ODISHA POWER TRANSMISSION CORPORATIONLIMITED
OFFICE OF THE SR. GENERAL MANAGER
CENTRAL PROCUREMENT CELL
JANAPATH, BHUBANESWAR-751022
TEL NO. 0674-2541801 FAX NO. 0674-2542964

TENDER SPECIFICATION NO.
SR.GM-CPC-II-E-TENDER-INSULATOR-30/2018-19
FOR PROCUREMENT OF
PORCELAIN LONG ROD INSULATOR & SILICON RUBBER LONG ROD INSULATOR & POST INSULATOR

LOT-I

Sl. No.	Item Description	UOM	Requirement of 2018-19	Requirement of 2019-20	Total requirement
1	132kV 90 KN Porcelain Long Rod Insulator	Nos	1000	830	1830
2	132 kV 120KN Porcelain Long Rod Insulator	Nos	595	500	1095

LOT-II

Sl. No.	Item Description	UOM	Requirement of 2018-19	Requirement of 2019-20	Total requirement
1	220 kV 90KN Porcelain Long Rod Insulator	Nos	3723	912	4635
2	220 kV 160KN Porcelain Long Rod Insulator	Nos	1405	200	1605

LOT-III

Sl. No.	Item Description	UOM	Requirement of 2018-19	Requirement of 2019-20	Total requirement
1	132kV 90 KN Silicon Rubber Long Rod Insulator	Nos	360	…….	360
2	132 kV 120KN Silicon Rubber Long Rod Insulator	Nos	880	…….	880

LOT-IV

Sl. No.	Item Description	UOM	Requirement of 2018-19	Requirement of 2019-20	Total requirement
1	220 kV 90KN Silicon Rubber Long Rod Insulator	Nos	592	…….	592
2	220 kV 160KN Silicon Rubber Long Rod Insulator	Nos	1000	514	1514

LOT-V

Sl. No.	Item Description	UOM	Requirement of 2018-19	Requirement of 2019-20	Total requirement
1	400KV Post Insulator	Nos	12	8	20

LOT-VI

Sl. No.	Item Description	UOM	Requirement of 2018-19	Requirement of 2019-20	Total requirement
1	33KV Post Insulator	Nos	56	50	106

REQUEST FOR ON LINE TENDER DOCUMENT : From 07.01.2019 (11.00Hr)
to 28.01.2019(13.00Hr)

LAST DATE OF SUBMISSION ON LINE TENDER : 29.01.2019(13.00Hr)

DATE OF OPENING OF TENDER : 30.01.2019(15.00Hr)

ODISHA POWER TRANSMISSION CORPORATION LTD.
REGD. OFFICE: JANPATH, BHUBANESWAR – 751 022,
ODISHA

e-TENDER NOTICE NO. CPC- 30/ 2018-19

For and on behalf of ODISHA POWER TRANSMISSION CORPORATION LTD, C.G.M. [C.P.C.] invites bids from reputed manufacturers in two part bidding system for supply of Porcelain long rod insulators, Silicon rubber long rod insulators & Post insulators. The interested bidders would be required to enroll themselves on the tender portal **www.tenderwizard.com/OPTCL**. Complete set of bidding documents are available at **www.tenderwizard.com/OPTCL** from 07.01.2019 **(11.00Hr) to 28.01.2019(13.00Hr)** Interested manufacturers may visit OPTCL's official web site **http://www.optcl.co.in** and **www.tenderwizard.com/OPTCL** for detail specification.

N.B: All subsequent addendum / corrigendum to the tender shall be hosted in the OPTCL's official website http://www.optcl.co.in, www.tenderwizard.com/OPTCL only.

CHIEF GENERAL MANAGER [C.P.C.]

NOTICE INVITING TENDER

ODISHA POWER TRANSMISSION CORPORATION LTD.,

REGD. OFFICE: JANPATH, BHUBANESWAR – 751 022, ODISHA, INDIA.

e-TENDER NOTICE NO- CPC- 30 / 2018-19.

For and on behalf of the ODISHA POWER TRANSMISSION CORPORATION LTD., the undersigned invites bids under two-part bidding system in e- tendering mode only as per the following details.

Tender Specification No	Description of materials.	Quantity in Nos.	Earnest Money Deposit (In Rs.)	Cost of Tender Document (In Rs.)	Tender Processing Fee (In Rs.)	Last date of receipt & Date of opening of Tender
	LOT-I		2,20,292/-	12,000/- + GST @12% (Rs.13,440/-	Rs 5,000/ + GST@18% Rs 5,900/-	
	(1)132kV 90 KN Long Rod Insulator-	1830				
	(2)132kV 120KN Long Rod Insulator-	1095				
	LOT-II		7,40,676/-			
	(1) 220 kV 90KN Long Rod Insulator-	4635				
	(2) 220 kV160KN Long Rod Insulator-	1605				
	LOT-III		27331/-			
	(1)132kV 90 KN Silicon Rubber Long Rod Insulator–	360				
	(2)132 kV 120KN Silicon Rubber Long Rod Insulator–	880				
	LOT-IV		1,18,102/-			
	(1)220 kV 90KN Silicon Rubber Long Rod Insulator	592				
	(2)220 kV 160KN Silicon Rubber Long Rod Insulator	1514				
	LOT-V		8,085/-			
	400KV Post Insulator	20				
	LOT-VI		2,933/-			
	33KV Post Insulator	106				

The bidders can view the tender documents from website free of cost.

TENDER COST:

The bidders who want to submit bids shall have to pay non-refundable amount Rs. 13,440/- (Rupees Thirteen thousand four hundred forty) only including GST @ 12%) towards the tender cost, in the form of Demand draft/Pay order/Cash only, drawn in favour of the D.D.O Head Qrs, OPTCL,

Bhubaneswar. They have to also submit notarized hard copy of GST registration certificate on or before the date & time of submission of techno-commercial bid.

TENDER PROCESSING FEE:

The bidders shall have to submit non-refundable amount of Rs.5,900/- (Rupees Five thousand & nine hundred) only including GST @ 18%) towards the tender processing fee to K.S.E.D.C.Ltd, in e-payment mode. The e-payment of above amount is to be made to enable the bidder to down load the bid proposal sheets & bid document in electronic mode.

SUBMISSION OF TENDE COST, TENDER PROCESSING FEE & EMD:

The bidder shall deposit the tender cost, tender processing fee & EMD BG prior to last date & time for submission of bid as notified in tender notice. Local micro & small enterprisers (MSEs) **(In the state of Odisha)** based in Odisha and registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC can participate without payment of the cost of tender specification. They have to submit notarized hard copy of valid registration as local MSE **(In the state of Odisha)** as above on or before the date & time of submission of techno-commercial bid.

The demand draft/pay order for tender cost , processing fees are to be submitted along with the EMD at the office of the undersigned on or before the last date & time of submission of tender.

The bidders shall scan the Demand Draft/Pay order/ Bank guarantee, towards EMD/ notarised hard copy of valid registration as local MSE **(In the state of Odisha)** (if any) and upload the same in the prescribed form in .gif or .jpg format in addition to sending the original as stated above.

The prospective bidders are advised to register their user ID, Password, company ID from website **www.tenderwizard.com/OPTCL** by clicking on hyper link "Register Me".

Any clarifications regarding the scope of work and technical features of the tender can be had from the undersigned during office hours.

Minimum qualification criteria of bidders: AS STIPULATED IN SECTION-II, (G.T.C.C) OF THE TENDER SPECIFICATION.

CHIEF GENERAL MANAGER, CPC

ODISHA POWER TRANSMISSION CORPORATION LTD.

OFFICE OF THE SR. GENERAL MANAGER

CENTRAL PROCUREMENT CELL

FAX NO.:0674 – 2542964

TELEPHONE NO.:0674 – 2541801

JANAPATH, BHUBANESWAR – 751022

TENDER SPECIFICATION NO. SR. GM.-CPC-II-E-TENDER- INSULATOR – 30 / 2018-19

CONTAINING

PART – I

SECTION – I : INSTRUCTION TO TENDERERS

SECTION – II :GENERAL TERMS AND CONDITIONS OF CONTRACT (G.T.C.C.) (COMMERCIAL)

SECTION – III : LIST OF ANNEXURES (COMMERCIAL)

SECTION – IV : TECHNICAL SPECIFICATION

PART – II PRICE BID.

PART – I.

SECTION – I.

INSTRUCTIONS TO TENDERERS

COMMERCIAL SPECIFICATION.

SECTION-I

INSTRUCTIONS TO TENDERER

1. Submission of Bids: -

The bidder shall submit the bid in Electronic Mode only i.e. **www.tenderwizard.com/OPTCL**. The bidder must ensure that the bids are received in the specified website of the OPTCL by the date and time indicated in the Tender notice. Bids submitted by telex/telegram will not be accepted. No request from any bidder to the OPTCL to collect the Bids in physical form will be entertained by the OPTCL.

The OPTCL reserves the right to reject any bid, which is not deposited according to the instruction, stipulated above. The participants to the tender should be registered under GST laws.

a) For all the users it is mandatory to procure the Digital Signatures.

b) Contractors / Vendors / Bidders / Suppliers are requested to follow the below steps for Registration:

- Click "Register", fill the online registration form.
- Pay the amount of Rs. 2360/- through DD in Favour of KSEDCL Payable at Bangalore.
- Send the acknowledgment copy for verification.
- As soon as the verification is being done the e-tender user id will be enabled.

c) After viewing Tender Notification, if bidder intends to participate in tender, he has to use his e-tendering User Id and Password which has been received after registration and acquisition of DSCs.

d) If any Bidder wants to participate in the tender he will have to follow the instructions given below:

- Insert the PKI (which consist of your Digital Signature Certificate) in your System. (Note: Make sure that necessary software of PKI be installed in your system).
- Click / Double Click to open the Microsoft Internet Explorer (This icon will be located on the Desktop of the computer).
- Go to Start > Programs > Internet Explorer.
- Type **www.tenderwizard.com/OPTCL** in the address bar, to access the Login Screen.

- Enter e-tender User Id and Password, click on "Go".
- Click on "Click here to login" for selecting the Digital Signature Certificate.
- Select the Certificate and enter DSC Password.
- Re-enter the e-Procurement User Id Password

e) To make a request for Tender Document Bidders will have to follow below mentioned steps.
   - Click "Un Applied" to view / apply for new tenders.
   - Click on Request icon for online request.

f) After making the request Bidders will receive the Tender Documents which can be checked and downloaded by following the below steps:
   - Click to view the tender documents which are received by the user.
   - Tender document screen appears.
   - Click "Click here to download" to download the documents.

g) After completing all the formalities Bidders will have to submit the tender and they must take care of following instructions.
   - Prior to submission, verify whether all the required documents have been attached and uploaded to the particular tender or not.
   - Note down / take a print of bid control number once it displayed on the screen

h) Tender Opening event can be viewed online.

i) Competitors bid sheets are available in the website for all.

j) **For any e-tendering assistant contact help desk number mentioned below.**Bangalore – 080- 40482000.

The participants to the tender should be registered under GST laws.

2. Division of Specification.

The specification is mainly divided into two parts viz. Part-I & Part-II.

Part-1 Consists of

[i] Section-I	Instruction to Tenderers.
[ii] Section-II	General Terms & conditions of contract.
[iii] Section-III	Schedules and forms etc.
[iv] Section-IV	Technical Specification.

Part-II Consists of

Schedule of prices as per Annexure-V

3. Tenders shall be in two parts.

The Tenderers are required to submit the tenders in two parts viz. Part-I (Techno commercial) & Part-II (Price bid).

4. Opening of Bids.

[a] The tender shall be opened on the date and time fixed by the OPTCL for opening of bids in Electronic mode in presence of such of the Tenderers or their authorized representatives [limited to one person only] on the due date of opening of tender who opt remain present. After scrutiny of the technical particulars and other commercial terms, clarifications, if required, shall be sought for from the bidders. The Tenderers shall be allowed 15 days time for such activity.

[b] On receipt of technical clarification, the bids shall be reviewed, evaluated and those not in conformity with the technical Specification / qualifying experience, shall be rejected. If any of the technical proposal requires modification to make them comparable, discussion will be held with the participating bidders.

All the responsive bidders shall be given opportunity to submit the revised technical and revised price proposals as a follow up to the clarification (modification if any) on the technical proposals. The qualified bidders shall be given opportunity to submit revised price proposals within 15 days from the date of such discussion or within time frame mutually agreed, whichever is earlier.

[c] When the revised price proposals are received, the original price proposals will be returned to the bidders unopened along with their original technical proposals. Only the revised technical and price proposals will be considered for bid evaluation. The price bids [Part-II] of such of the Tenderers, whose tenders have been found to be technically and commercially acceptable, including those supplementary revised price bids, submitted subsequently, shall be opened in the presence of the bidder's representative on a date and time which will be intimated to all technically and commercially acceptable Tenderers.

[d] The bidders are required to furnish sufficient information to the Purchaser to establish their qualification, capacity to manufacture and/or supply the materials/perform the work. Such information shall include details of bidder's experience, its financial, managerial and technical capabilities.

[e] The bidders are also required to furnish details of availability of appropriate technical staff and capability to perform after sales services. The above information shall be considered during scrutiny and evaluation of bids and any bid which does not satisfactorily meet these requirements, shall not be considered for price bid evaluation.

[f] The price bids of the technically and otherwise acceptable bids shall only be evaluated as per the norms applicable in terms of this Specification.

5. Purchaser's Right Regarding Alteration of Quantities Tendered.

The Purchaser may alter the quantities of materials/equipment at the time of placing orders. Initially the purchaser may place orders for lesser quantity with full freedom to place extension orders for further quantity under similar terms and conditions of the original orders. Orders may also be split among more than one tenderer for any particular item, if considered necessary in the interest of the Purchaser to get the goods/equipment earlier.

6. Procedure and opening time of tenders.

Tenders will be opened in the office of the Chief General Manager [C.P.C.] on the specified date and time in presence of the Tenderers or their authorized representatives [limited to one person only] in case of each bidder who may desire to be present, at the time of opening the bids.

7. Bidder's Liberty to deviate from Specification.

The Tenderer may deviate from the specification while quoting, if in his opinion, such deviation is in line with the manufacturer's standard practice and conducive to a better and more economical offer. All such deviations should however be clearly indicated giving full justifications for such deviation. [Read with Clause-9, Section-II of the Specification].

8. Eligibility for submission of bids.

Only those manufacturers who have deposited the cost of tender specification are eligible to participate in the tender. They should submit the money receipt as a proof of such payment. The local Micro and small Enterprises(MSEs) (In the state of Odisha) registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC can participate without payment of the cost of tender specification

9. Purchaser's right to accept/reject bids:

The purchaser reserves the right to reject any or all the tenders without assigning any reasons what so ever if it is in the interest of OPTCL, under the existing circumstances. [Read with clause-10, Section-II of the specification].

10. Mode of submission of Tenders.

[A] Tenders shall be submitted in electronic mode only. (www.tenderwizard.com/OPTCL)

[B] **Telegraphic or FAX tenders** shall not be accepted under any circumstances.

11. Earnest money deposit:

The tender shall be accompanied by Earnest Money deposit of value specified in the notice inviting tenders against each lot / bid. Tenders without the required EMD as indicated at **Annexure-VIII** will be rejected out rightly.

The local Micro and small Enterprises(MSEs) (In the state of Odisha)registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC can participate by submitting Earnest Money Deposit @ fifty percent of the amount indicated in the Notice Inviting Tender.

The earnest money deposit shall be furnished in one of the following forms subject to the conditions mentioned below:

(a) **Cash:-** Payable to drawing & disbursing Officer, OPTCL (Hd.qrs. Office), Bhubaneswar - 751022

(b) **Bank Draft**: -To be drawn in favour of Drawing & Disbursing Officer, OPTCL [H.Qrs.Office], Bhubaneswar-751 022.

(c) Bank Guarantee from any Nationalized/Scheduled Bank strictly as per enclosed proforma vide **Annexure-VI** to be executed on non-judicial stamp paper worth Rs.29.00 or as applicable, as per prevailing laws in force and also to be accompanied by the confirmation letter of the issuing Bank Branch.

NOTE:

(i). The validity of the EMD in the form of Bank Guarantee shall be at least for 240 days from the date of opening of tender failing which the tender will be liable for rejection.

(ii) No interest shall be paid on the Earnest Money Deposit.

(iii) E.M.D. in shape of cash may be submitted up to Rs. 25,000/- (Rupees Twenty-five) Thousand) only. Above Rs. 25,000/- (Rupees Twenty-five thousand) the Earnest Money Deposit shall be furnished in any one of the forms indicated above (i.e. Through Bank Draft, Bank Guarantee/ National Savings Certificate).

(iv) No adjustment towards EMD shall be permitted against any outstanding amount with the **ODISHA POWER TRANSMISSION CORPORATION LTD**.

(v) The chart showing particulars of EMD to be furnished by Tenderers of different categories is placed at **Annexure-VIII.**

(vi) In the case of un- successful tenderer, the EMD will be refunded after the tender is decided. In the case of successful Tenderer, this will be refunded only after furnishing of security money referred to at clause-19 of Section-II.

(vii) Suits, if any, arising out of this clause shall be filed in a Court of law to which the jurisdiction of High Court of ODISHA extends.

(vii) EMD will be forfeited if the tenderer fails to accept the letter of intent and/or purchase order issued in his favour or to execute the order, placed on them.

(viii) Tenders not accompanied by Earnest Money shall be disqualified.

12. Validity of the Bids: -

The tenders should be kept valid for a period of **180** days from the date of opening of the tender, failing which the tenders will be rejected.

13. PRICE: -

i) Tenderers are requested to quote-'FIRM' Price. No deviation from **FIRM PRICE** will be entertained irrespective of deviation clause No.7 of this part of the specification.

14. Revision of tender price by Bidders: -

[a] After opening of tenders and within the validity of period, no reduction or enhancement in price will be entertained. If there is any change in price, the tender shall stand rejected and the EMD deposited shall be forfeited.

[b] After opening of price bid if the validity period is not sufficient to place purchase order, the tenderer may be asked by the purchaser to extend the validity period of the bid under the same terms and condition as per the original tender.

However, the tender are free to change any or all conditions including price except delivery period of their bids at their own risk, if they are asked by the purchaser to extend the validity period of the bid prior to opening of price bid.

15. Tenderers to be fully conversant with the clauses of the Specification: -

Tenderers are expected to be fully conversant with the meaning of all the clauses of the specification before submitting their tenders. In case of doubt regarding the meaning of any clause, the tenderer may seek clarification in writing from the Chief General Manager (Central Procurement Cell) OPTCL. This, however, does not entitle the Tenderer to ask for time beyond due date, fixed for receipt of tender.

16. Documents to Accompany Bids.

Tenderers are required to submit tenders in the following manner:

The Tender shall Contain the following documents.

[i] Declaration Form. [As per Annexure-I]

[ii] Earnest Money. [As per **Annexure-VIII**]

[iii] Technical specification and Guaranteed Technical Particulars conforming to the Purchaser's Specification along with drawings, literatures and all other required Annexures, duly filled in.

[iv] Photostat copies of type test certificates of materials/equipments offered as stipulated in the Technical Specification.

[v] Abstract of Terms & conditions in prescribed proforma as per **Annexure-II.**

[vi] General Terms & Conditions of supply offer as per Section-II of the Specification.

[vii] List of orders executed for similar materials/equipment's during preceding 2 (two) years indicating the customer's name, Purchase Order No. & Date, date of supply and date of commissioning etc.

[viii] Data on past experience **as per Clause-7 of Section-II** of the Specification.

[ix] Sales tax clearance certificate for the previous year and GST Compliance Rating. The GST Identification Number (GSTIN) under GST Laws and permanent account number [PAN] of the firm under Income tax Act are required.

[x] Audited Balance sheet & profit loss accounts of the bidder, for past (3) three years.

[xi] Schedule of quantity and delivery in the prescribed Proforma vide Annexure, as appended.

[xii] List of Orders in hand to be executed.

[xiii] Deviation schedule.

[xiv] The bidder should not have any pending litigation or arbitration with OPTCL with regard to any project or related activity. The bidder should certify/declare the same in unequivocal terms by way of an affidavit duly sworn before a magistrate/notary.

[xv] Notarized hard copy and soft copy of valid registration as local MSE(In the state of Odisha)(if any).

17. Documents/Papers to accompany Part-II Bid.

(a) Part-II of the tender shall consist of the following

(i) Schedule of prices in the prescribed proforma

18. Conditional Offer:

Conditional offer shall not be accepted.

19. General: -

(i) In the event of discrepancy or arithmetical error in the schedule of price, the decision of the purchaser shall be final and binding on the Tenderer.

(ii) For evaluation, the price mentioned in words shall be taken if there is any difference in figures and words in the price bid.

(iii) Notice inviting tender shall form part of this specification.

(iv) The price bids of the technically and otherwise acceptable bids shall only be evaluated. The EMD of others, if any, shall be returned to the bidders.

(v) Tenderer can offer any lot or all the lots of the tender, if there are more than one lots. But the tender (bid) must be furnished separately for each lot.

(vi) It should be distinctly understood that the price bid shall contain only details/documents relating to price, as outlined in clause-17 mentioned herein above. Inclusion of any of the documents/information etc. shall render the bid liable for rejection.

(vii) The tenderer must submit the EMD amount, cost of tender document (Form Fee) and Tender processing fee in a sealed cover envelope super-scribing the tender specification number, Tender Notice No & Date of tender clearly on the cover envelope. The said envelope is to be submitted in the office of the purchaser on or before the last date and time of submission of Bids.

20.0 Expenses in respect of OPTCL's representative for witnessing the inspection & testing of the offered equipment/materials at the inspection and testing site.

The testing and inspection of the equipment/ materials at manufacturer works are in the scope of work of the Contractor/Supplier.

OPTCL inspecting officer, on receipt of offer for inspection from the contractor/supplier, proceeds to the manufacturer works to witness the Type/Acceptance/Routine test.

