



**ORISSA POWER TRANSMISSION CORPORATION
LTD
OFFICE OF THE SR. GENERAL
MANAGER,
CENTRAL PROCUREMENT CELL,
JANPATH, BHUBANESWAR - 751022**

TENDER SPECIFICATION NO. SR.G.M.-CPC -TENDER- 07 /10-11

FOR

**PROCUREMENT OF LONG ROD AND SILICON
COMPOSITE INSULATORS**

DATE OF OPENING OF TENDER PAPER:- 26.06.2010

COST OF TENDER PAPER- Rs 10000.00 + Rs 400.00 VAT



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

TENDER NOTICE NO. 07 /10-11

For and on behalf of ORISSA POWER TRANSMISSION CORPORATION LTD., Sr. G.M. [C.P.C.] invites Tenders from reputed manufacturers for supply of **Long Rod (Lot-1) & Siliccon Insulators (Lot-II)** Tender papers shall be sold from 26.05.2010 to 25.06.2010 . Interested manufacturers may visit OPTCL's official web site <http://www.OPTCL.Co.in> for detail specification.

SR. GENERAL MANAGER [C.P.C.]



NOTICE INVITING TENDER
ORISSA POWER TRANSMISSION CORPORATION LTD.,
REGD. OFFICE: JANPATH, BHUBANESWAR – 751 022,
ORISSA, INDIA.
TENDER NOTICE NO- 07 /10-11

For and on behalf of the ORISSA POWER TRANSMISSION CORPORATION LTD., the undersigned invites bids under two-part bidding system in double-sealed cover, duly super scribed with tender specification number and date of opening, from manufacturers for supply of the following equipments/materials, as required under the following specifications.

<i>Sl. No</i>	<i>Tender Specification No.</i>	<i>Description of equipments/materials.</i>	<i>Quantity</i>	<i>Earnest Money Deposit (In Rs.)</i>	<i>Cost of Tender Spec. document (in Rs.)</i>	<i>Last date of receipt & opening of tender</i>
1	Sr.GM-CPC-Tender-Ins.-07/10-11	LOT-I Solid Core Long Rod Insulators	100	.58600.00	10,000/- + 400/- (VAT)	26.06.2010 up to 1.00P.M & 26.06.2010 at 3.30 P.M.
		a) 90 KN for 220 KV b) 120KN for 132KV c) 160KN for 220 KV	400 200			
		LOT-II Silicon Composite Long Rod Insulators	100	58600.00		
		a) 90 KN for 220 KV. b) 120KN for 132 KV c) 160KN for 220 KV	400 200			

The tender specification documents can be had from the office of the undersigned on payment of non-refundable cost of tender specification documents in the shape of cash from 10 A.M. to 1 P.M. during **26.05.10 to 25.06.10** (both days inclusive) any working day either in person or by remitting demand draft payable to Drawing & Disbursing Officer, ORISSA POWER TRANSMISSION CORPORATION LTD., Regd. Office: Janpath, Bhubaneswar-751 022. No tender documents will be sold on any other day except as indicated.

The specification can also be down loaded from OPTCL'S official web site and the same may be submitted along with the cost of tender document by way of demand draft/pay order payable to D.D.O., OPTCL Ltd. Janapath, Bhubaneswar at the time of submission of tender document. In case, any deviation is found in the tender document, submitted by the tenderer from the content mentioned in our web site and/or non-submission of the cost of tender

documents, the tender shall be liable to be rejected at any stage of the contract. The tenderer has to indemnify OPTCL for any loss accruing due to such alteration in the terms and conditions of the tender document &/or for such alternation, resulting, in the cancellation of the contract.

The intending bidders, who want to get a copy of the tender specification document by post, are required to deposit an additional amount of Rs.100/- (Rupees one hundred) only over and above the cost of the tender specification, mentioned against each Tender Specification under heading "Cost of tender specification". Complete bids for different items will be received up to 1.00 P.M. only and the same will be opened at 03.30 P.M. on the date mentioned in the notice inviting tender. Date and time of opening of price bids shall be intimated to the techno-commercially responsive bidders only. In the event of any specified date for the sale, submission or opening of bids being declared a holiday for purchaser, the bids will be sold/ received/ opened up to the appointed times on the next working day. Only one representative of each bidder will be allowed to participate in the bid opening with valid identification certificate. OPTCL also reserves the right to accept or reject any or all tenders without assigning any reason thereof, if the situation so warrants. OPTCL shall not be responsible for any postal delay or loss at any stage.

Minimum qualification criteria of bidders: 1) The bidder should be a manufacturer and should have earlier supplied at least equal quantities tendered for, during the last one year.

AS STIPULATED IN SECTION-II, PART-I (G.T.C.C) OF THE TENDER SPECIFICATION.

**SR. GENERAL MANAGER
CENTRAL PROCUREMENT CELL**

FAX NO.: 0674 – 2542964

TELEPHONE NO.: 0674 – 2541801

**ORISSA POWER TRANSMISSION CORPORATION LTD.
OFFICE OF THE SR. GENERAL MANAGER
CENTRAL PROCUREMENT CELL**

JANAPATH, BHUBANESWAR – 751022

TENDER SPECIFICATION NO.SR.G.M.-CPC - /10-11

CONTAINING

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- SECTION – I : INSTRUCTION TO TENDERERS**
- SECTION – II : GENERAL TERMS AND CONDITIONS OF CONTRACT (G.T.C.C.) (COMMERCIAL)**
- SECTION – III : LIST OF ANNEXURES (COMMERCIAL)**
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SECTION-I
INSTRUCTIONS TO TENDERER

1. **Submission of Bids: -**

Sealed tenders in triplicate on two part bid basis, each complete in all respects, in the manner hereinafter specified are to be submitted in the office of Sr.General Manager [Central Procurement cell], OPTCL, Bhubaneswar on or before the date and time specified against the relevant tender Specification in the notice inviting the tenders. Each copy of the bids [Original, duplicate and triplicate] shall be in separate double sealed envelopes, superscribed on each of the covers, the relevant tender specification number and the due date of opening of the bids on the top right hand side of the envelopes. On the top left sides, original/duplicate/triplicate as is relevant, shall be written. The participants to the tender should be registered under Orissa Sales Tax, 1947 as stipulated in Industrial policy-2001 of Government of Orissa.

2. Division of Specification.

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

Part-I 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

- [i] Abstract of price components as per Annexure-IV
- [ii] 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 each in separate double sealed covers. Part-I shall be superscribed as “E.M.D”., technical and commercial and Part-II shall be superscribed as “Price Bid”

4. **Opening of Bids.**

- [a] **The part-I shall be opened in the Office of the Senior General Manager [Central Procurement Cell] in presence of such of the Tenderers or their authorized representatives [limited to one person only] on the due date of opening of tender. 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, is 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 Senior 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. The Senior General manager [C.P.C.] or his authorized representatives will, on opening each bid, read aloud the name of the bidder. He shall also read aloud the attested and unattested corrections and shall record the number of such corrections on each page of the Techno-Commercial Bid over his dated initials and also initial all such corrections.

