

TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED



Bid Specification No.: PMM41-e- /2024

Supply of OPGW Cable and associated Accessories

SUPPLY, ERECTION/STRINGING AND COMMISSIONING OF OPGW CABLE AND ASSOCIATED ACCESSORIES UNDER PSD FUNDING FOR PROVIDING RELIABLE COMMUNICATION SYSTEM UPTO 132 KV SUBSTATIONS

CHIEF ENGINEER / TRANSMISSION, APTRANSCO,

Vidyut Soudha, Vijayawada-520 004

Tele Ph/Fax No.: 0866-2429230,

Extn. 2014 / 2034

Website : www.tender.apecurement.gov.in

IMPORTANT NOTE TO BIDDERS

All Bidders are requested to note the following new provisions in the Tender Specification

I) Purchase Preference

Preference for procurement of goods/services/works from ‘Class –I local suppliers’ under Public Procurement (Preference to Make in India) Order, 2017

In line with Public Procurement (Preference to Make in India) Order, 2017 issued by **Department for promotion of Industry and Internal Trade (DPIIT)**, Ministry of Commerce and Industry, Government of India vide order dated 15/06/2017, its revision dated **04/06/2020(PPP-MII Order)**,

‘Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector’ order dated 28/07/2020 and 17/09/2020.

As per Orders vide G.O.Ms.NO.9, Industries and Commerce (PROG-I) Department Dt.25.02.2021

and any subsequent modifications/Amendments, if any, **‘Class –I local suppliers’** shall be eligible for purchase preference as follows:

(i) For the purpose of purchase preference under the PPP-MII Order

‘Local Content’ means the amount of value added in India which shall be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

‘Class –I local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has Local Content equal to or more than 50%.

‘Class-II local supplier’ means a supplier or service provider, whose goods, services or works offered for procurement, has Local Content more than 20% but less than 50%.

Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector, Revised Order No. A-1/2021-FSC-Part (5) dt. 16/11/2021 issued by Ministry of Power (MoP Order) in supersession of all the aforementioned orders the following has been decided:

As per Clause 3(ii), in procurement of all good & Services of works in respect of which there is sufficient local capacity and local competition as in Annexure-I, only “Class-I –Local Suppliers” shall be eligible to bid irrespective of purchase value.

*In Annexure-I of MoP Order No. A-1/2021-FSC-Part (5) vide dt.16.11.2021 of Govt of India in respect of Power sector, Sl.No.(15) & (17), Class-I Local supplier for subject material having **Minimum Local Content-60%**.*

Hence it is proposed to incorporate the same clause **“only Class-I –Local Suppliers has MLC is equal to more than 60% shall be eligible to bid”** in the tender specification.

i) The bidder with lowest evaluated Price in bid shall be denoted as L1.

(ii) If L1 bid is from a **‘Class –I local supplier’**, the contract will be awarded to L1.

(iii) **‘Class-II Local supplier’ will not get purchase preference.**

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(iv) The ‘**Class –I local supplier**’/‘**Class-II Local supplier**‘ shall give a self-certification in his bid in the given format, indicating the percentage of Local Content and certifying that the item offered meets the Local Content requirement for ‘Class –I local supplier’/‘Class-II Local supplier‘, as the case may be and shall give details of the location(s) at which the local value addition is made. Further, in case of procurement value above Rs. 10 Cr, the ‘Class –I local supplier’/‘Class-II Local supplier‘ shall provide a certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of Local Content.

(v) False declaration regarding Local Content by the bidder, will be in breach of code of Integrity under Rule 175(1) (i)(h) of General Financial rules for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of General Financial rules along with such other actions as may be permissible under law.

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SECTION-I
NOTICE INVITING TENDERS (NIT)

1.	Department Name	:	TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED
2.	Circle/ Division Name	:	Chief Engineer / Transmission
3.	Bid Notice/Specification No.	:	PMM41-e- /2024
4.	Bid Subject	:	Supply, Erection/Stringing and Commissioning of OPGW Cable and associated accessories under PSD Funding for providing Reliable Communication System up to 132 KV Substations in three Lots in Zone wise.
5.	Estimated Contract Value (ECV)	:	Lot-I: Rs. 29,51,83,282/- Lot-II: Rs. 25,27,32,215/- Lot-III: Rs.46,93,74,546/-
6.	Period of Contract	:	Delivery period + 18 months Guarantee period
7.	Form of Contract	:	Supply, Erection/Stringing and Commissioning of Equipment
8.	Bid Type	:	Open competitive bidding with reverse bidding
9.	Bid Category	:	Goods
10.	BID SECURITY	:	Lot-I:Rs.59,03,666/- Lot-II: Rs.50,54,644/- Lot-III: Rs.93,87,491/-
11.	BID SECURITY Payable to	:	Bank Guarantee in favour of Chief Engineer/ Transmission, APTRANSCO, Vidyut Soudha, Gunadala, Vijayawada-04 (or) Online money transfer through NEFT/RTGS.
			EMD ONLINE PAYMENT: Bidders can pay EMD online payment through RTGS / internet banking in beneficiary name Pay officer, APTRANSCO A/C No. 52117469736 IFSC code SBIN0016576, SBI branch address: Specialized Mid Corporate Branch, Ramavarapadu Ring Road, Vijayawada. Bidder shall indicate bid number and name of bidding entity in the transaction details field at the time of on-line transfer. Bidder has to upload scanned copy / proof of the online payment transfer along with bid.
12.	Schedule Availability Date	:	From 17:00Hrs on . .2024
	Pre-bid meeting date & time (Off line)	:	11:30Hrs on . .2024
13.	Pre-bid clarifications issue Date/Bid submission start Date & Time	:	17:00 Hrs on . .2024
14.	Bid Submission closing Date & time	:	16:00Hrs on . .2024
15.	Bid Submission	:	Online
16.	P.Q/ Technical Bid Opening Date (Qualification and Eligibility stage)	:	At 16:30 Hrs on . .2024
17.	Price Bid Opening Date & Time	:	Will be opened online

18. Eligibility Criteria & Qualifying Requirements (QR):

18.1 QR-Supply: The bidder should be manufacturer/authorised agent who must have designed, manufactured, tested, supplied, erected and commissioned to any power utilities, at least 40% of the tender quantity for each Lot of the goods/equipment of same or higher class as indicated in the “Schedule of Requirements” (Section-IV) in one continuous period of 12 months in the last five years as on the date of opening of bid.

18.2 QR-Performance: At least 20% of the similar material offered against each Lot (same or higher class), as indicated in the ‘Schedule of Requirements’ (Section-IV) should be in successful operation since two years as on the date of opening of the Bid.

18.3 The bidder’s financial turnover during any one year of the last five years should have been equal or more than 100% value of Estimated Contract Value for each Lot. The bidder shall furnish Type Test Reports as per the technical specification.

The detailed Qualifying Requirements are indicated in [Section-VI](#).

18.4 The bidder is required to furnish the year wise supply of Material/ equipment and the maximum quantity of material/ equipment supplied in one continuous period of 12 months of the last five years along with proof of supplies. The bidder is required to furnish evidence and certificates for the quantity of material which are in successful operation since two years as on the date of opening of the Bid to meet Performance requirement.

18.5 The bidder is required to furnish the Financial Turnover of last five years. Bidders shall submit audited financial reports (audited Profit & Loss statement, audited Income & Expenditure statement and audited Balance Sheet) counter signed by Chartered Accountant for last **five financial years** preceding the date of bid submission, in support of financial turnover and Banker’s certificates regarding Bank limits.

18.6 In case the bidder is an authorized agent, the erection/stringing, testing and commissioning of OPGW cable and associated accessories shall be done under the supervision of manufacturer who has given Manufacturing Authorisation Form (Undertaking from the manufacturer in support of this shall be enclosed).

18.7 The Bidders should quote for 100% of the tender quantity of all items in the bid indicated against each Lot in the ‘Schedule of Requirements’ (Section-IV) of Bid specification on single responsibility basis.

18.8 The Bids received without relevant proof of documents to meet Qualifying Requirements and valid type test reports will be treated as Non-Responsive.

18.8 A) Purchase preference shall be given to “Class-I local supplier” in procurement process.

In procurement of all goods, services or works in respect of which the Nodal Department has communicated that there is sufficient local capacity and local competition, only “Class I local supplier” as defined under the Order, shall be eligible to bid irrespective of purchase value.

