



**ORISSA POWER TRANSMISSION  
CORPORATION LIMITED  
OFFICE OF THE SR. GENERAL MANAGER**

**CENTRAL PROCUREMENT CELL**

**JANAPATH, BHUBANESWAR-751022**

**TEL NO. 0674-2541801 FAX NO. 0674-2542964**

**TENDER SPECIFICATION NO.  
SR.G.M.[C.P.C.] - Power & Control Cable- 105 /2009-10  
FOR**

**PROCUREMENT OF POWER & CONTROL  
CABLES**

**SECTION-I INSTRUCTION TO TENDERERS.**

**SECTION-II GENERAL CONDITIONS OF CONTRACT**

**SECTION-III LIST OF ANNEXURE  
(SCHEDULES & PROFORMA)**

**SECTION-IV TECHNICAL SPECIFICATION.**

**DATE OF OPENING OF TENDER PAPER-03.05.10  
COST OF TENDER PAPER- Rs.10000.00 +4% VAT..**



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

**TENDER NOTICE NO. 57 /2009-2010**

For and on behalf of Orissa Power Transmission Corporation Limited, Sr. G.M. [C.P.C.] invites Tenders from reputed manufacturers for supply of Power & Control cables for Substation work in OPTCL's system. Tender papers shall be sold from **02.04.10 to 03.05.10**. Interested firms may visit in 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 LIMITED**  
**REGD. OFFICE: JANPATH, BHUBANESWAR – 751 022,**  
**ORISSA, INDIA.**  
**TENDER NOTICE NO. 571 /2004-2005**

For and on behalf of the of Orissa Power Transmission Corporation Limited, 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 items and /or rendering the required services as required under the relevant specifications.

<b>Sl. No</b>	<b>Tender Specification No.</b>	<b>Pack-age</b>	<b>Description of materials.</b>	<b>Qty. In Kms.</b>	<b>Earnest Money Deposit (In Rs.)</b>	<b>Cost of Tender Spec. Document (In Rs)</b>	<b>Last date of receipt &amp; opening of tender</b>
1.	Sr.G.M. CPC- Power & Control Cable-105/09-10		A) Supply of 1.1 KV grade armoure Power cables of following sizes:- a) Power Cable(31/2 Core,95 sq mm b) Power Cable(31/2 Core,25 sq mm B) Supply of 1.1 KV grade unarmoured control cables of following sizes:-  (a)2.5 Sq. mmX3 Core  (b) 2.5sq. mmX4 Core  ©2.5 sq.mmx 12 core  (d) 2.5 X 19 core	   1 1           10  10   5  5	   14170.00	10000.00+ 4% VAT	03.05.10

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 3 P.M. during **02.04.10 . to 03.05.10** (both days inclusive) on any working day either in person or by remitting demand draft payable to Drawing & Disbursing Officer, of Orissa Power Transmission Corporation Limited, 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 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.1000/- over and above the cost of the tender specification, under heading "Cost of tender specification". Complete bids for different items will be received upto 1 P.M. only and the same will be opened at 3 P.M. on respective date. Date and time of opening of price bids in respect of two-part tenders 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 upto the appointed times on the next working day. Only one representative of each bidder will be allowed to participate in the bid opening. GRIDCO also reserves the right to accept or reject any or all tenders without assigning any reasons thereof, if the situation so warrants. Gridco shall not be responsible for any postal delay at any stage.

**Minimum qualification criteria of bidders:**

1. The bidder should be a manufacturer of all the Power & Control cables described above and should have earlier supplied at least equal quantity tendered for, during the last two year and must furnish the performance certificate from the user.
2. Must have type tested the cable within last five years from the date of tendering.

**SR. GENERAL MANAGER**  
CENTRAL PROCUREMENT CELL

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# COMMERCIAL SPECIFICATION.

## PART-I

### 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, super scribed 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   | <b>General Terms &amp; conditions of contract.</b> |
| [iii] Section-III | Schedules and forms etc.                           |
| [iv] Section-IV   | <b>Technical Specification.</b>                    |

**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 super scribed as “E.M.D”, technical and commercial and Part-II shall be super scribed 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, its financial, managerial and technical capabilities.

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

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

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

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

6. **Procedure and opening time of tenders.**

Tenders will be opened in the office of the 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.P.C.], 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-VIII** 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 at least for 240 days from the date of opening of tender failing which the tender will be liable for rejection.
- (ii) No interest shall be paid on the Earnest Money Deposit.
- (iii) E.M.D. in shape of cash may be submitted up to Rs. 25,000/- (Rupees Twenty-five Thousand) only. Above Rs. 25,000/- (Rupees Twenty-five thousand) the Earnest Money Deposit shall be furnished in any one of the forms indicated above (i.e. Through Bank Draft, Bank Guarantee/ National Savings Certificate).
- (iv) No adjustment towards EMD shall be permitted against any outstanding amount with the 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 120 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 on 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 judgment 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 judgment 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 at least 18 [eighteen] months from the last date of delivery or 12 [twelve] months from the date of commissioning whichever is earlier. The above guarantee

certificate shall be furnished in triplicate to the purchaser for his approval. Any defect noticed during this period should be rectified by the supplier free of cost to the purchaser provided such defects are due to faulty design, bad workmanship or bad materials used, within one month upon written notice from the purchaser failing which provision of clause 22 (ii) shall apply.

- [ii] Equipment/material failed or found defective during the guarantee period shall have to be guaranteed after repair/replacement for a further period of 12 months from the date of commissioning or 18 months from the date of receipt at the store/site after such repair/replacement 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 30<sup>th</sup>. 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 along with the bid(s)

**28. Validity**

Prices and conditions contained in the offer should be kept valid for a minimum period of 120 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.

**(I) 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 (both Battery Sets & Chargers).
- 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.

i) 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 120 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 120 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. <b>(A) Bank Guarantee, (B) Bank Draft.</b>	
2	Manufacturer's supply experience including user's certificate furnished or not.[As per clause No.7 of Section-II.]	<b>Yes/No</b>
3	Deviations to the specification if any[list enclosed or not] [As per clause-9 of the Section-II] (a) Commercial (b) Technical.	<b>Yes/No</b> Yes/No
4	<b>Delivery</b> (period in months from the date of purchase order)	
5	<b>Guarantee:-</b> 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.	<b>Terms of payment:-</b> 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.	<b>Penalty:-</b> 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.	<b>Validity: -</b> 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	<b>Yes/No</b>
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.	<b>Whether registered under Orissa Sales Tax Act. 1947</b>	Yes/No
18.	<b>Whether declaration form duly filled in furnished or not.</b>	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					
LOT-II					
LOT-III					
LOT-IV					
.					
.					
.					
.					
.					
.					
.					
.					