Important:

It is hereby informed to all the bidders that the relevant clauses of the contract specification, pertaining to inspection and testing of equipment/materials, are hereby supplemented with following additional terms and conditions.

The expenses under the following heads, in respect of OPTCL's representative for witnessing the inspection & testing of the offered equipment/materials at the inspection and testing site, shall be borne by the contractor / supplier.

a) Hotel Accommodation:

I. Single room accommodation in 4 star hotel for the OPTCL inspecting officer of the rank of Assistant General Manager (Grade E-6) and above.

II. Single room accommodation in 3 star hotel for the OPTCL inspecting officer of the rank below Assistant General Manager (Grade E-6).

N.B.: It is the responsibility of the contractor to arrange the hotel accommodation matching with their inspection and testing schedule, so that the inspecting officer can check-in the hotel one day prior to the date of inspection and check out after the completion of the inspection, subject to availability of the return travel ticket. In case of extended duration of inspection or non-availability of the return travel ticket, Contractor/supplier/manufacturer shall arrange for the extended stay of the inspecting officer in the Hotel accordingly. In case there is no hotel with prescribed standard in and around the place of inspection, the contractor/supplier/manufacturer shall suggest alternative suitable arrangement at the time of offer for inspection, which is subjected to acceptability of OPTCL inspecting officer.

b) Journey of the inspecting officer:

(i) To and fro travel expenditure from the Head Quarters of the inspecting officer to the place of inspection/testing shall be borne by the contractor/supplier/manufacturer. Journey from the Head Quarters of the inspecting officer to the nearest Air Port by train (Ist/IInd A.C) & A/C Taxi then by Air to the place of inspection/testing or to the nearest place of inspection/testing and then by train (Ist/IInd A.C) & A/C taxi to the place of inspection/testing shall be arranged by the contractor/supplier/manufacturer.

(ii) For train journey, inspecting officer of the rank Assistant General Manager and above shall be provided with 1st class AC ticket and inspecting officer below the rank of Assistant General Manager shall be provided with 2nd class AC ticket.

(iii) The Air-ticket / train-ticket booking/cancellation is the responsibility of the contractor / supplier.

(iv) Moreover, if during the journey there is an unavoidable necessity for intermediate travel by road/ waterway/sea-route, the contractor/supplier shall provide suitable conveyance to the inspecting officer for travel this stretch of journey or bear the cost towards this. Any such possibilities shall be duly intimated to OPTCL at the time of their offer for inspection.

c) Local Conveyance:

At the place of the inspection/testing, for local journey of the inspecting officer between Hotel and inspection/testing site and or any other places, Air-conditioned four wheeler vehicle in good condition shall be provided by the contractor/supplier/manufacturer.

d) Following points are also to be considered:

(i) All the above expenses shall be deemed to be included in the bidder's quoted price for that supply item. Bidder shall not be eligible to raise any extra claim in this regard.

(ii) Contractor/supplier/manufacturer may assume that only in 40% of the inspection and testing offer cases, OPTCL inspecting officer, not below the rank of Assistant General Manager will witness the inspection and testing.

(iii) In case of inspection and testing of some critical equipment/materials like Power transformers, OPTCL may depute more than one inspecting officer. (iv)Contractor/supplier/manufacturer shall judiciously plan the inspection/testing schedule and place of inspection/testing, so that optimum number of inspection/testing and minimum time shall be required to cover all the equipment/materials of the relevant contract package.

(v) It shall be the responsibility of the Contractor/Supplier to organize the above tour related matters of OPTCL inspecting officer including the matters related to overseas inspection/testing, if any.

21.0 (a). Detailed information on any litigation or arbitration arising out of contract completed or under execution by it over the last five years. A consistent history of litigation by or against the bidder may result in rejection of bid.

21.0 (b). The bidder should not have any pending litigation or arbitration with OPTCL with regard to any project or related activity. The bidder should certify / declare the same in the unequivocal terms by way of an affidavit duly sworn before a magistrate/notary. Bid furnished by the bidder shall not be eligible for consideration if it is not accompanied by the affidavit. Further the bid / LOA/ LOI shall be liable for outright rejection/ cancellation at any stage if any information contrary to the affidavit / declaration is detected.

SECTION – II.

GENERAL TERMS AND CONDITIONS OF CONTRACT [G.T.C.C.]

PART-I

SECTION-II

GENERAL TERMS AND CONDITIONS OF CONTRACT [G.T.C.C.]

1. **Scope of the contract:**

The scope of the contract shall be to design, manufacture, supply of equipment as per the specification at the consignee's site, and rendering services in accordance with the enclosed technical specification and bill of quantity.

2.0 **Definition of terms:**

For the purpose of this specification and General Terms and Conditions of contract [GTCC], the following words shall have the meanings hereby indicated, except where otherwise described or defined.

2.1 "The Purchaser" shall mean the Chief General Manager[Central Procurement Cell] for and on behalf of ODISHA POWER TRANSMISSION CORPORATION LTD., Bhubaneswar.

2.2 "The Engineer" shall mean the Engineer appointed by the Purchaser for the purpose of this contract.

2.3 "Purchaser's Representative" shall mean any person or persons or consulting firm appointed and remunerated by the Purchaser to supervise, inspect, test and examine workmanship and materials of the equipment to be supplied.

2.4 "The supplier" shall mean the bidder whose bid has been accepted by the purchaser and shall include the bidder's executives, administrators, successors and permitted assignees.

2.5 "Equipment" shall mean and include all machinery, apparatus, materials, and articles to be provided under the contract by the suppliers.

2.6 "Contract Price" shall mean the sum named in or calculated the bid.

2.7 "General Condition" shall mean these General Terms and Conditions of Contract.

2.8 The Specification" shall mean both the technical as well as commercial parts of the specification annexed to or issued with GTCC and shall include the schedules and drawings, attached thereto as well as all samples and pattern, if any.

2.9 "Month" shall mean "Calendar month".

2.10 Writing" shall include any manuscript, type written, printed or other statement reproduction in any visible form and whether under seal or under hand.

2.11 Basic Price (Taxable value for Goods) at the point of destination" shall mean the price quoted by the bidder for equipment and material at the consignee's store/site. The cost is inclusive of packing, forwarding, freight, insurance and all expenses and taxes & duties at the end of the supplier excluding Goods & Service Tax. The Goods & Service Tax shall be shown in a

separate column item wise alongside the Basic Price quoted at the applicable rate in the Tax Invoice. The applicable rate of GST shall refer to the HSN code of the material supplied. The Basic Price and GST thereon shall be the "FOR Destination Price" as quoted by the bidder.

2.12 The term "Contract document" shall mean and include GTCC, specifications, schedules, drawings, form of tender, Notice Inviting Tender, covering letter, schedule of prices or the final General Conditions, any special conditions, applicable to the particular contract.

2.13 Terms and conditions not herein defined shall have the same meaning as are assigned to them in the Indian Contract Act, failing that in the Odisha General Clauses Act.

3. **Manner of execution**:

All equipment supplied under the contract shall be manufactured in the manner, set out in the specification or where not set out, to the reasonable satisfaction of the Purchaser's representative.

4. **Inspection and Testing**:

[i] The purchaser's representative shall be entitled at all reasonable times during manufacture to inspect, examine and test at the supplier's premises, the materials and workmanship of all equipment/materials to be supplied under this contract and if part of the said equipment/material is being manufactured in other premises, the supplier shall obtain for the purchaser's representative permission to inspect, examine and test as if the equipment/material were being manufactured in the contractor's premises. Such inspection, examination and testing shall not relieve the supplier from his obligations under the contract.

[ii] The Supplier shall give to the purchaser adequate time/notice (at least clear 15 days for inside the state suppliers and 20 days for outside the state suppliers) in writing for inspection of materials indicating the place at which the equipment/material is ready for testing and inspection and shall also furnish the shop Routine Test Certificate, Calibration certificates of Testing instruments, calibrated in Govt. approved laboratory with authenticity letter of that laboratory along with the offer for inspection. A packing list along with the offer, indicating the quantity which can be delivered in full truck load/Mini truck load to facilitate issue of dispatch instruction shall also be furnished.

[iii] Where the contract provides for test at the Premises of the supplier or any of his sub-vendors, the supplier shall provide such assistance, labour, materials, electricity, fuel and instruments, as may be required or as may be reasonably demanded by the Purchaser's representative to carry out such tests efficiently. The supplier is required to produce shop routine test Certificate, calibration certificates of Testing Instruments before offering their materials/equipment for inspection & testing. The test house/laboratory where tests are to be

carried out must be approved by the Govt. A letter pertaining to Govt. approved laboratory must be furnished to the purchaser along with the offer for inspection.

[iv] After completion of the tests, the Purchaser's representative shall forward the test results to the Purchaser. If the test results conform to the specific standard and specification, the Purchaser shall approve the test results and communicate the same to the supplier in writing. The supplier shall provide at least five copies of the test certificates to the Purchaser.

[v] The Purchaser has the right to have the tests carried out at his own cost by an independent agency whenever there is dispute regarding the quality of supply.

[vi] If the firm fails to present the offered items for inspection/testing as per their inspection call due to any reason(s) during the visit of inspecting officer at the testing site ,the firm shall have to bear all expenses towards repetition of inspection and testing of the total offered quantity or part thereof.

5. **Training facilities.**

The supplier shall provide all possible facilities for training of Purchaser's Technical personnel, when deputed by the Purchaser for acquiring first hand knowledge in assembly of the equipment, its erection, commissioning and for its proper operation & maintenance in service, wherein it is thought necessary by the purchaser.

6. **Rejection of Materials.**

In the event any of the equipment /material supplied by the manufacturer is found defective due to faulty design, bad workmanship, bad materials used or otherwise not in conformity with the requirements of the Specification, the Purchaser shall either reject the equipment/material or ask the supplier in writing to rectify or replace the defective equipment/material free of cost to the purchaser. The Supplier on receipt of such notification shall either rectify or replace the defective equipment/material free of cost to the purchaser within 15 days from the date of issue of such notification by the purchaser. If the supplier fails to do so, the Purchaser may:-

[a] At its option replace or rectify such defective equipment /materials and recover the extra costs so involved from the supplier plus fifteen percent and/or.

[b] Terminate the contract for balance work/supplies, with enforcement of penalty Clause as per contract for the un-delivered goods and with forfeiture of Performance Guarantee/ CompositeBankguarantee.

[c] Acquire the defective equipment/materials at reduced price, considered equitable under the circumstances.

7. Experience of Bidders:

The bidders should furnish information regarding experience particularly on the following points:

[i] Name of the manufacturer:

[ii] Standing of the firm and experience in manufacture of equipment/material quoted:

[iii] Description of equipment/material similar to that quoted, supplied and installed during the last two years with the name(s) of the Organisations to whom supplies were made wherein, at least one (1) certificate shall be from a state/central P.S.U.

[iv] Details as to where installed etc.

[v] Testing facilities at manufacturer's works.

[vi] If the manufacturer is having collaboration with another firm [s], details regarding the same.

[vii] A list of purchase orders of identical material/equipment offered as per technical specification executed during the last two years along with users certificate. User's certificate shall be legible and must indicate, user's name, address, designation, place of use, and satisfactory performance of the equipment/materials for at least two years from the date of commissioning. Wherein at least one (1) certificate shall be from a State/Central or P.S.U.Bids will not be considered if the past manufacturing experience is found to be un-satisfactory or is of less than 2 (two) years on the date of opening of the bid and bids not accompanying user's certificate will be rejected..

8. **Language and measures**:

All documents pertaining to the contract including specifications, schedule, notices, correspondence, operating and maintenance instructions., drawings or any other writing shall be written in English language. The metric system of measurement shall be used exclusively in this contract.

9. **Deviation from specification**:

It is in the interest of the tenderers to study the specification, specified in the tender schedule thoroughly before tendering so that, if any deviations are made by the Tenderers,(both commercial and Technical), the same are prominently brought out on a separate sheet under heading "Deviations Commercial" and " Deviations Technical".

A list of deviations shall be enclosed with the tender. Unless deviations in scope, technical and commercial stipulations are specifically mentioned in the list of deviations, it shall be presumed that the tenderer has accepted all the conditions, stipulated in the tender specification, not- withstanding any exemptions mentioned therein.

10. **Right to reject/accept any tender**:

The purchaser reserves the right either to reject or to accept any or all tenders if the situation so warrants in the interest of the purchaser. Orders may also be split up between different Tenderers on individual merits of the Tenderer. The purchaser has exclusive right to alter the quantities of materials/ equipment at the time of placing final purchase order. After placing of the order, the

purchaser may defer the delivery of the materials. It may be clearly understood by the Tenderer that the purchaser need not assign any reason for any of the above action [s].

11. **Supplier to inform himself fully**:

The supplier shall examine the instructions to tenderers, general conditions of contract, specification and the schedules of quantity and delivery to satisfy himself as to all terms and conditions and circumstances affecting the contract price. He shall quote price [s] according to his own views on these matters and understand that no additional allowances except as otherwise provided there in will be admissible. The purchaser shall not be responsible for any misunderstanding or incorrect information, obtained by the supplier other than the information given to the supplier in writing by the purchaser.

12. **Patent rights Etc.**

The supplier shall indemnify the Purchaser against all claims, actions, suits and proceedings for the infringement of any patent design or copy right protected either in the country of origin or in India by the use of any equipment supplied by the manufacturer. Such indemnity shall also cover any use of the equipment, other than for the purpose indicated by or reasonably to be inferred from the specification.

13. **Delivery:-**

[a] Time being the essence of the contract; the equipment shall be supplied within the delivery period, specified in the contract. The Purchaser, however, reserves the right to reschedule the delivery and change the destination if required. The delivery period shall be reckoned from the date of placing the Letter of Intent/Purchase order, as may be specified in LOI/Purchase order.

[b] The desired delivery period shall be as indicated at Appendix-II (Quantity & Delivery Schedule) of Section-IV (Technical Specification).

14. **Despatch instructions**.

I] The equipment / materials should be securely packed and dispatched directly to the specified site at the supplier's risk by Road Transport only.

II] **Loading & unloading of Ordered Materials.**

It will be the sole responsibility of the supplier for loading and unloading of materials both at the factory site and at the destination site/store.

The Purchaser shall have no responsibility on this account.

15. **Supplier's Default Liability.**

[i] The Purchaser may, upon written notice of default to the supplier, terminate the contract in circumstances detailed hereunder.

[a] If in the judgement of the Purchaser, the supplier fails to make delivery of equipment/material within the time specified in the contract or within the period for which if extension has been granted by the Purchaser in writing in response to written request of the supplier.

[b] If in the judgement of the Purchaser, the supplier fails to comply with any of the provisions of this contract.

[ii] In the event, Purchaser terminates the contract in whole or in part as provided in Clause-15 {I) of this section, the Purchaser reserves the right to purchase upon such terms and in such a manner as he may deem appropriate in relation to the equipment/material similar to that terminated and the supplier will be liable to the Purchaser for any additional costs for such similar equipment/material and/or for penalty for delay as defined in clause-22 of this section until such reasonable time as may be required for the final supply of equipment.

[iii] In the event the Purchaser does not terminate the contract as provided in clause 15(I) of this Section, supplier shall be liable to the Purchaser for penalty for delay as set out in Clause-22 of this section until the equipment is accepted. This shall be based only on written request of the supplier and written willingness of the Purchaser.

16 **Force Majeure**:

The supplier shall not be liable for any penalty for delay or for failure to perform the contract for reasons of force majeure such as acts of god, acts of the public enemy, acts of Govt., Fires, floods, epidemics, Quarantine restrictions, strikes, Freight Embargo and provided that the supplier shall within Ten (10)days from the beginning of delay on such

account notify the purchaser in writing of the cause of delay. The purchaser shall verify the facts and grant such extension, if facts justify .

17. Extension of time:-

If the delivery of equipment/material is delayed due to reasons beyond the control of the supplier, the supplier shall without delay give notice to the purchaser in writing of his claim

for an extension of time. The purchaser on receipt of such notice may or may not agree to extend the contract delivery date as may be reasonable but without prejudice to other terms and conditions of the contract.

18. **Guarantee period: - (As per clause 35 of the technical specification.**

[i] The stores covered by this specification should be guaranteed for satisfactory operation and against defects in design, materials and workmanship for a period of at least 18 [Eighteen] months from the last date of delivery or 12 [Twelve] months from the date of commissioning whichever is earlier. The above guarantee certificate shall be furnished in triplicate to the purchaser for his approval. Any defect noticed during this period should be rectified by the supplier free of cost to the purchaser provided such defects are due to faulty design, bad

workmanship or bad materials used, within one month upon written notice from the purchaser failing which provision of clause 22 (ii) shall apply.

[ii] Equipment/material failed or found defective during the guarantee period shall have to be guaranteed after repair/replacement for a further period of 12 months from the date of commissioning or 18 months from the date of receipt at the store/site after such repair/replacement whichever is earlier . The Bank Guarantee is to be extended accordingly. Date of delivery as used in this clause shall mean the date on which the materials are received in OPTCL'S stores/site in full & good condition which are released for Despatch by the purchaser after due inspection.

19. B.G. towards security deposit, 100% payment and performance guarantee:

[i] For manufacturers situated Inside & out side the state of Odisha.

A Composite Bank Guarantee as per the Proforma enclosed at Annexure-VII of the specification for 10% [ten percent] of the Total Landing cost (Taxable Value plus GST thereon) of the purchase order (In case of successful bidder who is a local Micro and small Enterprise(MSEs) (In the state of Odisha) registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC 5% (five percent) shall be furnished from any nationalized/scheduled bank having a place of business at Bhubaneswar, to the office of Chief General Manager [Central Procurement Cell] OPTCL within 15 days from the date of issue of the purchase order,. The BG shall be executed on non-judicial stamp paper worth of Rs.29.00 [Rupees twenty nine] only or as per the prevalent rules, valid for a period of 20 months from the last date of stipulated delivery period, for scrutiny and acceptance, failing which the supply order will be liable for cancellation without any further written notices. The BG should be accompanied by a confirmation letter from the concerned bank and should have provision for encashment at Bhubaneswar, before the Bank Guarantee is accepted and all concerned intimated. The B.G should be revalidated as and when intimated to you to cover the entire guarantee period.

[ii] No interest is payable on any kind of Bank Guarantee.

[iii] In case of non-fulfillment of contractual obligation, as required in the detailed purchase order/Specification, the composite Bank guarantee shall be forfeited.

20. Import License

In case imported materials are offered, no assistance will be given for release of Foreign Exchange. The firm should arrange to import materials from their own quota. Equipment of indigenous origin will be preferred.

21. (A) Terms of Payment.

i) 100% taxable value of each consignment with 100% Goods and Services Tax in full as applicable will be paid on receipt of materials in good condition at stores/desired site and verification thereof, subject to furnishing and approval of a. Contract cum Performance Bank Guarantee at the rate of 10% (Ten percent) of Taxable Value plus GST thereon [In case successful bidder is a local Micro and small Enterprise (MSEs), based in Odisha & registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC, **5% (five percent) in place of 10%** (ten percent) will be applicable].

b.Guarantee certificate, c.Test certificate by the Purchaser.

ii) TDS under GST Laws for intra state transactions shall be deducted, if applicable.

iii)Any imposition of new tax or revision of tax shall be paid/reimbursed at the time of dispatch, scheduled or actual whichever is lower (i.e. If delivery is within schedule period, tax variation as applicable shall be paid, and if delivery is made beyond schedule date, any additional financial implication due to statutory variation in tax shall be to bidder's account)

[B] The supplier shall furnish contract cum performance Bank Guarantee of appropriate amount to OPTCL as indicated in (i) above, within 30 days from the date of issue of the purchase order.

22 Price Reduction Schedule for Delay in Completion of Supply under Purchase Order/Contract

(i) If the Supplier fails to deliver the materials/equipment within the delivery schedule, specified in the Purchase Order/Contract including delivery time extension, if any, granted with waiver of Price Reduction Schedule, the Purchaser shall recover from the Supplier, Price Reduction Schedule for a sum of half per cent (0.5 per cent) of the Taxable Value of the un-delivered equipment /materials for each calendar week of delay or part thereof. For this purpose, the date of receipted challan shall be reckoned as the date of delivery. The total amount of Price Reduction Schedule shall not exceed five per cent (5%) of the Taxable Value of the un-delivered equipment/materials. Equipment will be deemed to have been delivered only when all its components, accessories and spares as per technical Specification are also delivered. If certain components, accessories and spares are not delivered in time, the equipment/materials will be considered delayed until such time as the missing components, accessories and spares are delivered.

(ii) During the guarantee period, if the Supplier fails to rectify/replace the equipment/material within 30 daysfrom the date of intimation of defect by the purchaser, then the Price Reduction Schedule at the rate of half percent (0.5%) of the Total Taxable Value for each calendar week of delay or part thereof shall be recovered by the purchaser. For this purpose, Price Reduction Schedule shall be reckoned from the 30th day from the date of issue of letter on defectiveness

of equipment/material. The total amount of Price Reduction Schedule in this case shall not exceed 10% (TEN PERCENT) of the Purchase Order/Contract amount except GST (i.e.Total Taxable Value). If the defects, so intimated are not rectified or equipment/materials not replaced by the supplier within the guarantee period, then whole of the C.P.B.G. will be forfeited by the purchaser, without any intimation to the supplier.

23. Insurance

The Supplier shall undertake insurance of stores covered by this Specification unless otherwise stated. The responsibility of delivery of the stores at destination in good condition rests with the Supplier. Any claim with the Insurance Company or transport agency arising due to loss or damage in transit has to be settled by the supplier. The Supplier shall undertake free replacement of materials damaged or lost, which will be reported by the consignee within 30 days of receipt of the materials at destination without awaiting for the settlement of their claims with the carriers and underwriters.

24. Payment Due from the Supplier. All costs and damages, for which the supplier is liable to the purchaser, will be deducted by the purchaser from any money, due to the supplier, under any of the contract (s), executed with OPTCL.