The Bidder shall in its bid submit a certificate in compliance to DoE order as per the given format. Further, the firm has to be a ‘Class-I local supplier’ or ‘Class-II local supplier’ (if applicable only) as defined under Public Procurement (Preference to Make in India) Order, 2017 issued by Department for promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Government of India vide order dated 15/06/2017, its revision dated 04/06/2020 (PPP-MII Order) read in conjunction with ‘Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector’ order dated 28/07/2020 and 17/09/2020 and 16/11/2021 issued by Ministry of Power (MoP Order) and subsequent modifications/amendments if any Firms who are not ‘Class-I local supplier’ or ‘Class-II local supplier’ shall not be eligible to bid.

B) Bidders shall also submit Affidavit of Self certification regarding Minimum Local Content, if applicable, duly signed and stamped on each page and Certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of Local Content, if applicable, duly signed and stamped on each page, in line with PPP-MII order and MoP Order.

18.9 Responsibility for correctness of the information submitted in online bid lies with bidder. If any information furnished in the bid is proved to be false at a later date, the bid will not only be rejected but the bidder will be BLACKLISTED.

19. **Officer Inviting Bids:** Chief Engineer/ Transmission, APTRANSCO.

20. **Address:** Ground Floor, Vidyut Soudha, Vijayawada - 520 004

21. **Contact Details:** Phone/Fax : **0866-2429230, Extn. 2014 / 2034/2013**

22. **Procedure for bid submission:**

22.1.1 The Bids should be in the prescribed form, which can be obtained from e-procurement platform from the date of electronic publication up to the time and date indicated in the bid notice. The intending bidders would be required to enroll themselves on the e-procurement market place www.tender.apecurement.gov.in.

Those contractors/Suppliers who register themselves in the e-procurement market place can download the Bid schedules free of cost. The bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-procurement platform and the bids not authenticated by digital certificate of the bidder will not be accepted on the e-procurement platform following the G.O.Ms.No.6, I.T&C Department, dated 28-02-2005. **For enrolment and Registration APTS, Vijayawada is to be contacted.**

22.2 Intending bidders can contact office of the Chief Engineer/Transmission, APTRANSCO, Vidyut Soudha, Vijayawada for any clarification/ information on any working day during working hours.

22.3 The bidders who are desirous of participating in e-procurement shall submit their technical bid, price bid etc. in the standard formats prescribed in the bid documents displayed at e-market place. The bidders should invariably upload the statement showing the list of documents uploaded in the e-market place in support of their technical bid. The bidder should upload scanned copies of all the statements, certificates, documents etc. as called for here under, duly signed by him, owning responsibility for their correctness/ authenticity.

22.4 Technical bid evaluation of the bidders would be done on the certificates/ documents uploaded/furnished by the bidder against the qualification criteria.

22.5 The bidders shall invariably upload the scanned copy of Bid Security, either **Online payment or Bank Guarantee**. The successful bidder shall furnish the original of the same either personally or through courier or by post within the stipulated time specified by the purchaser.

22.6 The bidder shall invariably upload the following on e-procurement platform:

- i) Bank Guarantee towards Bid security,
- ii) Statement of Supply & Performance details of equipment (as per Form-5 of Section-VII) along with documentary proofs, i.e. scanned copies of purchase orders, Invoices, delivery challans, material receipt & satisfactory performance certificates of the purchaser, etc. to meet Qualification Requirements for the required quantity as per the specification,
- iii) Financial Turnover of last five years, audited financial reports (audited Profit & Loss statement, Income & Expenditure statement and Balance Sheet) counter signed by Chartered Accountant for last five financial years preceding the date of bid submission, in support of financial turnover and Banker's certificates regarding Bank limits (as per Form-10 of Section-VII),

- iv) Type test reports of the material offered as per the Bid specification,
- v) Guaranteed Technical Particulars & drawings of the equipment,
- vi) Other declarations/statements/information as per the formats of Section-VII of this specification:
 - a) Details to be furnished by the bidder (as per Form-6),
 - b) Technical & Commercial deviations (as per Form-7),
 - c) Declaration regarding relatives (as per Form-8),
 - d) Bank Account details for RTGS (as per Form-10),
 - e) Manufacturer's Bidding authorization (as per Form-11),
 - f) Undertaking to be given by the company regarding blacklisting (as per Form-12),
 - g) Bankers Certificate (as per Form-13)
 - h) Format for Affidavit of Self certification regarding Local Content in line with **PPP-MII order and MoP Order (Form-14)**
 - i) Certificate from statutory auditor or cost auditor of the company giving the percentage of Local Content, in line with **PPP-MII order and MoP order (Form-15)**
 - j) Certification by the Bidder per order no. **F.No.6/18/2019-PPD dated 23/07/2020 (Form-16)**
- vii) Other information and relevant documents as per the Bid specification.

22.7 The bidder shall furnish original of all documents/ certificates/ statements uploaded by him whenever sought by the Purchaser. The successful bidder shall furnish their company brochures, technical write-ups and printed materials if any.

22.8 The bidder shall furnish the declaration that:

- 1) They have not been blacklisted/ debarred by any department due to any reasons, as per the Form No.12 of Section-VII of this specification.
- 2) The soft copies uploaded by them are genuine.
- 3) They will agree to get disqualified themselves for any wrong declaration in respect of the above and get their Bid summarily rejected.

Any incorrectness/ deviations noticed will be viewed seriously and apart from cancelling the contract, duly forfeiting the Bid security, criminal action will be initiated including suspension of business and/ or black-listing.

23. General Terms & Conditions:

Bids are invited on the e-procurement platform for the above-mentioned procurement from the firms eligible.

23.1 Bid security to be paid online or in the shape of Bank Guarantee issued from any Scheduled Bank to be valid for a period of 60 days over and above the validity of Bid i.e. 150 days from the date of bid opening. Scanned copy of online payment receipt or Bank Guarantee towards Bid security shall be uploaded along with the Bids. Originals must be submitted by successful bidder to the purchaser through registered post/ courier/ in person before placing of the order. In case extension of Bid validity by the bidder at the request of APTRANSCO, the validity of the Bid security Bank guarantee shall be extended suitably. **In case of quoting for all Lots, combined Bank Guarantee for total ECV is also accepted.**

23.2 Exemption for payment of Bid security is not allowed in any case. The permanent Bid Security Bank Guarantee accepted earlier is deemed to have been withdrawn. Permanent Bid Security Bank Guarantee is not accepted. Bid security extensions accorded earlier are deemed to have been withdrawn.

23.3 Bid schedules: Bid schedule can be downloaded free of cost from the web site www.tender.apecurement.gov.in

23.4 The bidder is subject to be disqualified, if he is found to have misled or furnished false information in the forms/ Statements/ Certificates submitted in proof of qualification requirements and any record of abandoning supplies, not fulfilling contractual obligations in earlier contracts, inordinate delays in completion of supplies, litigation history, financial failures or participating in the previous Bidding for the same supply and quoting unreasonably high price.

Even while execution of the contract, if it is found that the bidder had produced false/fake certificates of experience, he will be black listed and the contract will be terminated and his Bid security will be forfeited and contract will be carried through other agency at his cost and risk.

23.5a) Transaction fee : The participating bidders have to pay transaction fee of 0.03% on Estimated Contract Value (ECV) with a cap of Rs 10,000/- (Rupees ten thousands only) for all tenders with ECV up to Rs.50.00 crore plus service charges GST @ 18% and Rs.25,000/- (Rupees Twenty Five thousand only) plus service charges GST @ 18% for tenders with Estimated Contract Value (ECV) above Rs.50.00 crore online payment gateway with any master/visa credit card issued by any Bank and through net Banking facility (direct debit) with AXIS/ICICI or HDFC Banks at the time of bid submission. Submission is mandatory as per G.O. Ms.No.13. Payment of transaction fee through DD will not be accepted". GST on transaction fee is 18% with effect from 01.07.2017

b) Corpus Fund: The successful bidder shall pay an amount equivalent to 0.04% of ECV (estimated contract value) with a cap of Rs. 10,000/- (Rupees Ten Thousand only) for all tenders with ECV up to Rs.50.00 Crore and Rs.25,000/- (Rupees Twenty-Five Thousand only) for tenders with ECV above Rs.50.00 crore on e-Procurement platform, before entering into agreement/issue of purchase orders towards e-Procurement fund in favour of Managing Director, APTS, Vijayawada, through the Agreement authority.

