

**REQUEST FOR
OFFERS FOR
SUPPLY OF 24F OPGW CABLE AND OFAC ALONG WITH
ACCESSORIES**

REF. NO. : TCIL/052/717/011/10-NT

DATE : 08-04-2011

ISSUED BY

Group General Manager (NT)
Fourth Floor,
Fax :+91 (11) 26242266
Tel: +91 (11) 26202408
Email: hk.verma@tcil-india.com
visit us at <http://www.tcil-india.com>


	<p>Telecommunications Consultants India Ltd. (A Govt. of India Enterprise) TCIL Bhawan, Greater Kailash-I New Delhi – 110 048 (India)</p>	<p>IS/ISO 9001</p> 
---	--	--

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE NO.</u>
1.	NOTICE INVITING OFFERS	3-4
2.	INSTRUCTIONS TO PARTICIPATING PARTIES	5-10
3.	GENERAL CONDITIONS OF THE CONTRACT	11-17
4.	SPECIAL CONDITIONS OF THE CONTRACT	18-20
5.	BILL OF QUANTITY & PRICE BID SCHEDULE	21
6.	TECHNICAL SPECIFICATION	22-23
7.	PERFORMANCE BANK GUARANTEE (Format)	24

SECTION - 1

Reference No.: TCIL/052/717/011/10-NT

Date : 08.04.2011

REQUEST FOR OFFERS

Sealed offers are invited from eligible/experienced firms/organizations/suppliers for the “ Supply of 24F OPGW cable and OFAC along with accessories” for APTRANSCO project Hyderabad.

The documents are enclosed.

Complete set of documents are also available on TCIL’s website, address given below:

<http://www.tcil-india.com>

The documents downloaded by the parties from the website shall be valid for participation.

ELIGIBILITY CRITERIA :

- a) The manufacturer should have valid ISO 9000:2000 certification.
 - b) Average Annual Financial Turnover of the bidder during the last 3 years, ending March 2005 should be at least Rs.2.52 Crore (equivalent US\$ 0.6 Million).
 - c) Experience of having successfully supplied similar items during the last seven years ending March, 2011 should be either of the following :
 - i) Three similar supplies each completed each costing not less than Rs. 2 Cr.(equivalent US\$ 0.45 million) in not more than a supply period. of 8 weeks.
 - ii) Two similar supplies each costing not less than Rs. 2.5 Cr. (equivalent US\$ 0.6 million) in not more than a supply period. of 8 weeks.
- OR
- iii) One similar supply costing not less than Rs. 4.34 Crore (equivalent US\$.96 million) in not more than a supply period. of 8 weeks.

Documents in support of the above eligibility criteria shall be required to be submitted by the parties/suppliers.

Two stage offer system shall be adopted, i.e., Techno-Commercial Offer and Price Offer.

The offers shall be submitted in the office of Group General Manager (NT), TCIL, 4th Floor, TCIL Bhawan, Greater Kailash-I, New Delhi – 110 048 on or before 15:00 hrs., on 22.04.2011.

In the first stage, the Techno-Commercial Offers shall be opened on 16:00 hrs., on 22.04.2011.

The Price Offers of only those parties who qualify in the first stage shall be opened at time and date to be notified separately.

TCIL reserves the right to accept or reject any or all the offers without assigning any reason.

(**HK Verma**)
Group General Manager (NT)

- **END OF SECTION 1** -

SECTION - 2

Reference No.: TCIL/052/717/011/10-NT

Date : 08.04.2011

INSTRUCTIONS

- 2.1 INTRODUCTION (DEFINITIONS)
- 2.2 DOCUMENTS
- 2.3 AMENDMENT TO DOCUMENTS
- 2.4 EXTENSION OF TIME
- 2.5 PRICE
- 2.6 ELIGIBILITY AND QUALIFICATIONS
- 2.7 SUBMISSION OF OFFER
- 2.8 VALIDITY PERIOD OF OFFER
- 2.9 FORMAT OF SIGNING OF THE OFFERS
- 2.10 DEADLINE FOR SUBMISSION OF OFFER
- 2.11 LATE OFFERS
- 2.12 MODIFICATION AND WITHDRAWAL OF OFFERS
- 2.13 OPENING OF OFFERS
- 2.14 CLARIFICATION OF OFFERS
- 2.15 EVALUATION OF OFFERS
- 2.16 PURCHASER'S RIGHT TO VARY QUANTITIES
- 2.17 PURCHASER'S RIGHT TO ACCEPT ANY OFFER AND TO REJECT ANY OR ALL OFFERS
- 2.18 POST OFFER CLARIFICATIONS
- 2.19 DELIVERY

2.1 **INTRODUCTIONS (DEFINITIONS)**

The “Purchaser” means Telecommunications Consultants India Ltd. (TCIL), its Head Quarter at New Delhi or any other project/branch offices within or outside India.

The “Goods/Products” means all the Hardware equipments, Instruments, tools, machinery etc., and/or other materials like components/parts/spares including consumables, which the Supplier is required to supply to the Purchaser under the Purchase Order.

“Purchase Order/Work Order (PO)” means the order placed by the Purchaser on the Supplier duly signed by the Purchasers authorized representative to purchase certain goods and services from the vendor/contractor.

“Contract Price” means consideration payable to the Supplier/contractor as stipulated in the Purchase or Work Order for performance of specified contractual obligations.

“Supplier” means the individual or firm or corporate body whose offer to supply the goods/provide the services has been accepted by the Purchaser under the Purchase Order.

2.2 **DOCUMENTS**

2.2.1 Documents include:-

Section 1	Notice Inviting Offers
Section 2	Instructions
Section 3	General Conditions of the Contract
Section 4	Special Conditions of the Contract
Section 5	Bill of Quantity & Price Bid Schedule
Section 6	Technical Specification
Section 7	Performance Bank Guarantee

2.2.2 Any clarification or communications obtained from the Purchaser.

2.3 **AMENDMENT TO DOCUMENTS**

2.3.1 At any time, prior to the date of submission of offers, the Purchaser may for any reason, whether at its own initiative or in response to a clarification requested by a prospective supplier, modify the documents by amendments.

2.3.2 The amendments will be notified in writing or by telex or fax to all prospective parties/Suppliers who have received the bid documents and these amendments will be binding on them.

2.4 **EXTENSION OF TIME**

In order to give prospective parties/Suppliers required time in which to take the amendments into action in preparing their offer, the Purchaser may at its discretion extend the deadline for submission of offer suitably.

2.5 **PRICE**

- a) Unit prices/rates shall be quoted on CIF Chennai Sea Port (India) basis in US\$ by foreign sources and FOR Project site, Hyderabad basis in INR by indigenous sources, and shall be valid for a period of 120 days from the offer opening date.
- b) Mode of shipment shall be by Sea for foreign parties and by Road for indigenous parties.

2.6 **ELIGIBILITY AND QUALIFICATIONS**

Parties/suppliers shall furnish as a part of offer documents establishing their eligibility to supply the material. The parties shall also submit documentary evidence in the form of literature, drawing, data on the goods offered. Parties shall be required to submit certificate to prove their capability with respect to personnel, equipment and manufacturing capabilities to supply the items. Experience and past performance certificate issued by their customer/customers on similar contracts for last two years and documentary proof in support of "Eligibility Criteria" as in Section-1.

2.7 **SUBMISSION OF OFFERS**

Sealed offer shall be submitted in two separate envelopes.

Envelope 1 - superscribed as PART-1(Technical Offer) shall contain the following:

- a) Documentary evidence in respect of the eligibility criteria mentioned in the Notice Inviting Offer.
- b) Compliance to technical specification.
- c) A clause-by-clause compliance to all Terms & Conditions of the tender specified at Section 1,2, 3, 4, 5, 6 & 7.

Envelope 2 - superscribed as PART-II (Financial Offer) shall contain the Price Offer Schedule.

- (i) A single cover containing both the envelopes (i.e. Envelope 1 & Envelope 2 sealed separately) shall be addressed to the Purchaser at the following address:

**Group General Manager (NT)
Telecommunications Consultants India Limited,
NT Division,
TCIL Bhawan, 4th Floor,
Greater Kailash – I, New Delhi- 110048. INDIA
Tel: +91-11-26202020 / Extn. 2408
Fax: +91-11-26242266 / 26241847**

- (ii) All the three envelopes (one outer and two inner) shall bear the **Description of item, the Project name and the Reference Number with the words 'DO NOT OPEN BEFORE' (due date and time).**
- (iii) The inner and outer envelopes shall indicate the name and address of the parties/suppliers to identify the offer and to enable the offer to be returned unopened in case it is declared 'late' or 'rejected'.

- (iv) Sealed offers may be sent by Courier/Post or delivered in person on above-mentioned address. The responsibility for ensuring that the offers are delivered in time would vest with the parties/Suppliers.
- (v) Offers delivered in person on the day of offer opening shall be dropped in the box kept in MM Division at 4th floor up to the time mentioned in the request for offer. The purchaser shall not be responsible if the offers are delivered elsewhere.

The following officers can be contacted :

Mr. H.K.Verma
Group General Manager (NT)
Tel. : 26202020/Extn. 2408

Mr Subhasis Pal
Sr. Manager (NT)
Tel.: 26202020/Extn.2414

- (vi) Offers received through fax/e-mail or through open letter shall be ignored.

2.8 **VALIDITY PERIOD OF OFFER**

Offer shall remain valid for 120 days after the date of opening. The offer valid for a shorter period shall be rejected by the Purchaser as non-responsive.

In exceptional circumstances, the Purchaser may request the consent of the parties for an extension to the period of validity. A party accepting the request and granted extension will not be permitted to modify his offer.

2.9 **FORMAT OF SIGNING OF THE OFFER**

- 2.9.1 The party/Supplier shall prepare two copies of the offer clearly marking one copy as “Original Copy” and the other as “Copy”.
- 2.9.2 In the event of any discrepancy between the above two, the original shall prevail.
- 2.9.3 The original copy of the offer shall be typed and shall be signed by the party/Supplier or a person duly authorized by the party/Supplier. The Letter of Authorization shall be accompanied by a written Power of Attorney accompanying the offer.
- 2.9.4 All pages of the original offer except printed literature shall be initialed by the person signing the offer.
- 2.9.5 The offer shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the party/Supplier in which case such corrections shall be initialed by the party/Supplier signing the offer.

2.10 **DEADLINE FOR SUBMISSION OF OFFER**

Offer must be received by the Purchaser at the address specified and not later than the date and time specified in the Notice Inviting Offers.

2.11 **LATE OFFER**

Any offer received late by the Purchaser after the deadline for submission of the offer shall be rejected and may be returned un-opened to the party.

2.12 **MODIFICATION AND WITHDRAWAL OF OFFERS**

2.12.1 The party may modify or withdraw his offer provided that written notice of modification or withdrawal is received by the Purchaser prior to the deadline prescribed for submission of offers.

2.12.2 No party may modify or be allowed to withdraw offer subsequent to the deadline for submission of offers.

2.13 **OPENING OF TECHNICAL OFFERS (PART-1)**

Technical offers shall be opened at the time on the due date mentioned on the Notice Inviting Offers.

2.14 **CLARIFICATION OF OFFERS**

2.14.1 To assist evaluation and comparison of the offers, the Purchaser may at its discretion ask the party for clarification of the offer. The clarification and response from party shall be in writing.

2.14.2 The Purchaser does not bind himself to accept the lowest or any offer and reserves to himself the right to accept the whole or any part of the offer and altering the quantities offered and party shall supply the same at the rate offered.

2.15 **EVALUATION OF OFFERS**

2.15.1 The Purchaser shall evaluate the offers in respect to the substantive responsiveness of the offer or otherwise. The Purchaser shall carry out detailed evaluation of the substantially responsive offers. The Purchaser shall check the offer to determine whether they are complete, whether any computational errors have been made or required sureties have been furnished.

2.15.2 Arithmetical error shall be rectified on the following basis :-

a) if there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected by the Purchaser.

b) in case of discrepancy between words and figures, the amount in words shall prevail.

2.15.3 An offer determined as substantially non-responsive shall be rejected by the Purchaser.

2.15.4 The Purchaser may waive any minor non-conformity or irregularity in the offer provided it does not constitute a material deviation.

2.15.5 The Purchaser shall evaluate in detail and compare the offers, which are substantially responsive.

2.16 **PURCHASER'S RIGHT TO VARY QUANTITIES**

2.16.1 The Purchaser reserves the right at the time of award of the contract to increase or decrease the quantity of the goods and services specified in the schedule of requirement without any change in unit price of the ordered quantity.

2.16.2 In case of division of order among a number of parties, the distribution of quantity will be accordingly done by the Purchaser on an individual offer.

2.17 **PURCHASER'S RIGHT TO ACCEPT ANY OFFER AND TO REJECT ANY OR ALL OFFERS**

The Purchaser does not bind himself to accept the lowest or any other offer and has the right to cancel the process and reject all offers at any time prior to award of the contract without assigning any reasons whatsoever and without thereby incurring any liability to the affected party on the grounds of Purchaser's action.