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.

## ANNEXURE-V.

### SCHEDULE OF PRICES

### TENDER

#### SPECIFICATION No.

Item No.	Description.	Qty (unit)	Unit Ex-factory Price.	Unit Packing & Forwarding.	Unit Freight Charges.	Unit Insurance Charges.	Unit landing cost at destination store/site excluding ST,ED & Entry tax.
1.	2.	3.	4.	5.	6.	7.	8.

Unit E.D.	Unit S.T.	Unit Entry Tax.	Unit landing Cost including All taxes & Duties.	Total landing cost Including all taxes & duties.
9.	10.	11.	12= (8+9+10+11)	13= (3X12)

Signature of Tenderer  
Name, Designation and

Seal

NB: -

1. The tenderer should fill up the schedule properly and in full. The tender will be rejected, if the schedule of price is submitted in incomplete form. No post tender correspondence will be entertained on break-up of prices. Also, the supplier should agree for delivery at sub-station site.
2. In case, where F&I components are not specifically indicated in this schedule, 5% of the ex-works price shall be taken towards F&I components for the purpose of comparison of price.
3. The Tenderer shall certify in the price bid that MODVAT benefit, if any, has been fully passed on to the purchaser while quoting the tender price.
4. Conditional offers will not be acceptable.
5. The bidder is to clearly indicate the period up to which the tax holidays are available to them.
6. Price bid in any other format will not be acceptable and the offer will be rejected.
7. Test charges (Routine/type) if any, mandatory spares, if any, maintenance equipment charges, if any, as per Technical Specification, supervisory charges, if 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 notwithstanding 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.

6. This guarantee will not be discharged due to the change in the name, style and constitution of the Bank or the supplier [s].

7. We, \_\_\_\_\_ lastly undertake not 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**

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

**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.**

Rated MVA	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.

# **ERECTION - IV**

## **TECHNICAL SPECIFICATION** **FOR** **CONTROL & POWER CABLE**



# Technical specification for control and power cables

## PART 1 : SCOPE AND CONDITIONS

### 1. SCOPE

This specification covers the supply of power and Control cables to OPTCL .The Cables offered shall have been successfully type tested and the design shall have been in satisfactory operation for a period not less than two years on the date of bid opening. Compliance shall be demonstrated by submitting with the bid, (i) authenticated copies of the type test reports and (ii) performance certificates from the users..

The power and control cables shall conform in all respects to highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and OPTCL shall have the power to reject any work or material, which, in its judgment, is not in full accordance therewith.

### 2. STANDARDS

Except where modified by this specification, the power and control cables shall be designed, manufactured and tested in accordance with the latest editions of the following standards.

IEC / ISO	Indian Standard	Title
IEC 811	IS-18-10810:1982	Testing cables
IEC 502	IS-7098:1985 (part 2)	LT and 3.3 - 33kVXLPE cables
IEC 502	IS - 1554:1988 (part 1)	PVC Cables 1.kV
IEC 227	IS - 5819 :1970	Short circuit ratings for PVC cables
IEC 228	15-8130:1984	Conductors for insulated cables
IEC 502	IS - 6474: 1984	XLPE Cables

IEC 502	Extruded solid dielectric insulated power cables for rated voltages from 1kV to 30kV
IEC 540 IS - 5831: 1984	Test Methods for insulation and sheaths of electric cables and cords
IEC 287	Calculation of the continuous current rating of cables.
IS - 3975 : 1979 of cables	Mild steel wires, strips and tapes for armouring

### 3. SERVICE CONDITIONS

The service conditions shall be as follows:

- maximum altitude above sea level  
11,000m
- maximum ambient air temperature  
50°C
- maximum daily average ambient air temperature 35°C
- minimum ambient air temperature 0°C
- maximum temperature attainable by an object exposed to the sun 60°C
- maximum yearly weighted average ambient temperature 32°C
- maximum relative humidity 100%
- average number of thunderstorm days per annum (isokeraunic level) 70
- average number of rainy days per annum 120
- average annual rainfall 150cm
- wind pressures as per IS 802 (Part I/ Sect.I) : 1995

#### 4. SYSTEM CONDITIONS WHERE THE CABLES SHALL BE USED

The equipment shall be suitable for installation in supply systems of the following characteristics:

- Frequency 50Hz
  - Nominal system voltages 440 KV/220 KV/132 KV/33kV  
11kV  
400/230V
  - Maximum system voltages:
    - 33kV System 36.3kV
    - 11kV System 12.1kV
    - LV System 476V
  - Minimum LV voltage 340V
  - Nominal short circuit levels:
    - 33kV System 25kA
    - 11kV System 12.5kA
  - Insulation Levels:
    - 1 .2/50 (j.s impulse withstand voltage  
(positive and negative polarity):
      - 33kV System 170kV
      - 11kV System 75kV
  - Power frequency one minute withstand  
voltage (wet and dry) rms
    - 33kV System 70kV
    - 1 1kV System 28kV
    - LV System 3kV
  - Neutral earthing arrangements:
    - 33kV System solidly earthed
    - 11kV System solidly earthed
    - LV System solidly earthed
-

## **PART 2 : TECHNICAL**

All power and control cables to be used in the OPTCL system shall be of polyvinyl chloride (PVC) insulated with PVC sheathing types.

### **8. 1.1KV POLYVINYL CHLORIDE (PVC) INSULATED CABLES**

#### **8.1. RATED VOLTAGE AND TEMPERATURE**

The rated voltage of the cable shall be 1.1 kV and the maximum operating voltage shall not exceed 110% of the rated voltage.

These cables are suitable for use where the combination of ambient temperature and temperature rise due to load results in a conductor temperature shall not exceeding 70°C\* under normal operation and 160°C under short circuit conditions.

\*See 13.2.4 for heat resisting and general-purpose applications.