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. Further, the tender specification can also be downloaded from OPTCL's website and the cost of tender specification, in such a case, shall have to be remitted alongwith the submission of tender papers. Tenders submitted by others will be rejected. Also tender specification downloaded from OPTCL website may not be taken as 100% correct due to website technical difficulties. So it is advisable to purchase hard copies from the office of the Sr. General Manager (C.P.C.), OPTCL Bhubaneswar.

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 person or by Registered Post with AD. Any other means of delivery shall not be accepted. When delivered in person, the tenders shall be received by a responsible officer of the office of the Senior General Manager [C.PC.], OPTCL who shall officially acknowledge the receipt of the same. Tenders received after due date and time shall be returned un-opened.

[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-VI** will be rejected outright and their Part-II envelope will be returned to them, unopened.

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.

- (d) National saving certificate, duly pledged in favour of Senior General Manager [Central Procurement Cell] OPTCL {H.Qrs.Office}, Bhubaneswar-751 022.

NOTE:

- (i) The validity of the EMD in the form of Bank Guarantee shall be atleast 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 upto 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 ORISSA 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-19of Section-II. Suits, if any, arising out of this clause shall be filed in a Court of law to which the jurisdiction of High Court of Orissa 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: -**

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] If required, the tenderers may be asked to extend the validity period of bids under the same terms and conditions as per the original tender except for the change in delivery period. In such an event, the Tenderers are free to change any or all conditions of their bids including price at their own risk.

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 Senior 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:

Part-I of 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 alongwith 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/equipments 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. The permanent account number [PAN] of the firm is required under Income tax Act.
- [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.

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

- (a) Part – II of the tender shall consist of the following
 - (i) Abstract of Price Component, as per Annexure-IV
 - (ii) Schedule of prices in the prescribed proforma as per Annexure-V

18. Conditional Offer

Conditional offer shall not be accepted.

19. General: -

- (i) Over writing shall be avoided.

- (ii) Erasures and other changes shall bear the dated initial of the person signing the tender.
- (iii) 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.
- (iv) For evaluation, the price mentioned in words shall be taken if there is any difference in figures and words in the price bid.
- (v) Notice inviting tender shall form part of this specification.
- (vi) The price bids of the technically and otherwise acceptable bids shall only be evaluated. The price bids of others along with EMD, if any, shall be returned to the bidders un-opened.
- (vii) Tenderer can offer any lot or all the lots of the tender, if there are any lots. But the tender (bid) must be furnished separately for each lot. For each lot, the tenderer has to submit PART-I & PART-II of the bids separately.
- (viii) The person signing the tender should sign on each page of the Tender paper in acknowledgement of having gone through the entire Tender Specification and in agreement thereof. Tender papers, not signed on each page with official seal by the bidder(s), shall not be considered.
- (ix) ***It should be distinctly understood that the part-II of the 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.***

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 equipments 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 Senior General Manager[Central Procurement Cell] for and on behalf of ORISSA 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 “FOR Destination costs” shall mean the cost of equipment and material at the consignee’s store/site. The cost is inclusive of Excise duty, Sales tax and other local taxes, packing, forwarding and insurance and freight charges.
- 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 Orissa General Clauses Act.

3. Manner of execution:

All equipments 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 equipments/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 alongwith the offer for inspection. A packing list alongwith 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 carryout 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 alongwith 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 atleast 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.

5. **Training facilities.**

6. **Rejection of Materials**

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 In the event any of the equipments/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 equipments/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/ Composite Bank guarantee.
- [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/equipments offered as per technical specification executed during the last two years alongwith 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, notwithstanding 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 Annexure-III (Quantity & Delivery Schedule) of Section-IV (Technical Specification). .

14. **Despatch instructions.**

- I] The equipments/ 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 :-

[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 atleast 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 which ever 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 Orissa.

A Composite Bank Guarantee as per the Proforma enclosed at Annexure-VII of the specification for 10% [ten percent] of the total FORD cost of the purchase order, shall be furnished from any nationalized/scheduled bank having a place of business at Bhubaneswar, to the office of Sr.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.

(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% value of each consignment with 100% Excise duty, Entry Tax, if any, and sales tax in full as applicable along with freight & Insurance charges will be paid on receipt of materials in good condition at stores/desired site and verification thereof, subject to furnishing and approval of Composite Bank Guarantee at the rate of 10% (Ten percent) of the cost of supplied materials, as stipulated under clause-19 of this specification & on prior approval of guarantee certificate & Test certificate by the Purchaser.

(ii) **Payment of Freight & Insurance charges and Entry Tax.**

Freight & Insurance Charges & Entry Tax, incorporated in the Purchase contract shall be paid after receipt of materials at stores/desired site in good condition and on production of authenticated documentary evidence, otherwise no Freight, Insurance charges & entry taxes shall be payable.

[B] The supplier shall furnish Composite Bank Guarantee of appropriate amount to OPTCL covering 10% of F.O.R. Destination cost of the purchase order well in advance (within 15 days from the date of issue of the purchase order) before despatch of materials.

22. Penalty for Delay in Completion of Contract

I) If the Supplier fails to deliver the materials/equipments within the delivery schedule, specified in the contract including delivery time extension, if any, granted thereto, the Purchaser shall recover from the Supplier, penalty for a sum of half percent (0.5 percent) of the Ex-works price of the un-delivered equipment 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 penalty shall not exceed five percent (5%) of the ex-works price of the unit or units so delayed. Equipment will be deemed to have been delivered only when all its components and accessories as per technical Specification are also delivered. If

certain components & accessories are not delivered in time, the equipment will be considered delayed until such time as the missing parts are delivered.

- II) If the Supplier fails to rectify /replace the equipment/material within 30 days from the date of intimation of the defect, so noticed by the purchaser within the guarantee period then the penalty for sum of one half of the one percent (0.5%) of the total Purchase order amount for each calendar week of delay shall be recovered by the purchaser within the guarantee period. For this purpose, penalty date will start from the 30th. day from the date of issue of letter on defectiveness of equipment/material, so supplied, by the purchaser. The total amount of penalty in this case shall not exceed 10% (TEN PERCENT) of the purchase order amount.The purchase order amount shall mean ex-works price + freight & insurance and all taxes & duties.If the defects so intimated will not be rectified by the supplier within the guarantee period, then whole of the 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 and Balance sheet and profit & Loss Account:

- i. Sales Tax clearance certificate for the previous year shall be enclosed with the tender.
- ii. Audited Balance Sheet and Profit & Loss Account of the bidder for the previous three years shall be enclosed to assess the financial soundness of the bidder(s).

26. Certificate of Exemption from Excise Duty/Sales tax.

Offers with exemption from Excise duty including sales tax shall be accompanied with authenticated proof of such exemption. Authenticated proof for this clause shall mean attested Photostat copy of exemption certificate. Any claim towards Excise duty/ Sales Tax shall be paid on actual basis subject to production of authenticated documentary evidence.

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 alongwith 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 bids will be on the basis of the FOR DESTINATION PRICE (By Road Transport) including Excise Duty, sales Tax & other levies as may be applicable. The FORD PRICE shall consist of the following components

- a) Ex-works price.
- b) Packing & Forwarding charges.
- c) Freight
- d) Insurance.