25. Sales Tax clearance certificate , Rating under Goods and Services Tax and Balance sheet and profit & Loss Account:

The following documents are to be submitted at the time of Tender Submission:

i. Compliance rating under Goods and Services Tax for immediate preceding financial year.

ii. Audited Balance Sheet and Profit & Loss Account of the bidder for the previous three years to assess the financial soundness of the bidder(s).

iii. GST registration certificate and PAN Card Copy.

iv. Tax holiday/exemption certificate under GST or any other Act.

v. TDS exemption certificate under the Income Tax Act or any other act.

26. Certificate of Exemption from Goods and Services Tax.

Offers with exemption from Goods and Services Tax shall be accompanied with authenticated attested Photostat copy of exemption certificate. Any claim towards Goods and Services Tax shall be paid on actual basis subject to payment of GST by the supplier. In case Outward supply details of the supplier of Goods in GSTR-1 do not match with GSTR -2 of OPTCL on GSTN portal, the same will be adjusted through debit/credit advice issued by OPTCL under intimation to the supplier after allowing cooling period of 3 months after the date of supply.

27. Supplier's Responsibility.

Notwithstanding anything mentioned in the Specification or subsequent approval or acceptance by the Purchaser, the ultimate responsibility for design, manufacture, materials

used and satisfactory performance shall rest with the Tenderers. The Supplier(s) shall be responsible for any discrepancy noticed in the documents, submitted by them along with the bid(s)

28. Validity.

Prices and conditions contained in the offer should be kept valid for a minimum period of **180** days from the date of opening of the tender, failing which the tender shall be rejected.

29. EVALUATION.

(i) Evaluation of price bids will be on the basis of the FOR DESTINATION PRICE including Goods and Services Tax & other levies as may be applicable. The FORD PRICE shall consist of the following components:

a) Taxable value of equipment/materials including mandatory spares, if any for maintenance of equipment. (At discretion of the purchaser)
b)Good and Services Tax
c)Other levies, if any.
d)Test charges, if any.
e)Supervision of erection, testing and commissioning charges, if any.
f)Any other items, as deemed proper for evaluation by the purchaser.
g) Loading will be made for items not quoted by the bidder at the highest rate quoted by other bidders unless particular item is included in other items.
h) Any imposition of new tax or revision of tax shall be considered between due date of submission of bids and the date of price bid opening.

(II) Weightage shall be given to the Following factors in the Evaluation & Comparison of Bids.

In comparing bids and in making awards, the Purchaser will consider other factors such as compliance with Specification, minimum qualification criteria as per clause-30, outright rejection of tenders clause-34 of this tender, relative quality, adaptability of Supplies or services, experience, financial soundness, record of integrity in dealings, performance of materials/equipment earlier supplied, ability to furnish repairs and maintenance services, the time of delivery, capability to perform including available facilities such as adequate shops, plants, equipment and technical organization.

(III) The local MSE (In the state of Odisha) bidders shall be required to furnish their willingness to match their bid price with that of the lowest evaluated bidder without any price preference and in case they agree, they shall be eligible to get up to 30% of the tendered quantity to be distributed suitably among the willing MSE bidders failing which the said 30% of the tendered quantity be awarded to the lowest evaluated bidder.

30. Minimum Qualification Criteria of Bidders.

All the prospective bidders are requested to note that their bids for tendered equipment can only be considered for evaluation if:

i) The bidder should have manufacture and supply experience of above rated or higher capacity equipment for a minimum period of 3 (three) years as on the date of opening of the tender

ii) At least 50% of the tendered quantity of above rated or higher capacity equipment should have been supplied within the above-stipulated period.

iii) The above rated or higher capacity equipment should have at least 3 (three) years successful performance from the date of commissioning. At least one of the performance certificates shall be submitted from Govt. of India/State Govt.(s) or their undertakings.

iv) The bidder should have conducted type tests on the tendered equipment in Government approved laboratory within five years from the date of opening of the tender..

31. **Jurisdiction of the High Court of Orissa.**

`Suits, if any, arising out of this contract shall be filed by either Party in a court of Law to which the jurisdiction of High court of Orissa extends.

32. **Correspondences.**

i) Any notice to the supplier under the terms of the contract shall be served by Registered Post or by hand at the Supplier's Principal Place of Business.

ii) Any notice to the Purchaser shall be served at the Purchaser's Principal Office in the same manner.

33. Official Address of the Parties to the Contract

The address of the parties to the contract shall be specified:-

[i] **Purchaser**: Senior General Manager (Procurement), (CPC), OPTCL
Bhubaneswar-751022 (Orissa)
Telephone No. 0674 - 2541801
FAX No. 0674 - 2542964

[ii] **Supplier:** Address
Telephone No. Fax No.

34. **Outright Rejection of Tenders**

Tenders shall be outrightly rejected if the followings are not complied with.

[i] The tenderer shall submit the bid in electronic mode only and shall submit the tender cost on or before the date and time of submission of tender. In case of local Micro and small Enterprises(MSEs) **(In the state of ODISHA)** registered with respective DICs, Khadi, Village, Cottage & Handicrafts Industries, OSIC and NSIC participating in the tender they have to submit notarised hard copy of valid registration as local MSE as above on or before the date and time of submission of tender.

[ii] The tenderer shall submit the bid in electronic mode only

[iii] The Tender shall not be submitted telegraphically or by FAX.

[iv] The prescribed EMD shall be submitted on or before the date and time of submission of technical bid.

[v] The Tender shall be kept valid for a minimum period of 180 days from the date of opening of tender.

[vi] The Tender shall be submitted in two parts as specified.

[vii] The Tenders shall be accompanied by a list of major supplies effected prior to the date of opening of tender. Data of at least 3 (three) years shall be furnished.

[viii] The tenderer shall upload the scanned copy of latest type test certificates (for the tests, carried out on the tendered equipment, being offered). Such type tests should have been conducted within last five years from the date of opening of this tender in a Government approved laboratory/CPRI in presence of any Government Organisation's representative(s).

[ix] The schedule of prices should be filled up fully to indicate the break-up of the prices including taxes and duties. Incomplete submission of this schedule will make the tender liable for rejection. Vide Clause-4(ii) of Part-II..

[x] The Tenderer should quote 'FIRM' price only and the price should be kept valid for a minimum period of 180 days from the date of opening of the tender.

(xi) The tenderer shall upload the scanned copy legibly written user's certificate to prove the satisfactory operation of the offered equipment/materials for a minimum period of 3 (three) years from the date of commissioning/use as per the tender specification. User's certificate shall include the detailed

address of the user with Equipment/Material, Name and type as per this specification, number of years of satisfactory use/operation & date of issue of this user's certificate with official seal written in English only & clearly visible must be furnished. At least one of the user's certificates shall be from state or Central Govt. or their Undertakings.

(xii) Guaranteed Technical particulars & Abstract of terms and Conditions should be filled in completely.

xiii) (a) Detailed information on any litigation or arbitration arising out of contract completed or under execution by it over the last five years. A consistent history of litigation by or against the bidder may result in rejection of bid.

(b) The bidder should not have any pending litigation or arbitration with OPTCL with regard to any project or related activity. The bidder should certify/declare the same in unequivocal terms by way of an affidavit duly sworn before a magistrate. Bid furnished by the bidder shall not be eligible for consideration if it is not accompanied by the affidavit. Further, the bid/LOA/LOI shall liable for outright rejection/cancellation at any stage if any information contrary to the affidavit/declaration is detected.

35. **Documents to be treated as confidential**.

The supplier shall treat the details of the specification and other tender documents as private and confidential and these shall not be reproduced without written authorization from the Purchaser.

36. **Scheme/Projects**

The materials/equipment covered in this specification shall come under "O&M WORKS "

SECTION – III

[LIST OF ANNEXURES]

The following schedules and proforma are annexed to this specification and contained in Section-III as referred to in the relevant clauses.

1	Declaration form	ANNEXURE-I
2	Abstract of terms and conditions to accompany Section-II of	ANNEXURE-II
3	Schedule of Quantity and Delivery	ANNEXURE-III
4	Abstract of price component	ANNEXURE-IV
5	Schedule of prices	ANNEXURE-V
6	Bank Guarantee form for earnest money deposit	ANNEXURE-VI
7	Composite Bank Guarantee form for security deposit, payment and performance	ANNEXURE-VII
8.	Chart showing particulars of E.M.D.	ANNEXURE – VIII
9.	Data on Experience.	ANNEXURE – IX
10.	Schedule of spare parts.	ANNEXURE-X
11.	Schedule of Installations.	ANNEXURE-XI
12	Schedule of deviations (Technical)	ANNEXURE-XII (A)
13.	Schedule of deviations (Commercial)	ANNEXURE-XII (B)
14	Litigation /Arbitration	ANNEXURE-XIII

ANNEXURE - I

DECLARATION FORM

To

The Chief. General Manager (CPC)

OPTCL Head Qrs.BBSR,751022

Sub:- Tender Specification No-_____

Sir,

1. Having examined the above specification together with terms & conditions referred to therein * I/We the undersigned hereby offer to supply the materials/equipment covered therein

complete in all respects as per the specification and General conditions, at the rates, entered in the attached contract schedule of prices in the Tender.

2. * I/We hereby undertake to have the materials/equipment delivered within the time specified in the Tender.

3. * I/We hereby guarantee the technical particulars given in the Tender supported with necessary reports from concerned authorities.

4. * I/We certify to have submitted the bid electronically by remitting *cash/money order/D.D./ remitting the cost of tender, herewith and this has been acknowledged by your letter/ money receipt No. Dated,

5. In the event of Tender, being decided in *my/our favour, * I/We agree to furnish the Composite B.G. in the manner, acceptable to ODISHA POWER TRANSMISSION CORPORATION LTD., and for the sum as applicable to *me/us as per clause-19 of section-II of this specification within 15 days of issue of letter of intent/purchase order failing which *I/We clearly understand that the said letter of Intent/Purchase order will be liable to be withdrawn by the purchaser, and the EMD deposited by us shall be forfeited by OPTCL.

Signed this day of 2016

Yours faithfully

Signature of the Tenderer with seal of the company

[This form should be dully filled up by the tenderer and uploaded at the time of submission of tender.]

* (Strikeout whichever is not applicable).

ANNEXURE-II

ABSTRACT OF GENERAL TERMS AND CONDITIONS OF CONTRACT [COMMERCIAL]

(To be filled up by the tenderer as indicated in the excel sheet)

ANNEXURE-III

SCHEDULE OF QUANTITY AND DELIVERY

(To be filled up by the tenderer**)**

SL No	Description of materials	Quantity required	Desired Delivery	Destination	Remarks.
1	2	3	4	5	6

Signature of Tenderer

with seal of Company

ANNEXURE-IV

(To be filled up by the tenderer as indicated in the excel sheet)

NB:- Abstract of price component shall be done for equipment/material offered, for testing & commissioning charges, if any. All the above prices will be taken during bid price evaluation.

ANNEXURE-V.

(To be filled up by the tenderer as indicated in the excel sheet)

NB: -

1. The tenderer should fill up the price schedule properly in Excel file in e-tender mode. The tender will be rejected, if the price bid is not submitted in accordance with the price schedule. No post tender correspondence will be entertained on break-up of prices. Also, the supplier should agree for delivery at the desired site.

2. The Tenderer shall give an undertaking in part-I of the bid that, entire implication of lower Tax and Input Tax Credit benefit have been fully passed on to the purchaser as per anti-profiteering and other provisions under GST Laws while quoting the tender price.

3. Conditional offers will not be acceptable.

ANNEXURE-VI

PROFORMA FOR BANK GUARANTEE FORM FOR EARNEST MONEY DEPOSIT

(To be Stamped in accordance with Stamp Act and the Non-Judicial Stamp Paper of appropriate value should be in the name of Issuing Bank)

Ref No: …….

Bank Guarantee No. …….

Date:……
BG Amount:…….
Validity Period:……..

This Guarantee Bond is executed this…… day of …… by us the…… Bank at …… , P.O…… , Dist……, State…… and Code No……..

Whereas the ODISHA POWER TRANSMISSION CORPORATION Limited, Janpath, Bhubaneswar, a company constituted under the Companies Act-1956 (hereinafter called OPTCL) has invited Tender vide e-NIT No……. Dated…… for the purpose of …… work under Package(s) No……../ purchase of ---------- .

1. Now, therefore, in accordance with Notice Inviting Tender (e-NIT) No…….. Dated …… of OPTCL, Ms/Shri……Address……..... Wish / wishes to participate in the said tender and as a Bank Guarantee for the sum of Rs.……. [Rupees in ***words***----------] valid for a period of ……days is required to be submitted by the bidder, as per Tender Specification, we the _____) [indicate the name, Address & Code of the bank] [hereinafter referred to as "Bank"] at the request of Ms/Shri…….... [hereinafter referred to as "Bidder"] do hereby unequivocally and unconditionally guarantee and undertake to pay during the above said period on written request by the <Tender Issuing Authority, Central Procurement Cell (CPC) ODISHA POWER TRANSMISSION CORPORATION Ltd. , Bhubaneswar an amount not exceeding Rs……. to OPTCL., without any reservation. The guarantee would remain valid up to …….. [Date] and if any further extension to this is required, the same will be extended on receiving instruction from ---------- on whose behalf this Bank Guarantee has been issued.

2. We, the _____ [indicate the name of the Bank, Address, Code] do hereby further undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from OPTCL. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs…… (Rupees in words……)

3. We undertake to pay to OPTCL any money so demanded not withstanding any dispute or disputes so raised by the bidder in any suit or proceeding instituted/pending before any court or tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the bidder shall have no claim against us for making such payment.

4. We, the _____ Bank further agree that the guarantee herein contained shall remain in full force and effect during the aforesaid period of _____ days [in words]…….. (as per Tender Specification) and it shall continue to be so enforceable till all the dues of OPTCL under or by virtue of the said Bid have been fully paid and its claims satisfied or discharged or till OPTCL certifies that the terms and conditions of the said Bid have been fully and properly carried out by the said bidder and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us or our Branch Office at Bhubaneswar <Mention Name, Address & Code of the Branch Office at Bhubaneswar of Issuing Bank> in writing on or before _____ we shall be discharged from all liability under this guarantee thereafter.

5. We the _____ Bank further agree with OPTCL that OPTCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bid or to extend time of performance by the said Bidder from time to time or to postpone for any time or from time to time any of the powers exercisable by OPTCL against the said Bidder and to forbear or enforce any of the terms and conditions relating to the said Bid and we shall not be relieved from our liability by reason of any such variation, postponement or extension granted to the Bidder or for any forbearance, act or omission on the part of OPTCL or any indulgence by OPTCL to the said Bidder or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.

6 This guarantee will not be discharged due to the change in the name, style and constitution of the Bank and/or of the Bidder.

7 We _____ [indicate the name of Bank, Address &Code] lastly undertake not to revoke this guarantee during its currency except with the previous consent of OPTCL in writing .

8. We, the _____Bank (Name, Address & Code) further agree that this guarantee shall also be invokable at our place of business at ---------- Branch of **Bhubaneswar** (indicate Name, Address & Code of the Branch at Bhubaneswar) in the State of Odisha."

" Notwithstanding anything contained herein"

a) Our liability under the bank guarantee shall not exceed Rs.----------(Rupees in words----------) only.

b) This Bank guarantee shall be valid up to ----------.

c) We or our Branch at Bhubaneswar <Mention Name, Address & Code…….> shall be liable to pay guaranteed amount or any part thereof under this guarantee only if you serve upon us at---------- Branch of Bhubaneswar a written claim or demand on or before ……,

The Bank Guarantee is issued in paper form and Advice transmitted through SFMS with required details to the beneficiary's advising bank (ICICI Bank Bhubaneswar, IFSC Code ICIC0000061).

Dated, the _____Day of _____

For _____ [Indicate name of Bank]

Signature ……
Full name …….
Designation ……
Power of Attorney No. …….
Date…….
Seal of the Bank…….

WITNESS: (SIGNATURE WITH NAME AND ADDRESS)
(1)
Signature ……
Full name …….
(2)
Signature ……
Full name …….

N.B.:

1. Name of the Bidder.: ……
2. BG No & Date :……
3. Amount (In Rs.):……
4. Validity up to :……
5. E-NIT No……..
6. Package/Works No……..
7. Name, Address & Code of Issuing Bank:……
8. Name, Address & Code Bhubaneswar Branch of the Issuing Bank:……
9. The Bank Guarantee shall be accepted after getting SFMS advice as per details below.

Format for SFMS details

Sl. No	PARTICULARS	TYPE	DETAILS
1	Type of Bank Guarantee	Mandatory	EMD
2	Currency & Amount	Mandatory	
3	Validity Period(from—to --)	Mandatory	
4	Effective Date	Mandatory	
5	End date of lodgment of Claim	Mandatory	

6	Place of lodgment of claim	Mandatory	Bhubaneswar, Branch Name------ of Bhubaneswar Branch code------- of Bhubaneswar Branch Address ------ at Bhubaneswar
7	Issuing Branch IFSC Code	Mandatory	
8	Issuing Branch name & address	Mandatory	
9	Name of applicant and its details	Mandatory	
10	Name of Beneficiary and its details	Mandatory	
11	Beneficiary's Bank/Branch and IFSC Code	Mandatory	ICICI Bank Ltd IFSC Code-ICIC0000061
12	Beneficiary's Bank/Branch name and address	Mandatory	ICICI Bank Ltd Bhubaneswar Main Branch, Bhubaneswar
13	Sender to receiver information	Mandatory	
14	Purpose of Guarantee	Mandatory	EMD
15	Reference/Description of the underlined tender/contract	Mandatory	NIT No

ANNEXURE-VII

PROFORMA FOR COMPOSITE BANK GUARANTEE FOR SECURITY DEPOSIT

PAYMENT AND PERFORMANCE

(To be stamped in accordance with Stamp Act and the Non-Judicial stamp paper of appropriate value should be in the name of the Issuing Bank.)

Ref No:- …….

Bank Guarantee No. …….

Date: ……

BG Amount:…….

Validity Period:……..

This Guarantee Bond is executed this…… day of …… by us the…… Bank at …… , P.O…… , Dist……, State…… and Code No……..

Whereas the ODISHA POWER TRANSMISSION CORPORATION Limited, Janpath, Bhubaneswar, a company constituted under the Companies Act-1956 (hereinafter called OPTCL) has issued Letter of Award (LOA) No…… Dated…… for the purpose of …… work under Package No……. (herein after called "the Agreement") to M/s/Shri …….. , Address…….. (herein after called the "Contractor") for supply, erection, installation & commissioning and associated civil works under the above LoA and whereas OPTCL has agreed (1) to exempt demand of security deposit under the terms and conditions of the LOA (2) to release payment of the cost of the Contract Price to the Contractor on furnishing by the Contractor to OPTCL a Contract Performance Bank Guarantee (CPBG) of the value of 10% of the Contract Price of the said Agreement.

1. Now therefore, in accordance with the terms and conditions of LOA No. _____ dated _____ for the due fulfillment by the said Contractor of the terms and conditions contained in the said agreement, on production of a Bank Guarantee for Rs._____ (Rupees_____) only, we the bank _____ [Indicate bank Name , Address & Code] (hereinafter referred to as "the Bank") at the request of M/s/Shri _____ contractor do hereby undertake to pay to OPTCL, an amount not exceeding Rs._____ (Rupees _____) only .

2. We, the _____ Bank [indicate the name of the Bank, Address & Code] do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from OPTCL. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____(Rupees---------- In Words).

3. We, the …… Bank also undertake to pay to OPTCL any money so demanded not withstanding any dispute or disputes raised by the Contractor in any suit or proceeding instituted / pending before any court or tribunal relating thereto, our liability under this present being absolute and irrevocable. The payment so made by us under this bond shall be a valid

discharge of our liability for payment thereunder and the Contractor shall have no claim against us for making such payment.

4. We, the _____ Bank further agree that the guarantee herein contained shall remain in full force and effect during the aforesaid period of _____ days and it shall continue to be so enforceable till all the dues of OPTCL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till OPTCL certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor and accordingly discharges this guarantee.

   Unless a demand or claim under this guarantee is made on us or our Branch Office at Bhubaneswar <Mention Name, Address & Code of the Branch Office at Bhubaneswar of issuing Bank> in writing on or before …… (Date), we shall be discharged from all liability under this guarantee thereafter.

5. We, the _____ Bank [indicate the name of the Bank, Address & Code] further agree with the Board that OPTCL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bid or to extend time or performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by OPTCL against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Bid and we shall not be relieved from our liability by reason of any such variation postponement or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of OPTCL or any indulgence by OPTCL to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so relieving us.

6. This guarantee will not be discharged due to the change in the name, style or constitution of the Bank and/or of the contractor(s).

7. We, the _____ Bank [indicate the name of the bank, Address & Code] lastly undertake not to revoke this guarantee during its currency except with the previous consent of OPTCL in writing.

8. We, the _____Bank (Name, Address & Code) further agree that this guarantee shall also be invokable at our place of business at **Bhubaneswar** (indicate Name, Address & Code of the Branch at Bhubaneswar) in the State of Odisha.

" Notwithstanding anything contained herein"

a) Our liability under the bank guarantee shall not exceed Rs.----------(Rupees in words----------) only.

b) This Bank guarantee shall be valid up to ----------.

c) We or our Branch at **Bhubaneswar** <Mention Name, Address & Code…….> shall be liable to pay guaranteed amount or any part thereof under this guarantee only if you serve upon us at--------- Branch of Bhubaneswar a written claim or demand on or before …….,

The Bank Guarantee is issued in paper form and Advice transmitted through SFMS with required details to the beneficiary's advising bank (**ICICI Bank Bhubaneswar**, IFSC Code ICIC0000061).

Dated, the _____Day of _____
For _____ [Indicate name of Bank]

Signature……..

Full Name…….

Designation……..