23.6 In case of discrepancy with Bid conditions in the Bid document and NIT, the condition in the Bid document prevails.

23.7 Note:

- a) Any other condition regarding receipt of Bids in conventional method appearing in the Bid documents may please be treated as not applicable.
- b) The contractors are to upload the information preferably in Zip format.
- c) The contractors should upload the documents duly signing each and every paper.
- d) Bidders are requested to go through all the clauses and contents of specification thoroughly and quote the bid. Ignorance of clauses will not be entertained by the purchaser at later date.
- e) The Bidders are advised to ensure that their bids are uploaded in complete shape and as per the requirement of this specification.

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SECTION-II (A)
INSTRUCTIONS TO BIDDERS

The **Chief Engineer/ Transmission, APTRANSCO, Vidyut Soudha, Vijayawada** invites bids on e-procurement platform in two parts for the materials indicated in the “Schedule of Requirements” during the period, for which dates and time specified in the NIT, and will be opened by (him) or his nominee at this office on the date and time mentioned in the NIT.

- 1.1 The intending Bidders would be required to enroll themselves on the ‘e-procurement’ market place at www.tender.apecurement.gov.in
- 1.2 The Bids should be in the prescribed form invited on e-procurement by the Chief Engineer/ Transmission, APTRANSCO, Vidyut Soudha, Vijayawada (as specified in NIT) that can be downloaded free of cost from the website www.tender.apecurement.gov.in.
- 1.3 The dates stipulated in the Bid notice, i.e. NIT are firm and under any circumstances they will not be relaxed unless officially extended by APTRANSCO in e-procurement plat-form.
- 1.4 The Bidder should upload scanned copies as specified in checklist and all enclosures required for the schedules and Appendices. Bidders should produce the originals of Bid Security and all other documents for verification within 3 (Three) days if asked for, by the Competent Authority.
- 1.5 Bidders are required to register on the e-procurement market place www.tender.apecurement.gov.in and submit their bids in two parts:
Part-I: Eligibility and Technical bid.
Part-II: Financial bid.
- 1.6 The successful bidder shall pay an amount equivalent to 0.04% of Estimated Contract value against which contract is awarded with a cap of Rs.10,000/- (Rupees Ten Thousand only) for all supplies/works with ECV upto Rs.50.00 Crore and Rs.25,000/- (Rupees Twenty Five thousand only) for works/supplies with ECV above Rs.50.00 crore on e-procurement platform before entering into agreement/issue of purchase orders, towards e-Procurement fund in favour of **Managing Director, APTS, Vijayawada** through the Agreement authority.
- 1.7 The successful Bidder is expected to complete the supplies within the time period specified in the ‘Schedule of Requirements’ (Section-IV).
- 1.8 The uploading of bids on-line through e-procurement cannot be possible after expiry of due date and time and it is sole discretion of APTRANSCO to consider any requests for extension.
- 1.9 APTRANSCO reserves the right to cancel/extend/alter the bid conditions at any time. In the process, if the tender process/works are stalled due to legal intervention or due to natural calamities, no compensation will be paid.

2. Bidders / Firms eligible to Bid :

2.0 The Bidders / Firms who

- a) Possess the valid registration as mentioned in the NIT and satisfies all the conditions therein.
- b) Are not blacklisted or debarred or suspended by any department for whatever be the reason, prohibiting them not to continue in the contracting business
- c) Have complied with the eligibility criteria specified in the NIT are the eligible Bidders /Firms.
- d) The bidder should be Class -1 local manufacturer

2.1 Bidders / Firms ineligible to Bid:

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- a) A retired officer of the Govt. of AP or Govt. of India executing works/supplies is disqualified from Bidding for a period of two years from the date of retirement without the prior permission of the Government.
- b) The Bidder who has employed any retired officer as mentioned above shall be considered as an ineligible Bidder.
- c) The contractor himself or any of his employee is found to be Gazetted Officer who retired from Government Service and had not obtained permission from the Government for accepting the contractor's employment within a period of 2 years from the date of his retirement.
- d) The Contractor or any of his employees is found at any time after award of contract, to be such a person who had not obtained the permission of the Government as aforesaid before submission of the Bid or engagement in the Contractor's service.
- e) Contractor shall not be eligible to Bid for works/supplies in AP Transco where any of his near relatives are employed in the rank of Assistant Engineer or Assistant Executive Engineers and above on the Engineering side and Assistant Accounts Officer and above on the accounts side. The Contractor shall intimate the names of persons who are working with him in any capacity or are subsequently employed. He shall also furnish a list of Gazetted /Non-Gazetted State Government Employees related to him. Failure to furnish such information Bidder is liable to be removed from the list of approved contractors and his contract is liable for cancellation.

Note: Near relatives include

Sons, step sons, daughters, and step-daughters.

Son-in-law, and daughter-in-law.

Brother-in-law, and sister-in-law.

Brothers and Sisters.

Father and Mother.

Wife / Husband.

Father-in-law and Mother-in-law

Nephews, nieces, uncles and aunts

Cousins and

Any person residing with or dependent on the contractor.

3.0 Documents to be furnished for Qualification Requirements of the Bidders:

- 3.1 The Bidder shall furnish the following particulars in the formats provided online and supported documentary evidence shall be uploaded:

Attested copies of documents relating to the Registration of the firm, Registration as Electrical Licensed Contractor, Partnership deed, Articles of Association, Commercial Tax Registration, Latest Income Tax Clearance certificate/ latest IT return and PAN number from IT Department, excise department registration certificates etc.

Note: The Partnership firms, which are registered as Contractors shall intimate the change in partnership deed, if any, as per GO Ms No.58, I & CAD, dated 23-04-2002 within one month of such change. Failure to notify the change to the registration authority in time will entail the firms to forfeit their registration and their Bid will be rejected. The intimation of change of partners if any and the acceptance by the Registration authority may be enclosed.

Availability of key personnel for administration/ site management and execution viz., technical personnel required for the work.

- 3.2 Bids from Joint Ventures / agents / consortiums are not acceptable.

- 3.3 Qualification criteria for opening of the price bid:

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- 3.4 Even though the Bidders meet the above qualification requirements, they are liable to be disqualified / debarred / suspended / blacklisted if they have:
- 3.4.1 Furnished false/ fabricated particulars in the forms, statements and/ annexure submitted in proof of the qualification requirements and/or,
- 3.4.2 Not turned up for entering into agreement, when called upon within the time specified in the letter of acceptance,
- 3.4.3 Record of poor progress such as abandoning the work/supplies, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc.,
- 3.4.4 Participated in the previous bidding for the same work and had quoted unreasonably high Bid percentage and,
- 3.4.5 A history of criminal record in which the Bidder is involved if any.
- 3.4.6 Even while execution of the contract, if found that the contract was awarded to the Contractor based on false/fake certificates of experience, the Contractor will be blacklisted and contractor will be taken over invoking clause-61 of PS to APSS.
- 3.4.7 History of litigation with the Government during the last five years in which the Bidder is involved.
- 3.4.8 Bidders should specifically indicate whether their firm has been banned/ blacklisted/debarred by any Government department/undertaking or any power utility for non-performance/malpractice or due to any reason. Bids of bidders who are banned/ blacklisted/debarred will be treated as non-responsive.

3.5 ELIGIBILITY CRITERIA:

A) PHYSICAL EXPERIENCE:

The bidder should be **manufacturer/authorized agent** who must have designed, manufactured, tested, supplied, erected and commissioned to Power Utilities, at least 40% of the quoted quantity for each Lot of the goods/equipment of similar same or higher class as indicated in the "Schedule of Requirement" (Schedule-IV) in one continuous period of 12 months in the last five years as on the date of opening of bid.

B) PERFORMANCE:

At least 20% of the similar/higher class material offered for each Lot as indicated in the 'Schedule of Requirements' should be in successful operation since 2 years as on the date of opening of the Bid.

(The bidder is required to furnish evidence and certificates for the quantity of material which are in successful operation since 2 years as on the date of opening of the Bid.)

Note: The above eligibility criteria shall be fulfilled by the bidder against each lot separately for the lots the Bidder has quoted, in case of more than one lot.