- e) Excise Duty.
- f) Sales Tax.
- g) Other levies.
- h) Mandatory spares, if any for maintenance of equipment. (At the discretion of the purchaser)
- i) Test charges, if any. .
- j) Supervision of erection, testing and commissioning charges, if any.
- k) Any other items, as deemed proper for evaluation by the purchaser.
- l) Loading factors will be taken in to account during evaluation if the prices of some of the items, not quoted.

(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/equipments 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 organisation.

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 equipments for a minimum period of 2 (two) 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 2 (two) 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 (both Battery Sets & Chargers).
- iv) The bidder should have conducted type tests on the tendered equipments 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 should have purchased/obtained the Bid specification document from the office of the Purchaser or downloaded the same from website of OPTCL, but shall deposit the tender cost, while submitting the tender.
- [ii] The Tender shall be submitted in person or by Registered Post with A.D.
- [iii] The Tender shall not be submitted telegraphically or by FAX.
- [iv] The Tender shall be accompanied by the prescribed Earnest Money deposit.
- [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 2 (two) years shall be furnished.
- [viii] Tender shall be accompanied by Photostat copy of latest type test certificates (for the tests, carried out on the tendered equipments, 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) Tender shall be accompanied by legibly written user's certificate to prove the satisfactory operation of the offered equipments/materials for a minimum period of 2 (two) 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.

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 & CONSTRUCTION WORKS"

SECTION – III

[LIST OF ANNEXURES]

The following schedules and proformas 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 Part-I	ANNEXURE-II
3	Schedule of Quantity and Delivery	ANNEXURE-III
4	Abstract of price component [to accompany Part-II of this specification]	ANNEXURE-IV
5	Schedule of prices to accompany Part-II	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

ANNEXURE - I DECLARATION FORM

To

Sir,

1. Having examined the above specification together with terms & conditions referred to therein * I/We the undersigned hereby offer to supply the materials/equipments 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/equipments 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 purchased/ downloaded a copy of the specification 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 ORISSA 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

`2007

Yours faithfully

Signature of the Tenderer with seal of the company

[This form should be dully filled up by the tenderer and submitted along with the original copy of the tender]

* (Strikeout whichever is not applicable).

ANNEXURE-II
ABSTRACT OF GENERAL TERMS AND CONDITIONS OF
CONTRACT [COMMERCIAL] TO ACCOMPANY PART-I

1	(a) OPTCL Money Receipt No. & Date towards purchase of Tender. (b) Earnest money furnished. (A) Bank Guarantee, (B) Bank Draft.	
2	Manufacturer's supply experience including user's certificate furnished or not.[As per clause No.7 of Section-II.]	Yes/No
3	Deviations to the specification if any[list enclosed or not] [As per clause-9 of the Section-II] (a) Commercial (b) Technical.	Yes/No Yes/No
4	Delivery (period in months from the date of purchase order)	
5	Guarantee:- Whether agreeable to OPTCL's terms. [As per clause-18 of Section-II]	Yes/No
6	Whether agreeable to furnish Composite B.G. in case his tender be successful [As per clause-19 of Section-II]	Yes/No
7.	Terms of payment:- Whether agreeable to OPTCL's terms or not [As per clause-21 of Section-II]	Yes/No.
8.	Nature of price:- FIRM	Yes/No
9.	Penalty:- Whether agreeable to OPTCL's terms or not (As per clause-22 of Section-II)	Yes/No
10.	Whether STCC/ P&L A/C, Balance Sheet for the required period are furnished as per clause-25 of Section-II	Yes/No
11.	Validity: - Whether agreeable to OPTCL's terms or not [As per clause-28 of Section-II]	Yes/No
12.	Whether recent type test certificates from any Government approved laboratory are furnished or not. [As per clause-34[viii] of section-II]	Yes/No
13.	Whether guaranteed technical particulars in complete shape are furnished or not	Yes/No
14.	Whether dimensional design/drawings furnished or not	Yes/No
15.	Whether materials are ISI/ISO marked.	Yes/No
16.	Manufacturer's name and it's trademark.	Yes/No
17.	<u>Whether registered under Orissa Sales Tax Act. 1947</u>	Yes/No
18.	<u>Whether declaration form duly filled in furnished or not.</u>	Yes/No.

Place: - _____

Date: - _____

Signature of the Tenderer
with seal of the company

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
LOT-I	Solid Core Long Rod Insulators a) 90 KN for 220 KV b) 120KN for 132KV c) 160KN for 220 KV	100 400 200	Within Three months from the date of P.O.	Any store within the Orissa State willnbe indicated in the P.O.	
LOT-II.	Silicon Composite Long Rod Insulators a) 90 KN for 220 KV b) 120KN for 132KV c) 160KN for 220 KV	100 400 200	Within Three months from the date of P.O.	Any store within the Orissa State willnbe indicated in the P.O.	

Place:

Date:

Signature of Tenderer
with seal of Company

ANNEXURE-IV

ABSTRACT OF PRICE COMPONENT [TO ACCOMPANY PRICEBID]

1	Price basis	F.O.R. Purchaser's destination Stores/site.
2	Packing & forwarding	
3	Rate of Insurance charges	
4	Rate of Freight charges	
5	Rate of excise duty	
6	Rate of sales Tax	
7	Rate of other taxes/levies /duties etc.	
8	Rate of entry tax.	
9.	Rate of Service Tax on supervision of erection testing and commissioning	
10.	Nature of price.	

Place

Date:

**Signature of Tenderer
With seal of company**

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.

any, (in case of equipments by taking 30 Man days) shall be indicated separately, row-wise.

8. All the above charges will be taken into account, during bid price evaluation.

ANNEXURE-VI

PROFORMA FOR BANK GUARANTEE FORM FOR EARNEST MONEY DEPOSIT

Ref _____ Date _____ Bank Guarantee No: _____
1 In accordance with invitation to Bid No. _____ Dated _____ of ORISSA
POWER TRANSMISSION CORPORATION LTD. [OPTCL][herein after
referred to as the OPTCL for the purchase of

Messers _____
Address _____

_____ wish/wished to participate in the said tender and as a Bank Guarantee for
the _____ sum _____ of
Rs. _____ [Rupees _____]

Valid for a period of 240 days [Two hundred forty days] is required to be
submitted by the Tenderer. We the

_____ [Indicate the
Name of the Bank]
[Hereinafter referred to as 'the Bank'] at the request of M/S

[Herein after referred to as supplier (s)] do hereby unequivocally and
unconditionally guarantee and undertake to pay during the above said
period, on written request by the Sr. General Manager [Procurement]
ORISSA POWER TRANSMISSION CORPORATION
LTD. _____

_____ [Indicate designation of the
purchaser]

an amount not exceeding Rs. _____ to the OPTCL, without any
reservation. The guarantee would remain valid up to 4.00 PM of

_____ [date] and if any further extension to this is required, the same will be
extended on receiving instructions from
the _____ on whose
behalf this guarantee has been issued.

2. We the _____ do hereby, further
undertake

[Indicate the name of the bank]
to pay the amounts due and payable under this guarantee without any
demur, merely on a demand from the OPTCL stating that the amount
claimed is due by way of loss or damage caused to or would be caused to or
suffered by the OPTCL by reason of any breach by the said supplier [s] of
any of the terms or conditions or failure to perform the said Bid . 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. _____

3. We undertake to pay the OPTCL any money so demanded not withstanding
any dispute or disputes so raised by the contractor [s] 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 there under and the supplier(s) shall have no claim against us for making such payment.