Power Of Attorney……..

Dated……

Seal of the Bank……..

WITNESS: (SIGNATURE WITH NAME AND ADDRESS)

1.Signature…….

Full Name…….

2. Signature…….

Full Name…….

N.B.:

1. Name of the Contractor.: ……
2. BG No & Date :……
3. Amount (In Rs.):……
4. Validity up to :……
5. LOA No……..
6. Package No……..
7. Name, Address & Code of Issuing Bank:……
8. Name, Address & Code of Bhubaneswar Branch of the Issuing Bank:……
10. The Bank Guarantee shall be accepted after getting SFMS advice as per details below.

Format for SFMS details

Sl. No	PARTICULARS	TYPE	DETAILS
1	Type of Bank Guarantee	Mandatory	Contract Performance
2	Currency & Amount	Mandatory	
3	Validity Period(from—to --)	Mandatory	
4	Effective Date	Mandatory	
5	End date of lodgment of Claim	Mandatory	

6	Place of lodgment of claim	Mandatory	Bhubaneswar, Branch Name------ of Bhubaneswar Branch code------- of Bhubaneswar Branch Address ------ at Bhubaneswar
7	Issuing Branch IFSC Code	Mandatory	
8	Issuing Branch name & address	Mandatory	
9	Name of applicant and its details	Mandatory	
10	Name of Beneficiary and its details	Mandatory	
11	Beneficiary's Bank/Branch and IFSC Code	Mandatory	ICICI Bank Ltd IFSC Code-ICIC0000061
12	Beneficiary's Bank/Branch name and address	Mandatory	ICICI Bank Ltd Bhubaneswar Main Branch, Bhubaneswar
13	Sender to receiver information	Mandatory	
14	Purpose of Guarantee	Mandatory	Contract Performance
15	Reference/Description of the underlined tender/contract	Mandatory	LOA No----

ANNEXURE-VIII

CHART SHOWING PARTICULARS OF EARNEST MONEY DEPOSIT FURNISHABLE BY TENDERERS

1.	Central and State Government Undertakings	Exempted
2.	All other inside & outside state units.	The amount of EMD as specified in the specification /Tender Notice in shape of bank guarantee /DD.

NB: - REFUND OF E.M.D.

[a] In case of unsuccessful tenderers, the EMD will be refunded immediately after the tender is decided. In case of successful tenderer, this will be refunded only after furnishing of Composite Bank Guarantee referred to in clause No.19 of Section-II of this specification.

Suits, if any, arising out of EMD shall be filed in a court of law to which the jurisdiction of High Court of ODISHA extends.

[b] Earnest Money will be forfeited if the tenderer fails to accept the letter of intent/purchase order, issued in his favour or revises the bid price[s] within the validity period of Bid.

ANNEXURE-IX

DATA ON EXPERIENCE

[a] Name of the manufacturer.

[b] Standing of the firm as manufacturer of equipment quoted.

[c] Description of equipment similar to that quoted [supplied and installed during the last two years with the name of the organizations to whom supply was made].

[d] Details as to where installed etc.

[e] Testing facilities at manufacturer's works.

[f] If the manufacturer is having collaboration with another firm, details regarding the same and present status.

[g] A list of purchase orders, executed during last three years.

[h] A list of similar equipment of specified MVA rating, voltage class, Impulse level, short circuit rating, Designed, manufactured, tested and commissioned which are in successful operation for at least two years from the date of commissioning with legible user's certificate. User's full complete postal address/fax/phone must be indicated. (Refer clause No.7 of the Part-I, Section-II of the specification).

Place:

Date:

Signature of tenderer

Name, Designation, Seal

ANNEXURE-X

SCHEDULE OF SPARE PARTS FOR FIVE YEARS OF NORMAL OPERATION & MAINTENANCE

SL. No	Particulars	Quantity	Unit delivery rate	Total price

Place:

Date: Signature of Tenderer

Name, Designation, Seal

ANNEXURE-XI

SCHEDULE OF INSTALLATIONS.

		Place of installation and complete postal address	Year of commissioning

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

ANNEXURE-XII

DEVIATION SCHEDULE.

Tenderer shall enter below particulars of his alternative proposal for deviation from the specification, if any.

A) Technical

(To be filled up by the tenderer as indicated in the excel sheet)

B) Commercial deviations.

(To be filled up by the tenderer as indicated in the excel sheet)

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

ANNEXURE – XIII

LITIGATION HISTORY

Year.	Award for or against bidder	Name of client, cause of litigation and matter in dispute	Disputed amount (current value in Rs.)

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

QUANTITY AND DELIVERY SCHEDULE : PHASE-I (As per requirement of 2018-19)

Sl. No.	Description	Quantity in Nos	Desired delivery	Destination
LOT-I	**1) 132kV 90 KN Long Rod Insulator**	1000	Delivery to be completed within 3 month from the date issue of purchase order.	Any store or Grid Sub-station within the Odisha State which will be indicated in the purchase order / release order.
	2) 132 kV 120KN Long Rod Insulator	570		
LOT-II	**3) 220 kV 90KN Long Rod Insulator**	2000	Delivery to be completed within 3 month from the date issue of purchase order.	
	4) 220 kV 160KN Long Rod Insulator	300		
LOT-III	**1) 132kV 90 KN Silicon Rubber Long Rod Insulator**	360	Delivery to be completed within 3 month from the date issue of purchase order.	Any store or Grid Sub-station within the Odisha State which will be indicated in the purchase order / release order.
	2) 132 kV 120KN Silicon Rubber Long Rod Insulator	880		
LOT-IV	**3)220KV 90KN Silicon Rubber Long Rod Insulator**	592	Delivery to be completed within 3 month from the date issue of purchase order.	
	4) 220 kV 160KN Silicon Rubber Long Rod Insulator	1000		
LOT-V	**1) 400KV Post Insulator**	12	Delivery to be completed within 3 month from the date issue of purchase order.	Any store or Grid Sub-station within the Odisha State which will be indicated in the purchase order / release order.
LOT-VI	**2) 33KV Post Insulator**	56	Delivery to be completed within 3 month from the date issue of purchase order.	

N.B:- The destination Stores /Sub-stations will be intimated at the time of placement of the purchase order/issue of release order.

QUANTITY AND DELIVERY SCHEDULE : PHASE-II (As per requirement of 2019-20)

Sl. No.	Description	Quantity in Nos	Desired delivery	Destination
LOT-I	**1) 132kV 90 KN Long Rod Insulator**	830	Delivery to be completed within	Any store or Grid Sub-station within the

	2) 132 kV 120KN Long Rod Insulator	500	3 month from 01.04.2019.	Odisha State which will be indicated in the purchase order / release order.
LOT-II	**3) 220 kV 90KN Long Rod Insulator**	912	Delivery to be completed within 3 month from 01.04.2019.	
	4) 220 kV 160KN Long Rod Insulator	200		
LOT-III	**1) 132kV 90 KN Silicon Rubber Long Rod Insulator**	0	Delivery to be completed within 3 month from 01.04.2019.	Any store or Grid Sub-station within the Odisha State which will be indicated in the purchase order / release order.
	2) 132 kV 120KN Silicon Rubber Long Rod Insulator	0		
LOT-IV	**3) 220 kV 90KN Silicon Rubber Long Rod Insulator**	0	Delivery to be completed within 3 month from 01.04.2019.	
	4) 220 kV 160KN Silicon Rubber Long Rod Insulator	514		
LOT-V	**1) 400KV Post Insulator**	8	Delivery to be completed within 3 month from 01.04.2019.	Any store or Grid Sub-station within the Odisha State which will be indicated in the purchase order / release order.
LOT-VI	**2) 33KV Post Insulator**	50	Delivery to be completed within 3 month from 01.04.2019.	

N.B:- The destination Stores /Sub-stations will be intimated at the time of placement of the purchase order/issue of release order.

ANNEXURE – IV-B

(For Testing of Insulators)
(To be filled in by the bidder)

CALIBRATION STATUS OF TESTING EQUIPMENTS AND INSTRUMENTS/ METERS

Name of the Test	Meters & Equipment required for the corresponding test with range, accuracy, make & Sl. No.	Date of Calibration	Due date of Calibration	Name of the Calibrating Agency	Whether Calibrating Agency is Govt. approved	Whether documents relating to Govt. approval of the calibrating Agency furnished	Whether the meters/ equipment fulfill the accuracy class as per calibration report.	Whether the calibrating agency has put any limitation towards the use of the particular meter/ equip-ment/ meter. If yes state the limitations	Whether the calibrating agency has put any limitation towards the use of the particular meter/equip-ment/ meter. State the colour of the affixed sticker	Inspite of imposed limitations. Whether the particular meter / equipment can still be used? Justify its use for corresponding test(s)	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

Signature of the tenderer with seal & date

ANNEXURE V(A)

(To be filled in by the bidder)

CHECK LIST TOWARDS TYPE TEST REPORTS FOR INSULATORS

Name of the Type Test	Date of Test	Name of the Laboratory where the Test has been conducted	Whether the Laboratory is Government approved	Whether the Test report is valid as per Spn.	Whether the Test report in complete shape along with drawings etc. furnished or not ?	Whether the type tested Insulators fulfills the technical requirements as per TS	If the type tested Insulators does not fulfill the technical requirements as per this specification, whether the bidder agrees to conduct he particular type test again at their own cost without any financial liability to OPTCL in the presence of OPTCL's representative within the specified delivery period	Remarks
1	2	3	4	5	6	7	8	9

Signature of the tenderer with seal & date

ANNEXURE – VI

[To be filled in by the bidder]

CHECK-LIST FOR DELIVERY SCHEDULE

Phase	LOT No.	Description of the Equipment	Quantity	Delivery Schedule
PHASE-I & II				

PART – II

PRICE BID

1. PRICE:

(i) Bidders are required to quote their price(s) for goods offered indicating they are 'FIRM'

(ii) The prices quoted shall be FOR Destination only at the consignee's site/store inclusive of packing, forwarding, Freight & Insurance. In addition, the break-up of FOR Destination price shall be given as per schedule of Prices in Annexure-V of Section – III. The Bidders has to certify in the price bid that any implication of lower Tax and Input Tax Credit benefit as per anti-profiteering and other provisions under GST Laws, have been fully passed on to the Purchaser, while quoting the tender prices.

2. INSURANCE:

Insurance of materials/equipment, covered by the Specification should normally be done by the Suppliers with their own Insurance Company unless otherwise stated. The responsibility of delivery of the materials/equipment at destination stores/site in good condition rests with the Supplier. Any claim with the Insurance Company or Transport agency arising due to loss or damage in transit has to be settled by the Supplier. The Supplier shall undertake free replacement of equipment/materials damaged or lost which will be reported by the Consignee within 30 days of receipt of the equipment/materials at Destination without awaiting for the settlement of their claims with the carriers and underwriters.

3. CERTIFICATE FOR EXEMPTION FROM GOODS AND SERVICES TAX:

Offers with exemption from Goods and Services Tax shall be accompanied with authenticated proof of such exemption. Authenticated proof for this clause shall mean Photostat copy of exemption certificates, attested by Gazetted Officers of State or Central Government.

4. PROPER FILLING UP OF THE PRICE SCHEDULE:

The Bidders should fill up the price schedule (Annexure-V of Section-III) properly and in full. The tender may be rejected if the schedule of price is submitted in incomplete form as per clause-34 (ix) of Section-II of the Specification.

5. NATURE OF PRICE INDICATED IN SPECIFICATION SHALL BE FINAL.

The nature of price indicated in the Clause-13, Section – I of PART –I of the Specification shall be final and binding.

SECTION – IV

TECHNICAL SPECIFICATION FOR NORMAL / ANTIFOG DISC, LONG ROD & COMPOSITE SILICON RUBBER INSULATORS FOR TRANSMISSION LINES OF OPTCL.

1.0 SCOPE

This specification provides for design, manufacture, engineering, inspection and testing before despatch, packing and delivery FOR (destination) for Indian manufacturers of disc. Insulators (Normal & Anti-fog) and long rod insulators as per technical requirements furnished in this specification.

These insulators are to be used in suspension and tension insulators strings for the suspension and anchoring of the conductors on EHV transmission line towers of OPTCL

All the above volumes alongwith amendments there of shall be read and interpreted together. However, in case of a contradiction between the "Technical Specification" and any other volume, the provisions of this volume will prevail.

The insulators shall conform in all respects to high standards of engineering, design workmanship and latest revisions of relevant standards at the time of offer and purchaser shall have the power to reject any work or material which in his judgment, is not in full accordance therewith.

2.0 STANDARDS:

Except as modified in this specification, the disc insulators shall conform to the following Indian Standards, which shall mean latest revisions and amendments. Equivalent International and Internally recognized standards to which some of these standards generally correspond are also listed below.

Sl.No.	Indian Standard	Title.	International Standard.
1.	IS: 206	Method for Chemical Analysis of Slab Zinc.	
2.	IS: 209	Specification for Zinc.	BS: 3436
3.	IS: 731	Porcelain insulators for overhead power lines with a normal voltage greater than 1000V	BS: 137(I&II); IEC 274 IEC 383
4.	IS: 2071 Part-(I) Part-(II) Part-(III)	Method of High Voltage Testing.	
5.	IS: 2121 (Part-I)	Specification of Conductors and Earth wire Accessories for Overhead Power lines. Armour Rods, Binding wires and tapes for conductor.	
6.	IS: 2486	Specification for Insulator fittings for overhead power lines with a nominal voltage greater than 1000V.	
	Part – I	General Requirement and Tests.	BS: 3288
	Part – II	Dimensional Requirements.	IEC: 120
	Part – III	Locking devices.	IEC: 372
7.	IS: 2629	Recommended practice for Hot Dip Galvanisation for iron and steel.	
8.	IS: 2633	Testing for Uniformity of Coating of Zinc coated articles.	

9.	IS: 3138	Hexagonal Bolts & Nuts.	ISO/R 947 & ISO/R 272
10.	IS: 3188	Dimensions for Disc Insulators.	IEC: 305
11.	IS: 4218	Metric Screw Threads	ISO/R 68-1969 R 26-1963, R 262-1969 & R965-1969
12.	IS: 6745	Determination of weight of zinc coating on zinc coated iron and steel articles.	
13.	IS: 8263	Methods of RIV Test of HV insulators.	IEC 437 NEMA Publication No.107/1964 CISPR
14.	IS: 8269	Methods for switching impulse test on HV insulators.	IEC: 506
15.		Thermal mechanical performance test and mechanical performance test on string insulator units.	IEC: 575
16.	IEC	Long Rod Insulators	IEC-433

The standards mentioned above are available from:

Reference.	Abbreviation.	Name & Address:
BS		British Standards, British Standards Institution, 101, Pentonvile Road, N-19 ND,U
IEC / CISPR		International Electro technical commission Electro Technique International. 1, Rue de verembe Geneva SWITZERLAND.
IS		Bureau of Indian Standards, Manak Bhavan, 9 Bahadurshah Zafar Marg, New Delhi-110001, INDIA
ISO		International Organisation for Standardization. Danish Board of Standardization Dansk Standardizing Sraat Aurehoegvej-12 DK-2900 Helleprup DENMARK.
NEMA		National Electric Manufacturers Association 1`55, East 44th. Street New York, NY 10017 USA

3.0 PRINCIPAL PARAMETERS.

3.1 DETAILS OF DISC INSULATORS:

3.1.1 The Insulator strings shall consist of standard discs for use in three phases. 50 Hz effectively earthed 132/220 KV transmission system of OPTCL in a moderately polluted atmosphere. The discs shall be cap and pin, ball and socket type, radio interference and have characteristics as shown in Table-I and all ferrous parts shall be hot dip galvanized as per the latest edition of IS 2629. The zinc to be used for making sleeves shall be 99.95 % pure.

The size of disc insulator, minimum creepage distance the number to be used in different type of strings, their electromechanical strength and mechanical strength of insulator string alongwith hardware shall be as follows:

3.2 SPECIFICATION DRAWINGS:

Sl. No.	Type of String.	Size of disc. Insulator (mm)	Minimum creepage distance of each disc(mm)	No. of standard discs 132/220 KV	Electro-mechanical strength of insulator string fittings (KN)
1	Single suspension	255 x 145	320	1x9 / 1x14	90 KN Normal Disc
2.	Double suspension.	-do-	-do-	2x9 / 2x14	90 KN Normal Disc
3	Single Tension	280x145	320	1x10 / 1x15	120 KN Normal Disc
4	Double Tension	-do-	-do-	2x10 / 2x15	120 KN Normal Disc
5	Single Tension	305x170	330	……. / 1x15	160 KN Normal Disc
6	Double Tension	-do-	-do-	……. / 2x15	160 KN Normal Disc
7	Single suspension	255 x 145	430	1x9 / 1x14	90 KN Antifog Disc
8	Double suspension.	-do-	-do-	2x9 / 2x14	90 KN Antifog Disc
9	Single Tension	280x145	-do-	1x10 / 1x15	120 KN Antifog Disc
10	Double Tension	-do-	-do-	2x10 / 2x15	120 KN Antifog Disc
11	Single Tension	305x170	475	……. / 1x15	160 KN Antifog Disc
12	Single Tension	-do-	-do-	…….. / 2x15	160 KN Antifog Disc

All the bidders have to submit the drawings for insulator alongwith the crates to be utilized for packing of the insulator, for the number specified in this tender.

GENERAL TECHNICAL REQUIREMENTS:

4.1 Porcelain:

The porcelain used in the manufacture of the shells shall be ivory white nonporous of high dielectric, mechanical and thermal strength, free from internal stresses blisters, laminations, voids, forgone matter imperfections or other defects which might render it in any way unusable for insulator shells. Porcelain shall remain unaffected by climatic conditions ozone, acid, alkalis, zinc or dust. The manufacturing shall be by the wet process and impervious character obtained by through vetrification.

The insulator shall be made of highest grade, dense, homogeneous, wet-process porcelain, completely and uniformly vitrified throughout to produce uniform mechanical and electrical strength and long life service. The porcelain shall be free from warping, roughness, cracks, blisters, laminations, projecting point, foreign particles and other defects except those within the limits of standard accepted practice. Surfaces and grooves shall be shaped for easy cleaning. Shells shall be substantially symmetrical.

4.1.1 Porcelain glaze:

Surface to come in contact with cement shall be made rough by stand glazing. All other exposed surfaces shall be glazed with ceramic materials having the same temperature coefficient of expansion as that of the insulator shell. The thickness of the glaze shall be uniform throughout and the colour of the glaze shall be down. The Glaze shall have a visible luster and smooth on surface and be capable of satisfactory performance under extreme tropical climatic weather conditions and prevent ageing of the porcelain. The glaze shall remain under compression on the porcelain body through out the working temperature range.

METAL PARTS:

Cap and Ball Pins:

Ball pins shall be made with drop forged steel caps with malleable cast iron. They shall be in one single piece and duly hot dip galvanized. They shall not contain parts or pieces joined together welded, shrink fitted or by any other process from more than one piece of materials. The pins shall be of high tensile steel, drop forged and heat-treated. The caps shall be cast with good quality black heart malleable cast iron and annealed. Galvanizing shall be by the hot dip process with a heavy coating of zinc of very high purity. The bidder shall specify the grade composition and mechanical properties of steel used for caps and pins. The cap and pin shall be of such design that it will not yield or distort under the specified mechanical load in such a manner as to change the relative spacing of the insulators or add other stresses to the shells. The insulator caps shall be of the socket type provided with nonferrous metal or stainless steel cotter pins and shall provide positive locking of the coupling.

Security Clips:

The security clips shall be made of phosphor bronze or of stainless steel.

FILLER MATERIAL:

Cement to be used as a filler material which is quick setting & fast curing Portland cement. It shall not cause fracture by expansion or loosening by contraction. Cement shall not react chemically with metal parts in contact with it and its thickness shall be as small and as uniform as possible.

MATERIALS DESIGN AND WORKMANSHIP:

GENERAL:

All raw materials to be used in the manufacture of these insulators shall be subject to strict raw material quality control and to stage testing/ quality control during manufacturing stage to ensure the quality of the final end product. Manufacturing shall conform to the best engineering practices adopted in the field of extra high voltage transmission. Bidders shall therefore offer insulators as are guaranteed by them for satisfactory performance on Transmission lines.

The design, manufacturing process and material control at various stages should be such as to give maximum working load, highest mobility, best resistance to corrosion, good finish elimination of sharp edges and corners to limit corona and radio interference voltages.

4.4.2 **INSULATOR SHELL:**

The design of the insulator shells shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration. Shells with cracks shall be eliminated by temperature cycle test followed by mallet test. Shells shall be dried under controlled conditions of humidity and temperature.

4.4.3 **METAL PARTS:**

The pin and cap shall be designed to transmit the mechanical stress to the shell by compression and develop uniform mechanical strength in the insulator. The cap shall be circular with the inner and outer surfaces concentric and of such design that it will not yield or distort under loaded conditions. The head portion of the pinball shall be suitably designed so that when the insulator is under tension the stresses are uniformly distributed over the pinhole portion of the shell. The pinball shall move freely in the cap socket either during assembly of a string or during erection of a string or when a string is placed in position.

Metal caps shall be free from cracks, seams, shrinks, air holes, blowholes and rough edges. All metal surfaces shall be perfectly smooth with no projecting part or irregularities, which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stress uniformly. Pins shall not show any microscopically visible cracks, inclusions and voids.

GALVANIZING:

All ferrous parts shall be hot dip galvanized in accordance with IS: 2629. The zinc to be used for galvanizing shall conform to grade Zn 99.5 as per IS: 209. The zinc coating shall be uniform, smoothly adherent, reasonably light, continuous and free from impurities such as flux, ash, rust stains, bulky white deposits and blisters. Before ball fittings are galvanized, all die flashing on the shank and on the bearing surface of the ball shall be carefully removed without reducing the designed dimensional requirements.