C) FINANCIAL TURNOVER:

1. Financial turnover during any one year of the last five years should have been equal or more than the estimated contract value for each Lot. (The bidder is required to furnish the Financial Turnover of last five years).
2. Reports on financial standing of the Bidder such as profit and loss statement, balance sheets and auditor's report for the past FIVE years, in support of financial turnover and Banker's certificates regarding Bank limits.

- D) In procurement of all goods, services or works in respect of which the Nodal Department has communicated that there is sufficient local capacity and local competition, only “Class I local supplier” as defined under the Order, shall be eligible to bid irrespective of purchase value.
- E) **TYPE TEST REPORTS:** The bidder shall furnish Type Test Reports. The type tests must have been conducted on the material offered as per the relevant IEC/IS in recognized laboratory as per the latest revision of the Relevant IEC/ IS applicable and Technical Specification. **The date of type tests shall not be earlier than Five years as on the date of bid opening.** The bids received without type test reports will be treated as non-Responsive. If any change in design was made latest type tests shall be furnished along with approved drawing. (Bidder is required to furnish the Year of Type Test Reports done for similar equipment/material in the remarks column of technical particulars).
- F) In case the bidder is an authorized agent, the erection/stringing, Testing and commissioning of OPGW cable and associated accessories shall be done under the supervision of manufacturer who has given Manufacturing Authorisation Form (Undertaking from the manufacturer in support of this shall be enclosed).

The detailed Qualifying Requirements are indicated at Section-VI

Responsibility of correctness of the information submitted in online bid lies with bidder. If any information furnished in the bid is proved to be false at a later date, the bid will not only be rejected but the bidder will be BLACKLISTED.

The bids not complying with the stipulated completion period will be treated as non-responsive. While being equal or compatible in other aspects preference will be given to those bidders who have experience in erection/stringing of above works/supplies similar to that given in the specification or of higher voltages during the last five financial years.

IF A BIDDER QUOTING FOR THE BIDS IS HAVING POOR PERFORMANCE IN THE AND NOT COMMENSURATE WITH THE AGREEMENT IN THE PREVIOUS CONTRACTS, THE BID OF SUCH BIDDER WILL NOT BE CONSIDERED FOR AWARD OF CONTRACT.

4.0 One Bid per Bidder:

Each Bidder shall submit only one Bid. A Bidder who submits more than one Bid will cause dis-qualification of all the Bids submitted by the Bidder.

5.0 Cost of Bidding:

The Bidder shall bear all costs associated with the preparation and submission of his Bid and the Bid inviting authority will in no case be responsible and liable for those costs.

6.0 The pre-bid meeting will be held on the date & time indicated in the NIT, in the office of the bid inviting authority. All the prospective bidders may attend the pre-bid meeting.

SECTION –II (B) : CHECK LIST

The bidders shall invariably upload/attach the information and records listed in the check list below on **e-procurement platform**, and also confirm by marking Yes or No. The same shall have to be furnished either personally or through courier or by post in the stipulated time, if asked by the Purchaser.

1	Whether Original Bid Security BG/online payment uploaded ? for each Lot separately or combinedly in case of quoting for all lots.	Yes / No
2	Whether Transaction Fee is paid electronically or not. The copy of the receipt may be uploaded.	Yes / No
3	Whether Guaranteed Technical Particulars are furnished (uploaded) or not.	Yes / No
4	Whether Proof of Turnover signed by Auditors are uploaded or not.	Yes / No
5	Whether supply qualification & performance statements (Form-1 & form-5) uploaded or not?	Yes / No
6	Whether all the documents as proof of pre-Qualification Requirements i.e. 40% quantity of supply in 12 months from the power utilities as called for, are uploaded with attestation or not?	Yes/No
7	Whether all the documents pertaining to the two years satisfactory performance, i.e., satisfactory performance certificates from the utilities along with relevant documentary proof with attestation, are uploaded	Yes /No
8	Whether Bankers certificate uploaded (Form-13) or not?	Yes / No
9	Whether Schedule of Deviations - Technical & Commercial are uploaded or not?	Yes / No
10	Whether 'Declaration Form' uploaded (Form-8) or not?	Yes / No
11	Whether copies of Type Test Certificates uploaded?	Yes / No
12	Whether uploaded all other forms as per Section-VII of the Bid Specification?	Yes / No
13	Whether uploaded the undertaking informing that firm has not been banned/ black listed/debarred by any Govt. Department / undertaking or any power utility for non-performance or malpractice? (Form-12)	Yes / No
14	Whether uploaded the undertakings as per MoP (Form-14,15 & 16)	Yes / No
15	Whether accepted for submission of Performance Bank Guarantee (as per clause 39) and Additional Security Deposit (as per clause 40)	Yes / No
16	Whether sample of offered type of OPGW is furnished?	Yes / No.

The Bidder shall indicate that all the forms and enclosures indicated in the checklist furnished are compiled with.

SIGNATURE OF THE BIDDER
Designation &
Seal of the company :

SECTION – III
GENERAL TERMS & CONDITIONS OF THE CONTRACT
A. Introduction

Definitions

1.1 In this Contract, the following terms will be interpreted as indicated:

- (a) "The Contract" means the agreement entered into between the Purchaser and the Supplier, as recorded in the contract Form signed by the Parties, including all attachments and appendices thereto and all documents incorporated by reference therein.
- (b) "The Contract Price" means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations.
- (c) "The Materials / equipment" means all of the material/ equipment, machinery, and/or other materials which the Supplier is required to supply to the Purchaser under the Contract.
- (d) "The Services" means those services ancillary to the supply of the material/ equipment, such as transportation and insurance, and any other incidental Services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract.
- (e) "GCC" means the General Terms and Conditions of Contract contained in the section.
- (f) "The Purchaser" means the organization purchasing the Materials / equipment.
- (g) Vendor is a supplier for supply of material/ equipment.
- (h) "The Supplier" means the firm supplying the Materials / equipment and Services under this Contract.
- (i) "Day" means calendar day.

2. Applicability

2.1 These General Conditions of contract will apply to the extent that they are not superseded by provisions of Salient features of the Bid.

3 (a) Standards:

The equipment/material supplied under this Contract will conform to the Standards mentioned in the Technical specifications, and, when no applicable standard is mentioned, the authoritative standards appropriate to the equipment/ material, i.e., BIS, such standards will be the latest. All material will be of the best class and will be capable of satisfactory operation under tropical conditions without distortion or deterioration.

3 (b) Interchangeability:

All similar material and removable parts of similar equipment will be interchangeable with each other. A specific confirmation of this should be furnished in the bid.

4. Scope of Work:

The scope of work of this specification covers design, engineering, manufacture, testing, supply & delivery FADS (Free at Destination Stores/ Site) including un-loading of the equipment/ material and erection/stringing & commissioning of the material under live line condition described in Section-IV ‘Schedule of Requirements’ and Section-V ‘Technical Specification’.

5. Eligible Bidders:

Vendors for supply of the equipment/ material including erection/stringing and commissioning listed in section-IV ‘Schedule of requirements’ of Bid specification and meeting the Qualification Requirements described in section-VI ‘Qualifying Requirements’ only need quote. Bids received from firms not meeting the eligibility/ Qualification criteria will not be considered.

Any company/vendor/supplier/contractor that is blacklisted/ debarred by any power utility is not eligible to participate in the bidding.

B. THE BIDDING DOCUMENTS:

6. Contents of Bidding Document:

6.1 The Material/ equipment required, bidding procedures, and contract terms are prescribed in the bidding documents as listed below:

1. Notice Inviting Tenders (NIT) – Section-I
2. Instruction to Bidders & Check List – Section-II
3. General Terms and Conditions of Contract – Section-III
4. Schedule of Requirements & Delivery Schedule – Section-IV
5. Technical Specifications – Section-V
6. Qualification Requirements – Section-VI
7. Sample Forms – Section-VII
(Qualification & Performance Statements, Bid Security form, details to be furnished by Manufacturer, Performance Security form, Schedule of Deviations and Other forms to be duly filled-in & signed and up-loaded).

6.2 The Bidder is expected to examine all instructions, forms, terms and Technical specifications in the bidding documents. Failure to furnish all the information required as per the bidding documents, or to submit a bid not responsive to the bidding documents in every respect will be at Bidder's risk and may result in the rejection of its Bid.