4. We, the _____ further agree that the guarantee

[Indicate the Name of the Bank]

herein contained shall remain in full force and effect during the aforesaid period of 240 days [two hundred forty days] and it shall continue to be so enforceable till all the dues of the OPTCL under or by virtue of the said Bid have been fully paid and its claims satisfied or discharged or till Managing Director, ORISSA POWER TRANSMISSION CORPORATION LTD. certifies that the terms and conditions of the said Bid have been fully and properly carried out by the said Supplier [s] and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the _____ we shall be discharged from all liability under this guarantee thereafter.

5. We, the _____ further agree with the OPTCL that

[Indicate the name of the Bank]

the 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 Supplier [s] from time to time or to postpone for any time or from time to time any of the powers exercisable by the OPTCL against the said supplier [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 Supplier [s] or for any forbearance act or omission on the part of the OPTCL or any indulgence by the OPTCL to the said Supplier[s] or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

1. This guarantee will not be discharged due to the change in the name, style and constitution of the Bank or the supplier [s].
2. We, _____ lastly undertake not to revoke this

[Indicate the name of the Bank]

Guarantee during its currency except with the previous consent of the OPTCL in writing.

- 8 We the _____ Bank further agree that this guarantee shall also be invocable at our place of business at Bhubaneswar in the state of Orissa.

Dated _____ Day of _____

Witness ((Signature, names & address)

- 1.
- 2

For _____
[Indicate the name of Bank]

ANNEXURE-VII

PROFORMA FOR COMPOSITE BANK GUARANTEE FOR SECURITY DEPOSIT PAYMENT AND PERFORMANCE

This Guarantee Bond is executed this _____ day
of _____ 2007 by us the
_____ Bank at

P.O. _____ P.S. _____

_____ District _____ State _____

1. WHEREAS the ORISSA POWER TRANSMISSION CORPORATION LTD., a body corporate constituted under the Electricity Act, 2003 [hereinafter called "the OPTCL" which shall include its successors and assigns has placed orders No. _____ Date _____ [hereinafter called "The Agreement"] on M/s. _____ [hereinafter called "The Supplier"] which shall include its successors & assigns for supply of materials.

AND WHERE AS the supplier has agreed to supply materials to the OPTCL in terms of the said agreement AND

WHEREAS the OPTCL has agreed [1] to exempt the supplier from making payment of Security [2] to release 100% payment of the cost of materials as per the said agreement and [3] to exempt from performance guarantee on furnishing by the Supplier to the OPTCL, a Composite bank Guarantee of the value of 10 % [ten percent] of the contract price of the said agreement.

NOW THEREFORE, in consideration of the OPTCL having agreed [1] to exempt the Supplier from making payment of Security [2] releasing 100% payment to the Supplier and [3] to exempt from furnishing performance guarantee in terms of the said agreement as aforesaid, we, the _____ [Bank][hereinafter referred to as 'the Bank'] do hereby undertake to pay to the OPTCL an amount not exceeding Rs. _____ [Rupees _____] against any loss or damage caused to or suffered by or would be caused to or suffered by the OPTCL by reason of any breach by the said Supplier [s] of any of the terms or conditions contained, in the said agreement.

2. We the (_____ Bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on demand from the OPTCL stating that the amount claimed is due by way of loss or damage caused to or suffered by the OPTCL by reason of any breach by the said Supplier [s] of any of the terms or conditions, contained in the said agreement or by reason of the supplier's failure to perform the said agreement. 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 _____]

3. We the _____ Bank} also undertake to pay to the OPTCL any money so demanded notwithstanding any dispute or disputes raised by the supplier [s] 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 there under and the Supplier [s] shall have no claim against us for making such payment.

4 We, (_____ Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to do so enforceable till all the dues of the OPTCL under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Managing Director, ORISSA POWER TRANSMISSION CORPORATION LTD. certifies that the terms and conditions of the said agreement have been fully and properly carried out by the said Supplier [s] and accordingly discharges this Guarantee.

Unless a demand or claim under this guarantee is made on us in writing on or before the [Date _____], we shall be discharged from all liability under this guarantee thereafter.

5. We,(_____ Bank) further agree that the 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 agreement or to extend time of performance by the said Supplier [s] and we shall not be relieved from our liability by reason of any such variations or extension being granted to the said supplier [s] or for any forbearance, act or omission on the part of the OPTCL or any indulgence by the OPTCL to the said Supplier [s] or by any such matter or thing whatsoever which under the law relating to sureties would but these provisions have 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 supplier [s].

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

Date at _____ the, _____ day of _____
Two thousand _____
For _____

[Indicate the name of the bank]

8. We the _____ Bank further agree that this guarantee shall also be invokable at our place of business at Bhubaneswar in the state of Orissa.

Witness (Name, Signature & Address)

1.

2.

For _____

_____ [Indicate the name of Bank]

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 Orissa 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 equipments 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-XI
SCHEDULE OF INSTALLATIONS.

<u>Rated MVA</u>	Rated Voltage	Place of installation and complete postal address	Year of commissioning

Place: -

Date

Signature of Tenderer:

Name, Designation, Seal

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 Tenderer has to certify in the price bid that MODVAT benefit if any, has been fully passed on to the Purchaser, while quoting the tender prices.
2. INSURANCE :

Insurance of materials/equipments, 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/equipments 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 equipments/materials damaged or lost which will be reported by the Consignee within 30 days of receipt of the equipments/materials at Destination without awaiting for the settlement of their claims with the carriers and underwriters.
3. CERTIFICATE FOR EXEMPTION FROM EXCISE DUTY/SALES TAX:

Offers with exemption from excise Duty/ Sales 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:
 - (i) In case where Freight & Insurance charges are not furnished, 5% of the Ex-works price shall be considered as the freight & Insurance charges.
 - (ii) The tenderer 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 INSULATORS.

160 KN LONG ROD INSULATORS. (FOR 220 KV)

120 KN LONG ROD INSULATORS. (FOR 132 KV)

90 KN LONG ROD INSULATORS. (FOR 220 KV)

160 KN SILICON COMPOSITE INSULATORS. (FOR 220 KV)

120 KN SILICON COMPOSITE INSULATORS. (FOR 132 KV)

90 KN SILICON COMPOSITE INSULATORS(FOR 220 KV)

TECHNICAL SPECIFICATION FOR LONG ROD & SILICON COMPOSITE INSULATORS FOR TRANSMISSION LINES OF OPTCL.

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 disc. Insulators 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.

- 1.2 Following is the list of documents constituting this package.

- (i) Technical specification.
- (ii) Technical data sheet.
- (iii) Drawings of insulators

- (ii)
1.3 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.

- 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:

- 2.1 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.
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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

2.2 The standards mentioned above are available from:

Reference.	Abbreviation.	Name & Address:
BS		British Standards, British Standards Institution, 101, Pentonville 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 44 th . 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.