CEMENTING:

The insulator design shall be such that the insulating medium shall not directly engaged with hard metal. The surface of porcelain coated with resilient paint to offset the effect of difference in thermal expansions of these materials. High quality Portland cement shall be used for cementing the porcelain to the cap & pin.

SECURITY CLIPS (LOCKING DEVICES)

The security clips to be used as locking device for ball and socket coupling shall be ‘R’ shaped hump type to provide for positive locking of the coupling as per IS: 2486 (Part-IV). The legs of the security clips shall allow for spreading after installation to prevent complete withdrawal from the socket. The locking device shall resilient corrosion resistant and of sufficient mechanical strength. There shall be no possibility of the locking device to be displaced or be capable of rotation, which placed in position, and under no circumstances shall it allow separation of insulator units and fittings. ‘W’ type security clips are also acceptable. The hole for the security clip shall be counter sunk and the clip shall be of such design that the eye of the clip may be engaged by a hot line clip puller to provide for disengagement under energized conditions. The force required for pulling the clip into its unlocked positions shall not be less than 50 N (5 kg.) or more than 500 N (50 KG).

MARKING:

Each insulator shall have the rated combined mechanical and electrical strength marked clearly on the porcelain surface. Each insulator shall also bear symbols identifying the manufacturer, month, and year of manufacture. Marking on porcelain shall be printed, not impressed, and shall be applied before firing.

BALL AND SOCKET DESIGNATION:

The dimensions of the ball and sockets for 70 and 90 KN discs shall be of 16 mm and for 120 KN and 160 KN discs shall be of 20 mm designation in accordance with the standard dimensions stated in IS: 2486 (Part-II).

DIMENSIONAL TOLERANCE OF INSULATOR DISCS:

It shall be ensured that the dimensions of the disc insulators are within the limits specified below:

a) Diameter of Disc (mm)

	Standard	Maximum	Minimum
90 KN Disc	255	As per IS	As per IS
120 KN Disc	280	As per IS	As per IS
160 KN	305	As per IS	As per IS

b) Ball to Ball spacing Between Discs (mm)

	Standard	Maximum	Minimum
90/120 KN Disc	145	As per IS	As per IS
160 KN Disc	170	As per IS	As per IS

4.7 **INTERCHANGEABILITY:**

The insulators inclusive of the ball and socket fittings shall be of standard design suitable for use with hardware fittings of any make conforming to relevant Indian Standards.

4.8 **CORONA AND RIV PERFORMANCE**:

All surfaces shall be even, smooth, without cuts, abrasions or projections. No part shall be subject to excessive localized pressure. The metal parts and porcelain shall not produce any noise-generating corona under all operating conditions.

SUITABILITY FOR LIVE LINE MAINTENANCE:

The insulator shall be compatible for use with hot line or live line maintenance techniques so that usual hot line operation can be carried out with easy speed and safety.

FREEDOM FROM DEFECTS:

Insulators shall have none of the following defects:
Ball pin shake.
Cementing defects near the pin like small blow holes, small hair cracks lumps etc.
Sand fall defects on the surface of the insulator.

INSULATOR STRINGS:

TYPE AND RATING:

The insulator strings shall be formed with standard discs described in this specification for use on 3 phases 132/220 KV 50 Hz effectively earthed systems in an atmosphere with pollution level as indicated in project synopsis. Suspension insulator strings for use with suspension/tangent towers are to be fitted with discs 70/90 KN EMS rating while tension

insulator strings for use with Anchor/ Tension towers are to be fitted with discs of 120 KN / 160 KN EMS level rating.

STRING SIZE:

The sizes of the disc insulator, the number to be used in different types of strings, their electro-mechanical strength and minimum nominal creep age distance shall be as given in clause 3.12

STRING CHARACTERISTICS:

4.12.1 The characteristics of the complete string shall be as follows:

Sl.No	Description.	Suspension.		Tension.	
		132KV	220kV	132KV	220KV
i	Switching surge withstand voltage (dry & wet) KV peak.	-	-	-	-
ii	Lighting impulse withstand voltage (dry) KV Peak.	650	1050	650	1050
iii	Power frequency withstand voltage (wet) KV r.m.s.	275	460	275	460
iv.	Corona extinction voltage level KV rms	-	176	-	176
v.	Max. RIV for comp. Etc. strong including corona rings at 156 KV (rms). … hours clamps etc. at 1.1 times maximum knee to ground voltage (micro volts).	-	500	-	500
vi.	Mechanical failing load for each sting (kgf)	6500	11500	11500	15500
Vii.	No deformation load for each string (kgf)	-	7705	-	10385
Viii.	Max. Voltage across any disc.	13%	13%	13%	13%

Insulator units after assembly shall be concentric and coaxial within limits as permitted by Indian Standards.The strings design shall be such that when units are coupled together there shall be contact between the shell of one unit and metal of the adjacent unit.

TECHNICAL REQUREMENT

FOR NORMAL DISC INSULATORS

Sl.No.	DESCRIPTION	90 KN	120 KN	160KN
1.	Manufacture's name &address			
2	Type of Insulator	Ball & socket	Ball & socket	
3	Size of ball & socket	16B	20	20
4	Dimensions			
(a)	Disc diameter	255	255	280
(b)	Unit spacing	145	145	170
©	Creepage distance of the single insulator-mm	320	320	330

5	Electro-mechanical strength of single inslator-kN	90	120	160
6	Materials of shell	Porcelain	Porcelain	Porcelain
	Electrical value			
7.1	Power frequency Withstand voltage disc (a) Dry-kV (rms) (b) Wet-kV (rms)	 70 40	 70 40	 75 45
7.2	Power frequency flash over voltage single-disc (a) Dry-kV (rms) (b) Wet-kV (rms)	 75 45	 75 45	 80 50
7.3	Impulse withstand voltage 1.2/50 micro second Positive –kV(peak) Negative –kV (peak)	 110 110	 110 110	 120 120
7.4	Impulse withstand voltage 1.2/50 micro second (a) Positive –kV(peak) (b) Negative –kV (peak	 115 120	 115 120	 125 130

TECHNICAL REQUREMENT

FOR ANTIFOG DISC INSULATORS

Sl.No.	DESCRIPTION	90 KN	120 KN	160KN
1.	Manufacture's name &address			
2	Type of Insulator	Ball & socket	Ball & socket	Ball & socket
3	Size of ball & socket	16B	20	20
4	Dimensions			
(a)	Disc diameter	255	280	305
(b)	Unit spacing	145	145	170
©	Creepage distance of the single insulator-mm	430	430	475
5	Electro-mechanical strength of single inslator-kN	90	120	160
6	Materials of shell	Porcelain	Porcelain	Porcelain
	Electrical value			
7.1	Power frequency Withstand voltage disc (a) Dry-kV (rms) (b) Wet-kV (rms)	 80 45	 85 50	 90 50
7.2	Power frequency flash over voltage single-disc (a) Dry-kV (rms) (b) Wet-kV (rms)	 85 50	 90 55	 95 55
7.3	Impulse withstand voltage 1.2/50 micro second Positive –kV(peak) Negative –kV (peak)	 125 125	 130 130	 135 135
7.4	Impulse withstand voltage 1.2/50 micro second (a) Positive –kV(peak)	 135	 140 135	 145 140

	(b) Negative –kV (peak	130		

DETAILS OF SOLID CORE LONG ROD INSULATORS:

5.1 The insulator shall consist of standard-discs for a three-phase 50 Hz effectively earthed 132 & 220 KV transmission system heavily polluted atmosphere. The insulator shall be ball and socket type.

The size of long rod insulator, minimum creepage distance & the number to be used in different type of strings, their electromechanically strength and mechanical strength of insulator string along with hardware shall be as follows:

(A) 220KV LONG ROD

Sl. No.	Type of string.	Size of long rod insulator (mm)/(Unit)	Minimum creepage distance (mm)	No. of unit (220KV)	Electromechanical strength of insulator (KN)
1.	Single suspension	210x2030	6125	2	90 KN
2.	Double suspension	-do-	-do-	4	2x90 KN
3.	Single tension.	215x2550	7130	2	160 KN
4.	Double Tension.	-do-	-do-	4	2x160KN

(A) 132KV LONG ROD

Sl. No.	Type of string.	Size of long rod insulator (mm)/(Unit)	Minimum creepage distance (mm)	No. of unit (132KV)	Electromechanical strength of insulator (KN)
1.	Single suspension	180x1450	3625	1	90 KN
2.	Double suspension	-do-	-do-	2	2x90 KN
3.	Single tension.	205x1450	4300	1	120 KN
4.	Double Tension.	-do-	-do-	2	2x120KN

SPECIFICATION DRAWINGS:

All the bidders have to submit the drawings for insulator alonwith the crates to be utilized for packing of the insulator, for the number specified in this tender.

6.1

GENERAL TECHNICAL REQUIREMENT:

7.1 **PORCELAIN**:

The porcelain used in the manufacture of the shell shall be ivory white, nonporous of high dielectric, mechanical and thermal strength free from internal stress blisters and thermal strength from internal stresses blisters, laminations, voids, foreign matter. Imperfections or other defects which might render in any way unsuitable for insulator shells. Porcelain shall remain unaffected by climatic conditions, ozone, acid alkalis, and zinc of dust. The manufacturing shall be by the wet process and impervious character obtained by through vetrification.

7.2 **PORCELAIN GLAZE**:

Surfaces to come in contact with cement shall be made rough by stand glazing. All other exposed surfaces shall be glazed with ceramic materials having the same temperature coefficient of expansion as that of the insulator shell. The thickness of the glaze shall be uniform throughout and the colour of the glaze shall be brown. The glaze shall have a visible luster and smooth on surface and be capable of satisfactory performance under extreme tropical climatic weather conditions and prevent ageing of the porcelain. The glaze shall remain under compression on the porcelain body throughout the working temperature range.

7.3 **METAL PARTS:**

7.3.1 **Cap and Ball pins:**

Twin Ball pins shall be made with drop forged steel and caps with malleable cast iron. They shall be in one single piece and duly hot dip g galvanized. They shall not contain parts or pieces joined together, welded, shrink fitted or by any other process from more than one piece of material. The pins shall be of high tensile steel, drop forged and heat malleable cast iron and annealed. Galvanizing shall be by the hot dip process with a heavy coating of zinc of very high purity with minimum of 6 dips. The bidder shall specify the grade, composition and mechanical properties of steel used for caps and pins.

7.3.2 **SECURITY CLIPS**:

The security clips shall be made of phosphor bronze or of stainless steel.

7.4 **FILLER MATERIAL**:

Cement to be used as a filler material, which is quick setting for curing Portland cement. It shall not cause fracture by expansion or loosening by contraction. Cement shall not react chemically with metal parts in contract with it and its thickness shall be as small and as uniform as possible.

MATERIAL DESIGN AND WORKMANSHIP:

8.**GENERAL**:

All raw materials to be used in the manufacture of these insulators shall be subject to strict raw materials quality control and to stage testing quality control during manufacturing stage to ensure the quality of the final end product. Manufacturing shall conform to the best engineering practices adopted in the field of extra high voltage transmission. Bidders shall therefore offer insulators as are guaranteed by them for satisfactory performance on Transmission lines.

The design, manufacturing process and material control at various stages be such as to give maximum working load, highest mobility, best resistance to corrosion good finish, elimination of sharp edges and corners to limit corona and radio interference voltage

INSULATOR SHELL:

The design of the insulator shell shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration. Shells with cracks shall be eliminated by temperature cycle test followed by temperature cycle test followed by mallet test. Shells shall be dried under controlled conditions of humidity and temperature.

METAL PARTS:

The twin ball pin and cap shall be designed to transmit the mechanical stresses to the shell by compression and develop uniform mechanical strength in the insulator. The cap shall be circular with the inner and outer surfaces concentric and of such design that it will not yield or distort under loaded conditions. The head portion of the insulator or is under tension the stresses are uniformly distributed over the pinhole portion of the shell. The pinball shall move freely in the cap socket either during assembly of a string or during erection of a string or when a string is placed in position.

Metal caps shall be free from cracks, seams, shrinks, air holes, blowholes and rough edges. All metal surfaces shall be perfectly smooth with no projecting parts or irregularities which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly. Pins shall not show any macroscopically visible cracks, insulations and voids.

GALVANIZING:

All ferrous parts shall be hot dip galvanized six times in accordance with IS: 2629. The zinc to be used for galvanizing shall conform to grade Zn 99.5 as per IS: 209. The zinc coating shall be uniform, smoothly adherent, reasonably light, continuous and free from impurities such as flux ash, rust stains, bulky white deposits and blisters. Before ball fittings are galvanized, all die flashing on the shank and on the bearing surface of the ball shall be carefully removed without reducing the designed dimensional requirements.

CEMENTING:

The insulator design shall be such that the insulating medium shall not directly engage with hard metal. The surfaces of porcelain and coated with resilient paint to offset the effect of difference in thermal expansions of these materials.

SECURITY CLIPS (LOCKING DEVICES

The security clips to be used as locking device for ball and socket coupling shall be ‘R’ shaped hump type to provide for positive locking of the coupling as per IS: 2486 (Part-IV). The legs of the security clips shall allow for sore adding after installation to prevent complete withdrawal from the socket. The locking device shall be resilient corrosion resistant and of sufficient mechanical strength. There shall be no possibility of the locking device to be displaced or be capable of rotation when placed in position and under no circumstances shall it allow separation of insulator units and fitting ‘W’ type security clips are also acceptable. The hole for the security clip shall be countersunk and the clip shall be of such design that the eye of the clip may be engaged by a hot line clip puller to provide for disengagement under energized

conditions. The force required for pulling the clip into its unlocked position shall not be less than 50 N (5 Kgs.) or more than 500N (50 Kgs.)

BALL AND SOCKET DESIGNATION:

The dimensions of the balls and sockets for 90 KN long rod insulators shall be of 16mm and for 120 KN shall be of 20mm designation in accordance with the standard dimensions stated in IS: 2486 (Part-III).

DIMENSIONAL TOLERANCE OF INSULATORS DISCS

It shall be ensured that the dimensions of the long rod insulators are within the limits as per relevant IEC/ISS.

9. TESTS (FOR DISC INSULATORS) :

The following tests shall be carried out on the insulator string and disc insulators.

TYPE TEST:

This shall mean those tests, which are to be carried out to prove the design, process of manufacture and general conformity of the material and product with the intents of this specification. These tests shall be conducted on a representative number of samples prior to commencement of commercial production. The Bidder shall indicate his schedule for carrying out these tests.

ACCEPTANCE:

This shall mean these tests, which are to be carried out on samples taken from each lot offered for pre-despatch inspection for the purpose of acceptance of the lot.

ROUTINE TESTS:

This shall mean those tests, which are to be carried out on each insulator to check the requirements, which are likely to vary during production.

TESTS DURING MANUFACTURE:

Stage tests during manufacture shall mean those tests, which are to be carried out during the process of manufacture to ensure quality control such that the end product is of the designed quality conforming to the intent of this specification.

TEST VALUE:

For all type and acceptance tests the acceptance values shall be the value guaranteed by the bidder in the guaranteed technical particulars of the acceptance value specified in this specification of the relevant standard whichever is more stringent for that particular test.

TEST PROCEDURE AND SAMPLING NORMS:

The norms and procedure of sampling for the above tests shall be as per the relevant Indian Standard or the internationally accepted standards. This will be discussed and mutually agreed to between the supplier and purchaser before placement of order. The standards and normal according to which these tests are to be carried out are listed against each test. Where a particular test is a specific requirement of this specification, the norms land procedure for the

same shall be as specified in Annexure-IV attached hereto as mutually agreed to between the supplier and the purchaser in the quality assurance programme.

TYPE TESTS:

The following type test shall be conducted on a suitable number of individual unit components, materials or complete strings.

Complete insulator string with hardware fittings.

a)	Power frequency voltage withstand test with corona control rings and under wet condition.	: BS:137(Part-I)
b)	Switching surge voltage withstand test under wet condition (400 only)	:
c)	Impulse voltage withstand test under dry condition.	: IEC: 383
d)	Impulse voltage flashover test under dry condition.	:
e)	Voltage distribution test.	:
f)	Corona & RIV test under dry condition	
g)	Mechanical strength test.	: As per this specification.
h)	Vibration.	:
9.8.2	On Insulators:	
a)	Verification of dimensions.	: IS: 731
b)	Thermal mechanical performance test:	: IEC:575
c)	Power frequency voltage withstand and flashover (I) dry (ii) wet.	: BS: 173
d)	Impulse voltage withstand flashover test (dry)	: IEC: 383
e)	Visible discharge test (dry)	: IS:731
f)	RIV test (dry)	: IS:8263
9.8.3	All the type tests given under clause No.9.8.1 above shall be conducted on single suspension and Double Tension insulator string alongwith hardware fittings.	
9.9	ACCEPTANCE TESTS:	
9.9.1	For insulator:	
	a) Visual examination	: IS:731
	b) Verification of dimensions.	: IS:731
	c) Temperature cycle test.	: IS:731
	d) Galvanizing test.	: IS:731
	e) Mechanical performance test.	: IEC:575
	f) Test on locking device for ball and socket coupling.	: IEC:372
	g) Eccentricity test.	: As per this specification.
	h) Electro-mechanical strength test.	:
	i) Puncture test.	: IS:731
	j) Porosity test.	: IS:731
9.10	ROUTINE TESTS:	
9.10.1	For insulators:	
	a) Visual inspection.	: IS:731
	b) Mechanical routine test.	:
	c) Electrical routine test.	: IEC:383
9.11	TEST DURING MANUFACTURE:	
	On all components as applicable.	

a) Chemical analysis of zinc used for galvanizing.	:
b) Chemical analysis, mechanical and metallographic test and magnetic particle inspection for malleable castings.	:
c) Chemical analysis, hardness test and magnetic particle inspection for forgings.	: As per this specification.
d) Hydraulic Internal Pressure tests on shell.	:
e) Crack detection test for metal parts.	:

ADDITIONAL TEST:

The purchaser reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/ laboratory or at any other recognized laboratory/ research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the purchaser to satisfy that the material complies with the intent of this specification.

CO-ORDINATION FOR TESTING:

For insulator strings, the supplier shall arrange to conduct testing of their disc insulators with the hardware fittings to be supplied to the purchaser by other suppliers. The supplier is also required to guarantee overall satisfactory performance of the disc insulator with the hardware fittings.

NOTE:

In respect of electrical tests on a complete string consisting of insulators and hardware guarantee of values of responsibility of testing shall be with hardware manufacturer of RIV corona and voltage distribution test and with insulator manufacturer for all other tests.

TEST CHARGES AND TEST SCHEDULE:

TYPE TEST:

The insulator offered shall be fully type tested as per this specification. In case the equipment of the type and design offered, has already been type tested in an independent test laboratory. The bidder shall furnish four sets of type test reports alongwith the offer. These tests must not have been conducted earlier than five years. The purchaser reserves the right to demand repetition of some or all type tests in the presence of purchasers' carrying representative. For this purpose the bidder may quote unit rates for carrying out each type test. These prices shall be taken into consideration for bid evaluation. For any change in the design/type already type tested and the design/type offered against this specification, purchaser reserves the right to demand repetition of tests without any extra cost.

ACCEPTANCE AND ROUTINE TEST:

All acceptance and routine tests as stipulated herein shall be carried out by the supplier in the presence of purchaser's representative.

Immediately after finalisation of the programme of type/ acceptance/ routine testing, the supplier shall give sufficient advance intimation to the purchaser to enable him to depute his representative for witnessing the tests. For type tests involving tests on a complete insulator string with hardware fittings, the purchaser will advise the supplier of the hardware fittings to provide the necessary fittings to the place of the test.

In case of failure of the complete string in any type tests, the supplier whose product has failed in the tests shall get the tests repeated at his cost. In case of any dispute, assessment of the

purchaser as to the items that has caused the failure in any of the type tests shall be final and binding.

10. **INSPECTION**:

10.1 i. Purchaser and its representative shall at all times be entitled to have access to the works and to all places of manufacturer where insulators are manufactured and the supplier shall afford all facilities to them for unrestricted inspection of the works, inspection of materials, inspection of manufacturing process of insulators and for conducting necessary tests as specified herein.

ii. The supplier shall keep the purchaser informed in advance of the time of starting and of progress of manufacture of insulators in its various stages so that arrangements could be made for inspection.

iii. No material shall be dispatched from its point of manufacture unless the materials has been satisfactorily inspected and tested.

iv. The acceptance of any quantity of insulators shall in no way relieve the supplier of his responsibility for meeting all the requirement of this specification and shall not prevent subsequent rejection, if such insulators are later found to be defective.

10.2 IDENTIFICATION MARKING:

Each unit of insulator shall be legibly and indelibly marked with the trade mark of the supplier, the year of manufacture, the guaranteed combined mechanical and electrical strength in kilo-newtons abbreviated by 'KN' to facilitate easy identification and proper use.

The marking shall be on porcelain for porcelain insulators. The marking shall be printed and not impressed and the same shall be applied before firing.

11. **QUALITY ASSURANCE PLAN**:

The bidder hereunder shall invariably furnish following information alongwith his offer, failing which the offer shall be liable for rejection.

Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw material are tested, list of tests normally carried out on raw materials in presence of bidder's representative, copies of test certificates.
Informations and copies of test certificates as in (i) above in respect of bought out materials.

List of manufacturing facilities available.

Level of automation achieved and lists of area where manual processing exists.

List of areas in manufacturing process, where stage inspections are normally carried out in quality control and details of such tests and inspection.
Special features provided in the equipment to make it maintenance free.
List of testing equipping 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 specified test requirements.
The supplier shall within 30 days of placement of order submit the following information to the owner.

List of raw material and the names of sub-suppliers selected from those furnished alongwith the offer.