7. Clarification of Bidding Documents:

Clarification of Bidding Documents: A prospective Bidder requiring any clarification of the bidding documents may notify the Purchaser in writing or by mail at the Purchaser's address. The Purchaser will respond in writing to any request for clarification of the bidding documents, which it receives no later than fifteen (15) days prior to the deadline for the submission of bids. Written copies of Purchaser's response (including an explanation of the query but without identifying the source of inquiry) will be put on e-procurement platform/ website of the purchaser or intimated by mail.

8. Amendment to Bidding Documents:

8.1 At any time prior to the deadline for submission of bids, the Purchaser, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, may modify the bidding documents by amendment.

- 8.2 All such amendments also would be made available on the e-procurement platform/ website of APTRANSCO and such amendments will be binding on the respective Bidders.
- 8.3 In order to allow prospective Bidders reasonable time in which to take the amendment into account in preparing their bids, the Purchaser, at its discretion, may extend the deadline for the submission of bids.

C. PREPARATION OF BIDS

9. Language of Bid :

The bid prepared by the Bidder including all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, will be in English.

10. Cost Associated with Bidding:

The Bidder will bear all costs associated with the preparation and submission of its bid, and the Purchaser, will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

Bidders have to pay a transaction fee @ 0.03% of ECV (Estimated Contract Value) with a cap of Rs.10,000/- for all works/ supplies with ECV up to Rs.50.00 Crore and Rs.25,000/- for works/supplies with ECV above Rs.50.00 Crore, at the time of bid submission electronically.

- Transaction Fee & other charges shall be paid by either Credit Card or Debit Card.
- Bidders have to pay 'service tax' i.e., GST as levied by Government of India on transaction fee, electronic payment gateway charges.
- Successful bidders shall pay another 0.04% of ECV to APTS towards e-procurement fund (Corpus Fund) with a cap of Rs 10000/- for all works with ECV up to Rs 50 Cr and Rs 25000/- for works with ECV above Rs 50 Cr.

Bidders shall obtain digital certificates from APTS.

11. Documents Constituting the Bid :

- a) The Bid comprises the following.
 - (i) Bid documents and Price Bid,
[Available online at www.tender.apecurement.gov.in]
 - (ii) Qualification information and supporting documents
[to be uploaded by the Bidder]
- b) Documentary evidence establishing in accordance with Clause No.19 'Documents Establishing Bidder's Eligibility and Qualifications' that the Bidder is eligible to bid and is qualified to perform the contract if its bid is accepted.
- c) Documentary evidence establishing that the Materials/ equipment and ancillary services to be supplied by the Bidder are as per the Technical specification of the bidding documents

- d) Bid Security in accordance with Clause No.20 of section-III, and as indicated in the Bid Notification.
- e) Taxes and Duties clearance certificates,
- f) Schedule of Deviations -
 - a) Commercial
 - b) Technical

All the schedules will be duly filled online with full details as called for in the schedules required for evaluation of bids without which, the bids will be liable for rejection. Bidders are expected to duly fill in all the schedules and sample forms and upload the same on e-procurement platform as part of the Bid.

12. Commercial form

The Bidder will complete the commercial form appropriately on e-procurement platform.

13. Bid Prices

- 13.1 The prices quoted shall be **FIRM**. Bids will be called for with prices FADS inclusive of packing and forwarding, **GST** and other legally permissible duties and levies wherever applicable, handling charges to cover the transport by road from destination railway station to site/stores, unloading at site/stores and insurance (from ware house to warehouse i.e final destination and storage upto commissioning) towards supply.
- 13.2 Even though composite price is given the break-up for all the duties, taxes, freight, packing and forwarding etc., will be furnished. **Freight shall be quoted separately. Quoting it as 'inclusive' / 'zero' will not be accepted.**
- 13.3 It is the responsibility of the Bidder to inform himself of the correct rates of duties and taxes leviable on the materials at the time of bidding.
- 13.4 It is the responsibility of the Bidder to know the prevailing statutory taxes. APTRANSCO considers evaluation of bid price on the basis of prevailing tax rates as on the date of 'Tender Calling Date'.
- 13.5 In case of difference in figures and text fields quoted by the bidder in the commercial form of e-procurement platform, the figures will be final and comments in the text field will not be taken in to consideration.
- 13.6 The Bidder will indicate the unit price and total bid price of materials appropriately and clearly in the price schedule. Any alternative offers shall be indicated only in the price schedule. Prices indicated elsewhere will not be considered.

Prices indicated on the Price Schedule will be entered separately in the following manner.

The price of the Materials / equipment quoted EXWORKS and all excise and other duties and sales and other taxes payable on the finished Materials / equipment with individual breakup for Taxes and Duties, packing and forwarding, freight etc.

In case of bought out materials/equipment the bidders shall quote all-inclusive price in basic/ex-works price and can mention '**Not –applicable being bought out item**' under **GST column**. APTRANSCO shall pay only for the taxes involving direct transaction between the bidder and APTRANSCO and not for the transaction between bidder and his sub-vendors.

14. Variable prices & Price Variation basis: Not Applicable

15. Taxes and Duties:

- 15.1 A bidder will be entirely responsible for quoting the correct taxes and duties, other local taxes or levies if any, license fees, etc., he has to incur until completion of the contract. For the purpose of evaluation, the bidder should clearly indicate the GST applicable and any other taxes and levies payable in the respective columns provided in the Commercial form on e-procurement platform. Failure to furnish the details as prescribed in the price schedule will be loaded as indicated in the evaluation criteria.
- 15.2 If the rates of statutory levies assumed by the Bidder are less than the actual rates prevailing at the time of bidding, the Purchaser will not be responsible for such errors. If the rates of statutory levies assumed by the Bidder are later proved to be higher than the actual/ correct rates prevailing at the time of bidding, the difference will be passed on to the credit of the Purchaser.
- 15.3 Deemed Export Benefits: This is not applicable for local purchases with APTRANSCO funds.

15.4 GST- reverse charge Mechanism-Contractor being un registered:

Reverse Charge mechanism was not applicable in respect of purchases made from the composition dealer /registered dealer, in case the service provider is an un registered dealer, the e-way bill will be issued by the APTRANSCO. The Contractor must mention on the Tax invoice if the tax is payable on reverse charge.

E-way bills: For supply of material/equipment e-way bills are to be provided by the bidder only. APTRANSCO will not provide any way bills for the supplies against this tender unless there is clear instructions in this regard by the concerned authorities.

16. Statutory Variations:

Any variation up or down in statutory levy or new levies introduced after ‘**Tender calling date**’ under this specification will be to the account of APTRANSCO within the scheduled delivery period as per the contract on production of documentary evidence. This is allowed only once during delivery period, i.e. at the time of delivery of goods at factory.

In cases where delivery schedule is not adhered to by the supplier and there are upward variation/ revision after the agreed delivery schedule, the supplier will bear the impact of such levies and if there is downward variation / revision, the APTRANSCO will be given credit to that extent.

In case of sub-vendor items, taxes & duties are inclusive in tender price. No statutory variation is applicable.

In cases where the bidder assumes less tax rates and become lowest, upward variation of taxes will not be considered. In case of the bought-out items for which the prices are quoted all inclusive of taxes, statutory variation shall not be applicable.

17. Bid Currencies:

Prices will be quoted in Indian Rupees; and will be paid in Indian Rupees only.

18. Quantity to quote:

Bidder shall quote 100% of the bid quantity and for all items against each Lot separately indicated in the “Schedule of Requirements” (Section-IV) of the bid specification on single responsibility basis. Bid offers less than the prescribed quantities are liable for rejection.

19. Documents Establishing Bidder's Eligibility and Qualifications:

The Bidder shall furnish, as part of its bid, documents establishing the Bidder's eligibility to bid and its qualifications to perform the contract if its bid is accepted.

The documentary evidence of the Bidder's qualifications to perform the contract if its bid is accepted shall establish to the Purchaser's satisfaction:

- (a) That the Bidder has the financial, technical, and production capability necessary to perform the contract;
- (b) That the Bidder meets the Qualification criteria listed in Section-VI. In addition, the Bidder may furnish full particulars regarding supply of the material in question made so far to APTRANSCO during the last 5 years and other reputed power utilities.