3.1.2 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:

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	430	1x9/1x14	70/90 KN
2.	Double suspension.	-do-	-do-	2x9/2x14	2x70/2x90
3.	Single Tension	280x170	-do-	1x10/1x15	120x160 KV
4.	Double Tension	-do-	-do-	2x10/2x15	2x120/2x160

3.2 **SPECIFICATION DRAWINGS:**

3.2.1 A list of specification drawings in respect of the disc insulators indicated above given at Annexure-I. These specification drawings are attached herewith 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 distinct and separate from these specification drawings.

4.0 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 points 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.

4.2 **METAL PARTS:**

4.2.1 **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.

4.2.2 **Security Clips:**

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

4.3 **FILTER MATERIAL:**

Cement to be used, as a filler material be 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.

4.4 **MATERIALS DESIGN AND WORKMANSHIP:**

4.4.1 **GENERAL:**

- (II) 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.
- (III) 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 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:**

- i) 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.
- ii) 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.

4.4.4 **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.

4.4.5 CEMENTING:

The insulator design shall be such that the insulating medium shall not directly engage with hard metal. The surface of porcelain shall be 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.

4.4.6 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 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 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 position shall not be less than 50 N (5 kg.) or more than 500 N (50 kgs.).

4.4.7 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.

4.5 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).

4.6 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
70/90 KN Disc/ 120 KN	255/280	266/293	244/267
160 KN Disc	280	293	267

b) Ball to Ball spacing Between Discs (mm)

	Standard.	Maximum	Minimum
70/90 KN Disc/ 120 KN	145	149	141

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.

4.9 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.

4.10 FREEDOM FROM DEFECTS:

Insulators shall have none of the following defects:

- 1) Ball pin shake.
- 2) Cementing defects near the pin like small blow holes, small hair cracks lumps etc.
- 3) Sand fall defects on the surface of the insulator.

4.11 INSULATOR STRINGS:**4.11.1 TYPE AND RATING:**

The insulator strings shall be formed with standard discs described in this specification for use on 3 phases 132/22 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.

4.11.2 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

4.12 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.	-	-	-	-
li	Lighting impulse withstand voltage (dry) KV Peak.	650	1050	650	1050
lii	Power frequency without 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%

4.12.2 Insulator units after assembly shall be concentric and coaxial within limits as permitted by Indian Standards.

4.12.3 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.

5.0 **DETAILS OF SOLID CORE LONG ROD INSULATORS:**

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

5.2 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 alongwith hardware shall be as follows:

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	200x1305	4000	2	90 KN
2.	Double suspension	-do-	-do-	4	2x90 KN
3.	Single tension.	190x1450	4300	2	120 KN
4.	Double Tension.	-do-	-do-	4	2x120 KN
5	Single tension				

6.0 **SPECIFICATION DRAWINGS:**

6.1 A list of specification drawings in respect of the long rod insulators indicated above is given at Annexure-II. These specification drawings are attached herewith 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 distinct and separate from these specification drawings.

7.0 **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 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 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 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.

8.0 **MATERIAL DESIGN AND WORKMANSHIP:**

8.1 **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

8.2 **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.

8.3 **METAL PARTS:**

- i) 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.
- ii) 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.

8.4 **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.

8.4.1 **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.

8.5 **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.)

8.6 BALL AND SOCKET DESIGNATION:

The dimensions of the balls and sockets for 80 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).

8.7 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.

9.0 TESTS (FOR DISC INSULATORS) :

9,1 The following tests shall be carried out on the insulator string and disc insulators.

9.2 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.

9.3 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.

9.4 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.

9.5 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.

9.6 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.

9.7 **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 and 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.

9.8 **TYPE TESTS:**

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

9.8.1 On the 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. : As per this specification.
- 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.6.8.1 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

- h) Electro-mechanical strength test. : specification.
- 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. :

9.12 **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.

9.13 **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.

9.14 **TEST CHARGES AND TEST SCHEDULE:**

9.14.1 **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.

9.14.2 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.

9.14.3 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.

9.14.4 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.

9.14.5 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:

10.2.1 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.

10.2.2 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:

11.1 The bidder hereunder shall invariably furnish following information alongwith 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. Informations 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.
- vii. 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.

11.2 The supplier shall within 30 days of placement of order submit the following information to the owner.

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

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 be 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 affect 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 white 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.

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. 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 mechanical performance test.	60
b) Puncture test (for porcelain insulator only)	40

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.

1. **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.

2. **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.

3. **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.

4. **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 circumference 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.

5. **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.

**GUARANTEED TECHNICAL PARTICULARS
FOR 220 KV LONG ROD INSULATORS**

Sl. No.	Description	unit	90 KN	160 KN
1	Type of Insulator			
2	Size & designation of ball and socket and standard to which it will conform	mm	16B	20
3	Matrrials			
i)	Core			
ii)	Housing			
iii)	End fitting			
4	Dimension of insulator			
i)	Sectional length	mm	2030 _+50	2550 _+50
ii)	Arcing Dintance	mm	As per IEC	As per IEC
iii)	Creepage Distance	mm	6125	7130
iv)	No. of shed		As per IEC	As per IEC
v)	Largest Sheds Diameter	mm	210	215
5	Weight of insulator(Appr)		74	112
6	Electrical Characteristics			
i)	Normal system voltage	KV(rms)	220	220
ii)	Highest system voltage	KV(rms)	245	245
iii)	System frequency	Hz	50	50
iv)	Corona extension voltage	KV(rms)	176	176
v)	Dry one minute Power frequency with stand voltage	KV(rms)	500	500
vi)	Wet one minute Power frequency with stand voltage	KV(rms)	460	460
vii)	Dry Lighting impulse with stand voltage-Positive Polarity	KVp	1050	1050
viii)	Dry Lighting impulse with stand voltage-Negetive Polarity	KVp	1050	1050
7	Mechanical Characteristics			
i)	Specified mechanical load	KN	90	160

GUARANTEED TECHNICAL PARTICULARS
FOR 132 KV LONG ROD INSULATORS

Sl. No.	Description	unit	90 KN	120 KN
1	Type of Insulator			
2	Size & designation of ball and socket and standard to which it will conform	mm	16B	20
3	Matrrials			
i)	Core			
ii)	Housing			
iii)	End fitting			
4	Dimension of insulator			
i)	Sectional length	mm	1305 _+36	1450+/- 36
ii)	Arcing Distantce	mm	As per IEC	As per IEC
iii)	Creepage Distance	mm	4000	4300
iv)	No. of shed		As per IEC	As per IEC
v)	Largest Sheds Diameter	mm	200	205
5	Weight of insulator(Appr)		45	59
6	Electrical Characteristics			
i)	Normal system voltage	KV(rms)	132	132
ii)	Highest system voltage	KV(rms)	145	145
iii)	System frequency	Hz	50	50
iv)	Corona extension voltage	KV(rms)	176	176
v)	Dry one minute Power frequency with stand voltage	KV(rms)	500	500
vi)	Wet one minute Power frequency with stand voltage	KV(rms)	275	275
vii)	Dry Lighting impulse with stand voltage-Positive Polarity	KVp	650	650
viii)	Dry Lighting impulse with stand voltage-Negetive Polarity	KVp	650	650
7	Mechanical Characteristics			
i)	Specified mechanical load	KN	90	120

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

Sl. No.	Description.	Single suspension	Double suspension	Single Tension	Double Tension.
1.	2.	3.	4.	5.	6.
1.	Makers name and address and country.				
2.	Size and designation of Ball and socket and standard to which it will conform 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) | With and without corona |
| | b) Wet kV (rms) | ang. |
| 9.2 | Lighting impulse voltage 1.2/50 micro second. | |
| | | -do- |
| | a) Positive kV(peak) | |
| | b) Negative Kv(Peak) | |
| 9.3 | Switching surge voltage 250/2500 micro second (for 400KV only) | |
| | | -do- |
| | 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) | With and without corona |
| | b) Wet kV (rms) | ring. |
| 11.2 | Lighting impulse voltage 1.2/50 micro second. | |
| | a) Positive kV(peak) | |
| | b) Negative Kv(Peak) | |

TABLE D-1
SUSPENSION INSULATOR CHARACTERISTIC.