12. TEST DETAILS.

1. **VOLTAGE DISTRIBUTION TEST**:

The voltage across each insulator unit shall be measured by sphere gap method. The result obtained shall be converted into percentage and proportionate correction be applied as to give a total of 100% distribution. The voltage across any disc should be not exceed the values given in clause 4-12.1

2. **CORONA EXTINCTION VOLTAGE TEST (DRY)**:

The sample assembly when subjected to power frequency voltage shall have a corona extinction voltage of not less than the value specified at clause 4.12.1 (iv) under dry condition. There shall be no evidence of corona on any part of the sample when all possible sources of corona are photographed in a darkened room.

3. **RIV TEST (DRY):**

Under the conditions as specified in (2) above, the insulator string alongwith complete hardware fittings shall have a radio interference voltage level below 500 micro volts at one MHz when subjected to 50 Hz AC voltage of 1.1 times maximum time to ground voltage under dry condition. The test procedure shall be in accordance with IS: 8263.

4. The complete insulator string alongwith its hardware fitting excluding arcing horn corona controlling/grading ring and suspension assembly/dead end assembly shall be subject to a load equal to 50% of the specified minimum ultimate tensile strength (UTS) which shall be increased already rate to 68% of the minimum UTS specified. The load shall be held for five minutes and then removed. After removal of the load, the string components shall not show any visual deformation and it shall be possible to disassemble them by hand,. Hand tools may be used to remove cotter pins and loosen the nuts initially. The string shall then be reassembled and loaded to 50% of UTS and the load shall be further increased at a steady rate till the specified minimum UTS and held for one minute. No fracture should occur during this period. The applied load shall then be increased until the failing loads reached and the value recorded.

5. **VIBRATION TEST:**

The suspension string shall be tested in suspension mode, and tension string in tension mode itself in laboratory span of minimum 30 meters. In the case of suspensions string a load equal to 600 Kg. shall be applied alongwith the axis of the suspensions string by means of turn buckle. The insulators string alongwith hardware fittings and two sub conductors throughout the duration of the test vibration dampers shall not be used on the test span. Both the sub-conductors shall be vertically vibrated simultaneously at one of the resonance frequencies of the insulator string (more than 10Hz) by means of vibration inducing equipment. The amplitude of vibration at the antipode point nearest to the string shall be measured and the same shall not be less than 120.4 being the frequency of vibration. The insulator strings shall be vibrated for five million cycles then rotated by 90 deg and again vibrated for 5 million cycles without any failure, after the test, the disc insulators shall be examined for looseness of pins and cap or any crack in the cement. The hardware fittings shall be examined to fatigue fatter and mechanical strength test. There shall be no deterioration of properties of hardware components and disc insulators after the vibration test. The disc insulators shall be subjected to the following tests as per relevant standards.

Test.	Percentage of disc

		To be tested.
a)	Temperature cycle test followed by	60
	Mechanical performance test	40
b)	Puncture test (for porcelain insulator only)	

6. **CHEMICAL ANALYSIS OF ZINC USED FOR GALVANIZING**.

Samples taken from the zinc ingot shall be chemically analysed as per IS: 209. The purity of zinc shall not be less than 99.95%.

7. **TEST FOR FORGINGS**:

The chemical analysis hardness tests and magnetic particle inspection for forgings will be as per the internationally recognized procedures for these tests. The sampling will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the supplier and purchaser in quality assurance programme.

TEST ON CASTING:

The chemical analysis mechanical and metallographic tests and magnetic particle inspection for castings will be as per the internationally recognized procedures for these tests. The samplings will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the supplier and purchaser in quality assurance programme.

HYDRAULIC INTERNAL PRESSURE TEST ON SHELLS:

The test shall be earned out on 100% shells before assembly. The details regarding test will be as discussed and mutually agreed to by the suppliers and purchaser in Quality Assurance Programme.

THERMAL MECHANICAL PERFORMANCE TEST:

The thermal mechanical performance test shall be carried out on minimum 15 number of disc insulators units as per the procedure given in IEC 575. The performance of the insulator unit shall be determined by the same standard.

ECCENTRICITY TEST:

The insulator shall be vertically mounted on a future using dummy pin and socket. A vertical scale with horizontal slider shall be used for the axial run out. The pointer shall be positioned in contact with the bottom of the outermost petticoat of the disc. The disc insulators shall be rotated with reference to the fixture and the slider shall be allowed to move up and down on the scale but always maintaining contact with the bottom of the outer most petticoats. After one full rotation of the disc the maximum and minimum position the slider has reached on the scale can be found out. Difference between the above two readings shall satisfy the guaranteed value for axial run out.

Similarly using a horizontal scale with veridical slider the radial run out shall be measured. The slider shall be positioned on the scale to establish contact with the circumstance of the disc insulator and disc insulator rotated on its future always maintaining the contact. After one full rotation of the disc the maximum and minimum position the slider has reached on the scale

can be found out. Difference between the above two readings shall satisfy the guaranteed value for axial run out.

CRACK DETECTION TEST:

Crack detection test shall be carried out on each ball and pin before assembly of disc unit. The supplier shall maintain complete record of having conducted such tests on each and every piece of ball pin The bidder shall furnish full details of the equipment available with him for crack test and also indicate the test procedure in detail.

TECHNICAL REQUIREMENT

FOR 220 KV LONG ROD INSULATORS

Sl. No.	Description	unit	90 KN	120KN	160 KN
1	Type of Insulator				
2	Size & designation of ball and socket and standard to which it will conform	mm	16	20	20
2.	No. of insulator per string.		Two	Two	Two
3	Materials				
I)	Core				
ii)	Housing				
iii)	End fitting				
4	Dimension of insulator				
I)	Sectional length	mm	2030 ±50	2175±50	2550 ±50
ii)	Arcing Disntance	mm	As per IEC	As per IEC	As per IEC
iii)	Creepage Distance	mm	6125	6450	7130
iv)	No. of shed		As per IEC	As per IEC	As per IEC
v)	Largest Sheds Diameter	mm	210	210	215
5	Weight of insulator(Appr)	Kg	74		112
6	**Electrical Characteristics**				
i)	Normal system voltage	KV(rms)	220	220	220
ii)	Highest system voltage	KV(rms)	245	245	245
iii)	System frequency	Hz	50	50	50
iv)	Corona extinction voltage	KV(rms)	176	176	176

v)	Dry one minute Power frequency with stand voltage	KV(rms)	500	500	500
vi)	Wet one minute Power frequency with stand voltage	KV(rms)	460	500	460
vii)	Dry Lighting impulse with stand voltage-Positive Polarity	KVp	1050	1050	1050
viii)	Dry Lighting impulse with stand voltage-Negetive Polarity	KVp	1050	1050	1050
7	**Mechanical Characteristics**				
i)	Specified mechanical load	KN	90	120	160

TECHNICAL REQUREMENT
FOR 132 KV LONG ROD INSULATORS

Serial No	Description	90KN, Single Suspension, 111-C278/ R-0	120KN, Single tension 111-C-155/R-2
1.	Size and designation of ball and socket and standard to which it will conform (MM)	16 mm, Alt-B IS-2486-II	20 mm, Alt-B IS-2486-II
2.	No. of insulator per string.	One	One
3.	Outside dia of the LRI (MM)	200	205
4.	Creep-age Distance of insulator (MM)	4000	4300
5.	Mechanical strength of single LRI. (KN)	90	120
6.	Withstand voltage of single LRI		
7.1	Power Frequency a) Dry-KV (mms) b) Wet-KV (mms)	 315 275	 315 275
7.2	Impulse voltage 1.2/50micro second. a) Positive-KV (peak) b) Negetive-KV (peak)	 650 650	 650 650
8.	Withstand voltage for the complete string.	-	-
8.1	Power frequency- (a) Dry-KV (peak) Without corona ring. (b) Wet-KV (rms)	 390 360	 400 380
8.2	Lighting impulse voltage 1.2/50 micro second (a) Positive KV (peak) (b) Negetive KV (Peak)	 700 700	 740 740
8.3	Switching surge voltage 250/2500 micro second (for 400 KV only) (a) Dry –KV (rms) (b) Wet-KV (rms)	Not applicable for 132 KV -do-	
9.	Flashover voltage for the LRI		
9.1	Power frequency-	390	400

	(a) Dry-KV (rms) (b) Wet-KV (rms)	360	380
9.2.	Lighting impulse voltage 1.2/50 micro second (a) Positive – KV (peak) (b) Negetive –KV (peak)	 670 670	 670 670
10	Flash over voltage for the complete string.		
10.1	Power frequency (a) Dry- KV (rms) Without corona ring. (b) Wet-KV (rms)	 325 295	 325 295
10.2	Lighting impulse voltage 1.2/50 micro second (a) Positive KV (peak) (b) Negative KV (peak)	 670 670	 670 670

GUARANTEED TECHNICAL PARTICULARS FOR INSULATORS
(SEPARATE SHEETS MAY BE FILLED IN FOR EACH VOLTAGE RATING)

Sl. No.	Description.		Single suspension	Double tension	Single Tension	Double Tension
1	Makers name and address and country.					
2	Size and designation of Ball and socket and standard to which it will conform in mm.					
3	No. of insulator discs per string.					
4	Outside dia of the disc. Mm					
5	Spacing – mm					
6	Creepage distance of the single disc –mm					
7	Electro-mechanical strength of single disc. Kg.					
8	Withstand voltage of single disc.					
8.1	Power frequency: a) Dry-kV (rms) b) Wet-kV (rms					
8.2	Impulse voltage 1.2/50 micro second. a) Positive-kV (peak) b) Negative-kV (peak)					
9.	Withstand voltage for the complete string					
9.1	Power frequency: a) Dry-kV (rms) b) Wet kV (rms)	With & without corona ring				
9.2	Lighting impulse voltage 1.2/50 micro second. a) Positive kV(peak) b) Negative Kv(Peak)	do				
9.3	Switching surge	do				

	voltage 250/2500 micro second (for 400KV only) a) Dry-kV (rms) b) Wet kV (rms)					
10	Flashover voltage for the disc.					
10.1	Power frequency: a) Dry-kV (rms) b) Wet kV (rms)					
10.2	*Lighting impulse voltage 1.2/50 micro second.* *a) Positive kV(peak)* *b) Negative Kv(Peak)*					
11	Flashover voltage for the complete string.					
11.1	Power frequency: a) Dry-kV (rms) b) Wet kV (rms					
11.2	Lighting impulse voltage 1.2/50 micro second. a) Positive kV(peak) b) Negative Kv(Peak)					

INSULATOR CHARACTERISTIC.

1. Type. Ball and socket

2. Dimension:

Porcelain disc diameter. mm 250/280/305

Unit spacing.

Mm 146

Leakage distance. Mm 292

Mechanical values:

Combined mechanical and electrical strength. Kg. 9,000

3. Mechanical impact strength. m-kg 1.03

Tension proof. Kg 4,000

Time load. Kg 5,400

4. Electrical values:

Low – frequency dry flashover.	Kv	80
Low – frequency wet flashover.	Kv	50
Critical impulse – flashover, positive.	Kv	125
Critical impulse – flashover, negative.	Kv	130
Low frequency puncture voltage.	Kv	110

5. Radio – influence –voltage Data:

Low frequency test voltage, rms to ground.	Kv	10
Maximum RIV at 1,000 khz.	Kv	50
Coupling type.		B
Glaze colour.		Brown.

TECHNICAL SPECIFICATION FOR SILICON RUBBER HOUSED COMPOSITE INSULATORS:

1.0 **SCOPE**

1.1 This specification covers design, manufacturing, testing, inspection, packing and supply of Silicon Rubber housed composite Insulators for satisfactory operation on various transmission lines and Substations situated in any part of Odisha state.

1.2 Now, hereunder, where composite insulator is mentioned, describes only Silicon Rubber housed composite insulators.

1.3 These insulators are to be used as insulating part on single circuit / or double circuit lattice tower structures single/double suspension & tension (dead end) for 400/220 / 132 KV transmission lines. The configuration on structure may be single or double insulators per phase at required locations.

1.4 The Bidder should be original manufacturer of the SIR housed composite insulators and shall have all the facilities to manufacture 90KN/120KN/160KN and higher sizes of composite insulators.

This will be pre-qualifying requirement as a "Bidder"

2.0 SERVICE CONDITIONS

The composite insulators to be supplied against this specification shall be suitable for satisfactory continuous operation under following tropical conditions.

2.1.1 Maximum Ambient Air Temperature. °C. : 50

2.1.2 Minimum Ambient Air Temperature. °C. : 0
2.1.3 Average daily ambient Air Temperature °C. : 35
2.1.4 Maximum relative humidity. % : 95
2.1.5 Average rainfall per annum. (mm) : 1150
2.1.6 Maximum altitude above mean sea level – Mtr : 1000
2.1.7 Isoceraunic level i.e. Average number of Thunderstorm - Days/annum : 30
2.1.8 Maximum wind pressure.(kg/Sq. meters) : 200
2.1.9 Seismic level i.e. Earthquake Acceleration
a) Horizontal Seismic Co-efficient (acceleration) – g (Zone – 5) : 0.08
b) Vertical Seismic Co-efficient (acceleration) – g (Zone – 5) : 0.08

3.0 SYSTEM PARTICULARS

A) Electrical System Data:

a)	System Voltage (KV rms)	400/220/132
b)	Max. Voltage (KV rms)	420/245/145
c)	Lightning impulse withstand voltage (dry & wet) (KVP)	1425/1050/650
d)	Power Frequency withstand voltage (wet) (KV rms)	650/460/275
e)	Short circuit level (KA)	40/40/40
f)	Switching Surge withstand voltage (wet) KVP	1050/NA/NA
g)	Frequency – Hz I) Normal II) Maximum III) Minimum	 50 51.5 48
h)	Number Of Circuits	Single / Double
i)	Normal Span – m	400/350/350
j)	Wind Span – m	440/385/385
k)	Weight Span – m I) Maximum II) Minimum	 600/525/525 200/-100/-100
l)	Factor Of Safety (At Every Day Temp. & No Wind)	4
m)	Neutral Grounding	Effectively Earthed
n)	Ball Socket dia in mm Suspension/Tension	16/20
o)	Length of AF insulator string (in mm) 400/220/132/66 KV for suspension location	3335/2030/1305
p)	Length of AF insulator string (in mm) 400/220/132/66 KV for Tension location	4080/2175/1450
q)	Minimum failing load (KN) For 400KV For 220/132 KV	120/160 90/120
r)	Minimum Creepage distance in mm 400KV 220KV 132KV	 13020 7595 4495

B) DETAILS OF CONDUCTORS as per IS: 398(Part-I), 1996:

Sr. No.	Details	Moose -400KV	Zebra – 220KV	Panther – 132KV

1	Number Of Strands a) Aluminium b) Steel	 54 7	 54 7	 30 7
2	Wire Diameter – mm a) Aluminium b) Steel	 3.53 3.53	 3.18 3.18	 3 3
3	Approximate Weight – Kg / Km.	1998	1621	974
4	Overall Diameter – mm	31.77	28.62	21
5	Ultimate Tensile Strength – Kg	16275	13289	9144

4.0 STANDARDS

The Manufacturer should confirm the product with following Indian Standard, International Standards containing latest revisions, amendments, changes adopted.

Sr. No.	Indian Standards	Title	International Standards
1	IS:209-1992	Specifications for Zinc	BS:3436
2	IS:406-1991	Method of Chemical Analysis of Slab Zinc	BS:3436
3		Composite insulators for A.C Over head Power lines with a nominal voltage greater than 1000V	IEC:61109-1992
4	IS 2071 Part (I) Part(II)-1991 Part(II)-1991	Methods of High Voltage Testing.	IEC 60060-1
5	IS : 2486 Part I-1993 Part II-1989 Part-III1991	Specification for Insulator fittings for Over Head Power Lines with a nominal voltage greater than 1000 V General Requirements and Tests. Dimensional Requirements. Locking Devices.	IEC : 575 BS-3288 IEC-6020 IEC-60372
6	IS : 2629-1990	Recommended practice for Hot dip galvanisation for iron and steel.	ISO-1461 (E)
7	IS : 2633-1992	Testing of Uniformity of Coating of zinc coated articles.	
8	IS -6745-1990	Determination of weight of Zinc Coating on Zinc coated iron and steel articles.	BS : 443-1969 ISO 1460-1973
9	IS : 8263-1990	Methods of RI Test of HV insulators	IEC-60437 NEMA Publication No. 07/1964 CISPR
10	IS : 8269-1990	Methods for Switching Impulse test on HV insulators.	IEC-60506
11		Salt Fog Pollution Voltage Withstand Test.	IEC-60507
12		Guide for the selection of insulators in respect of polluted conditions.	IEC-60815
13		Tests or insulators of Ceramic material or glass or glass for overhead lines with a nominal voltage greater than 1000 V	IEC-60363

However, in an event of supply of insulators conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent to those specified. In case of award, salient features of comparison between the standards proposed by the Bidder and those specified in this document will be provided by the Supplier to establish equivalence.

5.0 GENERAL REQUIREMENT

The design, manufacturing, processes, tolerances and inspection of composite insulators shall confirm to the following.

5.1 Language and units.

5.1.1 All correspondence, literature, drawings and markings shall be in the English language.

5.1.2 Dimensioning shall be in the SI (Metric System) units. Manufacturer should mention the standard adopted for Dimensioning & tolerance principals considered for design.

6.0 DESIGN AND MATERIAL REQUIREMENT

6.1 Core:

The core shall be glass-fibre reinforced epoxy resin rod (FRP) of high strength. Both, glass fibre and resin shall be optimized in the FRP rod. Glass fibres with low content in alkalies shall be boron free E glass or Boron free electrically corrosion resistance (ECR) glass. Use of resin with hydrolysis trend due to water penetration should be prevented i. e. matrix of the FRP rod shall be Hydrolysis resistant. Suitability of Epoxy matrix as well as interface between matrix and fibres is to be considered as design parameter to prevent brittle fracture. The FRP rod should be void free and shall be manufactured through Pultrusion process.

6.2 Housing:

The core of the composite insulator shall be completely covered by a continuous housing consisting of a sheath-weather shed. For moulding of entire weather shed structure on to the rod in a one shot moulding process to be employed to avoid multiple interfaces. Hardware i. e. metal fittings may be installed on the rod prior to moulding of the shed controlling moulding lines.

The base polymer shall be 100% Silicon Rubber prior to the addition of reinforcing fillers.

The thickness of compounding material on core should be minimum 3 mm.

Manufacturer should furnish a description of its Quality Assurance Programme including fabrication; testing and inspection for any material (i.e. rubber), components (i.e. Rod) or hardware (i.e. end fittings). The manufacturer has had fabricated by others should also be included. Manufacturing methods and material composition documentation will be a part of Technical Bid to be submitted along with offer. Insulator should have hermetically sealed structure in which the housing material is moulded to cover the interface between the end fittings and the FRP rod. This seal should never be broken during testing or otherwise.

6.3 End fittings:

The composite insulators shall be socket and ball type with the necessary coupling arrangement such that pin shall move freely in the socket but do not get disengaged while in service under various operating and atmospheric conditions. The socket & ball type metal end fittings shall be designed to transmit the mechanical load to the core & the end fittings shall maintain uniform and consistent mechanical strength Material and methods used in the fabrication of metal parts shall be selected to provide good toughness and ductility. Metal end fittings shall be made from a quality malleable cast iron or forged steel or Spheroidal Graphite Iron(SGI) and shall be hot dipped galvanized in accordance with IS 2629. Metal end fittings shall be uniform

and without sharp edges or corners and shall be free of cracks, flakes, slivers, slag, blow-holes shrinkage defects and localized porosity. The attachment to the FRP rod shall be performed with a symmetrically controlled crimping method control by acquistic method that compresses the metal radially onto the rod without damage to the rod fibres or resin matrix while providing a strength equal to or greater than the defined and specified ultimate strength to the insulator. The material used in fittings shall be corrosion resistant. Nominal dimensions of the pin, ball and socket interior shall be in accordance with the standard shown at Cl.No. 4 No joints in ball & socket or pin will be allowed. Outer portion of ball or socket should be Zinc sleeved with minimum 99.95% purity of electrolytic high grade Zinc. The finished surface shall be smooth and shall have a good performance. The surface shall not crack or get chipped due to ageing effect under normal and abnormal service conditions or while handling during transit or erection.The design of the fittings and the insulators shall be such that there is no local corona formation or discharges likely to cause the interference to either sound or vision transmission.

6.4 GRADING RINGS:

Grading rings shall be provided when system voltages are equal to or greater than 220 KV. For 220 KV transmissions, grading ring is to be provided at energized end only. For 400 KV transmissions, grading ring is to be provided at both ends of an insulator. All grading rings and brackets shall be designed as an integral part of the insulator assembly with a positive mounting system that allows mounting in only one position. The design of the grading ring shall be such that ring can only be mounted with its orientation towards the weather sheds for maximum RIV and corona control. Grading rings shall be designed in such a manner that the rings can be readily installed and removed with hot line tools without disassembling any other part of the insulator assembly. Grading ring height (is the distance from the end of the end fitting to the top of corona ring) should be so selected that maximum field minimizes & uniformly distributed along the insulator. Manufacturer should provide reports of successful electrical field modelling testing for the specific insulator design. The EFM should be three dimensional with results containing drawing depicting the electric field in various colours, each of a different voltage level. The result of this study should show that the voltage field surrounding the composite insulator is optimum along the entire length of insulator, with the effected hot end of the insulator being a critical location. The threshold at which corona may or may not be present should be defined as a figure in kV/mm for the designed insulator.

7.0 VERIFICATION OF HOUSING MATERIAL

The manufacturer should provide written verification about housing material, for which base polymer shall be 100% Silicon Rubber prior to the addition of reinforcing fillers considered will provide satisfactory performance in the particular environment mentioned atCl.No.3

It shall meet following requirements

Be homogenous, impermeable, with no fissures, bubbles and strange materials inclusions.

Be designed in order to avoid formation of localized discharges and to prevent interfaces humid penetration.

Be resistant to corona, KV radiation, ozone, atmospheric contamination, water penetration and power arcs.