19.1 Documents Establishing Equipment/ material conformity to bidding Documents:

The Bidder will furnish as part of its bid, documents establishing conformity to the bidding documents of all Material/ equipment and services, which the Bidder proposes to supply under the Contract.

The documentary evidence of conformity of the material/equipment and the services to bidding documents may be in the form of literature, drawings, data, and will consist of:

- (a) A detailed description of the essential technical and performance characteristics of the materials/ equipment;
- (b) The bidder should specifically mention about furnishing the type test certificates and a copy of test certificate should be uploaded along with the bid.
- (c) a list giving full particulars, including available sources and current prices of spare parts, special tools etc., necessary for the proper and continuing functioning of the Material/equipment following commencement of the use of the Material/ equipment by the Purchaser; and
- (d) an item-by-item commentary on the Purchaser's Technical Specifications demonstrating substantial responsive-ness of the equipment/ material and services to those specifications, or a statement of deviations and exceptions to the provisions of the Technical Specifications.

For purposes of the commentary to be furnished pursuant to above, the Bidder will note that standards for workmanship, material, and equipment, as well as references to brand names or catalogue numbers designated by the Purchaser in its Technical Specifications, are intended to be descriptive only and not restrictive. The Bidder may substitute alternative standards, brand names, and/or catalogue numbers in its bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.

20. Bid Security:

- 20.1 The Bidder shall furnish, as part of its bid, a Bid Security specified in the NIT. This amount should be paid by way of BG/On line payment.

Bidders may furnish a **Bank Guarantee (B.G.)** as per the proforma attached. The scanned copy of BG should invariably upload along with the Bid.

Bid Security shall be furnished Lot wise separately or combined in case of quoting for all Lots.

20.2 The fact of having Bid security by way of Bank Guarantee along with the bid should be clearly indicated in the Bid.

20.3 Submission of **BID SECURITY by way of DD, cheque, cash, money order, call deposit will not be accepted and will be considered as disqualification.**

20.4 **Exemption for payment of Bid security is not allowed in any case.** The permanent bid security bank guarantee accepted earlier is deemed to have been withdrawn. Permanent bid security Bank Guarantee is not accepted. Bid security extensions accorded earlier are deemed to have been withdrawn.

20.5 Requests for exemption from payment of BID SECURITY will not be entertained on any account.

20.6 Any bid not secured as above will be rejected by the Purchaser.

20.7 The successful Bidder's Bid Security original shall be furnished before placing of order and the same will be discharged after award of contract and acceptance of Performance Security.

20.8 The Bid Security may be forfeited:

(a) If a Bidder:

- i) Withdraws its bid or alters its prices during the period of bid validity specified by the Bidder, or
- ii) Does not accept the correction of errors pursuant to Clause No.30.2; or
- iii) Offers post Bid rebates, revisions or deviations in quoted prices and/ or conditions or any such offers which will give a benefit to the Bidder over others will not only be rejected outright but the original Bid itself will get disqualified on this account and the Bidder's BID SECURITY will be forfeited.

(b) In the case of a successful Bidder, if the Bidder fails:

- i) To sign the contract in accordance with Clause No.38.
- ii) To furnish performance security in accordance with Clause No.39.

20.9 Bids without Bid Security will be rejected and bidder will run the risk of being banned.

21. Period of Validity of Bids:

21.1 Bids will remain valid for the period of **ninety (90) days** from the date of bid opening prescribed by the Purchaser. A bid valid for a shorter period will be rejected.

21.2 In exceptional circumstances, the Purchaser may solicit the Bidder's consent to an extension of the period of validity. The request and the responses there to will be made in writing (or by

Fax). The Bid Security Bank Guarantee provided under Clause No.20 shall also be suitably extended. A Bidder may refuse the request without forfeiting its Bid Security.

22. Tax Clearance Certificates:

22.1 Copies of Income Tax, GST and Turnover Tax certificates for the latest period from the appropriate authority will invariably be enclosed to the bid. In the case of proprietary or partnership firm it will be necessary to produce the certificate/ certificates for the proprietor or proprietors and for each of the partners as the case may be. If the Bidder has already produced the certificate during the calendar year in which the bid is made, it will be sufficient, if particulars are given.

23. Service Conditions:

23.1 The equipment/ materials offered will be entirely satisfactory for operation under the climatic conditions indicated below.

(a)	Location	-	at various sub-stations in the state of Andhra Pradesh
(b)	Maximum ambient air temperature		50 °C
(c)	Minimum ambient air temperature		5 °C
(d)	Average daily ambient air temperature		35 °C
(e)	Maximum relative humidity		74 %
(f)	Maximum altitude above mean sea level		1000 m
(g)	Average number of thunder storm days per annum		40 days
(h)	Average number of rainy days / annum		90 days
(i)	Average tropical monsoon condition per annum		3 months
(j)	Average Annual Rain fall		925 mm
(k)	Maximum wind pressure		200 kg/Sq.m.
(l)	Isoceraunic level per annum		50 days
(m)	Seismic level (horizontal acceleration)		0.3 g

23.2 Due consideration will be given to any special devices or attachments put forward by the Bidder which are calculated to enhance the general utility and the safe and efficient operation of the equipment / materials.

24. **Format & Signature of Bidder:** Clause deleted.

D. Submission of Bids:

25. Procedure for Submission of Bids:

25.1 Bids should be in the prescribed form, which can be obtained from 'e-procurement' platform from the date of electronic publication up to the time and date indicated in the Bid notice. The intending bidders would be required to enrol themselves on the 'e-procurement' market-place www.tender.apeprocurement.gov.in. Those bidders who register themselves in the 'e-procurement' market place can download the Bid specification and the Bid schedules free of cost.

The bidder shall authenticate the bid with his digital certificate for submitting the bid electronically on e-procurement platform **and the bids not authenticated by digital certificate of the bidder will not be accepted on the e-procurement platform** following the G.O.Ms.No.6, I.T&C Department, and dated 28-02-2005.

25.2 Intending bidders can contact office of the Chief Engineer/ Transmission, APTRANSCO, Vidyut Soudha, Vijayawada-520004, for any clarification/ information on any working day during working hours.

25.3 The bidders who are desirous of participating in “e-procurement” shall submit their technical bids, price bids etc., in the standard formats prescribed in the Bid documents, displayed at “e” market place. The bidders should invariably upload the statement showing the list of documents etc., in the “e” market place in support of their Pre-qualification/Technical bids. The bidder should load scanned copies of all relevant certificates. The bidder shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness/ authenticity.

If any bidder uploads the Bid without paying Bid security, he will be blacklisted. Similarly, if any of the certificates, documents etc., furnished by the Bidder are found to be false/fabricated/bogus, the Bidder will be blacklisted and bid security forfeited.

25.4 The Bidder will invariably complete the Bid in full.

25.5 Telegraphic quotations and quotations by fax/mail will not be entertained under any circumstances. Clarification, amplifications, and / or any other correspondence from the Bidder subsequent to the opening of bid will not be entertained.

The Bidders are advised to ensure that their bids are uploaded in complete shape at the first instance itself.

26. Deadline for Submission of Bids

Bids together with modifications if any, or other withdrawals must be received by the Purchaser not later than the deadline for submission of bids specified in the Salient features of the Bid.

The Purchaser may, at its discretion, extend this deadline for the submission of bids by amending the bidding documents in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

27. Modification and Withdrawal of Bids

No bid may be modified after the deadline for submission of bids.

No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified. Withdrawal of a bid during this interval may result in the forfeiture of its Bid Security.

E. Opening and Evaluation of Bids

28. Opening of Bids by the Purchaser

28.1 The Purchaser will open all the Pre-Qualification/ Technical bids meeting above criteria. In case the Technical, Financial & Pre-qualification requirements are found to be adequate and as required after the examination, Price Bids will be opened at later date.

28.2 If the Technical, Financial & Pre-Qualification requirements are found to be inadequate, the ‘Price Bid’ of such unqualified Bidders will not be opened.

29. Clarification of Bids

29.1 During evaluation of the bids, the Purchaser may, at its discretion, ask the Bidder for a clarification of its Bid. The request for clarification and the response will be in writing, and no change in the prices or substance of the bid will be sought, offered, or permitted.