#### **8.2. CABLE DESIGN**

The cable offered shall be single-core, four core or multi-core armoured or unarmoured PVC insulated, PVC sheathed to meet the following requirements:

##### **8.2.1. Conductor**

- **L.V System Cables**

The conductor shall be of compacted round shape in single core cables and sector shaped in 3.5 or 4 core cables, made up from stranded aluminium wires complying with IS -8130:1984 / IEC 228.

Cables with reduced neutral conductors shall comply with the cross-sections shown in the table below.

- **Control Cables**

The conductor shall be of round stranded plain copper wires complying with IS - 8130:1984/IEC 228.

The conductors shall be of Flexibility Class 2 as per IS - 8130 : 1984.

### 8.2.2. Cross-Sectional area of reduced Neutral Conductors:

Nominal cross-sectional area of main conductor (mm <sup>2</sup> )	25	35	50	70	95	120	150	185	240	300	400	500	630
Cross-sectional area of reduced neutral conductor (mm <sup>2</sup> )	16	16	25	35	50	70	70	95	120	150	185	240	300

### 8.2.3. Conductor Screening Not required

### 8.2.4. Insulation

The insulation shall be of Polyvinyl Chloride (PVC) compound. The 'General Purpose' Type A shall be used for the LV cables and 'Heat Resisting' Type C for the Control and Panel Wiring cables. Both shall conform to the requirements of IS - 5831: 1984.

Type of Insulation	Normal Continuous Operation	Short Circuit Operation
General Purpose	70°C	160°C
Heat Resisting	85°C	160°C

The PVC insulation shall be applied by extrusion and the average thickness of insulation shall not be less than the specified nominal value and the maximum value not more than 0.1mm plus 0.1 of nominal and as specified in IS - 1554(part 1): 1988.

The insulation shall be applied so that it fits closely on to the conductor and it shall be possible to remove it without damage to the conductor.

### 8.2.5. Insulation Screening Not required

8.2.6. Core Identification and Laying Up of Cores 3.5 and 4 core cables shall be identified by colouring of the PVC insulation and multi core by numbers as per IS- 1 554 (part 1): 1988

In multi-core cables, the cores shall be laid up together with a suitable lay as recommended in IS - 1554 (Part 1): 1988. The layers shall have successive right and left hand lays with the outermost layer having a right hand lay.

### 8.2.7. Inner Sheath

The laid up cores of the 3.5, 4 and multi core cables shall be covered with an inner sheath made of thermoplastic material (PVC) applied by extrusion.

The thickness of the sheath shall conform to IEC 502/IS - 1554: 1988. Single core cables shall have no inner sheath.

8.2.8. Armouring Only the 3.5 and 4 core LV cables will be armoured. The armour shall be applied helically in a layer of steel wires over the inner sheath of the cable. The armour shall consist of round or flat steel wires and comply with the requirements of IEC 502/IS - 1554:

8.2.9. 1988. The steel wires shall comply with IS - 3975:

### 8.2.9. Outer Sheath

An outer sheath of polyvinyl chloride (PVC) shall be applied over the armour wires (where fitted). The sheath shall be embossed at regular intervals as per the Cable Identification clause of this specification and the minimum thickness and properties shall comply with the requirements of IEC 502/IS - 1554: 1988. The outer sheath for cables with general purpose insulation shall be of the type ST1 PVC compound and for cables with heat resisting insulation type ST2 PVC compound conforming to the requirements of IEC 502/IS - 5831: 1984.

The outer serving shall incorporate an effective anti-termite barrier and shall be capable of withstanding a 10kV DC test voltage for five minutes after installation and annually thereafter.

Cables shall be installed as a single four core cable or three single phase cables plus neutral in a close trefoil formation.

Current ratings shall be calculated in accordance with IEC 287 "Calculation of the continuous current rating of cables with 100% load factor".

### 8.2.10. Conductor Sizes

- The following conductor sizes will be used on the Employer's LV distribution system: 300, 120 and 50 mm<sup>2</sup> single core, 300 mm<sup>2</sup> three and a half core and 120 mm<sup>2</sup> four core.

### 8.2.11. Cable Drum Length

The cable shall be supplied in 500metre lengths.

Technical Specification for Power and Control Cables

#### CABLE IDENTIFICATION

**The manufacturer's and Employer's name or trade mark, the voltage grade, cable designation and year of manufacture shall be indented or embossed along the whole length of the cable. The indentation or embossing shall only done on the outer sheath. The alphanumerical character size shall be not less than 20% of the circumference of the cable and be legible.**

The following code shall be used to designate cables:

Constituent	Code Letter
Aluminium conductor	A
XLPE insulation	2X
PVC insulation	Y
Steel round wire Armour	W
Non-magnetic round wire Armour	Wa
Steel strip Armour	F
Non-magnetic strip Armour	Fa
Double steel round wire Armour	WW
Double steel strip Armour	FF
PVC outer sheath	Y

Note: No code letter is required for copper conductor

## 10. SAMPLING OF CABLES

### 10.1. Lot

**In any consignment the cables of the same size manufactured under essentially similar conditions of production shall be grouped together to constitute a lot.**

### 10.2. Scale of Sampling

Samples shall be taken and tested from each lot to ascertain the conformity of the lot to specification.

The samples shall be taken at random. In order to achieve random selection the procedure for selection detailed in IS - 4905: 1968 shall be followed.

**1 1 . NUMBER OF TESTS AND CRITERION FOR CONFORMITY**

Suitable lengths of test samples shall be taken from each of the selected drums. These samples shall be subjected to each of the acceptance tests. A test sample shall be classed as defective if it fails any of the acceptance tests. If the number of defective samples is less than or equal to the corresponding number given in 8.3 the lot shall be declared as conforming to the requirements of acceptance test.

**1 2. TESTS ON 1.1 KV PVC INSULATED CABLES**

**12.1. Type Tests**

Certification of type tests already completed by independent test laboratories shall be presented with the bid for each cable type. These tests shall be carried out in accordance with the requirements of IS -8130: 1984/IEC 502, IS - 5831:1984/IEC 540 and IEC 811 unless otherwise specified.