2.18 **POST OFFER CLARIFICATIONS**

No post- offer clarification at the initiative of the party/Supplier shall be entertained and any effort by the parties/Suppliers to influence the Purchaser in the offer evaluation, offer comparison or award of the contract shall result in rejection of the offer.

2.19 **DELIVERY**

Delivery of the goods shall be made by the Supplier in accordance with the terms specified by the Purchaser in the Special Conditions of the Contract and goods shall remain at the risk of the Supplier until delivery has been completed in full. The Schedule of delivery shall be the essence of the contract.

-END OF SECTION 2-

SECTION - 3

Reference No.: TCIL/052/717/011/10-NT

Date : 08.04.2011

GENERAL CONDITIONS OF THE CONTRACT

- 3.1 PRICE APPLICABILITY
- 3.2 STANDARDS
- 3.3 PATENT RIGHTS
- 3.4 PERFORMANCE SECURITY
- 3.5 INSPECTION AND TESTS
- 3.6 WARRANTY
- 3.7 CHANGE ORDERS
- 3.8 SUB-LETTING
- 3.9 LIQUIDATED DAMAGES
- 3.10 RESOLUTION OF DISPUTES
- 3.11 ARBITRATION
- 3.12 RISK PURCHASE
- 3.13 APPLICABLE LAWS
- 3.14 GENERAL LIEN
- 3.15 PACKING
- 3.16 FORCE MAJEURE
- 3.17 TERMINATION FOR DEFAULT
- 3.18 TERMINATION FOR INSOLVENCY
- 3.19 RIGHT TO DISQUALIFY
- 3.20 RIGHT TO BLACK LIST

3.1 **PRICE APPLICABILITY**

Prices in the Purchase Order shall remain valid for the period of delivery schedule or extended delivery schedule. In case of delayed supplies, after delivery period, the advantage of reduction of taxes/duties shall be passed onto the Purchaser and no benefit of increase will be permitted to the Supplier.

3.2 **STANDARDS**

The goods supplied under the contract shall conform to the standards mentioned in the Technical Specifications.

3.3 **PATENT RIGHTS**

The Supplier shall indemnify the Purchaser against all third party actions/claims of infringement of patent, trademark or industrial design rights arising from the use of goods or any part thereof.

3.4 **PERFORMANCE SECURITY**

3.4.1 Within 10 days of the Supplier's receipt of Letter of Intent (LOI)/P.O., the Supplier shall furnish a Performance Security for the amount of 10% of the contract/P.O value.

3.4.2 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the contract.

3.4.3 The Performance Bond shall be in the form of Bank Guarantee issued by a scheduled bank situated in New Delhi/Delhi, India and in the format provided by TCIL.

3.4.4 The Performance Bond will be discharged by the Purchaser after completion of the Supplier's obligations including any warranty obligations under the contract.

3.4.5 As regards validity of PBG, please refer to special conditions of the contract (Section-4).

3.5 **INSPECTION AND TESTS**

3.5.1 The Purchaser or its representatives or ultimate client shall have the right to inspect and test the goods for their conformity to the specifications. The Purchaser may also appoint an agency for this purpose. The technical specifications shall specify what inspection and tests the Purchaser requires and where they are to be conducted. Where the Purchaser decides to conduct such tests on the premises of the Supplier, all reasonable facilities and assistance like testing instruments and other test gadgets including access to the drawings and production data shall be furnished to the Inspector free of costs. In case the tested goods fail to conform to the specifications, the Inspector may reject them and the Supplier shall either replace the rejected goods or make alteration necessary to meet the specification requirements free of cost to the Purchaser.

- 3.5.2 Notwithstanding the pre-supply tests and inspections, the material on receipt in the Purchaser's premises shall also be tested and if any material or part thereof is found defective, the same shall be replaced free of cost to the Purchaser.

If any material before it's taken over is found defective or fails to fulfill the requirements of the contract, the Inspector shall give the Supplier notice setting forth details of such defects or failures and the Supplier shall make good the material good or alter the same to make it comply with the requirements of the contract and in any case within a period not exceeding 2 months of the initial report. These replacements shall be made by the Supplier, free of the all charges, at the site(s).

- 3.5.3 As regards Inspecting Authority and other details please refer to Special Condition of the Contract (Section-4).

3.6 **WARRANTY**

- 3.6.1 The Supplier shall give warranty that goods to be supplied shall be new and free from all defects and faults in material, workmanship, and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for materials of the type ordered and shall perform in full conformity with the specifications and drawings. The Supplier shall be responsible for any defects that may develop under the conditions provided by the supplier and under proper use, arising from faulty materials, design or workmanship such as corrosion of the equipment, inadequate contact protection, deficiencies in circuit design and or otherwise and shall remedy such defects at his own cost when called upon to do so by the Purchaser who shall state in writing in what respect goods are faulty. This warrantee shall survive inspection or payment for, and acceptance of goods, 12 months after the goods have been taken over. The Supplier shall submit a declaration that the material sold to the Purchaser under this contract shall be of the best quality and workmanship and shall be strictly in accordance with the specifications. The Supplier shall enclose a guarantee certificate that the said material would continue to conform to the description and quality for the period of warranty.

However, the warranty period and/or any other condition specified if any, in the Special Condition of Contract (Section – 4) the same shall rule.

- 3.6.2 If it becomes necessary for the supplier to replace or renew any defective portion/portions of the equipment under this clause, the provisions of the clause shall apply to the portion/portions of equipment's replaced or renewed or until the end of the above-mentioned period of twelve months, whichever may be later. If any defect is not remedied within a reasonable time, the Purchaser may proceed to get the work done at the Supplier's risk and expenses, but without prejudice to any other rights, which the Purchaser may have against the Supplier in respect of such defects.

Replacement under warranty clause shall be made by the Supplier free of all charges at site including freight, insurance and other incidental charges.

3.7 **CHANGE ORDERS**

- 3.7.1 The Purchaser may at any time by written order given to the Supplier make changes within the general scope of the contract in any one or more of the following: -

Drawings, designs or specifications where goods to be furnished under the contract are to be specifically manufactured for the Purchaser.

- a) Method of transportation or packing.
- b) Place of delivery.
- c) Services to be provided by the supplier.

3.7.2 If any such change causes an increase or decrease in the cost or the time required for the execution of the contractor, an equitable adjustment shall be made in the contract price or delivery schedule or both and the contract shall accordingly be amended.

3.8 **SUB-LETTING**

The Bidder cannot assign or transfer and sub-contract its interest/obligations under the contract without prior written permission of the Purchaser.

3.9 **LIQUIDATED DAMAGES**

3.9.1 The date of the delivery of the goods stipulated in the acceptance of tender should be deemed to be the essence of the contract and the delivery must be completed not later than the dates specified therein. Extension in delivery period will not be given except in exceptional circumstances. Should, however, deliveries be made after expiry of the contract delivery period and accepted by the consignee, such deliveries will not deprive the Purchaser of the right to recover Liquidated Damages.

3.9.2 In case the Supplier fails to supply the material against the order, the material shall be procured from other suppliers at the cost and risk of the Supplier and the excess money will be recovered from any dues of the party.

3.9.3 A sum equal to 2% of the price of any store not delivered or total order value in case where part delivery is of no use to a Purchaser, for a week or part of a week subject to maximum limit of 10% of the total order will be recovered from the Supplier. The Purchaser also reserves the right to cancel the order in such cases and forfeit the Performance Bank Guarantee and may also debar the Supplier for future purchases.

3.9.4 L.D. can be recovered from any dues of the Supplier.

3.10 **RESOLUTION OF DISPUTE**

If any dispute arises between the Parties hereto during the subsistence or thereafter, in connection with the validity, interpretation, implementation or alleged material breach of any provision of the Contract or regarding a question, including the questions as to whether the termination of the Contract by one Party hereto has been legitimate, both Parties hereto shall endeavour to settle such dispute amicably. The attempt to bring about an amicable settlement is considered to have failed as soon as one of the Parties hereto, after reasonable attempts [which attempt shall continue for not less than 30 (thirty) days, given 15 days notice thereof to the other Party in writing.

3.11 **ARBITRATION**

For Foreign Bidders :

Any dispute or differences arising out of the contract which cannot be amicably settled between the supplier and the purchaser shall be decided as per arbitration rules of International Chamber of Commerce, Paris. The decision of the arbitrators shall be final and binding on the parties hereto.

For Indigenous Bidders :

In the event of any dispute arising between TCIL and the Supplier in any matter covered by this contract or arising directly or indirectly there from or connected or concerned with the said contract in any manner of the implementation of any terms and conditions of the said contract, the matter shall be referred to the Chairman & Managing Director, TCIL who may himself act as sole arbitrator or may name as sole arbitrator an officer of TCIL notwithstanding the fact that such officer has been directly or indirectly associated with this contract. The provisions of Arbitration & Conciliation Act of 1996 shall apply to such arbitration. The Supplier expressly agreed that the arbitration proceedings shall be held at New Delhi.

Pending final decision of dispute hereunder the supplier shall proceed diligently with the performance of the order and in accordance with the TCIL's decision.

The proceedings of arbitration shall be in English language.

3.12 **RISK PURCHASE**

3.12.1 In the event of Supplier's failure to execute the contract to the satisfaction of the Purchaser, the Purchaser reserves the right:

- (a) to reject any part of the Contract executed and withhold payment for such portion of the Contract till such time the defects are rectified to the satisfaction of the Purchaser.
- (b) to terminate the Contract by giving 2 weeks notice in writing without assigning any reason and to get the Contract executed by other agency at the risk and cost of the Supplier.

3.13 **APPLICABLE LAWS**

This contract shall be interpreted, construed and governed by the laws of the Republic of India and the parties hereby submit to the exclusive jurisdiction of the Courts at Delhi and to all Courts having jurisdiction in appeal there from.

Any dispute in relation to the contract shall be submitted to the appropriate Court of the Republic of India for determination. The parties to the contract shall continue to fulfill their respective obligations under the contract during the currency of the contract pending the final decision of the Court.

3.14 **GENERAL LIEN**

Whenever under this contract any sum of money is recoverable from and payable by the Supplier, the Company shall be entitled to recover such sum by appropriating in part or in whole the security deposit of the Supplier, if a security is taken from the Supplier. In the event of the Security being insufficient or if no security has been taken from the Supplier, the balance or the total sum recoverable, as may be, shall be deducted from any sum due to the Supplier or which at any time thereafter may become due to the Supplier under this or any other contract with the Company. Should this sum be not sufficient to cover the full amount recoverable, the Supplier shall pay to the Company on demand the remaining balance due.

3.15 **PACKING**

The supplier shall ensure that the Goods/Equipment is securely and adequately packed to ensure safe arrival at the destination fully withstanding all hazards such as rough handling etc. during transit.

3.16 **FORCE MAJEURE**

If any time, during the continuance of this contract, the performance in whole or in part by either party under obligation as per this contract is prevented or delayed by reasons of any war or hostility, act of the public enemy, civil commotion, sabotage, fire, flood, explosion, epidemic, quarantine restrictions, strike, lockout or acts of God (hereinafter referred to "eventuality"), provided notice of happening of any such eventuality is given by either party to the other within 21 days of the date of occurrence thereof, neither party shall be reason of such an "eventuality" be entitled to terminate this contract nor shall either party have any claim or damages against the other in respect of such non-performance or delay in performance and deliveries under the contract. The contract shall be resumed as soon as practicable after such "eventuality" has come to an end or ceased to exist. In case of any dispute, the decision of CMD, TCIL, shall be final and conclusive, provided further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reason of any such eventuality for a period exceeding 60 days, either party may at its option, terminate the contract. Provided also that if the contract is terminated under this clause the Purchaser shall be at liberty to take over from the Supplier at a price to be fixed by the Purchaser, which shall be final, all unused, undamaged and acceptable materials, bought out components and other stores in the course of manufacture which may be in the possession of the Supplier at the time of such termination, or such portion thereof as the Purchaser may deem fit except such material, as the Supplier may, with the concurrence of the Purchaser, elect to retain.

3.17 **TERMINATION FOR DEFAULT**

3.17.1 The Purchaser, may, without prejudice to any other remedy for breach of contract, by written notice of default, sent to the Supplier, terminate this contract in whole or in part.

- a) if the supplier fails to deliver any or all the goods within the time period (s) specified in the contract, or any extension thereof granted by the Purchaser .

- b) if the Supplier fails to perform any other obligation(s) under the contract; and
- c) if the Supplier, in either of the above circumstances, does not remedy his failure within a period of 15 days (or such longer period as the Purchaser may authorize in writing) after receipt of the default notice from the Purchaser.
- d) on a notice period of 30 days.

3.17.2 In the event the Purchaser terminates the contract in whole or in part pursuant to above para the Purchaser may procure, upon such terms and in such manner as it deems appropriate, goods similar to those undelivered and the Supplier shall be liable to the Purchaser for any excess cost for such similar goods. However, the Supplier shall continue the performance of the contract to the extent not terminated.