29.2 No clarifications shall be asked/ entertained regarding Qualification Requirements (Supply, Performance and Financial Turnover). Tenders shall be evaluated with uploaded documents only in the e-procurement website.

30. Preliminary Examination

- 30.1 The Purchaser will examine the bids to determine whether they are complete, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.
- 30.2 The Purchaser may waive any minor informality, nonconformity, or irregularity in bid which does not constitute a material deviation, provided such waiver doesn't prejudice or affect the relative ranking of any Bidder.
- 30.3 Prior to the detailed evaluation, the Purchaser will determine the substantial responsiveness of each bid to the bidding documents. For purposes of these Clauses, a substantially responsive bid is one, which conforms to all the terms and conditions of the bidding documents without material deviations. Deviations from, or objections or reservations to critical provisions, such as those concerning Bid Security, and Taxes and Duties will be deemed to be a material deviation. The Purchaser's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.
- 30.4 If a bid is not substantially responsive, it will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the nonconformity.

31. Evaluation and Comparison of Bids

- 31.1 The Purchaser will evaluate and compare the Technical & Pre-Qualification Bids, which have been determined to be substantially responsive. In case the Technical, Financial & Pre-qualification requirements are found to be adequate and as required after the examination, Price Bids of the qualified bidders will be opened subsequently.
- 31.2 The Purchaser's evaluation of a bid will take into consideration one or more of the following factors.
- a) All the bids, which are opened and considered for evaluation, will be checked for qualification requirements in respect of technical and commercial aspects. Such of the bids, which do not meet the qualification requirements, will not be evaluated further. The bid is to be checked for its conformity to the technical specification. If it does not meet the technical specification, the Bid will not be evaluated further. However, if in the opinion of the purchaser the bidder has offered equipment/material better than the technical specification the same may be considered.
 - b) Further, the purchaser may enquire from the bidder in writing for any clarification of the bid. The response of the bidder will also be in writing. However, no change in the prices or substance of the bid will be sought, offered or permitted.
 - c) Bids will be examined for completeness and for any computational errors. **If there is a discrepancy between the soft copy and the hard copy, the hard copy will prevail.**
 - d) It will be ensured that the required sureties have been furnished and that the documents have been properly signed.
 - e) The bid may be rejected for the following reasons:
 - i) Not in the prescribed form,
 - ii) Insufficient bid security or no proof of bid security,
 - iii) The bidder is a vendor who is banned from further business transactions and the period of ban is still in force.

- iv) Bids of bidders whose delivery against the pending orders is not satisfactory are liable for rejection.
- f) The purchaser's evaluation of a bid shall take into consideration one or more of the following factors.
 - (i) Qualifying Requirements in respect of the Supply, Performance, Financial, Type tests etc.
 - (ii) Delivery schedule offered in the bid;
 - (iii) Commercial & Technical deviations. **(Brought out in the prescribed proforma will only be considered. Deviations elsewhere indicated in the bidding documents will not be considered)**
 - (iv) The cost of components, mandatory spare parts, and service;
 - (v) The availability of spare parts and after-sales services for the material offered in the Bid;
 - (vi) The projected operating & maintenance costs during the life of the equipment/ material;
 - (vii) The performance and productivity of the material/ equipment offered;
 - (viii) Other specific criteria indicated in the Bidding documents.
- g) In addition, the Purchaser's evaluation of a bid will take into account the net landed cost of the material at the final destination. For the purpose of evaluation net landed cost is arrived at by adding all elements of the basic price, allowable discount, any other levies, packing & forwarding, freight charge as quoted by the bidder, interest on advance if any, unloading at final destination, erection, servicing and other charges as called for. In addition, any variation up or down in taxes and duties/new levies introduced subsequent to bid opening and before award will be considered for comparison purposes.
 - i) e-way Bills: For supply of material/equipment e-way bills are to be provided by the bidder only. APTRANSCO will not provide any way bills for the supplies against this tender unless there is clear instructions in this regard by the concerned authorities
- h) The following criteria may be adopted for taxes and duties for evaluation.
 - a) It is the responsibility of the bidder to quote all taxes and duties correctly without leaving any column unfilled. Where taxes and duties are not applicable the bidder should enter 'NA' and if no duty/tax is leviable the same may be entered as 'NIL'. If any column is left blank or filled vaguely like "as applicable", the same will be loaded with the maximum of the other eligible Bids.
 - b) Where there is an exemption of any tax, the documentary evidence to that effect will be enclosed by the bidder.
- i) Prior to detailed evaluation, the responsiveness of each bid will be determined. A substantially responsive bid is one that conforms to all the terms and conditions of the bidding documents without material deviations. For this purpose superscription, qualification requirement, bid security, validity, delivery, payment terms, price schedule, taxes and duties will be deemed to be the critical provisions and deviations in any one of these items will be deemed to be a material deviation.
- j) The purchaser may waive any minor informality, non-conformity or irregularity in the bid which does not constitute a material deviation, provided such waiver does not affect the relative ranking of any bidder. The purchaser will clearly indicate in the bid specification the methodology for evaluation of bids.

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- a) Bid price, which will include all, costs of manufacture and services at manufacturing place as well as, Transportation to destination stores, packing and forwarding, unloading, insurance and all Taxes & other legally permissible duties & levies payable.
 - b) Delivery schedule offered in the bid.
 - c) Deviations in payment schedule from that specified in the general terms and conditions of the contract.
 - d) The cost of components, mandatory spare parts, and service
 - e) The availability of spare parts and after-sales services for the equipment offered in the Bid;
 - f) The projected operating and maintenance costs during the life of the equipment;
 - g) The performance and productivity of the equipment offered; and/or
 - h) Other specific criteria indicated in the Bid Specification.
 - i) Cost of recommendatory spares if any indicated in the relevant price schedule will not be considered for bid evaluation.
- k) “The bidders for supply and works shall invariably possess “GST”, ‘TIN’ & ‘PAN’ Numbers” and the same should be furnished for Bids above Rs.5.00 Lakhs.
- 31.3(a) The Purchaser’s evaluation of a bid will take into account the Net Landed Cost of the Material at destination stores inclusive of all taxes and duties quoted by the Bidder excluding GST. It is the responsibility of the bidder to quote all Taxes and Duties correctly without leaving any column unfilled. Where not applicable the column may be filled as “NA”. If no duty / tax is levyable the same may be filled as “NIL”. If any column is left blank the same is loaded with maximum of other eligible Bids. If any overwriting is not attested by the bidder in the price schedule such Bids will be rejected.
- 31.3(b) Any statutory variations of taxes and duties and new levies imposed after opening of the bid and before award of the contract will be taken into consideration for the purpose of evaluation.
- 31.4 A substantially responsive bid is one, which conforms to all the terms and conditions of the bidding documents without material deviations. For this purpose, qualification requirement, bid security, validity, delivery, payment terms, price schedule, submission of types test certificates, taxes & duties will be deemed to be the critical provisions and deviations in any one of these things will be deemed to be a material deviation.
- 31.5 The ‘Class-I local supplier’ at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self- certification that the item offered meets the local content requirement for ‘Class-I local supplier’, as the case may be. They shall also give details of the location (s) at which the local value addition is made.
- In cases of procurement for a value in excess of Rs. 10crores, the ‘Class-I local supplier’ shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.
- False declarations will be in breach of the Code of Integrity under Rule 175(1) (i)(h) of the General Financial rules for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.
- 32. Contacting the Purchaser.**
- 32.1 From the time of the bid opening to the time of contract award, if any Bidder wishes to contact the Purchaser on any matter related to the bid, it should do so in writing.
- 32.2 Any effort by a Bidder to influence the Purchaser in its decisions on bid evaluation, bid comparison, or contract award will result in the rejection of the Bidder's bid.

F. Award of Contract

33. Post Qualification

33.1 In the absence of pre-qualification, the Purchaser will determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated responsive bid is qualified to perform the contract satisfactorily.

33.2 The determination will take into account the Bidder's financial, and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualification submitted by the Bidder, as well as such other information as the Purchaser deems necessary and appropriate.

34. Award Criteria for all the Qualified bidders shall participate in reverse tendering process.

34.1 The Purchaser will award the contract to the successful Bidder / Bidders whose bid has / have been determined to be substantially responsive.

However it is not binding on APTRANSCO to accept the lowest or any other Bid. It reserves the right to place orders on different Bidders.