1. Type.	Ball and socket	
2. Dimension:		
Porcelain disc diameter.	Mm	255
Unit spacing.	Mm	146
Leakage distance.	Mm	292
Mechanical values:		
Combined mechanical and electrical strength.	Kg.	8,000
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.

SCHEDULE OF QUANTITY.

Serial No.	Description of Insulators	Unit	Quantity as per O&M requirement	Quantity as per C.E (TP) requirement	Total quantities	Unit Rate Rs.	Amount Rs.
1	160 KN long Rod Insulator(220 KV)	Nos	200		200		
2	120 KN long Rod Insulator(132 KV)	Nos	400		400		
3	90 KN long Rod Insulator(90 KV)	Nos	100		100		

TECHNICAL SPECIFICATION FOR COMPOSITE SILICON INSULATORS FOR TRANSMISSION LINES OF OPTCL.

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 COMPOSITE SILICON LONG ROPE 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.

1.2 Following is the list of documents constituting this package.

- (i) Technical specification.
- (ii) Technical data sheet.
- (iii) Drawings of insulators

(ii) 1.5 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.

1.6 The insulators shall conform in all respects to high standards of engineering , design workmanship ; 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:

2.3 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 Internationally 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

2.4 The standards mentioned above are available from:

Reference.	Abbreviation.	Name & Address:
BS		British Standards, British Standards Institution, 101, Pentonville 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 Hellestrup DENMARK.
NEMA		National Electric Manufacturers Association 1`55, East 44 th . Street New York, NY 10017 USA

9.0 **JOINTS IN INSULATOR & PARTS:**

9.1 **Polymer Parts.**

9.1.1 No joints shall be permitted in the polymer parts of the insulators, in addition to those made in the base mater before final production.

9.2 Galvanised Steel Parts.

- 9.2.1 There shall be no joints in steel parts forming the fixing parts (core for mechanical strength) of the insulator.
- 9.2.2 The steel used in the construction of galvanised steel insulator parts before and after putting in position shall satisfy all the relevant requirements as per the standards indicated any other standards with due justification.
- 9.2.3 The zinc used for galvanizing shall be electrolytic high grade Zinc. It shall conform to and satisfy all requirements of relevant standards indicated or any other standards with due justification. Galvanising shall be done by hot dip galvanizing process.

10.0 MARKING

- 10.1 Each Composite long rod insulator shall be legible and indelibly suitably marked with the trade mark manufacturer, the Batch/Lot no. and year of manufacture, guaranteed Electrical and Mechanical strength and country of manufacture. The unit of E&M strength viz. 'Kg'. should be given to facilitate easy identification to ensure correct use. The marking should be in such a way that it should not affect any of the characteristic materials.

SPECIFIC TECHNICAL REQUIREMENTS:

TECHNICAL SPECIFICATION FOR COMPOSITE LONG ROD INSULATORS

1.0 SCOPE:

1.1 This specification provides for design, manufacture, testing, inspection, packing and dispatch, destination of Composite Long and Insulators, specified herein for their satisfactory operation in various transmission lines and substations of OPTCL.

1.2 These Insulators are to be used as insulating part on single circuit and / or double circuit 220KV & 132 transmission lines and/ or Sub-station of the purchaser.

2.0 PERE-QUALIFYING EQUIPMENT:

- 2.1 The Bidders should be original manufacturer of the Composite long rod insulators and shall have all facilities to manufacturer 90KN/120KN/160KN and higher sizes of Composite long rod insulators. Tenders are not eligible for this Tender.
- 2.2 The insulator must have tracking and erosion 5000 hours test by salt and fog method 5.3.1 of IEC61109
- 2.3 Must have salt and fog pollution test as per IEC60507 excluding pre conditioning.

3.0 **STANDARDS:**

3.1 The Composite long rod insulators shall conform to the following India / International Standards, which shall mean latest revisions, amendments / changes adopted and / or published as on the date of opening of the Tender.

Sl. 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/ing	BS:3436
3.		Composite insulators for a.c. overhead power lines with a nominal voltage greater than 1000V	IEC-611109 1992
4.	IS-2071 Part(I)-1993 Part(II)-1991 Part(II)-1991	Methods of High Voltage Testing.	IEC:60060-1
5.	IS: 2486 Part-I-1993 Part-II-1989 Part-III-1991	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-60371
6.	IS-2629-1990	Recommended practice for Hot dip galvanisation for iron and steel.	ISO-1461(E)
7.	IS:2633-1991	Testing of Uniformity of Coating of zinc coated articles.	
8.	IS: 3188-1988	Dimensions for Disc Insulators.	IEC-60305
9.	IS: 6745-1990	Determination of weight of Zinc Coating on Zinc coated iron and steel articles.	BS: 443 1969 ISO 1460-1973.
10.	IS: 9263-1990	Methods of R1 Test of HV insulators.	IEC:60437 NEMA Publication No.07/1964

			CISPR
11.	IS:8269-1990	Methods for Switching Impulse test on HV Insulators.	IEC-60506
12.		Thermal Mechanical Performance test and mechanical performance test on string insulators units	IEC-60575
13.		Salt Fog Pollution Voltage Withstand Test.	IEC-60507
14.		Residual strength of String Insulator Units of Glass or Ceramic material for overhead Lines after Mechanical Damage of the Dielectric.	IEC-60707
15.		Guide for the selection of insulators in respect of polluted conditions.	IEC-60805
16.		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 where the supplier offers insulators conforming to standards other than the above, salient points of comparison between the standards adopted and the standards quoted herein shall be detailed relevant scheduled with an authenticated English version of such standards referred to.