3.18 **TERMINATION FOR INSOLVENCY**

The Purchaser may at any time terminate the Contract by giving written notice to the Supplier, without compensation to the supplier if the supplier becomes bankrupt or otherwise insolvent as declared by the competent court provided that such termination will not prejudice or effect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

3.19 **RIGHT TO DISQUALIFY**

Purchaser reserves the right to disqualify the supplier for a suitable period who habitually failed to supply the ordered goods in time, further, the suppliers whose goods do not perform satisfactory in accordance with the specifications may also be disqualified for a suitable period as decided by the purchaser.

3.20 **RIGHT TO BLACKLIST**

Purchaser reserves the right to blacklist a bidder for a suitable period in case he fails to honour his bid without sufficient grounds.

- END OF SECTION 3 -

SECTION - 4

Reference No.: TCIL/052/717/011/10-NT

Date : 08.04.2011

1. PRICE BASIS

Unit price/rates shall be quoted on CIF Chennai Seaport basis in US\$ by foreign bidders & FOR project site Hyderabad by indigenous bidders.

2. PAYMENT TERMS

The payment shall be made within 45 days of receipt of materials at APTRANSCO Hyderabad store which is as under:

100% payments against supplies on back to back basis.

3. PAYING AUTHORITY

GM (LPF), TCIL
TCIL Bhawan, 3rd Floor
GK-1, New Delhi – 110048, India.

4. CONSIGNEE

SE (Lift Irrigation),
APTRANSCO,
Hyderabad

5. INSPECTION & EXAMINATION

- a) The Supplier for OPGW & its accessories shall be responsible to make the goods ready for pre-shipment inspection by TCIL / APTRANSCO or its nominated agency. Inspection of all other items will be done at the sites.
- b) The supplier will offer the material for inspection in writing to TCIL before dispatch. Each lot should be inspected separately and dispatched accordingly. Test report should invariably indicate lot no. and the date of dispatch.
- c) The supplier shall submit factory test results and is required to issue a certificate of the results of the tests in the factory, showing that the goods fulfill the specified requirements.

The Supplier shall bear the cost of the test of the goods in the factory.

6. PERIOD OF WARRANTY

Warranty shall be 18 months from the date of receipt of the material / equipment in good condition.

7. PERFORMANCE BANK GUARANTEE

10% of the order value through Indian Scheduled Bank, valid till the warranty period expires.

8. QUANTITY OF MATERIAL

The quantities indicated in the BOQ are tentative and subject to variation. Actual quantity will be indicated in the purchase order.

9. CONDITIONS OF GOODS

The goods supplied shall be new, unused, not reconditioned and of the respective kinds and standards described in the technical requirements and fit for the purpose there were intended.

10. DELIVERY PERIOD

8 Weeks from the date of release of purchase Order by TCIL. Any failure on adherence to delivery schedule will invoke the liquidated damage clause.

11. LIQUIDATED DAMAGES

The date of the delivery of the goods stipulated in the acceptance of tender should be deemed to be the essence of the contract and the delivery must be completed not later than the dates specified therein. Extension in delivery period will not be given except in exceptional circumstances. Should, however, deliveries, be made after expiry of the contract delivery period and accepted by the consignee, such deliveries will not deprive the Purchaser of the right to recover Liquidated Damages.

In case the supplier fails to supply the materials against the order, the material shall be procured from other suppliers at the cost and risk of the supplier and the excess money will be recovered from any dues of the party.

For late supplies, as liquidated damages, a sum equal to 2% of the price of any goods not delivered or total order value in case where part delivery is of no use to the Purchaser, for a week or part of a week subject to maximum limit of 10% of the total order value will be recovered from the supplier. Purchaser also reserves the right to cancel order in such cases and forfeit the EMD/Performance Guarantee and may also debar the supplier for future purchases.

12. **INSURANCE**

Transit Insurance cover shall be arranged by TCIL. The supplier shall notify consignment dispatch details by FAX to the Insurance Company nominated by TCIL with a copy to GM (FPF), TCIL Bhawan, GK-1, New Delhi – 110048 in advance and also immediately on dispatch.

- END OF SECTION 4 -

SECTION – 5

Tender No.: TCIL/052/717/011/10-NT

April 08, 2011

BILL OF QUANTITY & PRICE BID SCHEDULE

Sl. No.	Item Description	Quantity	Ex- Factory Price in INR/C&F Kandla Sea Port	Excise Duty/ Customs duty		Sales Tax / VAT		Freight		Any other levy/charges/Packing & forwarding charges	Discount	Unit Price inclusive of all levies & charges less discount [4+6+8+10+11-12]	Total Price inclusive of all levies & charges (3 X 13)	Excise/Custom Tariff Head
				%	Amount	%	Amount	%	Amount					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	OPGW 24F of DWSM type (10% extra on actual length)	287 kms.												
2.	Suspension Assembly (Grounding clamps are part of suspension assembly).	574 sets												
3.	Tension Assembly (Dead end clamps and grounding clamps are part of tension assembly)	540 sets												
4.	Vibration dampers	2228 nos.												
5.	Down lead clamps	960 nos.												
6.	Splice boxes (OPGW-OPGW)	96 nos.												
7.	Fibre approach Cable (OFAC) 24 Fibres of dwsm type with hdpe pipe suitable for laying in ducts/trenches	1 km												

8.	Splice boxes (OPGW-OFAC)	5 nos.												
9.	Fibre distribution panels for termination of fibres with connectors of 48 F CAPACITY	3 nos.												
10.	40MM dia HDPE pipe suitable for laying in ducts and trenches	1 km												

Note: The items should conform to the specification given in Section –6

- END OF SECTION 5 -

SECTION - 6

Reference No.: TCIL/052/717/011/10-NT

Date : 08.04.2011

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION FOR OPTICAL FIBRE GROUNDWIRE (OPGW & OFAC)

SCOPE OF WORK

THE SCOPE OF WORK INCLUDES THE FOLLOWING:

- 1.1 DESIGN, MANUFACTURE, TESTING BEFORE DISPATCH, PACKING, SUPPLY AND DELIVERY, SUPPLY OF THE OPGW, OFAC, HARDWARE FITTINGS, JOINT BOXES, FDP EQUIPMENTS AS SYSTEM IN TOTALITY DETAILED IN THIS SPECIFICATION.
 - A) Fibre Optic Composite earth wire (OPGW) along with associated accessories and hardware like tension clamps, suspension clamps, vibration dampers etc required for stringing & erection of OPGW cable on the EHT line sections indicated below.
400 KV MALKARAM – 400 kv vts-iv stage(261KMS)

THE BIDDER CAN CONDUCT A PRE-SURVEY BEFORE QUOTING THE BID, TO ASCERTAIN THE ACTUAL QUANTITIES OF HARDWARE ACCESSORIES REQUIRED TO CONFIRM THE TYPE & LOCATIONS AT HIS OWN COST. THE AVAILABLE LINE DETAILS ARE ENCLOSED ALONG WITH THE SPECIFICATION. ANY ADDITIONAL INFORMATION REQUIRED, IT IS BIDDER RESPONSIBILITY TO CONDUCT SURVEY AND GET THE DETAILS.
 - b) SHIELD WIRE JOINTING BOXES SUITABLE FOR SPLICING OF OPGW-OPGW EARTH WIRES.
 - C) Terminal jointing boxes suitable for splicing of OPGW earth wires and fibre optic approach cable.
 - D) Optical Fibre approach cable (OFAC) along with associated hardware suitable for direct burial.
- 1.2) TO PROVIDE SUPERVISION BY STAFF FROM THE OPGW, OFAC, HARDWARE ACCESSORIES MANUFACTURER (SUPPLIER) DURING INSTALLATION OF OPGW/OFAC AND GUIDANCE AT SITE TO THE CONTRACTOR'S AND PURCHASERS ENGINEERS AS DETAILED IN CLAUSES 20.0, 21.0 AND 22.0 AND THE DURATION OF SUPERVISION OF INSTALLATION WORKS AND SPLICING/TERMINATION WILL BE FINALIZED IN CONSULTATION WITH THE PURCHASER.
- 1.3) TO PROVIDE SUPERVISION BY STAFF FROM THE OPGW/OFAC & HARDWARE ACCESSORIES MANUFACTURER (SUPPLIER) FOR THE TESTING, COMMISSIONING AND SUCCESSFULLY PUTTING INTO OPERATION, THE OPGW/OFAC SYSTEM IN TOTALITY.
- 1.4) THE TENDERED PRICES SHALL BE EXCLUSIVE OF TYPE TEST CHARGES THAT SHALL BE INDICATED SEPARATELY. IN CASE NO CHARGES FOR TYPE TEST(S) ARE INDICATED THEN IT WILL BE CONSIDERED THAT THE TESTS REQUIRED WILL BE CARRIED OUT AT NO COST TO THE PURCHASER. THE TENDERED PRICES SHALL BE INCLUSIVE OF ALL ACCEPTANCE TEST CHARGES.
- 1.5) THE SUPPLIER SHALL CO-ORDINATE TO THE FOLLOWING:

- D) THE STRINGING OF OPGW ALONG WITH THE ASSOCIATED HARDWARE WILL BE CARRIED OUT ON THE EHT LINES MENTIONED IN PARA 1.0, PART-II OF THE SPECIFICATION BY THE DIFFERENT CONTRACTOR UNDER THE GUIDANCE AND SUPERVISION OF THE SUPPLIER OF OPGW OR HIS AUTHORIZED REPRESENTATIVE.
 - II) THE LAYING OF OFAC IN THE YARD TRENCH HOUSING IN SUITABLE HDPE PIPE ALONG WITH THE ASSOCIATED HARDWARE WILL BE CARRIED OUT BY THE DIFFERENT CONTRACTOR UNDER THE GUIDANCE AND SUPERVISION OF THE SUPPLIER OF OFAC OR HIS AUTHORIZED REPRESENTATIVE IN CONSULTATION WITH THE PURCHASER.
 - III) THE SPLICING/JOINTING WORK FOR SHIELD WIRE JOINT BOXES SHALL BE CARRIED OUT BY THE DIFFERENT CONTRACTOR UNDER THE SUPERVISION OF OPGW SUPPLIER IN ASSOCIATION WITH PURCHASER'S ENGINEERS.
 - IV) THE SPLICING/JOINTING WORK FOR TERMINAL JOINT BOXES SHALL BE CARRIED OUT BY THE DIFFERENT CONTRACTOR UNDER THE SUPERVISION OF OFAC SUPPLIER IN ASSOCIATION WITH PURCHASER'S ENGINEERS.
 - V) INTERFACING WITH THE OPTICAL LINE TERMINAL EQUIPMENT COVERED IN DIFFERENT PACKAGE FOR TESTING AND COMMISSIONING OF COMPOSITE FIBRE-OPTIC COMMUNICATION SYSTEM COMPRISING OF OPGW, OFAC AND OPTICAL LINE TERMINAL EQUIPMENT.
- 1.6 AT THE COMMENCEMENT OF WORK, ON INTIMATION FROM THE CONTRACTOR, THE SUPPLIER SHALL DEPUTE HIS PERSONNEL SITE DURING WHICH THE SUPPLIER'S PERSONNEL WILL:
- D) SUPERVISE THE WORKS OF THE CONTRACTOR'S PERSONNEL AND GUIDE THEM IN STRINGING/INSTALLATION OF OPGW/OFAC AND ASSOCIATED HARDWARE:
 - II) PERFORM THE WORK OF SPLICING/TERMINATION OF THE OPGW/OFAC IN ASSOCIATION WITH PURCHASER'S ENGINEERS.
- A. THE NUMBER OF SUPPLIERS' PERSONNEL AND THEIR CATEGORIES TO BE MOBILIZED FOR THE WORK AND PERIOD OF SUPERVISION WILL BE DECIDED IN CONSULTATION WITH THE CONTRACTOR AND PURCHASER.
 - B. AFTER THE COMPLETION OF WORK OF EACH LINE ON INTIMATION FROM THE PURCHASER, THE SUPPLIER SHALL MOBILIZE HIS PERSONNEL FOR CHECKING, TESTING AND COMMISSIONING OF THE OPGW/OFAC SYSTEM. THE NUMBER AND CATEGORIES OF THE SUPPLIER'S PERSONNEL REQUIRED, FOR THIS PURPOSE, WILL BE DECIDED IN CONSULTATION WITH THE PURCHASER AND CONTRACTOR.
 - C. IF ANY PROBLEM IS ENCOUNTERED DURING ANY STAGE OF THE WORK THE PURCHASER WILL REQUEST THE SERVICES OF SUPPLIER'S PERSONNEL AND THE SUPPLIER IN SUCH EVENTUALITY SHALL DEPUTE HIS PERSONNEL TO THE CONCERNED SITE(S) PROMPTLY.
 - D. 'OPGW SYSTEM' MEANS THE OPGW WITH ALL HARDWARE AND ACCESSORIES INCLUDING VIBRATION DAMPERS AND JOINTING BOXES, FIBRE OPTIC APPROACH CABLE, TOOLS, TESTING AND MEASURING INSTRUMENTS, SPARES FOR THE EQUIPMENT AND ANY OTHER ITEM(S) / EQUIPMENT REQUIRED FOR COMPLETENESS OF THE SYSTEM.