**Type testing of 1.1 kV cables shall include the following:**

<b>Test Method as a</b>	<b>Requirement Reference</b>	<b>Test</b>
		<b>Part of IS-10810/IEC 811</b>
(a) Tests on conductor		
Annealing test (copper)	IS-8130: 1984/IEC 502	1
Tensile test (aluminium)	IS-8130: 1984/IEC 502	2
Wrapping test (aluminium)	IS-8130: 1984/IEC 502	3
Resistance test	IS-8130: 1984/IEC 502	5
(b) Tests for Armour wires/strips	IS - 3975: 1979/IEC 502	36 - 42
(c) Tests for thickness of insulation and sheath	IS-5831:1984/IEC 540	6
(d) Physical tests for Insulation		
Tensile strength and elongation at break	IS-5831:1984/IEC 540	7
Ageing in air oven	IS-5831:1984/IEC 540	11
Hot test	IS-5831:1984/IEC 540	30



	Shrinkage test	IS-5831:1984/IEC 540	12
	Water absorption (gravimatic)	IS-5831:1984/IEC 540	33
(e)	Physical tests for outer sheath		
	Tensile strength and elongation at break	IS-5831: 1984/IEC 540	7
	Ageing in air oven	IS-5 831: 1984/IEC 540	11
	Shrinkage test	IS-5831: 1984/IEC 540	12
	Hot deformation	IS-5831: 1984/IEC 540	15

<b>Test</b>	<b>Requirement Reference</b>	<b>Test Method as a Part of IS-10810/IEC811</b>
Loss of mass in air oven	IS-5831: 1984/IEC540	10
Heat shock	IS-5831: 1984/IEC540	14
Thermal stability	IS-5831: 1984/IEC540	IS-5831: 1984 Appendix B
(f)	Partial discharge test (11 and 33kV only)	Section 13.2 of this specification 46
(g)	Bending test (11 and 33kV only)	Section 13.2 of this specification 50
(h)	Dielectric power factor test (11 and 33kV only)	Section 13. 4 of this specification 48
	As a function of voltage	
	As a function of temperature	
(j)	Insulation resistance (volume resistivity) test	IS-8130: 1984/IEC502 43
(k)	Heating cycle test (11 and 33kV only)	Section 13.5 of this specification 49
(1)	Impulse withstand test (11 and 33kV only)	Section 13.6 of this specification 47
(m)	High voltage test	Section 13.7 of this specification 45
(n)	Flammability test	Section 13.8 of this specification 53

Tests (g), (h), (j), (1) and (m) are only applicable to screened cables.

Notwithstanding the conditions of the above paragraph the following tests on screened 11 and 33kV cables shall be performed successively on the same test sample of completed cable.

1. Partial discharge test
2. Bending test followed by partial discharge test

3. Dielectric power factor as a function of voltage
4. Dielectric power factor as a function of temperature
5. Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests
6. Impulse withstand test
7. High voltage test

If a sample fails in test number 7, one more sample shall be taken for this test, preceded by tests 2 and 5.

### **12.2. Acceptance Tests**

The following shall constitute acceptance tests:

- Tensile test (aluminium)
- Annealing test (copper)
- Wrapping test
- Conductor resistance test
- Test for thickness of insulation and sheath
- Hot set test for insulation\*
- Tensile strength and elongation at break test for insulation and outer sheath
- Partial discharge test (for screened cables only)\*\*
- High voltage test
- Insulation resistance (volume resistivity) test.
- XLPE insulation only

\*\* test to be completed on full drum of cable

### **12.3. Routine Tests**

Routine tests shall be carried out on all of the cable on a particular order.

These tests shall be carried out in accordance with the requirements of IS - 8130: 1984/IEC 502 and IS - 5831:1984/IEC 540 unless otherwise specified.

The following shall constitute routine tests.

- Conductor resistance test
- Partial discharge test (for 1 kV and 33kV screened cables only)\*
- High voltage test

\* test to be completed on full drum of cable

#### **12.4. Optional Test**

Cold impact test for outer sheath (IS - 5831 - 1984), which shall be completed at the discretion of the Project Manager and at the same time as test at low temperature for PVC as stipulated in the section on special tests.

#### **12.5. Special tests**

Special tests shall be carried out at the Project Manager's discretion on a number of cable samples selected by the Project Manager from the contract consignment. The test shall be carried out on 10% of the production lengths of a production batch of the same cable type, but at least one production length. Special tests shall be carried out in accordance with the requirements of IEC 502 and IEC 540 unless otherwise specified.

The following special tests shall be included:

- Conductor Examination (IEC-228)
- Check of Dimensions
- 4-Hour High Voltage Test for 11 kV and 33kV Cables only
- Hot set test for XLPE Insulation
- Test at low temperature for PVC

### **13. DETAILS OF TESTS**

#### **13.1. General**

Unless otherwise stated, the tests shall be carried out in accordance with the appropriate part of IS -10810/IEC 502: 1994 and the additional requirements as detailed in this specification.

#### **13.2. Partial Discharge Test**

Partial discharge tests shall only be made on cables insulated with XLPE of rated voltages above 1.9/3.3kV.

For multicore cables, the test shall be carried out on all insulated cores, the voltage being applied between each conductor and the metallic screen.

The magnitude of the partial discharge at a test voltage equal to  $1.5U_0$  shall not exceed 20pC for XLPE and 40pC for PVC, where  $U_0$  is the power frequency voltage between the conductor and earth or J metallic screen.

### **13.3. Bending Test**

The diameter of the test cylinder shall be  $20(d + D) \pm 5\%$  for single core cables and  $15(d + D) \pm 5\%$  for multicores, where D is the overall diameter of the completed cable in millimetres and d is the diameter of the conductor. After completing the bending operations, the test samples shall be subjected to partial discharge measurements in accordance with the requirements of this specification.

### **13.4. Dielectric Power Factor Test**

#### **13.4.1. Tan $\delta$ as a Function of Voltage**

For cables of rated voltage 11/1 kV and above

The measured value of tan  $\delta$  at  $U_0$  shall not exceed 0.004 and the increment of tan  $\delta$  between  $0.5 U_0$  and  $2 U_0$  shall not be more than 0.002.

#### **13.4.2. Tan $\delta$ as a Function of Temperature For cables of rated voltage 11/1 kV and above**

The measured value of tan  $\delta$  shall not exceed 0.004 at ambient temperature and 0.008 at  $90^\circ\text{C}$  for XLPE cables.