4.0 **CLIMATIC CONDITIONS:**

- i) Location: In the State of Orissa as per Annexure-I
- ii) Maximum Ambient Air Temperature. o C. : 50
- iii) Maximum Ambient Air Temperature, o C. : 0
- iv) Average daily ambient Air Temperature, o C. : 35
- v) Maximum relative humidity- % : 95
- vi) Average rainfall per annum.(mm) : 1150
- vii) Maximum altitude above mean seal level- Mtr. : 1000
- viii) Iso-craunic level i.e. Average number of Thunderstorm- Days annum : 30
- ix) Maximum winding pressure (kg/Sq. meters) : 200
- x) Seismic level i.e. Earthquake Acceleration : 0.08
- xi) 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) : 0.84

5.0 **GENEAL TECHNICAL REQUIREMENT:**

- 5.1 The insulators shall be suitable for being installed directly in air supported on suspension insulator hardware or anchored through tension insulator hardware at the power cross arms of single circuit double circuit or multiple circuit transmission line towers as such it should be substitution for the conventional porcelain insulators.
- 5.2 The insulator shall therefore be suitable for satisfactory operation under the tropical climatic conditions listed in the relevant clause. The applicable design particulars of the insulator to be used on these lines are furnished in 'System Particulars'.
- 5.3 The design of the insulator String shall be such that all the stresses due to expansion or contraction in any part of the insulator under rapid temperature fluctuation, which may be created due to variation in the loads or fault of any nature, while in service shall not lead to any type of deterioration. Flat surface and corners shall not be allowed and shall be completely rounded off.
- 5.4 The Composite long rod Insulators shall be socket and pin type with the necessary coupling arrangement such that the pin shall move freely in the sockets but they do not get disengaged while in service under various operating conditions and atmospheric conditions.
- 5.5 The socket shall be free from cracks, shrinks, air holes burrs and rough edges etc. and shall be circular with the inner and outer surfaces concentric and of such design that they will not yield or distort under stresses to the polymer shells. The pins shall be of single piece made of high tensile forged steel hardened and tempered and shall be free from laps, folds, burrs and rough edges. All bearing surfaces shall be smooth and uniform so as to distribute loading stresses evenly. The pins shall be of such a design that they will not yield or distort under loaded condition. No joints in the pins shall be allowed, what so ever the joint type may be. The sleeve shall be made of aluminum having minimum 99.95% purity.
- 5.6 Nominal dimensions of the pin, ball and socket interior shall be in accordance with the Standards indicated above. The mechanical strength rating of the pinball shank shall not be less than the electromechanical strength of the insulator as specified in this Specification.
- 5.7 The finished surface shall be smooth surface and shall have a good performance under extreme weather conditions in tropical climate and heavily polluted atmosphere. 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 surface shall have same coefficient of expansion as of polymer body through out the working temperature range.
- 5.8 An additional quantity of clips to the extent of 1.5% shall be supplied with the insulators free of cost.
- 5.9 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.
- 5.10 The bidder shall be responsible for satisfying one self that the insulator string is suitable for the tower structure and conductors specified in this specification.
- 5.11 The insulators shall be of standard design and made to gauge or a jig and the same shall be interchangeable, in respect with the similar items.

- 5.12 The Reinforced Fiberglass Core shall be electrical grade epoxy or vinyl ester fiberglass rod to achieve maximum tensile strength, shall be born free and resistant to acid corrosion. The insulator core shall be mechanically ; electrically sound, free from voids, foreign substances and manufacturing flaws.
- 5.13 A protective, polymer material shall be extruded or injection moulded on the reinforced fiberglass rod t thickness of 3.0mm. The polymer shall be firmly bonded to the rod be seamless, smooth and free from imperfecti The strength of the bond shall be greater than the tearing strength of the polymer. The base polymer shall be 10 silicone rubber prior to the addition of reinforcing fillers.
- 5.14 The polymer weather sheds shall be firmly bonded to the sheath, vulcanized to the sheath or moulded as par the sheath and be seamless and free from imperfections. The strength of the weather shed to sheath interface shall greater than the tearing strength of the polymer. Weather sheds shall be silicone rubber prior to the addition reinforcing fillers.
- 5.15 The insulator shall be capable of high pressure power washing at a maximum nozzle pressure of 550 psi. insulators offered shall be suitable for employing Hot Line Maintenance Techniques with the required speed, c; and safety.
- 5.16 The metal end fittings shall be galvanized in accordance with ASTM A153.
- 5.16.1 The insulator's end fittings shall be connected to the rod core by means of a controlled compression technic which provides the required SML. A redundant mechanical sealing system shall be utilized to prevent moist ingress into the fittings. Effectiveness of sealing system must be supported by test documents.
- 5.16.2 The zinc coating shall be uniform and adhere to the surface of the base metal. The coating shall be free fr blisters, flux, black spots, dross, tear drop edges, flaking zinc, rough appearance and in general shall be smo clean and unblemished when received.
- 5.17 Grading rings shall be provided when system voltages are equal to or greater than 220KV. The size ; placement of the metallic grading rings shall be designed to eliminate dry band arcing in the vicinity of the fittings and shield the end fittings preventing corona inception at 115% of nominal line-to-ground voltage.
- 5.17.1 The design of the grading ring shall be such that the ring can only be mounted with its orientation towards weather sheds for maximum RIV/ corona control.
- 5.17.2 Grading rings shall be capable of installation and removal with hot line tools without disassembling any other of the insulator assembly.
- 5.18 Requirements for finished Insulator- The complete insulator shall have a permanent sealing system at interface between the metal end fittings and the housing to insure that no moisture of foreign material shall en This sealing system shall be multi-layer and offer true redundancy.

6.0 MATERIALS.

- 6.1 The insulators shall be manufactured from good quality polymer insulating material as per approved design. The materials supplied shall be free from blow-holes. Flaws, cracks, or other defects and shall smooth, close-grained and of true forms and approved dimensions. All machined surfaces shall be t smooth, ;and well finished. The materials used shall comply with all the relevant ISS, IEC,BSS,ANSI other standards to be specified along with the due the due justification.
- 6.2 The polymer(composite insulator) shall be non-porous of high dielectric, mechanical and ther strength. The materials shall be free from internal stresses, blisters, laminations, voids, ;foreign matt

particulars imperfection of other defects which might in way render it unsuitable as insulator shells. Composite materials shall be unaffected by climatic conditions, ozone, acids, alkalies, zinc, dust etc.

- 6.2.1 The composite material shall be clean, dense, homogeneous, and shall possess the qualities best adopted to insulators for service at extra and ultra high voltages.
- 6.2.2 Metal fittings of drop forged steel or heat-treated malleable cast iron for insulators are required to have excellent mechanical properties such as strength, toughness, high corrosion resistance, free from corrosion effects, etc.
- 6.2.3 The bonding material used in the construction of insulators, particularly for joining the metal parts to the insulator, shall not cause fracture by expansion or loosening by contraction and must have high strength in compression and shearing; strengths and be free from change in volume; due to ageing and temperature changes. It shall not give rise to chemical reaction with the metal fittings and or thermal instability or chemical changes either in the insulator or the metal parts themselves.
- 6.2.4 Galvanized steel parts shall be made from high quality steel produced by either acidic or basic open hearth process, electric furnace process or basic oxygen process. All the properties of the steel castings and hot rolled or drawn shall conform to the relevant standards.
- 6.2.5 The zinc used for galvanized shall be electrolytic high grade Zinc, not less than 99.5% purity. It shall conform to and satisfy all the requirements of relevant ISS, IEC, BSS or other Standards to be specified with the due justification. Galvanizing has to be done hot dip galvanizing process.
- 6.2.6 The bidder should specify the source of raw materials along with the proof of last purchase made. Purchaser may reject the tender of the Bidders whose raw material suppliers are found to be supplying poor quality or non standard materials, to the purchasers of this Specification or any other purchase.