DEFINITIONS

- 2.1 'OPGW MEANS' AN OPTICAL FIBRE UNIT EMBEDDED IN THE CORE OR FIRST LAYER OF THE GROUND WIRE, WHOSE SHIELD WIRE CONSISTS OF ONE OR MORE LAYERS OF ALUMINIUM CLAD STEEL/ALUMINIUM ALLOY WIRES.
- 2.1. OPTICAL WAVEGUIDE FIBRES' MEANS THE OPTICAL FIBRES EMBEDDED IN THE OPGW/OFAC – WHICH WOULD SERVE AS MEDIUM FOR THE PROPOSED OPTICAL COMMUNICATION SYSTEM.

- 2.3 `TERMINATION JOINT BOX MEANS` OUTDOOR BOX TO TERMINATE/SPLICE THE OPGW/OFAC-FIBRE OPTIC APPROACH CABLE IN AN ORGANIZED MANNER. THE BOX SHALL BE LOCATED ON THE TERMINAL GANTRIES AT EACH END OF THE LINES.
- 2.4 `SHIELD WIRE JOINT BOX MEANS` OUTDOOR BOX TO TERMINATE / SPLICE THE OPGW/OPGW IN AN ORGANIZED MANNER.
- 2.5 `THE CONTRACTOR` MEANS THE CONTRACTOR ENTRUSTED WITH THE WORK OF FABRICATION, SUPPLY AND ERECTION OF OPGW SYSTEM.
- 2.6 `OFAC` MEANS FIBRE OPTIC APPROACH CABLE INCLUDING ALL DIELECTRIC CABLES SUITABLE FOR CABLE TRENCH/BURIED DUCT INSTALLATION, WITH HEAVY DUTY THERMOSETTING JACKETING AND SHALL CONTAIN OPTICAL WAVE GUIDE FIBRES. THE APPROACH CABLE SHALL BE INSTALLED BETWEEN THE TERMINAL JOINT BOXES SUITABLE FOR OPGW AND FIBRE DISTRIBUTION FRAME INSTALLED AT THE SUBSTATION.
- 2.7 `DISTRIBUTION RACK/TERMINATION BOX` MEANS THE INDOOR RACK/BOX FOR TERMINATION OF THE OFAC AND CONNECTION TO THE OLTE.
- 2.8 `THE SUPPLIER` MEANS THE MANUFACTURER OF THE OPGW/OFAC CABLE SELECTED BY THE BIDDER AND NOMINATED AS SUCH IN HIS BID.
- 2.9 `The Bidder` means the contractor prior to award of contract.

3.1 UNLESS OTHERWISE SPECIFIED ELSEWHERE IN THIS SPECIFICATION THE RATING, PERFORMANCE AND TESTING OF THE OPGW/OFAC AND ACCESSORIES SHALL CONFIRM TO THE LATEST REVISIONS,

available at the time of placement of order, of all relevant standards listed below:

A) THE INTERNATIONAL TELEGRAPH AND TELEPHONE CONSULTATIVE COMMITTEE (CCITT) RED BOOK (1984) – VOLUME-III, FASCICLE III. 2-INTERNATIONAL ANALOGUE CARRIER SYSTEM. TRANSMISSION MEDIA, CHARACTERISTICS. RECOMMENDATIONS G-211-G-653 (STUDY GROUP XV AND EMBD) AND G-654.

B) AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1	ASTM-A 153-82	ZINC COATING (HOT DIP) ON IRON AND STEEL HARDWARE.
2	ASTM-398 M-82	ALUMINIUM ALLOY 6201-T 81 WIRE FOR ELECTRICAL PURPOSES.
3	ASTM-B415-81	HARD DRAWN ALUMINIUM CLAD STEEL WIRE.
4	ASTM-B416-81	CONCENTRIC LAY STRANDED ALUMINIUM CLAD STEEL.
5	ASTM-B 399 M-82	CONCENTRIC LAY STRANDED ALUMINIUM ALLOY 6201-781 CONDUCTORS.
6	ASTM-B 498M-83	ZINC COATED (GALVANISED) STEEL CORE WIRE FOR ALUMINIUM CONDUCTORS STEEL REINFORCED (ACSR).

C) INTERNATIONAL ELECTRO TECHNICAL COMMISSION (IEC)

1	IEC-50-(1975)	INTERNATIONAL ELECTRO TECHNICAL VOCABULARY
2	IEC-793-1	OPTICAL FIBRES. PART-1: GENERIC (1987) SPECIFICATION
3	IEC-794-1	OPTICAL FIBRE, CABLES, PART-1: (1987) GENERIC SPECIFICATION E1 – TENSILE PERFORMANCE OF OPTICAL FIBRE CABLE E3 – CRUSH STRENGTH TEST ON OPTICAL FIBRE CABLE E6 – BENDING TEST ON OPTICAL FIBRE CABLE F1 – TEMP CYCLING TEST ON OPTICAL FIBRE CABLE

		F5 – LONGITUDINAL WATER TIGHTNESS TEST ON OPTICAL FIBRE CABLE
4	IEC 1232	ALUMINIUM CLAD STEEL WIRE FOR ELECTRICAL PURPOSE.

D) ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

1	RS-445	FIBRE OPTIC TEST PROCEDURES SERIES (FOTP.S)
2	RS-458-A	STANDARD OPTICAL WAVE GUIDE FIBRE (1984) MATERIAL CLASSES AND PREFERRED SIZES.
3	RS-440 (1978)	FIBRE OPTIC CONNECTOR TERMINOLOGY
4	RS-455	FIBRE OPTIC TEST PROCEDURES SERIES (FOTP.S)
5	RS-475 (1961)	GENERIC SPECIFICATION FOR FIBRE OPTIC CONNECTORS

E) THE INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

1	IEEE 812-1984	STANDARD FIBRE OPTICS, DEFINITION OF TERMS.
2	IEEE 1138-1994	STANDARD CONSTRUCTION OF COMPOSITE FIBRE OPTIC OVERHEAD GROUND WIRE (OPGW) FOR USE ON ELECTRIC UTILITY POWER LINES.

F) INDIAN STANDARDS

1	IS- 1778 – 1980	REEL AND DRUM FOR BARE CONDUCTORS
2	IS 2486 1993- (PART-1)	METAL FITTINGS OF INSULATORS FOR OVERHEAD POWER LINES WITH NOMINAL VOLTAGE GREATER THAN 1000V GENERAL REQUIREMENTS AND TESTS.
3	IS 9708 1993	STOCKBRIDGE VIBRATION DAMPERS FOR OVERHEAD POWER LINES
4	IS 2121-1981 (PART-1)	CONDUCTORS AND EARTH WIRE ACCESSORIES FOR OVERHEAD POWER LIENS ARMOUR RODS, BINDING WIRES AND TAPES.
5	IS 4759 1979	HOT DIP ZINC COATINGS ON STRUCTURAL STEEL AND OTHER ALLIED PRODUCTS
6	IS 4826 1968	GALVANIZED COATINGS ON ROUND STEEL WIRES
7	IS 398	ALUMINIUM CONDUCTORS FOR OHL PURPOSES

- G) IEC-TC 86A COVERING DEVELOPMENT OF RECOMMENDATIONS FOR OPTICAL FIBRES AND CABLES.
- H) IEC-874 PART 0, PART-1 AND PART-2 COVERING THE REQUIREMENTS FOR OPTICAL DEMOUNTABLE CONNECTORS.
- I) CIGRE CENTRAL OFFICE DOCUMENT 85 B (SEC) 135, SPECIFICATIONS FOR FUSION SPLICES FOR OPTICAL FIBRE AND FUSION CABLES.
- J) CIGRE CENTRAL OFFICE DOCUMENT N0.34, 33 AND 28 DESCRIBING OPTICAL CONNECTORS.
- K) CIGRE CENTRAL OFFICE DOCUMENT 86 N (SEC) 134 – SPECIFICATIONS FOR SPLICE ORGANIZERS AND ENCLOSURES FOR OPTICAL FIBRES AND CABLES.
- L) ISO 9001 OR BS 5750 – REQUIREMENT FOR QUALITY ASSURANCE PLAN.
- M) ISO 9002 QUALITY SYSTEM MODEL FOR QUALITY ASSURANCE IN PRODUCTION, INSTALLATION AND SERVICE.
- N) CIGRE, GUIDELINES ON OPTICAL FIBRE COMMUNICATION FOR POWER UTILITIES.

3.2 MATERIAL MEETING WITH THE STIPULATIONS OF JIS OR OTHER EQUIVALENT STANDARDS, WHICH ENSURE EQUAL OR BETTER QUALITY THAN THE STANDARDS LISTED BELOW SHALL ALSO BE ACCEPTABLE. IN SUCH CASE THE BIDDER SHOULD SUBMIT, ALONG WITH HIS OFFER, TWO COPIES OF SUCH STANDARDS, IN AN AUTHENTIC ENGLISH TRANSLATION, IF THE LANGUAGE OF THE STANDARDS IS OTHER THAN ENGLISH. IN CASE OF DISPUTE, THE STIPULATIONS OF THE ENGLISH TRANSLATION, SUBMITTED BY THE BIDDER, SHALL PREVAIL. FURTHER, IN THE EVENT OF CONFLICT BETWEEN THE STIPULATIONS OF THE STANDARD ADOPTED BY THE BIDDER AND THE CORRESPONDING INDIAN STANDARD SPECIFICATION, THE STIPULATION OF INDIAN STANDARD SPECIFICATION SHALL PREVAIL.

4.0 CLIMATIC CONDIITONS
enclosed in Annexure - IV

GENERAL TECHNICAL REQUIREMENTS OF OPGW, OFAC AND HARDWARE.

5.1 It is not the intent to specify completely herein all the details of the design and construction of equipment or materials to be supplied or services to be rendered. However the equipment, materials and services shall conform in all respects to high standards of engineering design and workmanship and shall be capable of performing in continuous commercial operation for a minimum anticipated life of 25 years in a manner acceptable to the purchaser who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which in his judgement is not in accordance therewith. The equipment shall be in line with current practice for reliable and efficient functioning of the communication system. The equipment offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supply of the Bidder irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

5.2 a). The bidder shall indicate the standard OPGW length offered by him along with maximum lengths that could be supplied by him. The tower schedules are enclosed to the specification to assess the optimum lengths of OPGW. However, standard OPGW lengths shall be about 3.4 km.

b).The requirement of materials based on nominal cable factory length of (3.4) three point four Km. of OPGW is indicated in the schedule of requirements. The Bidder shall quote for the quantities as indicated in the schedule. However the Bidder shall furnish the quantities of materials/equipment, taking the standard length of OPGW as 3.4 km and the optimum economical length determined by him as per the tower schedules as per their methodology. The details of calculations and methodology shall be furnished along with the bid.

c) The length per drum shall include actual distances between specific towers plus allowances for sag plus height of tower plus additional lengths required for splicing and jointing.

5.3 OPGW

5.3.1 The communication system being established over the OPGW and associated accessories and hardware shall be integrated with the OLTE procured under different package.. The Bidder shall offer OPGW containing 24 Nos. Dual Window Single Mode (DWSM) optical fibres in conformity with ITU-T recommendations G-654. The Bidder shall offer loose buffer type of OPGW. The fibres shall be embedded in a water tight aluminium/aluminium alloy (AA) wires. If stainless steel tube is used in contact with the AA or AS wires, the Bidder shall furnish in his offer full details to establish that there will be no galvanic corrosion together with test results and field performance reports. Complete description of the metallic and fibre optic

components together with cross-sectional drawings of OPGW offered, shall be furnished by the Bidder. In addition to physical, electrical and mechanical characteristics, the Bidder shall indicate weight per unit length of OPGW and physical length of optical fibres per unit length of OPGW. The Bidder in his offer shall furnish technical data and test results of the effect of hydrogen on OPGW properties.

5.3.2 MECHANICAL AND ELECTRICAL REQUIREMENTS OF OPGW CABLE

The design of OPGW shall be similar to the galvanized stranded steel earthwire. The requirements are given under.

1	Total cross sectional area (Sq.mm)	73.65
2	Overall diameter (mm)	min 12.00 mm +/- 0.5 mm
3	Minimum ultimate tensile strength (kN)	81
4	D.C. resistance at 20 deg.C (not to exceed)Ohm/km	2.5
5	Approx. Mass(Kg/km)	500
6	Modulus of elasticity (kg/Sq.cm):	1.933x10 exp 6
7	Co-efficient of linear expansion: (per deg C)	11.5x 10 exp -6
8	Structure (Single Layer)	Hydrozen absorbent optical core
9	Protection	Metal Protection : Extruded aluminium tube Armour with: galvanized steel

5.3.3 TEMPERATURE RISE

The OPGW shall with stand without change in its characteristics, a fault current of 20 k A or more for 0.1 second (short circuit dissipation power equal to 40 KA Sq.sec.) without exceeding the maximum allowable temperature of OPGW for short circuit duration as specified by the Bidder in Bidder's guaranteed technical particulars taking OPGW temperature before short circuit as 53° C. The temperature rise, measured in the core of OPGW shall not exceed 75% of the OPGW maximum rated temperature. The bidder, in the offer, shall indicate maximum rated temperature of the fibres in the OPGW offered by him.