### **13.5. Heating Cycle Test**

The sample which has been subjected to previous tests shall be laid out on the floor of the test room and subjected to heating cycles by passing alternating current through the conductor until the conductor reaches a steady temperature  $10^\circ\text{C}$  above the maximum rated temperature of the insulation in normal operation. After the third cycle the sample shall be subjected to a dielectric power factor as a function of voltage and partial discharge test

## **13.7. High Voltage Test**

### **13.7.1. Type/Acceptance Test**

The cable shall withstand, without breakdown, at ambient temperature, an ac voltage equal to  $3U_0$ , when applied to the sample between the conductor and screen/armour (and between conductors in the case of unscreened cable). The voltage shall be gradually increased to the specified value and maintained for a period of 4 hours.

If while testing, interruption occurs during the 4 hour period the test shall be prolonged by the same extent. If the interruption period exceeds 30 minutes the test shall be repeated.

### **13.7.2. Routine Test**

Single core screened cables, shall withstand, without any failure, the test voltages given in this specification for a period of five minutes between the conductor and metallic screen.

Single core unscreened cables shall be immersed in water at room temperature for one hour and the test voltage then applied for 5 minutes between the conductor and water.

Multicore cables with individually screened cores, the test voltage shall be applied for 5 minutes between each conductor and the metallic screen or covering.

Multicore cables without individually screened cores, the test voltage shall be applied for 5 minutes in succession between each insulated conductor and all the other conductors and metallic coverings, if any.

### **13.7.3. Test Voltages**

The power frequency test voltage shall be  $2.5 U_0 + 2kV$  for cables at rated voltages, up to and including 3.8/6.6kV, and  $2.5 U_0$  for cables at higher rated voltages.

Values of single phase test voltage for the standard rated voltages are as given in the following table:

Voltage Grade kV	Test Voltage	
	Between conductors and screen/ armour kV(rms)	Between conductors kV(rms)
0.65/1.1	3	3

If, for three core cables, the voltage test is carried out with a three phase transformer, the test voltage between the phases shall be 1.732 times the values given in the above table.

When a DC voltage is used, the applied voltage shall be 2.4 times the power frequency test voltage. In all instances no breakdown of the insulation shall occur.

### **13.8. Flammability Test**

**The period for which the cable shall burn after the removal of the flame shall not exceed 60 seconds and the unaffected portion (uncharred) from the lower edge of the top clamp shall be at least 50mm.**

## **14. CABLE ACCESSORIES**

The accessories are for the following types of cable:

LV (650 - 1100V) PVC, single, three and a half and four core round or sector shaped stranded plain aluminium grade H4 conductor, PVC insulation, inner PVC sheath, steel wire armour for three phase cables and P.V.C. outer sheath.

### **14.1. JOINTS AND TERMINATIONS**

Joints and terminations shall be supplied in complete kit form with all materials and components required to complete the installation. A complete set of instructions for the joint or termination shall also be included in each kit.

All components shall be capable of being stored without damage or deterioration at temperatures up to 50°C. The material expiry date shall be marked on all packages, where appropriate.

Details of all equipment, tools and protective clothing required to complete the joint or termination shall be included with each joint or termination kit.

Components shall not be adversely affected in any manner by contact with other materials normally used in the construction of cable joints or terminations and shall not increase the rate of corrosion of any metals with which they may come into contact.

Components supplied with adhesive coatings shall have means to prevent the coated surfaces from adhering to each other.

Joints and terminations for armoured or screened cables shall include all items needed for wire or tape clamping. Rings shall be provided for such application.

The recovered thickness of insulation over the connector shall be uniform and equal to or greater than the cable insulation thickness as given in IEC 502/IS - 1554/IS - 7098.

The protection provided by the galvanised steel wire armouring shall be reinstated over the joint (s). Electric field stress control shall be provided on all of the High Voltage joints and terminations.

Joints shall provide waterproofing, mechanical and electrical protection, and be completely sealed from cable jacket to cable jacket. Joints shall accommodate crossing of the cores.

Where required 33kV, 1 kV and 1.1 kV cable joints shall be straight through joints only.

Terminations shall be designed to provide a complete moisture seal, including the crotch area of multi-core cables and complete rejacketing of the individual cores, conforming to Class 1 terminations as per IEEE 48. They shall be generally suitable for indoor and outdoor installation, be resistant to ultra violet radiation and chemical attack.

Minimum creepage distance for outdoor terminations shall not be less than:

Adhesives used shall have a softening temperature of not less than 90° C, be compatible with other components and after curing shall not flow at temperatures of normal service.

- 1.1 kV, terminations shall be designed so that no insulating or semi-conducting tapes shall be required. Reinstallation of the insulation and semi - conducting cover shall be achieved with the use of multiple layers of heat shrinkable tubes possessing high dielectric strength and thermal stability.

Phase identification colours shall be marked on the cable box, cable tail ends and single core cables at all connecting points and/or any positions the engineer in charge may determine. Cable boxes shall be provided with suitable labels indicating the purpose of the supply where such supply is not obvious or where the Project Manager may determine.

All cables shall be identified and shall have phase colours marked at their termination.

#### **14.2. CONNECTORS/TERMINALS**

Connectors and terminals shall perform without distress under normal loading, cyclic loading and fault conditions, and shall not limit the rating of the cables, which they joint.

33kV connections shall be compressed by hydraulically operated tools and 1 | kV /LV connectors by hand operated tools. The range of connectors/terminals should be kept to a minimum so as limit the the range of dies which may required and the use of die-less compression tools of the tension or non-tension type shall be permitted. Only approved and proven compression tools supplied by a reputable manufacturer shall be used.

The ends of connectors/terminals shall be suitably chamfered or coned to facilitate insertion of the conductors. Connectors shall have a solid central barrier to facilitate the insertion of the conductor to the correct depth.



The following items of information shall be clearly stamped on each connector/terminal:

- Manufacturer's name or trade mark.
- The conductor size (metric) for which the connector/terminal is suitable.
- The die number or size suitable for compressing the connector/terminal.
- The part of the connector/terminal surface to be compressed.
- The sequence of die action from the starting point and finishing point.

Compounds or greases for improving contact between the connector/terminal and the conductor are permitted. They must, however, be chemically neutral to the connector/terminal and conductor materials and must be present in position in the delivered connectors/terminals.