8.0 BALL AND SOCKET DESIGNATION

The dimensions of the Ball and Socket shall be 16mm designation for 90KN and 20mm designation for 120KN & 160KN insulators in accordance with the standard dimensions stated in IEC:120/IS:2486(Part-II)

9.0 DIMENSIONAL TOLERANCE OF COMPOSITE INSULATORS:

The tolerance on al dimensions e.g. diameter, length and creepage distance shall be allowed as follows:
± (0.04 d + 1.5) mm when d < = 300 mm.
± (0.025 d + 6) mm when d > = 300 mm.
Where d being the dimensions in millimetres for diameter, length or creepage distance as the case may be.
However, no negative tolerance shall be applicable to creepage distance.

10.0 INTGERCHANGEABILITY:
The composite insulators including the ball socket connections shall be standard design suitable for use with the hardware fittings of any make conforming to relevant IS/IEC standards.

11.0 CORONA AND RI PERFORMANCE:
All surfaces shall be clean, smooth, without cuts, abrasions or projections.
No part shall be subjected to excessive localized pressure. The insulator and metal parts shall be so designed and manufactured that it shall avoid local corona formation and not generate any radio interference beyond specified limit under the operating conditions.

12.0 MARKINGS:
Each insulator shall be legibly and indelibly marked with the following details as per IEC – 61109.
a. Name or trademark of the manufacturer.
b. Voltage and Type.
c. Month and year of manufacturing.
d. Minimum failing load / guaranteed mechanical strength in kilo Newton followed by the word 'KN' to facilitate easy identification.
e. Country of manufacture.

13.0 PACKING:
All insulators shall be packed in strong corrugated box of minimum 7 ply duly palette or wooden crates. The gross weight of the crates along with the material shall not normally exceed 100 kg to avoid hackling problem. The crates shall be suitable for outdoor storage under wet climate during rainy season. The packing shall be of sufficient strength to withstand rough handling during transit, storage at site and subsequent handling in the field.
Suitable cushioning, protective padding, or Dunn age or spacers shall be provided to prevent damage or deformation during transit and handling.
All packing cases shall be marked legibly and correctly so as to ensure safe arrival at their destination and to avoid the possibility of goods being lost or wrongly dispatched on account of faulty packing and faulty or illegible markings. Each wooden case / crate corrugated box shall have all the markings stencilled on it in indelible ink.
The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

14.0 INSPECTION, TESTS AND STANDARDS:

14.1 Proto type or Design or Type: To evaluate core material, housing material , core assembly (core & end fittings), interfaces and connections of sample insulators. Inspection includes the performance of acceptance, type and design tests.

OPTCL reserves the right to carry out design and type tests to check conformity of the material with the proto type unit previously approved.
OPTCL reserves the right to attend the tests and perform inspections in any stage of the supply, appointing its inspectors and following the approved manufacturing schedule. Inspection and tests scheduled to happen during manufacture shall have their dates informed to OPTCL at least 10 days in advance.
The manufacturer shall assure OPTCL's inspector the right to being fully acquainted with installations and apparatus, check calibrations, is present at the tests, check results and in case of doubt, perform new inspections and claim the repetition of any test.

14.2 No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected, tested, and necessary dispatch instructions are issued in writing, except for the cases where waiver of inspection is granted by competent authority of the Purchaser, and even in this case also written dispatch instructions will be issued. Any dispatches before the issue of Dispatch Instructions in writing will be liable for rejection and non-acceptance of the materials by the consignee.

14.3 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.

14.4 The sample taken from any numbers of crates for carrying out any type of tests will be to the suppliers account.

14.5 TYPE TESTS

14.5.1 The type, acceptance, routine tests, any tests specifically demanded by the Purchaser and tests during manufacture shall be carried out on the Insulators free of cost. The test reports shall be in accordance with the socket cap material offered.

14.5.1.2 Type tests shall mean those tests, which are to be carried out to prove the process of manufacture and general conformity of the material to this specification. These tests shall have to be carried out at the Government Approved Testing Laboratory. Purchaser reserves the right to specify the name of the laboratory also, if so felt. The Type test reports shall not be older than Five years and shall be valid till validity of offer.

14.5.1.3 Acceptance Tests shall mean those tests, which are to be carried out on samples taken from each lot offered for pre-despatch inspection, for the purposes of acceptance of that lot. These tests shall be carried out at the manufacturer's works in presence of Purchaser's representative before the despatch of the materials to the site.

14.5.1.4 Routine Tests shall mean those tests which are to be carried out on each of the Insulator to check requirements which are likely to vary during production. These tests shall be carried out by the manufacturer on each Insulator and shall have to furnish these reports to the Purchaser's representative during his visit for acceptance tests.

14.5.1.5 Tests during manufacture shall mean those tests, which are to be carried out during the process of manufacture and end inspection by the supplier to ensure the desired quality of the end product to be supplied by him, including all Quality Control checks and Raw Materials testing.

14.5.1.6 The standards to which these tests will be carried out are listed against them. Where a particular test is a specific requirement of this specification, the norms and procedures of the test shall be as specified as mutually agreed between the Bidder and the purchaser in the Quality Assurance Programme.

14.5.1.7 For all type and acceptance tests, the acceptance values shall be the values guaranteed by the Bidder in the "Guaranteed Technical Particulars" of his proposal or the acceptance value specified in this specification, whichever is more stringent for that particular test.

14.5.2 On the complete composite Insulator with Hardware Fittings:

(a) Power frequency voltage withstand test with corona control rings/grading ring and arcing horns under
wet condition-IEC:383-1993
(b) Impulse voltage withstand test under dry condition.-IEC:383-1993
(c) Wet switching Impulse withstand voltage.- For 400KV only IEC:61109-1992
(d) Salt-fog pollution withstand test-Annexure-A
(e) Grading device test- Applicable to 220KV and above voltage class
(f) Electrical Field Modelling test (EFM)- Applicable to 220KV and above voltage class
(g) Power arc test- Applicable to 220KV and above voltage class

All the above type test shall be conducted on Single 'I' suspension and Double tension insulator along with hardware fittings.

14.5.3 On Composite Insulator Units

(a) Tests on interfaces and connections IEC:61109-1992
i) Dry Power Frequency Voltages Test
ii) Sudden Load Release Test
iii) Thermal Mechanical Test
iv) Water immersion
v) Steep Front Impulse Voltage Test
iv) Dry Power Frequency Voltage Test
(b) Assembled Core Load -Time Tests- IEC:61109-1992
i) Average Falling Load of the Core of the assembled Insulator
ii) Control of the slope of the strength-time curve of the Insulator
(c) Test of Housing IEC:61109-1992
i) Tracking and Erosion test.
(d) Test for the Core Material IEC:61109-1992
i)Dye Penetration Test
ii)Water Diffusion Test
(e) Brittle fracture resistance test -Annexure-A
(f) Multi stress test for 5000 hours as per Annex C-IEC:1109
(g) Mechanical load time test IEC:61109-1992 Clause 6.4

14.5.4 On Silicone material

(a) Flammability test IEC:61109-Amd.1**or** Test as per UL94.
(b) Recovery of Hydrophobicity test-Annexure-A

14.6 Sample Tests (Acceptance Tests) –

When specified on a purchase order, sample tests shall be performed per

ANSI C29.11& IEC:61109-1992.
(a) Verification of Dimensions
(b) Verification of Locking System-applicable only in the event ball and socket insulators is specified.
(c) Mechanical Load test- In process testing used to verify the mechanical system is acceptable.
(d) Galvanizing Test

14.7 Routine Tests:
The following tests shall be performed on every insulator produced as per IEC:61109-1992.
(a) Mechanical Test: Every insulator shall withstand for a period not less than 10 seconds a tensile load equal to or greater than its Routine Test Load (50% of the Specified Mechanical Load)
(b) Visual Examination: Every insulator shall be examined to insure its conformance to the manufacturer's drawing. Superficial polymer surface defects of an area less than 25 square millimeters (total area not to exceed 2% of total insulator surface area) and depth less than 1 mm shall be acceptable.

14.8 Additional Tests
14.8.1 The Purchaser reserves the right of getting done any other test(s) of reasonable nature carried out at Purchaser's premises, at site, or in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy himself that the material comply with the specifications. In such case all the expenses will be to Suppliers account.

14.9 Sample Batch for Type Testing
14. 9.1 The Bidder shall offer at least 10% of the ordered quantity or 300 nos. whichever is higher, for selection of samples required for conducting all the type tests.
14. 9.2 The Bidder is required to carry out all the acceptance tests successfully in the presence of Purchaser's representative before dispatch of the selected sample to the testing laboratory for type test.

15. TEST REPORTS
15.1 Copies of type test reports shall be furnished in at least two (2) copies along with one original. One copy shall be returned duly certified by the Purchaser only after which the material already inspected i.e. the materials manufactured for selection of sample for type test, shall be dispatched on receipt of Dispatch Instructions.
15.2 Record of routine test reports shall be maintained by the Bidder at his works for periodic inspection by the purchaser's representative.
15.3 Test Certificates of test during manufacture shall be maintained by the Bidder. These shall be produced for verification as and when desired by the Purchaser.

16. TEST FACILITIES
16.1 The following additional facilities shall be available at Supplier's works:-
a) Calibration Reports from Government approved testing laboratory of various testing and measuring equipment including tensile testing machine, resistance measurement facilities, burette, thermometer, barometer etc.
b) Finished insulator shall be checked for dimension verification and surface finish separately.
c) The bidder should have all the routine and acceptance testing facilities, in house **in accordance with IEC: 383 & 61109.**

Manufacturers of foreign origin shall, in addition to the above, also have arrangements in India, either at works of their authorized representative/licenses or in the NABL lab. like CPRI, IISC, ERDA etc. for conducting sampling test in accordance with IEC : 383 & 1109.

17. QUALITY ASSURANCE PLAN

16.1 The bidder shall invariably furnish following information along with his offer:

i) Statement giving list of important raw materials, proposed to be used in the manufacture of the insulator against this Specification, names of sub suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials in presence of Bidder's representative as routine and / or acceptance during production and on finished goods, copies of test certificates.

ii) Information and copies of test certificates as in (i) above in respect of bought out accessories.

iii) List of manufacturing facilities available.

iv) Level of automation achieved and lists of areas where manual processing exists.

v) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

vi) List of testing equipment available with the Bidder for final testing of Insulator specified. In the case if the Bidder does not possess all the Routine and Acceptance testing facilities the tender will be rejected.

vii) The Purchaser reserves the right for factory inspection to verify the facts quoted in the offer. If any of the facts are found to be misleading or incorrect the offer of that Bidder will be out rightly rejected and he may be black listed.

viii) Special features provided to make it maintenance free.

ix) Bidder shall also submit the Field Quality Plan (FQP) along with Technical Bid.

16.2 The bidder shall also submit following information to the purchaser along with the technical Bid.

i) List of raw materials as well as bought out accessories, and the name of suppliers of raw materials as well as bought out accessories.

ii) Type test certificates of the raw material and bought out accessories.

iii) Quality assurance plan (QAP) withhold points for purchaser's inspection.

16.3 The Bidders shall submit the routine test certificates of all the bought out items, accessories etc.

17. DOCUMENTATION

17.1 Two sets of type test reports, duly approved by the Purchaser shall be submitted by the Bidder, before commencement of supply. A copy of acceptance and routine test certificates, duly approved by the purchaser shall accompany the dispatch consignment.

17.2 **The bidder shall submit the drawings in triplicate for the offered insulators well within the commencement period for approval.** The manufacturing of the insulator 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 insulator prior to the approval of the drawing shall be at supplier’s risk.

17.3 Approval of drawings etc. by the purchaser shall not relieve the Bidder of his responsibility and liability for ensuring correctness and correct interpretation of the latest revision of applicable standards, rules and codes of practices. The insulator shall conform in all respects to high standards of engineering, design, workmanship and **latest** revisions of relevant standards in vogue on the day of opening of the Technical Bid and purchaser shall have the power to reject any work or material which in his judgement is not in full accordance therewith.

18. DRAWINGS

All the bidders have to submit the drawings for Composite long rod (Silicon Rubber) insulator with the offer. In the event of an order the successful bidder shall submit the drawings stated above in triplicate for approval during the commencement period.

19. DEVIATIONS

Any deviation to this tender Specification will be out rightly rejected. All the Bidders have to submit this specification duly authenticated without any alterations, additions etc. on each page along with the Technical Bid. Any offer without this will be out rightly rejected.

20. MAINTENANCE:

The insulator shall be capable of high pressure washing at a maximum nozzle pressure of 550psi. The insulators offered shall be suitable for employing Hot Line Maintenance Techniques with required speed, ease and safety.

ANNEXURE-A

1. Tests on Complete composite Insulator with Hardware Fittings.

1.1 Salt - fog pollution withstand test

This test shall be carried out in accordance with IEC-60507. The salinity level for composite long rod insulators shall be 80 Kg / m3 NACL.

2. Composite Long rod Insulator Units

2.1 Brittle Fracture Resistance Test.

Assembled core load time test with container that contains in-HNO_3 concentric acid, this is applied at the naked rod. The rod should be held at 80% of SML for the duration of the test.

The rod should not fail within the 96 hour test duration.

2.2 Recovery of Hydrophobicity Test

(1) The surface of selected samples shall be cleaned with isopropyl alcohol. Allow the surface to dry and spray with water. Record the HC classification. Dry the sample surface.

(2) Treat the surface with corona discharges to destroy the hydrophobicity.

This can be done utilizing a high frequency corona tester. Holding the electrode approximately 3 mm from the sample surface slowly move the electrode over an area approximately 1'' x 1''. Continue treating this area for 2-3 minutes, operating the tester at maximum output.

(3) Immediately after the corona treatment, spray the surface with water and record the HC classification. The surface should be hydrophilic with an HC value of 6 to 7. If not, dry the surface and repeat the corona treatment for a longer time until an HC of 6 or 7 is obtained. Dry the sample surface.

(4) Allow the sample to recover and repeat the hydrophobicity measurement at several time intervals. Silicone rubber should recover to HC 1 – HC 2 within 24 to 48 hours, depending on the material and the intensity of the corona treatment.

3.0 Test on All components (As applicable).

3.1 Chemical Analysis of Zinc used for Galvanizing.

Samples taken from the zinc ingot shall be chemically analysed as per IS 209-1979. The purity of zinc shall not be less than 99.95%.

3.2 Tests for Forgings.

The chemical analysis hardness tests and magnetic particle inspection for forgings will be as per the internationally recognized procedures for these tests. The sampling will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the Supplier and Owner in Quality Assurance Programme.

3.3 Tests on Castings.

The chemical analysis, mechanical and metallographic tests and magnetic, particle inspection for castings will be as per the internationally recognised. Procedures for these tests.
The samplings will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the Supplier and Owner in Quality Assurance Programme.

4.0 Grading device test:

4.1 In addition to the electrical design tests, for 220 KV & above class insulator design with applicable grading device test, similar to the following described test:
Grading devices shall be tested using a mechanical shaker with at least a one inch stroke at the grading device and a frequency of no less than three cycles per second for duration of 2,000,000 cycles. Movement shall be along the long axis of the insulator. The grading device shall be attached to the shaker in a vertical position. The test shall be considered successful if no movement is detected in the ring with respect to the insulator and there is no physical damage to the grading device and the attachment assembly.
The manufacturer should provide with documentation that the insulator design with applicable grading devices will minimize or eliminate corona discharge activity under wet and dry conditions.

5.0 **Power Arc Test:**

5.1 One insulator having any one design of end fittings shall be tested for power arc endurance while tensioned horizontally at 3000lb. An arc shall be initiated across the insulator by means of a Copper shorting fuse wire.
The arc shall burn 15 to 30 cycles and its current magnitude is determined by ampere- time product (IxT) equal to a minimum of 150kA cycles. Each insulator is only acceptable if there is no exposure of the core, no mechanical separation of the insulator, and no cracks in the housing (As perIEC61467-1997)

GUARANTEED TECHNICAL PARTICULARS
FOR SILICON RUBBER HOUSED COMPOSITE INSULATORS (90KN /120KN)
(To be furnished by the bidder in the Bid Sheet.)

1. 132KV SILICON RUBBER HOUSED COMPOSITE INSULATORS :

A	**GENERAL**	**Unit**	**132KV 90KN Suspension**	**132KV 120KN Tension**
1	Nominal System Voltage Level	KV	132	132
2	Highest System Voltage Level	KV	145	145
3	Type (e.g. Ball & Socket)		B & S	B & S
4	Material of Disc		Silicon Rubber	Silicon Rubber
5	Colour		Grey	Grey
6	Surface		Smooth	Smooth
7	Type of Locking device and its material (Clip of SS/Phos.Bronze or better		"R" Clip of S.S	R" Clip of S.S
8	Size	mm	16	20
9	Ball/Socket diameter	mm	16	20
10	No. of units per single string		ONE	ONE

11	Length of insulator string (in mm)	mm	1123 ± 35	1268 ± 35
12	Total length with hardware (in mm)	mm	1305 ± 35	1450 ± 35
13	Guaranteed mechanical failing load	KN	90	120
B	**ELECTRICAL**			
1	Total Min. creep age distance (in mm)	mm	4500	5000
2	Power frequency withstand voltage - dry KV (peak)	**kVp**	310	310
3	Power frequency withstand voltage – wet KV(Peak)	**kVp**	275	275
4	Impulse withstand voltage (+/-)1.2x50 micro-second ,KV (peak	**kVp**	650	650
5	Visible discharge Voltage KV	**kV**	106	106
6	Total connection length	**mm**	1305 ± 35	1450 ± 35
7	Total minimum creepage distance	**mm**	4500	5000
8	Dry Arc Distance	**mm**	1123 ± 35	1268 ± 35
9	Standard Applicable		IEC 61109 & IEC: 60383	IEC 61109 & IEC: 60383
10	Core - ECR FRP rod		Boron free ECR	Boron free ECR
11	Housing - single mould		SINGLE MOULD	SINGLE MOULD
12	End fitting by acquistic method		Yes	Yes
13	Written verification of housing		Silicon Rubber	Silicon Rubber

1. 220KV SILICON RUBBER HOUSED COMPOSITE INSULATORS :

A	**GENERAL**	**Unit**	**220KV - 90KN Suspension**	**220KV - 160KN Tension**
1	Nominal System Voltage Level	KV	220	220
2	Highest System Voltage Level	KV	245	245
3	Type (e.g. Ball & Socket)		B & S	B & S
4	Material of Disc		Silicon Rubber	Silicon Rubber
5	Colour		Grey	Grey
6	Surface		Smooth	Smooth
7	Type of Locking device and its material (Clip of SS / Phos. Bronze or better		"R" Clip of S.S	R" Clip of S.S
8	Size	mm	16	20
9	Ball/Socket diameter	mm	16	20
10	No. of units per single string		ONE	ONE
11	Length of insulator string (in mm)	mm		
12	Total length with hardware (in mm)	mm	2030 ± 50	2550 ± 50
13	Guaranteed mechanical failing load	KN	90	160
B	**ELECTRICAL**			
1	Total Min. creep age distance (in mm)	mm	7595	7595
2	Power frequency withstand voltage - dry KV (peak)	kVp	500	500
3	Power frequency withstand voltage – wet KV(Peak)	kVp	460	460
4	Impulse withstand voltage (+/-)1.2x50 micro-second ,KV	kVp	1050	1050

	(peak			
5	Visible discharge Voltage KV	kV		
6	Total connection length	mm	2030 ± 50	2550 ± 50
7	Total minimum creepage distance	mm	7595	7595
8	Dry Arc Distance	mm	As per IEC	As per IEC
9	Standard Applicable		IEC 61109 & IEC: 60383	IEC 61109 & IEC: 60383
10	Core - ECR FRP rod		Boron free ECR	Boron free ECR
11	Housing - single mould		SINGLE MOULD	SINGLE MOULD
12	End fitting by acquistic method		Yes	Yes
13	Written verification of housing		Silicon Rubber	Silicon Rubber

TECHNICAL SPECIFICATION FOR POST INSULATORS

1.0 SCOPE

1.1 This specification provides for design, manufacture, engineering, inspection and testing before despatch packing and delivery FOR (destination) for Indian manufacturers of Post Insulators as per technical requirements furnished in this specification.

1.2 Following is the list of documents constituting this package.

(i) Technical specification.
(ii) Technical data sheet.
(iii) Drawings of Post Insulators

1.3 All the above volumes along with amendments there of shall be read and interpreted together. However, in case of a contradiction between the "Technical Specification" and any other volume, the provisions of this volume will prevail.

1.4 The insulators shall conform in all respects to high standards of engineering, design workmanship and latest revisions of relevant standards at the time of offer and purchaser shall have the power to reject any work or material which in his judgment, is not in full accordance therewith.

2.0 STANDARDS

a. Except as modified in this specification, the disc insulators shall conform to the following Indian Standards, which shall mean latest revisions and amendments. Equivalent International and Internally recognized standards to which some of these standards generally correspond are also listed below.