5.3.4 LIGHTNING PROTECTION.

The isoceraunic value (i.e. thunderstorm days per year) is 50. The OPGW shall be used to provide lightning protection to the transmission line and shall withstand a lightning current of 200 k A (peak) without change in its characteristics.

The maximum impulse lightning current capability along with its duration for the OPGW shall be provided. Also the OPGW performance under impulse and consequent occurring sustained current due to lightning shall be fully ensured and necessary adequate documents in support attached with the bid.

5.3.5 REQUIREMENT OF METALLIC WIRES.

The protective optic unit shall be surrounded by concentrically stranded metallic wires. The properties of the metallic wires shall be in conformation with ASTM-415 and 416. The surface of the OPGW shall be free from all imperfections that are

visible to the naked eye such as nicks, indentations, excess of lubricants etc. Adjacent wire layers shall be stranded with reverse lay directions. The direction of lay of the external layer shall be right hand. The wires in each layer shall be evenly and closely stranded around the underlying wires or around the central core. For Aluminum clad steel wires, the Aluminum covering on each individual steel wire shall be continuous and uniform and shall provide sufficiently strong bonding strength at the boundary between Aluminum layer and steel core.

5.3.6. MINIMUM BENDING RADIUS.

The Bidder shall specify the minimum allowable radius of bending for OPGW under all temperature conditions for all long term and short term applications.

5.3.7 OPTICAL FIBRES.

5.3.7.1 The single mode optical fibres shall have characteristics in accordance with the International Telegraph and Telephone Consultative Committee (CCITT) - Red Book (1984) – Volume-III. FASCICLE III. 2 –International Analogue Carrier System. Transmission Media, Characteristics. Recommendations G.211 ,G-652D, G.653 (Study Group XV and EMBD) and G-654 or equivalent standards with the following preferred sizes:

1	Number of optical fibres in OPGW / OFAC	24
2	Mode	DWSM (Dual Window Single Mode)
3	Optimised wavelength (nm)	1550 / 1310
4	Mode field diameter (µm)	9.2 +/- 0.5
5	Outside (Clad) diameter (µm) :	125 +/- 0.5
6	Attenuation	0.22 dB / Km Max. at 1550 nm 0.36 dB / Km Max at 1310 nm
7	Chromatic Dispersion At 1310 nm At 1550 nm	2.8 ps/ (nm.km) 18 ps/ (nm.km)
8	Polarisation Mode dispersion	≤ 0.1 ps Sqrt.Km

5.3.7.2 The offered single mode fibre shall be at dispersion minimized at a wavelength around 1550 nm for use in 1550 nm window. The maximum attenuation coefficient of any individual fibre shall not exceed 0.22 db/km in the 1550 nm region at 20 deg. C. The Bidder shall offer the typical attenuation spectral curves in the 1200 nm to 1600 nm wave length range. The additional attenuation introduced for 100 turns of un cabled optical fibres (loosely wound) with 37.5 mm radius mandrel and measured at 1550 nm at +20 deg. C shall be less than 0.5 db compared to the initial value measured before winding. The additional temporary attenuation compared to the initial value measured at + 20 deg. C due to

- i) temperature cycling (-20 deg.C to + 80 deg. C) shall be less than 0.05 db/km.
- ii) temperature rise on account of short circuit current shall be less than 0.22 db/km.

The above increase in attenuation shall be only temporary. There shall be no measurable increase in the fibre attenuation after normalcy is restored. The attenuation of the fibres embedded in the OPGW shall be distributed uniformly throughout its length so that there are no point discontinuities in excess of 0.05 db. The fibre lengths in each reel shall be continuous. No splice of fibre within a reel of

OPGW shall be accepted. The optical wave guide fibres shall be completely protected from water penetration and environmental conditions. The Bidder shall indicate index of refraction of the fibre core and cladding at 1550 nm and the effective group refractive index for use with optical time domain reflectometer (OTDR).

5.3.8 FIBRE SPLICE LOSS.

The splicing loss of any two fibres in any case shall not exceed 0.05db/splice. Ageing shall not cause increase of the nominal optical attenuation at ambient temp. at 1550 nm by more than 0.05 db/km of fibre over a period of 25 years. The bidder shall submit the ageing characteristics of the offered optic fibres. The total additional attenuation above the nominal attenuation due to regular splices, repair splices, connectors, temperature variation, ageing etc. shall be indicated by the Bidder.

5.3.9 CHROMATIC DISPERSION.

In addition the bidder / Contractor / Supplier shall provide a representative curve of the chromatic dispersion per 1300 / 1500 / 1600 nm operating window, indicating the figures of the dispersion slopes at 1300 / 1500 / 1600 nm operational wavelengths.

5.3.10 FIBRE MATERIAL

The fibre shall be manufactured from high grade silica and doped as necessary to provide required transmission performance. The chemical composition of the fibres shall be specifically designed to minimize the effect of hydrogen on the transmission properties. The fibres shall be heat resistant. The Bidder shall submit a certificate or test data to guarantee the maximum rated temperature of the fibres.

5.3.11 FIBRE COATING.

The fibre core and cladding shall consist of silica (SiO₂) glass. In order to prevent damage to optical fibre the optical fibre shall be suitably coated. The coating material shall be indicated by the bidder. The coating provided must guarantee a sufficient mechanical protection while splicing optical fibres. The number of coatings shall be as per design of OPGW. The fibre coating shall be easily strippable during splicing and termination with a mechanical stripping tool. Stripping shall not induce any mechanical stress or notches that could weaken the optical fibre. The Bidder shall describe composition and thickness of each layer of coating used for protection of fibres. He shall also recommend non-toxic and non-allergic solvents, if required to be used for cleaning fibre coating residues. He shall also indicate supply source of fibres. The Bidder shall recommend the required special tools and methods of unsheathing and stripping of fibres.

5.3.12 FIBRE IDENTIFICATION.

Each optical fibre for identification shall be colour coded corresponding to sequential numbering. The colours and numbering shall be in accordance with relevant International / Indian Standards in vogue. The colour shall be integrated in the fibre coating and shall

be homogeneous. The colour shall not be erased when handled during splicing. The original colour shall be disassemble throughout the design life of the OPGW. The colour should not bleed from one fibre to the other and not fade when wiping the fibre with acetone or alcohol. If the fibres are regrouped in bundles or in tubes the later shall be coloured according to a determined code.

5.3.13 FLLING OF OPGW (Filling compound)

The loose buffer type OPGW shall be offered and the interstices between the optical fibres shall be filled with a suitable water proof compound if required. The filling compound shall be non-hygroscopic, electrically non-conductive, homogenous and free from any metallic or foreign particles. The compound shall be compatible with all the OPGW components, it may come in contact with, and shall inhibit generation of hydrogen within the OPGW. It shall not adversely affect the colour of fibres and shall be non-toxic for the skin and readily removable with an appropriate solvent that is non-toxic and non-allergic. The Bidder in his offer shall indicate the filling compound material and recommend solvent for removal of the filling compound. The compound shall guarantee the longitudinal water tightness of the central core. It shall prevent longitudinal propagation of moisture in compliance with water penetration test as per IEC-794-1-F5. The filling compound shall remain stable for temperature variations from – 20 deg.C to + 80 deg.C in continuous operation. The compound shall no induce radial compression, micro bending or shear on the fibres at the specified extreme temperatures. It shall not drip or leak from OPGW at high temperatures and also under momentary increase of high temperatures due to lightning strokes and short circuit currents.

5.3.14. REQUIREMENTS OF CORE PROTECTION TUBE

The OPGW shall be of tube core construction. The core tube shall be made of Aluminium, Aluminium Alloy or stainless steel and shall protect the Optic Fibres from mechanical and thermal loadings.

The optical core, including the optical fibres, shall be contained and protected by a tube, that is continuous, fully sealed, water tight and without mechanical joints. The tube shall have sufficient resistance in order to protect the optical fibres against radial compression transmitted by the metallic wires of the external layers. Under the normal operating conditions, including Aeolian vibrations, sheave pulling at minimum/maximum temperature and maximum operating tension the tube shall not open, fissure and shall not be deformed. The internal surfaces of the tube shall be smooth, without smudges, notches, residues or roughness that may affect the optical fibres or their sheathing. The internal and external surfaces of the tube shall be circular and the tube thickness shall be constant. No tube joints shall be allowed in finished OPGW. The Bidder shall indicate in his offer all electrical and mechanical characteristics of the Tube and shall furnish fatigue test results performed on the tube.

5.4 FIBRE OPTIC APPROACH CABLE.

Loose buffer type Optical Fibre Approach Cable (OFAC) of 24 Nos. Dual window single mode optical fibres may be offered. The fibre optic approach cable shall be entirely suitable for laying in HDPE pipe in the cable ducts and on cable trays. The

cable shall comprise of a tensile strength member, fibre support/bedding structure, core wrap/bedding, armouring and over all impervious jacket. No intermediate joints shall be permitted in any run of approach cable between its two termination points. The cable sheathing shall have additive to prevent rodent attack.

- 5.4.1 The fibre optic approach cable shall have a minimum outer jacket thickness of 3.0 millimeters and shall meet the following requirements.
- i. Fire retardant and no acid gas evolution.
 - ii. Resistance to ultra-violet deterioration.
 - iii. Anti-moisture penetration.
 - iv. All the specification of the fibre will be same as fibre specifications mentioned under OPGW.

5.5 ASSOCIATED HARDWARE FOR OPGW:

5.5.1. SUSPENSION ASSEMBLY

Preformed Armour grip suspension clamp shall be supplied. The total drop of the suspension clamp from the center of the attachment to the center point of the OPGW shall not exceed 150 mm. The aluminium alloy retaining rods shall be used. The suspension clamp shall have a breaking strength of not less than 25 KN and shall have slip strength of 12 to 17 KN. The hardware required to connect the suspension clamp to the tower shall also be offered.. The grounding clamps shall also be included in the suspension assembly set.

Structure

Straight shackle – (Galvanized forged steel)
Twisted Link – (Galvanized forged steel)
Parallel connection clamp – (Aluminium)
Armour grid suspension clamp – (Aluminium)
Preformed rods – (Aluminium alloy)
Grounding Clamp – (Aluminium)

Grounding Clamps jumper assembly

The bolted clamps shall attach the OPGW to the structures. The clamp shall have two parallel grooves for the OPGW, One on either side of connecting bolt. The clamps shall be such that clamping characteristics do not adversely change if only one OPGW is installed. The tower attachment plates shall locate the OPGW on the inside of the tower. It shall be attached directly to tower legs/cross arm without drilling or any other modification to the tower. At splice locations the OPGW shall be coiled on the tower close to the splice box.

5.5.2 TENSION ASSEMBLY

Tension assembly shall include grounding clamps for tower connection. When the distance between two anchor towers is greater than the maximum length of OPGW cable drums, there are special tension assemblies for installation in suspension towers, allowing a cable joint to be included.

DEADEND CLAMP (part of tension assembly)

The dead end clamps shall be aluminum alloy and of bolted type using armour rod. The dead-end clamps shall include all necessary hardware for attaching the same to the tower strain plates. Dead-end clamps shall allow the OPGW to be continuous through the clamp without cutting and jointing. The dead-end clamp shall have an slip strength not less than 0.95 times the OPGW rated tensile strength. The clamp shall have a breaking strength of not less than the OPGW. The clamp shall be

capable of carrying the maximum current for which the OPGW is designed without overheating or loss of mechanical strength.

Grounding Clamps jumper assembly

The bolted clamps shall attach the OPGW to the structures. The clamp shall have two parallel grooves for the OPGW, One on either side of connecting bolt. The clamps shall be such that clamping characteristics do not adversely change if only one OPGW is installed. The tower attachment plates shall locate the OPGW on the inside of the tower. It shall be attached directly to tower legs/cross arm without drilling or any other modification to the tower. At splice locations the OPGW shall be coiled on the tower close to the splice box.

Structure

Straight shackle – (Galvanized forgedsteel)
Extension Link – (Galvanized laminated steel)
Dead end – (Compression aluminium clad steel)
Thimble – (Cast galvanized steel)
Protection splice – (Compression aluminium clad steel)
Grounding Clamp – (Aluminium)

Configuration

There should be three types of assemblies for installation in tension towers:
Passing tension assembly : for intermediate towers.
Splicing tension assembly: for towers with joint boxes.
Final tension assembly : for final towers.
There should be tension assemblies for suspension towers also.

5.5.3 DOWN LEAD CLAMPS

The down lead clamps shall be used to fix the cable to the tower in the down lead to the joint box.

Structure

Clamp – (Aluminum)
M-12-rod – (Galvanized steel)
Support body - (Galvanized steel)
Lock screw – (Stainless steel)
Standard clamp, for two cables adaptable to all diameters.