Cable connectors/terminals shall be able to accommodate typical variations in dimensions of cables supplied by different manufacturers.

Connector/terminal material shall not react chemically with the cable conductors to which they are connected.

Size and type of connectors required:

Straight through connectors for the following conductors:

- 300 - 300 mm<sup>2</sup> stranded round plain aluminium
- 185-185 mm<sup>2</sup> stranded round plain aluminium
- 120-120 stranded sector shaped plain aluminium Termination lugs for the following conductors:
  - 300 mm<sup>2</sup> stranded round and sector shaped plain aluminium
  - 185 mm<sup>2</sup> stranded round plain aluminium
  - 150 mm<sup>2</sup> stranded sector shaped plain aluminium for the neutral of the 3.5 core 300 mm<sup>2</sup> cable.
  - 120 mm<sup>2</sup> stranded round and sector shaped plain aluminium
  - 70 mm<sup>2</sup> stranded round plain aluminium
  - 50 mm<sup>2</sup> stranded round plain aluminium

Termination lugs shall be suitable for bi-metallic connections.

Terminals for pole top terminations of 33kV and 1 kV cables shall be of the post type capable of accepting a tap off connector. Appropriate tap off connectors shall be provided for making connections from the cable to the line conductors.

### **PART 3 : GENERAL PARTICULARS AND GUARANTEES**

#### **15. COMPLIANCE WITH SPECIFICATION**

The power and control cables shall comply in all respects with the requirements of this specification. However, any minor departure from the provisions of the specification shall be disclosed at the time of bidding in the Non Compliance Schedule in this document.

The mass and dimensions of any item of equipment shall not exceed the figures stated in the schedules.

#### **16. COMPLIANCE WITH REGULATIONS**

All the equipment shall comply in all respects with the Indian Regulations and Acts in force.

The equipment and connections shall be designed and arranged to minimise the risk of fire and any damage which might be caused in the event of fire.

#### **17. QUALITY ASSURANCE, INSPECTION AND TESTING**

##### **17.1. General**

To ensure that the supply and services under the scope of this Contract, whether manufactured or performed within the Contractor's works or at his sub-contractor's premises or at any other place of work are in accordance with the Specification, with the regulations and with relevant authorised international or Indian Standards, the Contractor shall adopt suitable Quality Assurance Programmes and Procedures to ensure that all activities are being controlled as necessary.

The quality assurance arrangements shall conform to the relevant requirements of ISO 9001 or ISO 9002 as appropriate.

The systems and procedures which the Contractor will use to ensure that the Plant complies with the Contract requirements shall be defined in the Contractor's Quality Plan for the Works. The Contractor shall operate systems which implement the following:

**Hold Point:-** "A stage in the material procurement or workmanship process beyond which work shall not proceed without the documented approval of designated individuals or organisations."

The Project Manager's written approval is required to authorise work to progress beyond the Hold Points indicated in approved Quality Plans.

**Notification Point:-** "A stage in material procurement or workmanship process for which advance notice of the activity is required to facilitate witness."

If the Project Manager does not attend after receiving documented notification in accordance with the agreed procedures and with the correct period of notice then work may proceed.

### **17.2. Quality Assurance Programme**

Unless the Contractor's Quality Assurance System has been audited and approved by the Project Manager, a Quality Assurance Programme for the Works shall be submitted to the Project Manager for approval a minimum of one month from contract award, or such other period as shall be agreed with the Project Manager. The Quality Assurance Programme shall give a description of the Quality System for the Works and shall, unless advised otherwise, include details of the following:

- The structure of the organisation;
- The duties and responsibilities assigned to staff ensuring quality of work;
- The system for purchasing, taking delivery and verification of materials;
- The system for ensuring quality of workmanship;
- The system for control of documentation;
- The system for the retention of records;
- The arrangements for the Contractor's internal auditing;
- A list of the administration and work procedures required to achieve and verify Contract's quality requirements. These procedures shall be made readily available to the Project Manager for inspection on request.

### **17.3. Quality Plans**

The Contractor shall draw up for each section of the work Quality Plans which shall be submitted to the Project Manager for approval at least two weeks prior to the commencement of work on the particular section. Each

Quality Plan shall set out the activities in a logical sequence and, unless advised otherwise, shall include the following:

- An outline of the proposed work and programme sequence;
- The structure of the Contractor's organisation for the Contract;
- The duties and responsibilities assigned to staff ensuring quality of work for the Contract;
- Hold and Notification Points;
- Submission of engineering documents required by the specification;
- The inspection of materials and components on receipt;
- Reference to the Contractor's Work Procedures appropriate to each activity;
- Inspection during fabrication/construction;
- Final inspection and test.

**17.4. Non-conforming product**

The Project Manager shall retain responsibility for decisions regarding acceptance, modification or rejection of non-conforming items.

**17.5. Sub-contractors**

The Contractor shall ensure that the Quality Assurance requirements of this specification are followed by any sub-contractors appointed by him under the Contract.

The Contractor shall assess the sub-contractor's Quality Assurance arrangements prior to his appointment to ensure compliance with the appropriate ISO 9000 standard and the specification.

Auditing of the sub-contractor's Quality Assurance arrangements shall be carried out by the Contractor and recorded in such a manner that demonstrates to the Project Manager the extent of the audits and their effectiveness.

**17.6. Inspection and testing**

The Project Manager shall have free entry at all times, while work on the contract is being performed, to all parts of the manufacturer's works which concern the processing of the equipment ordered. The manufacturer shall afford the Project Manager without charge, all reasonable facilities to

assure that the equipment being furnished is in accordance with this specification.

The equipment shall successfully pass all the type tests, acceptance tests and routine tests referred to in the section on Tests and those listed in the most recent edition of the standards given in this specification.

The Project Manager reserves the right to reject an item of equipment if the test results do not comply with the values specified or with the data given in the technical data schedule.

Type tests shall be carried out at an independent testing laboratory or be witnessed by a representative of such laboratory or some other representative acceptable to the Project Manager. Routine and acceptance tests shall be carried out by the Contractor at no extra charge at the manufacturer's works.

Type Test certificates shall be submitted with the bid for evaluation. The requirement for additional type tests will be at the discretion of the Project Manager.

