Judge of India, as the case may be shall have the power at request of either of the parties, to appoint an Arbitrator. A certified copy of the President of the ICC or IOE making such an appointment shall be furnished to both parties.

33.2. The arbitration shall be conducted in accordance with Rules and procedures for Arbitration of the International Chamber of Commerce (Paris) in the case of foreign contractors as per provisions of the Arbitration Act 1940 or any statutory modification thereof and in case of local contractors, shall be held at Guwahati or any other place as may be decided by the Managing Director, APDCL. The decision of the majority of Arbitrators shall be final & binding upon the parties and the expenses of the arbitration shall be paid as may be determined by the Arbitrator. However, any dispute arising out of this contract will first be discussed and settled bilaterally between LAEDCL and the Contractor.

34.0 **PRECAUTIONS TO BE TAKEN DURING CONSTRUCTIONS/ ERECTION:**

34.1. The Contractor shall take reasonable and statutory precaution during execution of erection and construction work so as to avoid accident and damage to equipment and injury to workman and to prevent theft, pilferage etc.

35.0 **LIABILITY FOR ACCIDENT AND DAMAGE:**

35.1. The Contractor shall not claim for compensation arising out of any accident(s) or damages done during the course of erection & commissioning work & the Contractor will be responsible for paying
compensation to the worker as per Workmen’s 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 the Purchaser shall make payment and the amount so paid shall be deducted from the bills of the Contractor.

35.2. The Contractor shall adequately insure against liability to third party, in the joint names of the Employer, the Contractor and the Sub-contractors for any loss, damage, death or bodily injury which may occur to any physical property owned by others, the goods/ materials of the contract or to any person which may arise out of the performance of the contract.

36.0 **REGULATION OF LOCAL AUTHORITIES:**

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

36.2. All electrical contractors need to possess a valid ‘Electrical Contractor’s License’ from the concerned Licensing Board, Government of Assam. A tenderer, who has a valid ‘Electrical Contractor’s License’ from other states will also qualify for a bidding. However, in such cases the tenderer will have to obtain the same or an endorsement to that extent, from the Licensing Board of Government of Assam within a reasonable time from the date of award of contract.

36.3. The Contractor is required to fulfil all criteria related to Labour Laws.

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

37.0 **SUSPENSION OF BUSINESS DEALINGS WITH FIRMS/ CONTRACTORS:**

37.1. The Purchaser 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) The Purchaser has past record of non-performance of the Firm in its previously awarded contracts.

(c) The Purchaser has record of ban against the Firm by other Government / Public sector utility

37.2. However, the Purchaser shall give the Firm/ Contractor a fair chance to explain the circumstances of such previous suspensions.

38.0 **BANNING OF BUSINESS DEALINGS WITH FIRMS/ CONTRACTORS:**

38.1. The Purchaser 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, interpolation, mis-representation, 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/ party in 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 bid 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.

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

39.0 **LEGAL JURISDICTION:**

39.1. For any litigation arising out of the contract which cannot be resolved through mutual agreement or through arbitration, the Guwahati High Court will have the sole jurisdiction.