5.5.4 VIBRATION DAMPERS

5.5.4.1 4R-stock bridge type vibration claspers shall be used. The damper shall have aluminum/Aluminum Alloy clamp capable of supporting the damper during installation and maintain the damper in position without damaging or crushing the OPGW or causing fatigue under the clamp. Armour or patch rod may be provided if necessary to reduce clamping stresses on the OPGW. The armour rod shall be made of Aluminum alloy. The messenger cable shall have 19 strands of galvanized or stainless steel with a minimum strength of 135 Kg/mm.sq. of sufficient size to prevent subsequent drop of the weights in service. The messenger cable shall be at the ends to prevent corrosion. The damper weight shall be not dip galvanized steel or cast iron. The castings shall be free from cracks, shrinkages, inclusion and blow holes. The vibration damper shall restrict the OPGW dynamic strain to 150 micro strains under normal/Aeolian vibration conditions. The dampers shall not be dynamically overloaded during operation to prevent damper fatigue. It is considered that at

tension tower locations two dampers shall be installed on OPGW on each side of the tower and at suspension locations one damper shall be installed on each side of the tower. The contractor shall however be responsible for carrying out necessary studies for arriving at the exact placement of the vibration dampers.

5.5.4.2 The contractor shall carry out the damping system analysis and recommend the type, number and location for vibration control of the OPGW. All supporting calculations, laboratory analysis etc shall be furnished by the contractor. The parameters for performing the damping analysis are given below.

No.	Description	Technical particulars
		400kv
1	Configuration :	One 7/3.18 earth wire in horizontal configuration with one OPGW
2	Span length in meters :	
	a) Ruling design span : (m)	400
	b) Maximum span : (m)	600
	c) minimum span (m)	100
3	Tensile load in OPGW for wind speed of 50 m/s	
a)	at temperature of 0 deg.C and still air: (Kgf)	
b)	at every day temperature of 32 Deg.C and still air (Kgf)	
c)	at 60 deg.C & no wind (Kgf)	
d)	at 60 deg.C & 36% full wind (Kgf)	
e)	at 32 deg.C & 60% full wind (Kgf)	
4	Max .permissible dynamic strains at 80cms from the end of the clamp	150 micro strains

NOTE: The data not given above shall be calculated by the contractor and he shall get the same approved by the Purchaser before conducting the studies.

5.5.5 JOINT BOXES (Splice boxes)

Study, weather proof units shall be provided.

5.5.5.1 THE OPGW/OPGW SHIELD WIRE JOINT BOXES CONFORMING TO IP55 SHALL INCLUDE ALL THE NECESSARY HARDWARE TO RETAIN, TERMINATE, PROTECT AND SPLICE THE 24 FIBRES, AS WELL AS SUITABLE CLAMPS FOR FIXING TO THE TOWER WITHOUT ANY NEED OF DRILLING HOLES IN THE TOWER STRUCTURE.

5.5.5.2.The OPGW/OFAC terminal joint boxes conforming to IP 55 shall include all the necessary hardware to retain, terminate, protect and splice the 24 fibres, as well as suitable clamps for fixing to the substation gantries without any need of drilling holes in the tower structure.

5.5.5.3.THE DISTRIBUTION RACK/TERMINATION BOXES IN THE COMMUNICATION ROOMS SHALL BE FREE

standing, vermin proof, watertight with protection degree of IP55 and shall be made of hot dipped galvanized steel. The distribution rack shall have the facility for different cable clamping locations and be suitable for all types of cable. The equipment shall include all the necessary hardware to retain, terminate, protect and splice the OFAC, patch cord, pigtails etc.

5.5.6 OPTICAL FIBRE DISTRIBUTION FRAME

The Fibre Distribution Frame shall have a capacity for termination of 48 fibres and entry for two nos. of OFAC cables each having capacity of 24F. Auxiliary fibres should be provided to facilitate testing & maintenance of the fibers. The spare fibre should be properly terminated. Additional 2 Nos. of trays with a 24 F capacity shall be provided as spare for each direction.

- | | | |
|---------------------------|---|-------------------|
| Standard Cabinet size | : | 19" |
| Connector Adaptors | : | |
| Type of Connector Adaptor | : | FC, SC, ST, E2000 |
| Capacity of bay frame | : | 0.5 dB |
| Capacity of bay frame: | | |
- (i) Line side : Maximum capacity to terminate 48 pigtailed or patch cord through different suitable inlets. Each cable inlet shall cater for 24 Nos. of FC/PC type connector pigtailed or patch cords each having diameter of 3 mm.
- (ii) Equipment side : - do -

The Optical Fibre Distribution Frame shall include all the necessary functions such as

- **Cable securing and Grounding**
- **Housing of Mechanical and / or fusion joints**
- **Connector / Adapters termination**
- **Storage of Fibre cords**

STRESS-STRAIN AND CREEP DATA

THE BIDDER/CONTRACTOR/SUPPLIER SHALL SUPPLY STRESS-STRAIN DATA FOR THE OFFERED OPGW IN THE FORM OF COEFFICIENTS, STRESS-STRAIN CURVES ETC.

6.1 Sag-Tension data

The bidder shall give the method of sagging and final sag-tension curves for the offered OPGW. The OPGW sag shall not be more than 85% of Moose ACSR (AS) under any condition. The sags of the conductor and GSS Earthwire will be given to the successful bidder.

TESTS

7.1 GENERAL

THE BIDDER ALONG WITH THE BID SHALL FURNISH TYPE TEST CERTIFICATES FOR THE TESTS SPECIFIED IN CLAUSE 12.2 BELOW FOR THE EQUIPMENT OFFERED BY HIM. IF THE BIDDER IS REQUIRED TO SPECIALLY DESIGN THE EQUIPMENT TO MEET THE PURCHASER'S SPECIFICATION, THEN HE SHOULD SUBMIT THEIR TYPE TEST CERTIFICATES FOR THE EQUIPMENT WHICH ARE SIMILAR TO THOSE OFFERED BY HIM. THE OFFER NOT ACCOMPANIED BY TYPE TEST CERTIFICATES AS STATED ABOVE WILL BE TREATED AS INCOMPLETE AND TERMED AS NON-RESPONSIVE AND WILL BE REJECTED.

7.1.1 The Bidder along with the bid shall furnish type test certificates for the tests specified in clause 12.2 below for the equipment offered by him. If the bidder is required to specially design the equipment to meet the purchaser's specification, then he should submit their type test certificates for the equipment which are similar to those offered by him. The offer not accompanied by type test certificates as stated above will be treated as incomplete and termed as non-responsive and will be rejected.

7.1.2 THE VARIOUS TYPE, ACCEPTANCE, ROUTINE TESTS AND TESTS DURING MANUFACTURE SHALL BE CARRIED OUT ON THE MATERIALS FOR THE PURPOSE OF THIS CLAUSE.

TYPE TESTS SHALL MEAN THOSE TESTS WHICH ARE TO BE CARRIED OUT TO PROVE THE DESIGN, PROCESS OF MANUFACTURE AND GENERAL CONFORMITY OF THE MATERIALS TO THIS SPECIFICATION. THESE TESTS SHALL BE CARRIED OUT ON SAMPLES PRIOR TO COMMENCEMENT OF COMMERCIAL PRODUCTION AGAINST THIS SPECIFICATION. THE BIDDER/CONTRACTOR/SUPPLIER SHALL INDICATE THEIR SCHEDULE FOR CARRYING OUT THESE TESTS. THE TYPE TESTS LISTED BELOW SHALL BE CARRIED OUT AS DETAILED IN ANNEXURE-I

- 7.1.3 ACCEPTANCE TESTS SHALL MEAN THOSE TESTS THAT ARE TO BE CARRIED OUT ON SAMPLES TAKEN FROM EACH LOT OFFERED FOR PRE-DESPATCH INSPECTION FOR THE PURPOSES OF ACCEPTANCE OF THAT LOT. THE ACCEPTANCE TESTS LISTED BELOW SHALL BE CARRIED OUT AS DETAILED IN ANNEX-1.
- 7.1.4 ROUTINE TESTS SHALL MEAN THOSE TESTS, WHICH ARE TO BE CARRIED OUT ON EACH EQUIPMENT TO CHECK REQUIREMENTS THAT ARE LIKELY TO VARY DURING PRODUCTION. THE ROUTINE TESTS LISTED BELOW SHALL BE CARRIED OUT AS DETAILED IN ANNEX-1.
- 7.1.5 TESTS DURING MANUFACTURE SHALL MEAN THOSE TESTS THAT ARE TO BE CARRIED OUT DURING THE PROCESS OF MANUFACTURE AND END INSPECTION BY THE BIDDER/CONTRACTOR/SUPPLIER TO ENSURE THE DESIRED QUALITY OF THE END PRODUCT TO BE SUPPLIED BY HIM. THE MANUFACTURING TESTS LISTED BELOW SHALL BE CARRIED OUT AS DETAILED IN ANNEX-1.
- 7.1.6 THE NORMS AND PROCEDURE OF SAMPLING FOR THESE TESTS WILL BE AS PER THE QUALITY ASSURANCE PROGRAMME TO BE MUTUALLY AGREED TO BY THE CONTRACTOR AND PURCHASER.
- 7.1.7 THE STANDARDS AND NORMS TO WHICH THESE TESTS WILL BE CARRIED OUT ARE LISTED AGAINST THEM. WHERE A PARTICULAR TEST IS A SPECIFIC REQUIREMENT OF THIS SPECIFICATION, THE NORMS AND PROCEDURE OF THESE SHALL BE AS SPECIFIED IN ANNEX-1 OF THIS SPECIFICATION AS MUTUALLY AGREED TO BETWEEN THE CONTRACTOR AND THE PURCHASER IN THE QUALITY ASSURANCE PROGRAMME.
- 7.1.8 FOR ALL TYPE AND ACCEPTANCE TESTS THE ACCEPTANCE VALUES SHALL BE THE VALUES GUARANTEED BY THE BIDDER IN THE GUARANTEED TECHNICAL PARTICULARS, ANNEX OR THE ACCEPTANCE VALUES SPECIFIED IN THE RELEVANT STANDARD, WHICH EVER IS MORE STRINGENT FOR THAT PARTICULAR TEST.
- 7.1.9 ADVANCE NOTICE FOR TYPE TEST AND ACCEPTANCE TEST. THE CONTRACTOR SHALL SUBMIT TO THE PURCHASER, FOR APPROVAL HIS DETAILED PROGRAMME AND PROPOSAL FOR TESTING THE MATERIALS INDICATING THE METHODS OF CARRYING OUT THE TESTS. AFTER THE PURCHASER HAS APPROVED THE TEST PROCEDURES AND PROGRAMME, THE CONTRACTOR WILL INTIMATE THE PURCHASER ABOUT CARRYING OUT OF THE TESTS AT LEAST 15 DAYS (30 DAYS IN CASE THE TESTS ARE TO BE CONDUCTED ABROAD) IN ADVANCE OF THE SCHEDULED DATE OF TESTS DURING WHICH THE PURCHASER WILL ARRANGE TO DEPUTE HIS REPRESENTATIVES TO BE PRESENT AT THE TIME OF CARRYING OUT THE TESTS.

7.2.0. **TYPE TESTS**

The following tests shall be conducted on at least one sample.

7.2.1 Complete OPGW/OFAC:

a)	Water penetration	As annexure-I.
b)	Seepage of flooding compound	As EIA-455-61 Method A
c)	Tensile performance	As IEC 794-1-E1
d)	DC resistance	As Annex-I
e)	Crush	
f)	Nand	
g)	Impact	
h)	Strain Margin	

i)	Aeolian vibration (OPGW only)	As IEE 1138
j)	Short circuit	As Annex-1
k)	Lightning	
l)	Temperature cycle	
m)	Sheave (OPGW only)	As IEE 1138

7.2.2 Suspension Assembly

a)	Mechanical Strength	As annex-1
b)	Clamp slip strength	As annex-1

7.2.3 Deadend Assembly

a)	Mechanical Strength	As IS 1486
b)	Clamp slip strength	As Annex-1

7.2.4 Structure mounting clamp

a)	Mechanical Strength	As Annex-1
b)	Clamp slip strength	As IS 1486

7.2.5 Vibration damper

a)	Dynamic characteristics	As Annex-1
b)	Vibration analysis	
c)	Clamp slip	
d)	Fatigue	

7.2.6 Any other type tests on OPGW/OFAC not specifically mentioned above but stipulated in relevant IEC and other International Standards.