The Project Manager may witness routine, acceptance and type tests. In order to facilitate this, the Contractor shall give the Project Manager a minimum of four weeks notice that the material is ready for testing. If the Project Manager does not indicate his intention to participate in the testing, the manufacturer may proceed with the tests and shall furnish the results thereof to the Project Manager.

Full details of the proposed methods of testing, including connection diagrams, shall be submitted to the Project Manager by the Contractor for approval, at least one month before testing.

All costs in connection with the testing, including any necessary re-testing, shall be borne by the Contractor, who shall provide the Project Manager with all the test facilities which the latter may require, free of charge. The Project Manager shall have the right to select the samples for test and shall also have the right to assure that the testing apparatus is correct. Measuring apparatus for routine tests shall be calibrated at the expense of

the Contractor at an approved laboratory and shall be approved by the Project Manager.

The Contractor shall be responsible for the proper testing of the materials supplied by sub-contractors to the same extent as if the materials were completed or supplied by the Contractor.

Any cost incurred by the Project Manager in connection with inspection and re-testing as a result of failure of the equipment under test or damage during transport or off-loading shall be to the account of the Contractor.

The Contractor shall submit to the Project Manager five signed copies of the test certificates, giving the results of the tests as required. No materials shall be dispatched until the test certificates have been received by the Project Manager and the Contractor has been informed that they are acceptable.

The test certificates must show the actual values obtained from the tests, in the units used in this specification, and not merely confirm that the requirements have been met.

In the case of components for which specific type tests or routine tests are not given in this specification, the Contractor shall include a list of the tests normally required for these components. All materials used in the Contract shall withstand and shall be certified to have satisfactorily passed such tests.

No inspection or lack of inspection or passing by the Project Manager's Representative of equipment or materials whether supplied by the Contractor or sub-contractor, shall relieve the Contractor from his liability to complete the contract works in accordance with the contract or exonerate him from any of his guarantees.

#### **17.7. Guarantee**

The Contractor shall guarantee the following :

- Quality and strength of materials used;
- Satisfactory operation during the guarantee period of one year from the date of commissioning, or 18 months from the date of acceptance of the

equipment by the Project Manager following delivery, whichever is the earlier;

- Performance figures as supplied by the Bidder in the schedule of guaranteed reticular.

### **20.1. Packing**

The cable shall be wound on strong drums or reels capable of withstanding all normal transportation and handling.

Each length of cable shall be durably sealed before shipment to prevent ingress of moisture. The drums, reels or coils shall be lagged or covered with suitable material to provide physical protection for the cable during transit and during storage and handling operations.

In the case of steel drums adequate precautions shall be taken to prevent damage being caused by direct contact between the cable sheath and the steel. These precautions shall be subject to the approval of the Project Manager.

If wooden drums are used then the wood shall be treated to prevent deterioration from attack by termites and fungi.

Each drum or reel shall carry or be marked with the following information:

- Individual serial number
- Employer's name
- Destination
- Contract Number
- Manufacturer's Name
- Year of Manufacture
- Cable Size and Type
- Length of Conductor (metres)
- Net and Gross Mass of Conductor (kg)
- All necessary slinging and stacking instructions.
- Destination;
- Contractor's name;
- Name and address of Contractor's agent in Orissa;
- Country of origin;

The direction of rolling as indicated by an arrow shall be marked on a flange.

## **20.2. Storage**

The site selected for the storage of cable drums shall be well drained and preferably have a concrete/firm surface which will prevent the drums sinking into the ground or being subjected to excess water thus causing flange rot.

All drums shall be stood on battens, in the upright position, and in such a manner to allow sufficient space between them for adequate air circulation. During storage the drums shall be rotated 90° every three months. In no instances shall the drums be stored "flat" on their flanges or one on top of each other.

## **20.3. Shipping**

The Contractor shall be responsible for the shipping of all cables, drums and reels supplied from abroad to the ports of entry and for the transport of all goods to the various specified destinations including customs clearance, offloading, warehousing and insurance.

## **23. SURFACE TREATMENT**

Where galvanised steel armour wire is used then the Contractor shall indicate his galvanising process utilised and its conformance with this specification

### **23.1. Galvanising**

All galvanising shall be carried out by the hot dip process, in accordance with Specification ISO 1460 or IS 2629. However, high tensile steel nuts, bolts and spring washers shall be electro galvanised to Service Condition 4. The zinc coating shall be smooth, continuous and uniform. It shall be free from acid spots and shall not scale, blister or be removable by handling or packing. There shall be no impurities in the zinc or additives to the galvanic bath which could have a detrimental effect on the durability of the zinc coating.

Before pickling, all welding, drilling, cutting, grinding and other finishing operations must be completed and all grease, paint, varnish, oil, welding



slag and other foreign matter completely removed. All protuberances which would affect the life of galvanising shall also be removed.

The weight of zinc deposited shall be in accordance with that stated in Standard BS 729, ISO 1460 or IS 2629 and shall be not less than 0.61kg/m<sup>2</sup> with a minimum thickness of 86 microns for items of thickness more than 5mm, 0.46 kg/m<sup>2</sup> (64 microns) for items of thickness between 2mm and 5mm and 0.33 kg/m<sup>2</sup> ( 47 microns ) for items less than 2mm thick.

Parts shall not be galvanised if their shapes are such that the pickling solution cannot be removed with certainty or if galvanising would be unsatisfactory or if their mechanical strength would be reduced. Surfaces in contact with oil shall not be galvanised unless they are subsequently coated with an oil resistant varnish or paint.

In the event of damage to the galvanising the method used for repair shall be subject to the approval of the Project Manager or that of his representative.

Repair of galvanising on site will generally not be permitted.

The threads of all galvanised bolts and screwed rods shall be cleared of sheller by spinning or brushing. A die shall not be used for cleaning the threads unless specifically approved by the Project Manager. All nuts shall be galvanised. The threads of nuts shall be cleaned with a tap and the threads oiled.

Partial immersion of the work shall not be permitted and the galvanising tank must therefore be sufficiently large to permit galvanising to be carried out by one immersion.

After galvanising no drilling or welding shall be performed on the galvanised parts of the equipment excepting that nuts may be threaded after galvanising. To avoid the formation of white rust, galvanised material shall be stacked during transport and stored in such a manner as to permit adequate ventilation. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanisation.