Sl. No.	Indian Standard	Title.	International Standard.
1.	IS: 206	Method for Chemical Analysis of Slab Zinc.	
2.	IS: 209	Specification for Zinc.	BS: 3436
3.	IS: 731	Porcelain insulators for overhead power lines with a normal voltage greater than 1000V	BS: 137(I&II); IEC 274 IEC 383
4.	IS: 2071 Part-(I) Part-(II) Part-(III)	Method of High Voltage Testing.	
5.	IS: 2121 (Part-I)	Specification of Conductors and Earth wire Accessories for Overhead Power lines. Armour Rods, Binding wires and tapes for conductor.	
6.	IS: 2486	Specification for Insulator fittings for overhead power lines with a nominal voltage greater than 1000V.	
	Part – I	General Requirement and Tests.	BS: 3288
	Part – II	Dimensional Requirements.	IEC: 120
	Part – III	Locking devices.	IEC: 372

7.	IS: 2544	Post Insulator	IEC: 168 & IEC: 815
8.	IS: 2629	Recommended practice for Hot Dip Galvanization for iron and steel.	
9.	IS: 2633	Testing for Uniformity of Coating of Zinc coated articles.	
10.	IS: 3138	Hexagonal Bolts & Nuts.	ISO/R 947 & ISO/R 272
11.	IS: 3188	Dimensions for Disc Insulators.	IEC: 305
12.	IS: 4218	Metric Screw Threads	ISO/R 68-1969 R 26-1963, R 262-1969 & R965-1969
13.	IS: 6745	Determination of weight of zinc coating on zinc coated iron and steel articles.	
14.	IS: 8263	Methods of RIV Test of HV insulators.	IEC 437 NEMA Publication No.107/1964 CISPR
15.	IS: 8269	Methods for switching impulse test on HV insulators.	IEC: 506
16.	IEC: 168	Post Insulators	IEC: 168
17.	IEC: 433	Long Rod Insulators	IEC: 433
18.	IEC: 575	Thermal mechanical performance test and mechanical performance test on string insulator units.	IEC: 575
19.	IEC: 815	Post Insulators	IEC: 815

b. The standards mentioned above are available from:

Reference.	Abbreviation.	Name & Address:
BS		British Standards, British Standards Institution, 101, Penton vile Road, N-19 ND,U
IEC / CISPR		International Electro technical commission Electro Technique International. 1, Rue de verembe Geneva SWITZERLAND.
IS		Bureau of Indian Standards, Manak Bhavan, 9 Bahadurshah Zafar Marg, New Delhi-110001, ORISSA
ISO		International Organization for Standardization. Danish Board of Standardization Dansk Standardizing Sraat Aurehoegvej-12 DK-2900 Helleprup DENMARK.
NEMA		National Electric Manufacturers Association 1`55, East 44th. Street New York, NY 10017 USA

3.0 POST INSULATORS

Post insulator shall conform in general to IS 2544, IEC 168 and IEC 815.

3.1 CONSTRUCTIONAL FEATURES

Post type insulators shall consist of a porcelain part permanently secured in a metal base to be mounted on the supporting structures. They shall be capable of being mounted upright and be designed to with stand any shocks to which they may bed subjected to by the operation of the associated equipment. Only solid core insulators will be acceptable.

Porcelain used shall be homogeneous, free from lamination, cavities and other flaws or imperfections that might after the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture.

Glazing of the porcelain shall be of uniform brown in colour, free from blisters, burrs and other similar defects.

The insulator shall have alternate long and short sheds with aerodynamic profile. The shed profile shall also meet the requirements of IEC 815 for the specified pollution level.

When operated at normal rated voltage there shall be no electric discharge between conductor and insulators which would cause corrosion or injury to conductors or insulators by the formation of substance produced by chemical action.

The design of the insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

All ferrous parts shall be hot dip galvanized in accordance with the latest edition of IS 2633, and IS 4579. The zinc used for galvanizing shall be grade Zn 99.95 as per IS 209. The zinc coating shall be uniform, adherent, smooth, reasonably bright, continuous and free from imperfections such as flux ash, rust stains, bulky while deposits and blisters. The metal parts shall not produce any noise generating corona under the operating conditions. Flat washer shall be circular of a diameter 2.5 times that of bolt and of suitable thickness. Where bolt heads/nuts bear upon the beveled surfaces they shall be provided with square tapered washers of suitable thickness to afford a seating square with the axis of the bolt.

Bidder shall make available data on all the essential features of design including the method of assembly of shells and metals parts, number of shells per insulator, the manner in which mechanical stresses are transmitted through shells to adjacent parts, provision for meeting expansion stresses, results of corona and thermal shock tests, recommended working strength and any special design or arrangement employed to increase life under service conditions

3.2 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

The equipment shall be able to withstand forces due to wind load on the equipment and approach conductor and due to short circuit, all forces considered together.

The Contractor shall submit detailed calculations proving the satisfactory performance of the equipment under short circuit conditions to meet the layout requirements.

3.3 TECHNICAL PARAMETERS

Sl No.	Parameter	400kV	245kV	132kV	33kV
1.	Type	Confirming to IEC 273 (solid core)			
2.	Voltage class (kV)	420	245	145	36
3.	Dry and wet one minute withstand voltage (kVrms)	630	460	235	70
4.	Dry lightning impulse withstand voltage (kVp)	□ 1550	□ 1050	□ 650	□ 250
5.	Wet switching surge withstand voltage (kVp)	□ 1175	NA	NA	NA
6.	Max. RIV at corona extinction voltage (microvolts)	500	500	500	NA
7.	Corona extinction voltage (kVrms)	320 (min)	156 (min)	105	

8.	Total minimum cantilever strength (kgf)	not□ 800	not□ 800	not□ 600	not□ 600
9.	Minimum torsional moment	As per IEC 273			
10.	Total height of insulator (mm)	3650	2300	1100	325
11.	PCD (mm) top/bottom	127/300	127/254	127/254	76/76
12.	No. of bolts top/bottom	4/8	4/8	4/8	4/8
13.	Diameter of bolt holes (mm) top/bottom	M16/18	M16/18	M16/18	M16/18
14.	Pollution level as per IEC 815	Heavy	Heavy	Heavy	Heavy
15.	Minimum total creepage distance (mm)	10500	6125	3625	900

If corona extinction voltage is to be achieved with the help of corona ring or any other similar device, the same shall be deemed to be included in the scope of the Supplier.

SPECIFICATION & DRAWINGS

The specifications in respect of the Post Insulators are described. This specification is for information and guidance of the bidder only. The drawings to be furnished by the supplier shall be as per his own design and manufacture and shall be in line with the specification.

5.0 GENERAL TECHNICAL REQUIREMENTS

5.1 PORCELAIN

The porcelain used in the manufacture of the shell shall be ivory white, nonporous of high dielectric, mechanical and thermal strength free from internal stress blisters and thermal strength from internal stresses blisters, laminations, voids, foreign matter. Imperfections or other defects, which might render it in any way unsuitable for insulator shells. Porcelain shall remain unaffected by climatic conditions, ozone, acid alkalis, and zinc of dust. The manufacturing shall be by the wet process and impervious character obtained by through verification.

5.2 PORCELAIN GLAZE

Surfaces to come in contact with cement shall be made rough by stand glazing. All other exposed surfaces shall be glazed with ceramic materials having the same temperature coefficient of expansion as that of the insulator shell. The thickness of the glaze shall be uniform throughout and the colour of the glaze shall be brown. The glaze shall have a visible luster and smooth on surface and be capable of satisfactory performance under extreme tropical climatic weather conditions and prevent ageing of the porcelain. The glaze shall remain under compression on the porcelain body throughout the working temperature range.

5.3 METAL PARTS

5.3.1 Cap and Ball pins

Twin Ball pins shall be made with drop forged steel and caps with malleable cast iron. They shall be in one single piece and duly hot dip g galvanized. They shall not contain parts or pieces joined together, welded, shrink fitted or by any other process from more than one piece of material. The pins shall be of high tensile steel, drop forged and heat malleable cast iron and annealed. Galvanizing shall be by the hot dip process with a heavy coating of zinc of very high purity with minimum of 6 dips. The bidder shall specify the grade, composition and mechanical properties of steel used for caps and pins.

5.4 FILLER MATERIAL

Cement to be used as a filler material shall be quick setting, for curing Portland cement. It shall not cause fracture by expansion or loosening by contraction. Cement shall not react chemically with metal parts in contract with it and its thickness shall be as small and as uniform as possible.

6.0 MATERIAL DESIGN AND WORKMANSHIP

6.1 GENERAL

i) All raw materials to be used in the manufacture of these insulators shall be subject to strict raw materials quality control and to stage testing quality control during manufacturing stage to ensure the quality of the final end product. Manufacturing shall conform to the best engineering practices adopted in the field of extra high voltage transmission. Bidders shall therefore offer insulators as are guaranteed by them for satisfactory performance on Transmission lines.

ii) The design, manufacturing process and material control at various stages be such as to give maximum working load, highest mobility, best resistance to corrosion good finish, elimination of sharp edges and corners to limit corona and radio interference voltage

6.2 INSULATOR SHELL

The design of the insulator shell shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration. Shells with cracks shall be eliminated by temperature cycle test followed by temperature cycle test followed by mallet test. Shells shall be dried under controlled conditions of humidity and temperature.

6.3 METAL PARTS

a) The twin ball pin and cap shall be designed to transmit the mechanical stresses to the shell by compression and develop uniform mechanical strength in the insulator. The cap shall be circular with the inner and outer surfaces concentric and of such design that it will not yield or distort under loaded conditions. The head portion of the insulator or is under tension the stresses are uniformly distributed over the pinhole portion of the shell. The pinball shall move freely in the cap socket either during assembly of a string or during erection of a string or when a string is placed in position.

b) Metal caps shall be free from cracks, seams, shrinks, air holes, blowholes and rough edges. All metal surfaces shall be perfectly smooth with no projecting parts or irregularities which may cause corona. All load bearing surfaces shall be smooth and uniform so as to distribute the loading stresses uniformly. Pins shall not show any macroscopically visible cracks, insulations and voids.

6.4 GALVANIZING

All ferrous parts shall be hot dip galvanized six times in accordance with IS: 2629. The zinc to be used for galvanizing shall conform to grade Zn 99.5 as per IS: 209. The zinc coating shall be uniform, smoothly adherent, reasonably light, continuous and free from impurities such as flux ash, rust stains, bulky white deposits and blisters. Before ball fittings are galvanized, all die flashing on the shank and on the bearing surface of the ball shall be carefully removed without reducing the designed dimensional requirements.

6.5 CEMENTING

The insulator design shall be such that the insulating medium shall not directly engage with hard metal. The surfaces of porcelain and coated with resilient paint to offset the effect of difference in thermal expansions of these materials.

6.6 DIMENSIONAL TOLERANCE OF POST INSULATORS

It shall be ensured that the dimensions of the Post Insulators are within the limits as per relevant IEC/ISS.

7 TESTS

The following tests shall be carried out on the Post Insulators.

7.1 TYPE TEST

This shall mean those tests, which are to be carried out to prove the design, process of manufacture and general conformity of the material and product with the intents of this specification. These tests shall be conducted on a representative number of samples prior to commencement of commercial production. The Bidder shall indicate his schedule for carrying out these tests.

7.2 ACCEPTANCE

This shall mean these tests, which are to be carried out on samples taken from each lot offered for pre-despatch inspection for the purpose of acceptance of the lot.

7.3 ROUTINE TESTS

This shall mean those tests, which are to be carried out on each insulator to check the requirements, which are likely to vary during production.

7.4 TESTS DURING MANUFACTURE

Stage tests during manufacture shall mean those tests, which are to be carried out during the process of manufacture to ensure quality control such that the end product is of the designed quality conforming to the intent of this specification.

7.5 TEST VALUE

For all type and acceptance tests the acceptance values shall be the value guaranteed by the bidder in the guaranteed technical particulars of the acceptance value specified in this specification of the relevant standard whichever is more stringent for that particular test.

7.6 TEST PROCEDURE AND SAMPLING NORMS

The norms and procedure of sampling for the above tests shall be as per the relevant Indian Standard or the Internationally accepted standards. This will be discussed and mutually agreed to between the supplier and purchaser before placement of order. The standards and normal according to which these tests are to be carried out are listed against each test. Where a particular test is a specific requirement of this specification, the norms land procedure for the same shall be as specified in Annexure-IV attached hereto as mutually agreed to between the supplier and the purchaser in the quality assurance programme.

7.7 TYPE TESTS

The following type test shall be conducted on a suitable number of individual unit components or materials

a)	Verification of dimensions.	: IS: 731
b)	Thermal mechanical performance test:	: IEC:575
c)	Power frequency voltage withstand and flashover (I) dry (ii) wet.	: BS: 173
d)	Impulse voltage withstand flashover test (dry)	: IEC: 383
e)	Visible discharge test (dry)	: IS:731
f)	RIV test (dry)	: IS:8263

7.8 ACCEPTANCE TESTS

a) Visual examination	: IS:731
b) Verification of dimensions.	: IS:731
c) Temperature cycle test.	: IS:731
d) Galvanizing test.	: IS:731
e) Mechanical performance test.	: IEC:575
f) Test on locking device for ball and socket coupling.	: IEC:372
g) Eccentricity test.	: As per this specification.
h) Electro-mechanical strength test.	
i) Puncture test.	: IS:731
j) Porosity test.	: IS:731

7.9 ROUTINE TESTS

a) Visual inspection.	: IS:731
b) Mechanical routine test.	:
c) Electrical routine test.	: IEC:383

7.10 TEST DURING MANUFACTURE

a) Chemical analysis of zinc used for galvanizing.	:
b) Chemical analysis, mechanical and metallographic test and magnetic particle inspection for malleable castings.	:
c) Chemical analysis, hardness test and magnetic particle inspection for forgings.	: As per this specification.

d) Hydraulic Internal Pressure tests on shell. :

e) Crack detection test for metal parts. :

7.11 ADDITIONAL TEST

The purchaser reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/ laboratory or at any other recognized laboratory/ research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the purchaser to satisfy that the material complies with the intent of this specification.

7.12 CO-ORDINATION FOR TESTING

For insulator strings, the supplier shall arrange to conduct testing of their Post Insulators to be supplied to the purchaser by other suppliers. The supplier is also required to guarantee overall satisfactory performance of the Post Insulators with the hardware fittings.

NOTE:-In respect of electrical tests on a complete unit consisting of insulators and hardware guarantee of values of responsibility of testing shall be with hardware manufacturer of RIV corona and voltage distribution test and with insulator manufacturer for all other tests.

7.13 TEST CHARGES AND TEST SCHEDULE

7.13.1 Type test

The insulator offered shall be fully type tested as per this specification. In case the equipment of the type and design offered, has already been type tested in an independent test laboratory. The bidder shall furnish four sets of type test reports alongwith the offer. These tests must not have been conducted earlier than five years. The purchaser reserves the right to demand repetition of some or all type tests in the presence of purchasers' carrying representative. For this purpose the bidder may quote unit rates for carrying out each type test. These prices shall be taken into consideration for bid evaluation. For any change in the design/type already type tested and the design/type offered against this specification, purchaser reserves the right to demand repetition of tests without any extra cost.

7.13.2 Acceptance and Routine test

i)All acceptance and routine tests as stipulated herein shall be carried out by the supplier in the presence of purchaser's representative.

ii) Immediately after finalisation of the programme of type/ acceptance/ routine testing, the supplier shall give sufficient advance intimation to the purchaser to enable him to depute his representative for witnessing the tests.

iii)For type tests involving tests on a complete Post Insulator unit, the purchaser will advise the supplier to provide the necessary materials to the place of the test.

iv)In case of failure of the complete string in any type tests, the supplier whose product has failed in the tests, shall get the tests repeated at his cost. In case of any dispute, assessment of the purchaser as to the items that has caused the failure in any of the type tests shall be final and binding.

8.0 TEST DETAILS

8.1 VOLTAGE DISTRIBUTION TEST

The voltage across each insulator unit shall be measured by sphere gap method. The result obtained shall be converted into percentage and proportionate correction be applied as to give a total of 100% distribution. The voltage across any disc not exceed the values given in clause 4-12.1

8.2 CORONA EXTINCTION VOLTAGE TEST (DRY)

The sample assembly when subjected to power frequency voltage shall have a corona extinction voltage of not less than the value specified at clause 3.3(7) under dry condition. There shall be no evidence of corona on any part of the sample when all possible sources of corona are photographed in a darkened room. For 400kV Solid Core Post Insulators, if corona extinction voltage is to be achieved with the help of corona ring or any other similar device, the same shall be deemed to be included in the scope of the bidder without any price implication.

8.3 RIV TEST (DRY)

Under the conditions as specified in (2) above, the insulator string along with complete hardware fittings shall have a radio interference voltage level below 500 micro volts at one MHz when subjected to 50 Hz AC voltage of 1.1 times maximum time to ground voltage under dry condition. The test procedure shall be in accordance with IS: 8263.

8.4 The complete insulator unit shall be subject to a load equal to 50% of the specified minimum ultimate tensile strength (UTS) which shall be increased already rate to 68% of the minimum UTS specified. The load shall be held for five minutes and then removed. After removal of the load, the string components shall not show any visual deformation and it shall be possible to disassemble them by hand,. Hand tools may be used to remove cotter pins and loosen the nuts initially. The string shall then be reassembled and loaded to 50% of UTS and the load shall be further increased at a steady rate till the specified minimum UTS and held for one minute. No fracture should occur during this period. The applied load shall then be increased until the failing loads reached and the value recorded.

8.5 VIBRATION TEST

The suspension string shall be tested in suspension mode, and tension string in tension mode itself in laboratory span of minimum 30 meters. In the case of suspensions string a load equal to 600 Kg. shall be applied along with the axis of the suspensions string by means of turn buckle. The insulators string along with hardware fittings and two sub conductors throughout the duration of the test vibration dampers shall not be used on the test span. Both the sub-conductors shall be vertically vibrated simultaneously at one of the resonance frequencies of the insulator string (more than 10Hz) by means of vibration inducing equipment. The amplitude of vibration at the antipode point nearest to the string shall be measured and the same shall not be less than 120.4 being the frequency of vibration. The insulator strings shall be vibrated for five million cycles then rotated by 90 deg. and again vibrated for 5 million cycles without any failure, after the test, the disc insulators shall be examined for looseness of pins and cap or any crack in the cement. The hardware fittings shall be examined to fatigue fatter and mechanical strength test. There shall be no deterioration of properties of hardware components and disc insulators after the vibration test. The disc insulators shall be subjected to the following tests as per relevant standards.

Test.		Percentage of disc To be tested.
a)	Temperature cycle test followed by	60
	Mechanical performance test.	40
b)	Puncture test (for porcelain insulator only)	

8.6 CHEMICAL ANALYSIS OF ZINC USED FOR GALVANIZING

Samples taken from the zinc ingot shall be chemically analyzed as per IS: 209. The purity of zinc shall not be less than 99.95%.

8.7 TEST FOR FORGINGS

The chemical analysis hardness tests and magnetic particle inspection for forgings will be as per the internationally recognized procedures for these tests. The sampling will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the supplier and purchaser in quality assurance programme.

8.8 TEST ON CASTING

The chemical analysis mechanical and metallographic tests and magnetic particle inspection for castings will be as per the internationally recognized procedures for these tests. The samplings will be based on heat number and heat treatment batch. The details regarding test will be as discussed and mutually agreed to by the supplier and purchaser in quality assurance programme.

8.9 HYDRAULIC INTERNAL PRESSURE TEST ON SHELLS

The test shall be earned out on 100% shells before assembly. The details regarding test will be as discussed and mutually agreed to by the suppliers and purchaser in Quality Assurance Programme.

8.10 THERMAL MECHANICAL PERFORMANCE TEST

The thermal mechanical performance test shall be carried out on minimum 15 number of disc insulators units as per the procedure given in IEC 575. The performance of the insulator unit shall be determined by the same standard.

8.11 ECCENTRICITY TEST

The insulator shall be vertically mounted on a future using dummy pin and socket. A vertical scale with horizontal slider shall be used for the axial run out. The pointer shall be positioned in contact with the bottom of the outermost petticoat of the disc. The disc insulators shall be rotated with reference to the fixture and the slider shall be allowed to move up and down on the scale but always maintaining contact with the bottom of the outer most petticoats. After one full rotation of the disc the maximum and minimum position the slider has reached on the scale can be found out. Difference between the above two readings shall satisfy the guaranteed value for axial run out.

Similarly using a horizontal scale with veridical slider the radial run out shall be measured. The slider shall be positioned on the scale to establish contact with the circumstance of the disc insulator and disc insulator rotated on its future always maintaining the contact. After one full rotation of the disc the maximum and minimum position the slider has reached on the scale can be found out. Difference between the above two readings shall satisfy the guaranteed value for axial run out.

8.12 CRACK DETECTION TEST

Crack detection test shall be carried out on each ball and pin before assembly of disc unit. The supplier shall maintain complete record of having conducted such tests on each and every piece of ball pin. The bidder shall furnish full details of the equipment available with him for crack test and also indicate the test procedure in detail.

9.0 INSPECTION:

i)Purchaser and its representative shall at all times be entitled to have access to the works and to all places of manufacturer where insulators are manufactured and the supplier shall afford all facilities to them for unrestricted inspection of the works, inspection of materials, inspection of manufacturing process of insulators and for conducting necessary tests as specified herein.

ii) The supplier shall keep the purchaser informed in advance of the time of starting and of progress of manufacture of insulators in its various stages so that arrangements could be made for inspection.

iii) No material shall be dispatched from its point of manufacture unless the materials has been satisfactorily inspected and tested.

iv) The acceptance of any quantity of Post Insulators shall in no way relieve the supplier of his responsibility for meeting all the requirement of this specification and shall not prevent subsequent rejection, if such insulators are later found to be defective.

10.0 IDENTIFICATION MARKING

i)Each unit of insulator shall be legibly and indelibly marked with the trade mark of the supplier, the year of manufacture, the guaranteed combined mechanical and electrical strength in kilo-newtons abbreviated by 'KN' to facilitate easy identification and proper use.

ii)The marking shall be on porcelain for porcelain Post Insulators. The marking shall be printed and not impressed and the same shall be applied before firing.

11.0 QUALITY ASSURANCE PLAN

11.1 The bidder hereunder shall invariably furnish following information along with his offer, failing which the offer shall be liable for rejection.

i) Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw material are tested, list of tests normally carried out on raw materials in presence of bidder's representative, copies of test certificates.

ii) Information and copies of test certificates as in (i) above in respect of bought out materials.

iii) List of manufacturing facilities available.

iv) Level of automation achieved and lists of area where manual processing exists.

v) List of areas in manufacturing process, where stage inspections are normally carried out in quality control and details of such tests and inspection.

vi) Special features provided in the equipment to make it maintenance free.

iv) List of testing equipping 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 specified test requirements.