7.3 Acceptance tests.

7.3.1 OPGW/OFAC hardware and fittings

7.3.1.1 Complete OPGW/OFAC

a)	Dimensional check	As IS 398
b)	Lay length measurement	As IS 398
c)	Crush	As annex-1
d)	Impact	
e)	Temperature Cycle	

7.3.1.2. Optic fibre

a)	Attenuation variation with wavelength	As EIA-455-78
b)	Attenuation at the water peak	As IEEE 1138
c)	Attenuation with bending	
d)	Temperature	As EIA-455-3

7.3.1.3. Metallic wires

a)	Tensile	As IS- 398
b)	Elongation	
c)	DC Resistance	
d)	Thickness of aluminium (for AS wires)	As IEC 1232
e)	Twist (for AS wires)	As IEC 1232 and IS 398

7.3.1.4 OPGW fittings and accessories

7.3.1.4.1 Suspension Assembly

a)	Visual check and dimensional Verification	As IS 1486
b)	Mechanical strength	As Annex –1
c)	Clamp slip strength	As IS 1486

7.3.1.4.2. Deadend Assembly

a)	Visual check and dimensional Verification	As IS 1486
b)	Mechanical strength	
c)	Clamp slip strength	As Annex - I

7.3.1.4.3. Grounding wire for clamps

a)	Visual check and dimensional Verification	As IS 1486
b)	Tensile	

7.3.1.4.4 Structure mounting clamp

a)	Visual check and dimensional Verification	As IS 1486
b)	Clamp fit	As Annex –1
c)	Clamp strength	

7.3.1.4.5. Vibration damper

a)	Visual check and dimensional Verification	As Annex –1
b)	Galvanising i. On damper masses ii. on messenger cable	
c)	Verificaiton of resonance frequencies	
d)	Clamp slip	
e)	Clamp bolt torque	
f)	Strength of messenger cable	
g)	Mass pull off	

7.4 ROUTINE TESTS

7.4.1 Measurement of optical fibre loss of each individual fibre at 1550 nm

7.4.2 Measurement of optical fibre loss of each individual fibre at 1550 nm

7.4.3 Measurement of mode field diameter and chromatic dispersion coefficient of the fibre

7.4.4 All acceptance tests as mentioned in clause 12.3.1.3 for metallic wire on each coil.

7.5 Tests during manufacture

7.5.1 Chemical analysis of steel/aluminium alloy used for making strands.

7.5.2 Tests for optical fibre to be mutually agreed between the Purchaser and the contractor in the Quality Assurance Plan.

7.6 Sample batch for type testing

The sampling for type testing shall be done after getting the Quality Assurance Plan approved and the samples shall be manufactured accordingly.

7.7 TESTING EXPENSES

7.7.1 Testing charges for the type tests specified shall be indicated separately in the appropriate schedule. The same will be considered for bid evaluation.

7.7.2 In case of failure in any type test the contractor is either required to manufacture fresh sample lot and repeat all the tests successfully once or repeat that particular type test three times successfully on the sample selected from three already manufactured lot at his own expenses. In case a fresh lot is manufactured for testing then the lot already manufactured shall be rejected. The decision of the Purchaser in this regard shall be final and binding.

- 7.7.3 The entire cost of testing for acceptance and routine tests and tests during manufacture specified here in shall be treated as included in the quoted unit price of materials except for the expenses of the Purchaser's representative.
- 7.7.4 Bidder shall indicate the standard laboratories I which they propose to conduct the type tests. They shall ensure that the tests can be completed in these laboratories within the time schedule guaranteed by them in the appropriate schedule.

7.8 ADDITIONAL TESTS

The Purchaser reserves the right of having at his own expenses any other test(s) of reasonable nature carried out at contractor's premises at site or in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy that the materials comply with the specifications. For this purpose the Bidder shall indicate the lists of tests, not included in clauses 12.2.0, 12.3.0 and 12.4.0 above, but which in his opinion are necessary to ensure satisfactory performance of the equipment and offer charges for each individual test. However, charges for these additional tests will not be considered for bid evaluation.

7.9 TEST REPORTS

- 7.9.1.4 At least six (6) copies acceptance test reports shall be furnished. One copy will be returned duly certified by the Purchaser only after which the commercial production of the materials shall start.
- 7.9.2 At least six (6) copies of acceptance test reports shall be furnished. One copy will be returned duly certified by the Purchaser only after which the material will be dispatched.
- 7.9.3 Record of routine test reports shall be maintained by the supplier at his works for periodic inspection by the Purchaser's representative.
- 7.9.4 Test certificates of tests carried out during manufacture shall be maintained by the supplier. These shall be produced for verification as and when desired by the Purchaser.

INSPECTION

- 8.1. The Purchaser's representative shall at all times be entitled to have access to the works and all places of manufacture where materials shall be manufactured and the representatives shall have full facilities for unrestricted manufactured and the representatives shall have full facilities for unrestricted inspection of the contractor/supplier's works, raw materials, manufacture of the materials and for conducting necessary tests as detailed here in.
- 8.1.2 The contractor shall keep the Purchaser informed in advance of the time of starting and of the progress of manufacture of materials. In their various stages so that arrangements could be made for inspection.
- 8.1.3 Unless specified otherwise, inspection shall be made at the place of manufacture prior to dispatch and shall be conducted so as not to interfere unnecessarily with the operation of the work.
- 8.1.4 Materials shall not be dispatched from its point of manufacture before it has been satisfactorily inspected and tested, unless the inspection is waived off by the Purchaser in writing. In the latter case also, the materials shall be dispatched only after satisfactory testing for all tests specified herein have been completed.
- 8.1.5 The acceptance of any quantity of materials shall in no way relieve the contractor of his responsibility of meeting all the requirements of the specification and shall not prevent subsequent rejection if such materials are later found to be defective.

RECOMMENDED SPARES

- 9.1** The contractor shall offer the list of recommended spares for at least 15 years operation of these equipment as optional items and will not be considered for evaluation. The successful Bidder shall train the Purchaser's engineers for maintenance and handling of these equipment, without any extra charges at Purchaser works.

QUALITY ASSURANCE PROCEDURE

10.1 General

The contractor shall operate a Quality Management System which is in conformity with the requirement of ISO:9001. This quality management system shall also be operated by all of the contractors subcontractors.

The contractor will be responsible for the quality assurance of all goods and services through all phases of the contract, from initial furnishing to final acceptance. This constitutes the assurance that all such goods and services are in conformity to required quality in terms of technical, delivery, commissioning and price requirement as defined in the contract.

10.2 QUALITY ASSURANCE SYSTEM AND REQUIREMENTS

The contractor's Quality Assurance system shall meet the following criteria

- a) It will be formally accredited by on an outside party as to compliance with the requirements of ISO:9001. Copies of all assessment and visit reports related to this accreditation shall be available to the Purchaser throughout the duration of the contract.
- b) It shall be documented and presented in the form of the company quality manual, the associated quality system procedures at each contractor location involved I the project and a quality plan specific to the contract.
- c) The first format issue of the contract specific quality plan shall be agreed between the Purchaser and the Bidder prior to contract signing. This quality plan shall then form part of the contractual documentation and shall not be changed without prior agreement with the Purchaser.

10.3 ADDITIONAL QUALITY ASSURANCE REQUIREMENTS

- a) The Purchaser shall have access to the contractor's premises at any mutually agreed time and be provided access to inspect and assess the quality system should any specific need arises. The Purchaser shall also be able to conduct on site reviews to discuss status, issues, progress, etc, as deemed mutually appropriate. Specific accommodation will not be provided for Purchaser's representatives, although full facilities could be available during any visit to enable the requirements of the visit to be met. The entire costs of the visits of the Purchaser's representatives to the contractor's premises shall be borne by the Purchaser.
- b) The purchaser shall have access to all relevant documentation including qualification and manufacturing test specifications and any other contract specific technical documentation including qualification test specifications for verification that the quality procedures are in accordance with the contract-specific quality plan.
- c) When the contractor is satisfied that the goods and services are ready for release in accordance with documented procedures, the agreement of the Purchaser's representative for release shall be sought.

When the Purchaser's representative is satisfied then the goods and services are ready for release, he will signify this by written authorization. This authorization will not absolve the contractor from his responsibility for meeting the requirements of the contract, nor shall modify the commencement date of the warranty period.

11.0 PERFORMANCE GUARANTEE

The OPGW system shall be capable of continuous commercial operation with reliable and efficient functioning for a minimum anticipated life span of forty (40) years.

The system shall be guaranteed for trouble free operation for a minimum period of twenty four (24) months from the final date of delivery or eighteen (18) months from the final date of commissioning which ever is later. In case of failure within this period of the OPGW/OFAC the contractor will make good the faulty equipment at no extra cost to the purchaser.

12.0 DOCUMENTATION

12.1 All drawings shall conform to international standards organization (ISO) 'A' series of drawing sheet/Indian Standards Specification IS.656. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in system International Units. Wherever possible, the documentation should use standard symbols and vocabulary recommended by the International Telecommunication Union (ITU), and the International Electro technical Commission (IEC).

12.2 LIST OF DRAWINGS AND DOCUMENTS

The Bidder shall furnish full description and illustration of the materials offered.

The Bidder shall furnish the drawings, calculations, test reports and literature pertaining to specified items (6 copies) which shall include but not be limited to the following information:

- a) Name and location of the Factory or Company manufacturing the optical fibres, OPGW/OFAC, and all other equipment offered.
- b) Technical standards, manufacturing technology and quality assurance system for optical fibres and OPGW/OFAC.
- c) Detailed description of the OPGW/OFAC structure, including dimensions of each part, unit weight and cross-section drawings.
- d) Technical Standards of all other main elements used in OPGW/OFAC and other equipment offered.
- e) Typical refractive index profile of the proposed fibres.
- f) The number of breakages per km. In the process of proof test and the values of M (gradient of weibull plot) and N (static fatigue constant, empirical) which are related to the life time of the optical fibres.
- g) Technical measures for ensuring the life time of the OPGW/OFAC embedded optical fibres.
- h) Optical signal performance calculations (e.g. optical power budget, signal bandwidth analysis), OLTE specifications are available with the purchaser for reference of Bidder/ contractor/suppliers.
- i) Schematic diagrams.
- j) Mounting showing details of fusion splicing of cables.
- k) Drawings showing details of fusion splicing of cables.
- l) Test reports and certificates showing compliance with all required tests
- m) Specific instructions for installation of OPGW/OFAC.

- n) Cable characteristics, including Optical wave guide fibres, strength member and all jacketing materials.
 - o) Shield wire and terminal joint box drawings and its details.
 - p) Installation, maintenance and instruction manuals.
 - q) Maximum allowable strain margin with back-up calculations and factory tests.
 - r) Sag and Tension Data
 - s) Initial and final stress-strain and creep datas.
 - t) Drawings of each hardware item showing yield strength and ultimate or breaking strength.
 - u) Description of quality Control/Assurance Programme.
 - v) Details of packing
 - w) Minimum permissible bend radius of OPGW / OFAC.
 - x) A drawing showing a graph of strain on the optical fibre Vs. strain on OPGW/OFAC.
 - y) Physical parameters, Mechanical and Electrical properties of conducting wires of OPGW/OFAC i.e. Aluminium Alloy and Aluminium Clad Steel etc.
 - z) Spectral attenuation curve of the offered single mode optical fibre as per G.653 and G.654.
- 12.3 The contractor shall within 2 weeks of placement of order, submit three sets of final versions of all the above mentioned drawings for purchaser's approval. The purchaser shall communicate his comments / approval on the drawings to the contractor within two/three weeks. The contractor shall, if necessary, modify the drawings and resubmit three copies of the modified drawings to the contractor within two weeks from the date of purchaser's comments. After receipt of purchaser's approval, the contractor shall within three weeks, submit 10 prints, one set of good quality reproducible's , one set of micro films of the approved drawings for purchaser's use.
- 12.4 Three (3) copies of acceptance and routine test certificates, duly approved by the purchaser, shall accompany the dispatched consignment.
- 12.5 The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the contractor's risk.
- 12.6 10 sets of nicely printed and bound volumes of operation, maintenance and erection manuals in English language for each equipment shall be submitted by the contractor for distribution, prior to the dispatch of the equipment. The manual shall contain all the drawings and information required for erection, trouble shooting, operation and maintenance of the equipment. The manual shall also contain a set of all the approved drawings, type test reports etc.
- 12.7 Approval of drawings/work by purchaser shall not relieve the contractor of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirement of the latest revision of applicable standards, rules and codes or practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have the power to reject any work or materials which in his judgment is not in full accordance therewith.
- 12.8 The contractor shall also furnish within thirty (30) days from receipt of order three sets of coloured video cassettes demonstrating the procedure of installation/stringing of OPGW and associated hardware, splicing of optical fibres of OPGW/OFAC cable and such other works and procedures including detailed testing procedures of all the equipment which would educate and guide the purchaser's engineers in execution of

work and trouble-shooting and operation and maintenance of the OPGW/OFAC system. The video cassettes shall be informative and self explanatory and in English language only.

13.0 PACKING AND FORWARDING

13.1 The packing and shipping shall be carried out in accordance with the standard practice of the OPGW/OFAC supplier and with following additional requirements.

The contractor shall prepare the equipment and storage in such a manner as to protect the equipment from damage or deterioration during shipping or storage. In India, shipments will be exposed to heavy rains, hot sub, high humidity and sudden extreme changes of temperature. The equipment shall be packed and shipped so as to protect it from all such conditions and any other abnormal conditions, generally expected during shipping & storage.