SYSTEM PARTICULARS

A) Electrical System Data:

a)	System Voltage (KV rms)	132	220
b)	Max. Voltage (KV rms)	145	245
c)	Lightning impulse withstand voltage (dry & wet) (KVP)	650	1050
d)	Power Frequency withstand voltage (wet) (KV rms)	275	
e)	Short circuit level (KA)	10	
f)	Switching Surge withstand voltage (wet) KVP	1050/Not applicable	
g)	Frequency-Hz		
	i) Normal	50	50
	ii) Maximum	51.1	51.1
	iii) Minimum	4%	4%
h)	Number of circuits.	Single/Double.	Single/Double
i)	Normal Span - m	350	350
j)	Wind Span –m	385	385
k)	Weight Span- m		
	I) Maximum	525	525
	II) Minimum	100	100
l)	Factor of Safety (At Every Day Temp. & No Wind)	4	4
m)	Neutral Grounding	Effectively Earthed	Effectively Earthed
n)	Ball Socket dia in mm Suspension/Tension.	16/20	16/20
o)	Length of AF insulator string (in mm) 400/220/132/66 KV for suspension location.	1305/1450 0	2030/2550
p)	Length of AF insulator string (in mm) 400/220/132/66 KV for Tension location.	1450 35	2175
q)	Minimum failing load (KN) For 220/132 KV	90/120	90/160
r)	Minimum Creepage distance (in case of AF/solid core insulator) in mm	9660/10500	9660/10500
	132 KV	3100/3625	
	66 KV		

GUARANTEED TECHNICAL PARTICULARS

FOR 132KV COMPOSITE LONG ROD INSULATORS

Sl. No.	DESCRIPTION	90 K SUSPENSION 111-C-278/R-O	132 KV 120KV TENSION 111-C-155/R-2
1.	Size & designation of ball and socket and standard to which it will conform mm.	16B IS 2486-II	20 IS 2486-II
2.	No.of insulator discs per string	One	One
3.	Outside dia of the LR1-mm
4.	Spacing –mm	78	75
5.	Creepage distance of the single insulator-mm	4000	4300
6.	Electro-mechanical strength of single insulator-kN	90	120
7.	Withstand voltage single -disc.		
7.1	Power frequency (a) Dry-kV (rms) (b) Wet-kV (rms)	315 275	315 275
7.2	Impulse voltage 1.2/50 micro second (a) Positive –kV(peak) (b) Negative –kV (peak)	650 650	650 650
8.	Withstand voltage for the complete string/Insulator.	NA	NA
8.1	Power frequency (a) Dry-kV (rms) (b) Wet-kV(rms)_	- -	- -
8.2	Lightning Impulse voltage 1.2/50 micro second (a) Positive –kV(peak) (b) Negative -kV (peak)	- -	- -
8.3	Switching surge voltage (250/2.2500 micro second (for 400kV only) (a) Dry-kV (rms) (b) Wet –kV(rms)_	- -	- -
9.	Flashover voltage for the disc.		
9.1	Power frequency (a) Dry-kV (rms) (b) Wet –kV(rms)	330 300	330 300
9.2	Lightning impulse voltage 1.2/50 micro second (a) Positive –kV(peak) (b) Negative -kV (peak)	700 700	700 700
10.	Flashover voltage for the complete string/insulator.	NA	NA
10.1	Power frequency (a) Dry-kV (rms) (b) Wet –kV(rms)	- -	- -
10.2	Lightning Impulse voltage 1.2/50 micro second (c) Positive –kV(peak) (d) Negative -kV (peak)	- -	- -

GUARANTEED TECHNICAL PARTICULARS
FOR 220 KV COMPOSITE LONG ROD INSULATORS

Sl. No.	Description	unit	90 KN	160 KN
1	Type of Insulator		Composite	Composite
2	Size & designation of ball and socket and standard to which it will conform	mm	16B IS 2486- II&IEC61109-08	20 IS 2486- II&IEC61109-08
3	Matrials			
i)	Core			
ii)	Housing		POLYMORE	POLYMORE
iii)	End fitting		SGCI/FORGED STEEL	SGCI/FORGED STEEL
4	Dimension of insulator			
i)	Sectional length	mm	2030 _+50	2550 _+50
ii)	Arcing Distantance	mm	1861	2210
iii)	Creepage Distance	mm	6020	6450
iv)	No. of shed		21/20	21/20
v)	Sheds Diameter	mm	164/130	164/130
5	Weight of insulator(Appr)		11.1	12.5
6	Electrical Characteristics			
i)	Normal system voltage	KV(rms)	220	220
ii)	Highest system voltage	KV(rms)	245	245
iii)	System frequency	Hz	50	50
iv)	Corona extension voltage	KV(rms)	176	176
v)	Dry one minute Power frequency with stand voltage	KV(rms)	500	500
vi)	Wet one minute Power frequency with stand voltage	KV(rms)	460	460
vii)	Dry Lighting impulse with stand voltage-Positive Polarity	KVp	1050	1050
viii)	Dry Lighting impulse with stand voltage-Negative Polarity	KVp	1050	1050
7	Mechanical Characteristics			
i)	Specified mechanical load	KN	90	160

**GUARANTEED TECHNICAL PARTICULARS
FOR 132 KV COMPOSITE LONG ROD INSULATORS**

Sl. No.	Description	unit	90 KN	120 KN
1	Type of Insulator		Composite	Composite
2	Size & designation of ball and socket and standard to which it will conform	mm	16B IS 2486- II&IEC61109-08	20 IS 2486- II&IEC61109-08
3	Materials			
i)	Core			
ii)	Housing		POLYMORE	POLYMORE
iii)	End fitting		SGCI/FORGED STEEL	SGCI/FORGED STEEL
4	Dimension of insulator			
i)	Sectional length	mm	1305 _+36	1305+/- 36
ii)	Arcing Disntance	mm	11143	1208
iii)	Creepage Distance	mm	4000	4300
iv)	No. of shed		21/20	21/20
v)	Sheds Diameter	mm	164/130	164/130
5	Weight of insulator(Appr)			
6	Electrical Characteristics			
i)	Normal system voltage	KV(rms)	132	132
ii)	Highest system voltage	KV(rms)	145	145
iii)	System frequency	Hz	50	50
iv)	Corona extension voltage	KV(rms)	176	176
v)	Dry one minute Power frequency with stand voltage	KV(rms)	500	500
vi)	Wet one minute Power frequency with stand voltage	KV(rms)	460	460
vii)	Dry Lighting impulse with stand voltage-Positive Polarity	KVp	1050	1050
viii)	Dry Lighting impulse with stand voltage-Negative Polarity	KVp	1050	1050
7	Mechanical Characteristics			
i)	Specified mechanical load	KN	90	160

SCHEDULE OF QUANTITY.

Serial No.	Description of Insulators	Unit	Quantity	Unit Rate	Amount
1	Composite Silicon Long Rod Insulators suitable for Suspension-90 KN for 220 KV	Nos	100 Nos		
2	Composite Silicon Long Rod Insulators suitable for Tension-120 KN for 132 KV	Nos	400 Nos		
3	Composite Silicon Long Rod Insulators suitable for Suspension-90 KN for 220 KV	Nos	200		