The galvanised steel shall be subjected to test as per IS-2633.

## 24. COMPLETENESS OF CONTRACT

All fittings or accessories, although not specifically mentioned herein, but necessary or usual for similar equipment and their efficient performance shall be provided by the Contractor without extra charges. The bid shall clearly indicate if any additional equipment or parts would be necessary to give a complete offer and if so, the details and the prices shall be included in the bid.

### 1100V Cable Schedule

The Contractor must complete a schedule for each size of cable supplied

ITEM NO.	DESCRIPTION	UNITS	BIDDERS OFFER
1	Standards to which the cable conforms	IS-1554/IEC 502	
2	Catalogue Number	-	
3	Conductor Material	-	
4	Conductor Strands	Number	
5	Conductor Shape	-	
6	Conductor cross sectional area	mm <sup>2</sup>	
7	Outer Diameter of Conductor	mm	
8	Number of Cores	—	
9	Reduced neutral conductor cross sectional area	mm <sup>2</sup>	
10	Insulation Material	-	
11	Minimum thickness of insulation	mm	
12	Nominal thickness of insulation	mm	
13	Outer Diameter over insulation	mm	
14	Nominal thickness of inner sheathing	mm	
15	Sheath Material	-	

16	Type of armoring	—	
17	Number and diameter/size of Armour wires/strips	No/mm	
18	Minimum outer sheath thickness	mm	
19	Nominal outer sheath thickness	mm	
20	Overall diameter of cable	mm	
21	Minimum Bending Radius	mm	
22	Cable identification per Clause 9	-	
23	Rated Voltage per IEC 502/IS - 1554	kV	
24	Conductor DC resistance per km at 20°C	ohm/km	
25	Conductor AC resistance per km at 20°C and 50Hz	ohm/km	
26	Maximum continuous rating of cable in the conditions outlined in Clause 4: System Conditions	A	
27	Minimum insulation resistance per km at 90°C	Mohm/km	
28	Maximum permissible continuous conductor temperature	°C	
29	Maximum permissible continuous outersheath temperature	°C	
30	DC test voltage for 15 mins. after installation	kV	
31	Delivery length per drum	m	
32	Weight of conductor per km	kg/km	
33	Weight of cable per km	kg/km	
34	Gross weight of full cable drum	kg	
35	Outer diameter of the cable drum	mm	
36	Width of cable drum	mm	

37	Maximum permissible cable pulling tension	kg	
38	Maximum permissible cable side wall pressure	kg	
39	Manufacturers Name	-	
40	Country of Origin	-	

### **SCHEDULE OF GUARANTEED PERFORMANCE & OTHER PARTICULARS OF CABLES**

(Must be filled in by the tenderer)

The particulars given in this schedule will be binding upon the contractor and must be departed from without the written permission of the General Manager / Competent authority.

<b>Sr. No.</b>	<b>Description</b>	
1.	System voltage.	
2.	Make of cable.	
3.	Type of cable	
4.	IS or other specification to which the cable is manufactured	
5.	Conductor material and its grade	
6.	i) Number of wires in each conductor in nos. ii) Nominal dia of wire dia each conductor in No. X mm	
7.	No. cores and nominal cross sectional area of each conductor in No. X sq. mm	
8.	Shape of conductors.	
9.	Core identification	
10.	Material used for insulation	
11.	Total thickness of insulation used over each conductor in mm.	
12.	Specific insulation resistance of dielectric ohm-Cm.	
13.	Maximum thermal resistivity of dielectric in electric measure (i.e. difference in C between opposite faces of a cm.cube of the dielectric to transfer 1 Watt of heat).	
14.	Type width and thickness of screen – mm a) Conductor	

	b) Insulation	
15.	Type of extrusion / curing process	
16.	Minimum thickness of Inner Sheath	
17.	Material used for Inner Sheath	
18.	Method of application of Inner Sheath	
19.	Minimum thickness of Outer Sheath in mm.	
20.	Material used for Outer Sheath	
21.	Type and size (i.e. Nominal diameter of armour wire) of Armouring in sq. mm.	
22.	Total cross sectional area of Armouring in sq. mm.	
23.	Calculated diameter over laying up cores (Calculated as per fictitious method to IS 10462 Part-I) in mm.	
24.	Calculated diameter of cable over inner sheath in mm. (calculated as per IS 10462 Part-I)	
25.	Calculated diameter of cable over armouring (as per fictitious method to IS 10462 Part-I in mm.	
26.	Approximate overall diameter of cable in mm.	
27.	Approximate total weight of aluminium conductor in 1000 mtrs. Length of finished cable in kgs	
28.	Max. thermal resistivity of outer sheath in electrical measure (i.e. difference in C between opposite face of cm. Cube of the dielectric to cause transfer of 1 watt of heat)	
29.	Total length of cable for each drum in meteres.	
30.	Total weight of each drum length of cable in Kg.	
31.	Total weight of each drum length of cable with drum	
32.	Size of each drum	
33.	No. of years the design of the cable offered is in service	
34.	Continuous safe current carrying capacity for following conditions for a single cable –  a) Ground temperature	

	b) Thermal resistivity of soil 120 C cm/w c) Depth of laying 1070 mm.	
35.	Continuous current rating in air at 40 C	
36.	Maximum permissible temperature rise of the conductor for continuous capacity	
37.	Current density under conditions stipulated in 34 above a) Duct b) Air c) Ground	
38.	Insulation resistance – Meg. Ohms. Per 1000 Metres of finished cable at 20 C.	
39.	Conductor resistance-ohms per 1000 Metres of finished cable at 20 C.	
40.	Conductor reactance –ohms per 1000 Metres of finished cable at 20C	
41.	Specific inductive capacity Micro – farads per 1000 Metres of finished cable at 20 C.	
42.	Impulse level	
43.	Positive sequence impedance of cable per 1000 metres in ohms.	
44.	Negative sequence impedance of cable per 1000 metres in ohms	
45.	Zero sequence impedance of cable per 1000 metres in ohms	
46.	Maximum allowable assymetrical fault current to earth for 1 sec	
47.	Maximum allowable symmetrical short circuit current for a duration of one second.	

Signature of the \_\_\_\_\_

Tenderer \_\_\_\_\_

Common Seal