The contractor shall furnish detailed instructions and precautions to be taken during handling at the port of entry, local transportation and handling at stores including long storage at Purchaser's stores, located along the route of the proposed transmission lines. This will in no way relieve the contractor from the overall responsibility of supplying the materials upto the purchaser's designated destination stores/site. If the materials are damaged due to improper packing or during loading and unloading process the damaged quantity of materials shall be replaced free of cost to the purchaser.

To the maximum degree possible, the contractor shall utilize the "Containersied shipping" system for any equipment being shipped to India. The contractor shall ensure that the equipment shall be properly packed, blocked, padded, coated and protected in the "Containers" so as to ensure that such equipment is not damaged due to possible mishandling of "Containers".

The metallic containers shall be considered as the property of the contractor and he will be allowed to remove them from site once the contents are unpacked, inspected, documented and placed in temporary storage or in final position in accordance with the specification.

The equipment shall be shipped in such a manner as to facilitate unloading, handling and storage en route and at the site/s. The contractor shall provide lifting lugs and special lifting devices for proper handling and erection.

The contractor shall be liable for any damage or loss resulting due to careless, improper or insufficient packing and any careless, improper or poor handling.

All shipments shall be shipped in units as large as practicable, but within the transportation limits. The equipment may be nested in each other where desirable to reduce shipping volume provided such nesting shall not cause any damage to any such nested parts. Each piece of works or equipment which is to be shipped as a separate piece or smaller parts packed within same crate shall be legibly marked to show the unit of which it is a part and match marked to show its relative position in the unit, to facilitate handling/assembling at sites.

All small parts shall be adequately tagged, boxed and crated. The crates shall be of closed wooden construction, lined with waterproof paper or equivalent and adequately reinforced and strapped on all sides and ends with steel strapping of suitable dimensions and strength. The tools shall be packed in separate close wooden crates, lined with water proof paper where practicable, the equipment or any part thereof, the works which may be damaged by moisture or humidity shall be given a transparent

coating or plastic cover. If applicable a coating of good quality grease can also be given, provided such coating does not damage the works.

Spare parts and spare equipment shall be packed separately in containers adequate for long term storage, plainly marked "Spare Parts Only"./ They shall be crated individually or in kits to be used in one single renewal or overhaul operation. Other spare parts or kits shall not be disturbed when using one set or kit. For the convenience of export shipping more than one set of spare parts may be packed in one single crate or case.

A packing list indicating the contents of each crate or box shall be furnished in a moisture proof envelope securely fastened to the outside of the crate or box. A copy of this packing list shall be included in the operation and maintenance instructions.

The contractor shall at all the times protect and preserve from damage, loss, corrosion and all other forms of damage to all parts of the works.

The contractor shall at all the times protect and preserve from damage, loss, corrosion and all other forms of damage to all parts of the works.

Prior to making any shipments, the contractor shall send to the Purchaser a complete packing list for such shipment. This packing list shall include at least the following information. The description of part or equipment, reference drawing number, quantity of each item, number of the parts, assembly number to which the parts relate, date of dispatch and method of transport.

Sketches illustrating the proposed method of shipping large components shall also be submitted to the Purchaser prior to the commencement of such shipment.

Packages should be such that long time storage at site, if required should not deteriorate the performance of any equipment supplied by the contractor.

13.2 DRUM

The OPGW/OFAC cable against any damage and displacement during transit, storage and subsequent handling and stringing operations in the field. The drums shall generally conform to IS-1778-1980 and latest version except as otherwise specified herein after. The steel drums shall be collapsible.

The drums shall be suitable for wheel mounting and for letting off the OPGW/OFAC cable drums shall be provided with necessary clamping arrangements so as to be suitable for tension stringing of OPGW/OFAC cable.

The contractor should submit their proposed drum drawings of the OPGW/OFAC cable along with the bid. After placement of letter of intent the contractor shall submit four copies of fully dimensioned drawing of the drum for purchaser's approval. After getting approval from the purchaser, the contractor shall submit 10 more copies of the approved drawings for further distribution and field use at Board's end.

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

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

The wooden battens used for making the barrel of the OPGW/OFAC cable shall be of segmental type. These shall be nailed to the barrel supports with at least three nails with Maximum nail spacing of 75 mm. The battens shall be closely buffed and shall provide a round barrel with smooth external surface. The edges of the battens shall be rounded or chambered to avoid damage to the OPGW/OFAC cable.

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

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

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

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

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

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

The OPGW/OFAC cable ends shall be properly sealed and secured with the help of U-nails or bolts on the side of one of the flanges, to avoid loosening of OPGW/OFAC cable layers in transit and handling.

Only one standard length of OPGW/OFAC cable shall be wound on each drum. The method of lagging to be employed shall be clearly stated in the tender. For normal supply, wooden drums and for spare length of OPGW/OFAC, steel drums shall be used.

13.3 Each consignment shall be accompanied by a detailed packing list containing the following information.

- a) Name of consignee
- b) Details of consignment
- c) Destination
- d) Total weight of consignment
- e) Handling and unpacking instructions
- f) Bill of material indicating contents of each package.

13.4 LABELLING AND MARKING.

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

- a) Manufacturer's name and address.
- b) Contract/Award letter number.
- c) Size and type of OPGW/OFAC cable and drum.
- d) Gross weight of the OPGW/OFAC cable and drum
- e) Weight of empty drum with lagging
- f) Net weight of the OPGW/OFAC cable.
- g) Length of the OPGW/OFAC cable
- h) Position of the OPGW/OFAC cable end.
- i) Arrow marking for un winding
- j) Drum and lot number
- k) Name and address of the consignee.
- l) Month and year of manufacture
- m) The drum may also be marked with standard specification as per which the OPGW /OFAC cable is manufactured.

SCHEDULES

14.1.1 The tenderer shall fill all the schedules which form part of the tender specification and offer. If the schedules are not submitted duly filled in with the offer the offer shall be liable for rejection.

14.1.2 Unless otherwise brought out separately by the Bidder/contractor/supplier in the schedule of deviations, the offers shall be deemed to conform to the specification scrupulously. All deviations from the specification shall be brought out in the schedule of deviation. The discrepancies between the specification and the catalogues or literature submitted as part of the offer shall not be considered as valid deviations unless specifically brought out in the schedule of deviations.

14.1.3 For any deviation from the specification, which is not specifically brought out in the schedule of deviation, the offer may be liable for rejection. The deviations brought out in the schedule shall be supported by authentic documents, standards and clarifications. Otherwise the offer may be liable for rejection. In the case of NIL deviations the schedule shall be completed and enclosed with the bid stating nil deviations.

15.0. INFORMATION TO BE FILLED INVARIABLY BY THE TENDERER

For ready reference of the tender, the items of information required to be invariably furnished by the Bidder/contractor/supplier in his offer are listed below.

- i) **Four copies of the authentic English translation of each of the standards to which the offered equipment conforms in case those are other than the standards specified in this specification.**
- ii) **All Annexures and Schedules**
- iii) Drawing listed in Clause No.12.2.
- iv) **Details supported by sectional drawings about the methods adopted for installation of OPGW/OFAC.**

16.0 TECHNICAL PARAMETERS of OPGW/OFAC

Sl.No.	Description	Tech.Particulars
1	Make & Model	
2	No. of Fibres in OPGW	24
3	Mode	DW-SM
4	Buffer type	Loose
5	Buffer tube diameter	2.2 mm
6	Buffer tube material	PBT
7	No. of buffer tubes	4
8	No. of fibres per tube	6
9	Identification/numbering of individual tubes	Red, green blue and natural
10	No. of empty tubes(if any)	1
11	Filling material	moisture proof & Hydrozen adherent jelly
12	Strength members	1
13	Binding yarn/tape	Tapes
14	10% Aluminium clad steel wire (Diameter & number)	2.24 mm & 12 Nos.
15	Aluminum alloy wires (Diameter & number)	2.24 mm & 3 Nos.
16	Aluminum tube diameter	6.2 mm
17	Approximate outside diameter	9 mm
18	Cable diameter	12.00 mm +/- 0.5 mm
19	Cable cross section area	113 mm ²
20	Min. Breaking load /Ultimate Tensile Strength	81.00 k N
21	Fibre Strain margin	0.6%
22	Weight	500 kgs / km
23	Crush strength	1000 kg with a 10 cm ² piste
24	Modulus of Elasticity	103.4 kN / mm ²
25	Minimum bending radius	300 mm
26	Maximum bending radius	Short term 300 mm long term 400 mm
28	Permissible CTS Tensile stress	0.669 k N / mm ²
29	Coefficient of inner expansion	15.3 X 10 ⁻⁶ Per °C
30	Coefficient of expansion Cladding Core	6.3 X 10 ⁻⁶ Per °C
31	Nominal operating	- 10 °C to 70 °C

32	temperature range SC current transient peak temperature	41 KA
33	Maximum allowable temperature for lightning strike	200
34	Available length of cable per drum: Min Max	2500mtrs. 3500mtrs.
35	Splice loss(Max. & Min. allowable) Operating Temperature range -	0.05 dB, 0.01dB - 10 °C to 70 °C
36		
37	Expected Cable Life	40years
38	Fibre production method	
39	Core diameter	9.2 +/- 0.5 µm
40	Core non circularity	
41	Cladding diameter	125 +/-0.5 µm
42	Core Clad Concentricity Error	< 1µm
43	Cladding noncircularity	< 2 %
44	Protective coating type & material Primary Secondary	Acrylate PBT
45	Coating concentricity	> 70%
46	Colour coding scheme compliant with EIA395A/IEC3047	Yes
47	Attenuation Coefficient @1310nm - @1550nm -	.36 d B /km .22 d B /km
48	Attenuation variation With Wavelength(+/-5nm Temperature-	0.05 d B /km 0.05d B /km
49	Mode field non Circularity -	< 2%
50	Chromatic Dispersion At 1310 nm At 1550 nm	2.8 ps/ (nm.km) 18 ps/ (nm.km)

ERECTION AND COMMISSIONING OF OPGW/OFAC

CLIMATIC CONDITIONS

I. LOCATION: 400 KV MALKARAM – 400KV VTS IV
opgwaptranscotci.doc

261 Km
Page 48 of 50

II.	MAXIMUM AMBIENT TEMPERATURE (DEGREE C)	45
III.	MINIMUM AMBIENT AIR TEMPERATURE (DEGREE C)	5
IV.	DAILY AVERAGE AMBIENT TEMPERATURE (DEGREE C)	32
V.	MAX.RELATIVE HUMIDITY	74%
VI.	ANNUAL RAIN FALL (MAX) MM	1500
VII.	RAINY DAYS IN A YEAR (DAYS)	JUNE TO OCTOBER – 120
VIII.	BASIC WIND SPEED M/SEC	44
IX.	MAXIMUM ALTITUDE ABOVE MEAN SEA LEVEL (METERS)	1000
X.	SEISMIC LEVEL	
	(HORIZONTAL ACCELERATION)	0.03
	(VERTICAL ACCELERATION)	0.015
XI.	AVERAGE NUMBER OF THUNDER STORM DAYS PER YEAR	50

SECTION – 7

Reference No.: TCIL/052/717/011/10-NT

Date : 08.04.2011

PERFORMANCE BANK GUARANTEE

**M/s Telecommunications Consultants India Ltd.,
TCIL Bhawan, Greater Kailash-I
New Delhi – 110 048 (INDIA)**

(With due stamp duty if applicable)

OUR LETTER OF GUARANTEE No. : _____

In consideration of TELECOMMUNICATIONS CONSULTANTS INDIA LIMITED, having its office at TCIL Bhawan, Greater Kailash-I, New Delhi – 110 048 (INDIA) (hereinafter referred to as “TCIL” which expression shall unless repugnant to the content or meaning thereof include all its successors, administrators and executors) and having entered into an agreement dated _____/issued Purchase Order No.TCIL/15/_____ dated _____ with/on M/s._____ (hereinafter referred to as “The Supplier” which expression unless repugnant to the content or meaning thereof, shall include all the successors, administrators, and executors).

WHEREAS the Supplier having unequivocally accepted to supply the materials as per terms and conditions given in the Agreement dated _____ /Purchase Order No. _____ dated _____ and TCIL having agreed that the Supplier shall furnish to TCIL a Performance Guarantee for the faithful performance of the entire contract, to the extent of 10% (ten percent) of the value of the Purchase Order i.e. for _____.

We, _____ (“The Bank”) which shall include OUR successors, administrators and executors herewith establish an irrevocable Letter of Guarantee No. _____ in your favour for account of _____ (The Supplier) in cover of performance guarantee in accordance with the terms and conditions of the Agreement/Purchase Order.

Hereby, we undertake to pay upto but not exceeding _____ (say _____ only) upon receipt by us of your first written demand accompanied by your declaration stating that the amount claimed is due by reason of the Supplier having failed to perform the Agreement and despite any contestation on the part of above named Supplier.

This Letter of Guarantee will expire on _____ including 30 days of claim period and any claims made hereunder must be received by us on or before expiry date after which date this Letter of Guarantee will become of no effect whatsoever whether returned to us or not.

**Authorized Signature
Manager
Seal of Bank**