34.2 In the opinion of the purchaser in case it is undesirable to depend on one supplier, quantity may be distributed among two or more suppliers adopting the same price.

34.3 In case of distribution of quantities among two or more sources due to

- (i) Large quantity of supplies
- (ii) Deliveries are spanning more than nine months
- (iii) For reliability of supplies
- (iv) The L1 is already executing other orders in APTRANSCO

34.4 The following ratio at the same prices shall be adopted

When the sources of supply are two, percentage distribution between L1 & L2

- i. When there are two identical L1 offers, order may be shared with 50:50 ratio
- ii. In case of urgency of material, distribution of quantities in 50:50 ratio shall also be considered even though the offers are not identical, when both L1 and L2 are industries in the private sector
- iii. If L1 already executing many other orders in APTRANSCO or other utilities, for reliability of supplies the quantities may be distributed between 2 or 3 supplies with L1-40%, L2-30% & L3-30% quantity.

34.5 *As per Clause No.4(a) of GO.Ms.No.9 dt.25.02.2021 vide T.O.O.(Addl.Secy-Per) MS.No.2359, dt.09.02.2022, in procurement of all good & Services of works in respect of which there is sufficient local capacity and local competition only "Class-I –Local Suppliers" shall be eligible to bid irrespective of purchase value.*

And

In MoP of Govt of India Oder No.A-1/2021-FSC-Part(5) dt.16.11.2021 in Clause 3 it is mentioned that DPIIT Order dt 04.06.2020 further revised vide dt 16.09.2020 & 20.03.2020, in supersession of all the aforementioned orders the following has been decided:

As per Clause 3(ii) MoP Order No. A-1/2021-FSC-Part(5) vide dt.16.11.2021 of Govt of India in respect of Power sector, in procurement of all good & Services of works in respect of which there is sufficient local capacity and local competition as in Annexure-I, only "Class-I –Local Suppliers" shall be eligible to bid irrespective of purchase value.

*In Annexure-I of MoP Order No. A-1/2021-FSC-Part(5) vide dt.16.11.2021, Sl.No.(15) & (17), Class-I Local supplier for subject material having **Minimum Local Content-60%**.*

Hence it is proposed to incorporate the same clause “**only Class-I –Local Suppliers has Minimum Local Content (MLC) is equal to more than 60% shall be eligible to bid**” as per the following procedure.

i) The lowest evaluated Price as mentioned in Technical specification in bid shall be denoted as L1.

ii) If L1 bid is from a ‘**Class –I local supplier**’, the contract will be awarded to L1.

iii) ‘**Class-II Local supplier**’ will not get purchase preference.

(iv) The ‘**Class –I local supplier**’/‘**Class-II Local supplier**’ shall give a self-certification in his bid in the given format, indicating the percentage of Local Content and certifying that the item offered meets the Local Content requirement for ‘**Class –I local supplier**’/‘**Class-II Local supplier**’, as the case may be and shall give details of the location(s) at which the local value addition is made. Further, in case of procurement value above Rs. 10 Cr, the ‘**Class –I local supplier**’/‘**Class-II Local supplier**’ shall provide a certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of Local Content.

(v) False declaration regarding Local Content by the bidder, will be in breach of code of Integrity under Rule 175(1) (i)(h) of General Financial rules for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of General Financial rules along with such other actions as may be permissible under law.

35. Purchaser’s Right to vary Quantities at the time of Award

35.1 The Purchaser reserves the right at the time of contract award to increase or decrease by 50%, the quantity of Materials/ equipment and services originally specified in the ‘Schedule of Requirements’ without any change in unit price or other terms and conditions.

35.2 The purchaser reserves the right to vary the ordered quantity by $\pm 50\%$ during the execution of the contract.

36. Purchaser's Right to Accept Any Bid and to Reject Any or All Bids

36.1 The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to the affected Bidder or Bidders. The Purchaser will inform the affected bidder/bidders of its reasons.

37. Notification of Award

37.1 Prior to the expiration of the period of bid validity, the Purchaser will notify the Successful Bidder in writing by registered letter or by fax, to be confirmed in writing by registered letter, that its bid has been accepted.

37.2 The notification of award will constitute the formation of the Contract.

37.3 Upon the successful Bidder's furnishing of the performance security, the Purchaser enters into contract with successful Bidder/ Bidders. The Purchaser will notify each unsuccessful Bidder and will discharge its Bid Security.

37.4 The supplier will have to predefine the Bank Account details after receipt of LOI and before entering into contract for electronic transfer of payment.

38. Signing of Contract:

The Purchaser notifies the successful Bidder that its bid has been accepted.

Within 30 (thirty days) of receipt of notification of award of Contract, the successful Bidder will sign and date the contract. Failure to comply with this stipulation will entail cancellation of the contract besides forfeiture of the bid security.

39. (A) Performance Security:

39.1 Within fifteen (15) days of receipt of notification of contract award, the successful Bidder will furnish to the Purchaser the performance security for an amount 10% of the contract value for proper fulfilment of the contract, which will include the warranty period, and completion of performance obligations including Warranty obligations. The Performance Security will cover 60 days beyond the date of completion of performance obligations including Warranty obligations.

In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected / replaced material will be extended to a further period of 18 months and the Performance Bank Guarantee for proportionate value will be extended 60 days over and above the extended warranty period.

39.2 The proceeds of the performance security will be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

39.3 The performance security will be...

- (a) A Bank Guarantee issued by Nationalised Banks/Schedule Banks approved by APTRANSCO as per the list enclosed acceptable to the Purchaser, in the form provided in the bidding documents.
- (b) A banker's cheque or crossed DD or Pay Order payable at the head quarter of the Purchaser in favour of the Purchaser drawn on any Nationalised Bank.

39.4 The performance security will be discharged by the Purchaser and returned to the Supplier not later than sixty (60) days after the expiry date.

39.5 Failure of the successful Bidder to comply with the above requirement will entail cancellation of the award and forfeiture of the Bid Security.

39.6 In case where the performance security is not yet paid, the bid security will be forfeited and the balance to makeup the performance security deposit will be deducted from pending payments any due to the bidder from APTRANSCO on other orders. In addition, the company will also become liable for black listed by APTRANSCO.

39.7 The permanent performance bank guarantee accepted earlier is deemed to have been withdrawn. The Permanent performance Guarantee is not accepted.

(B) Additional Security Deposit:

- i) If the rate quoted by the bidder less than 10% of the APTRANSCO's total estimated cost will be considered as abnormally low rate. In the case of abnormally low quoted rates i.e. less than 10% additional security deposit (ASD) to be paid for the less percentage below 10% i.e. if the bidder quotes 20% below the total estimated cost then he has to pay ASD equivalent to 10% of the total estimated cost.
- ii) The Additional security may be made by Demand Draft on Nationalized bank/ Scheduled bank approved by APTRANSCO as per the list enclosed payable at Vijayawada in favour of Pay officer, APTRANSCO, Vijayawada or by way of Bank Guarantee from a Nationalized/ / Scheduled bank

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approved by APTRANSCO as per the list enclosed in favour of tender inviting authority covering a period of 2 months over and above the completion of material supply.

- iii) All Bank Guarantees, which are executed in accordance with this specification, shall be on a Stamp paper of value not less than Rs.100/- (Rupees one hundred only). Bank Guarantee executed on the stamp paper of value less than Rs.100/- will not be accepted.

39.8 FORFEITURE OF PERFORMANCE SECURITY AND ADDITIONAL SECURITY DEPOSIT:

The Performance and Additional Securities will be forfeited in the following cases:

1. When the successful bidder does not fulfill the obligations under the contract or proven to be false submission of the information either in the bid or the information relating to the contract.
2. When the successful bidder fails to execute the work in accordance with the clauses under this specification.
3. When the successful bidder executing the work with in-ordinate delays or with poor quality which hampers the prime object of the contract, the securities will be en-cashed and will be adjusted towards such losses incurred by APTRANSCO or towards risk purchase.
4. When the successful bidder pleads his inability and backs out of his obligations after issue of the preliminary acceptance letter or the letter of intent, the APTRANSCO will forfeit his performance/ additional/ bid securities and also recover the loss, if any, sustained by the APTRANSCO as a consequence of such backing out. In addition, the company will be blacklisted.

40. Corrupt or Fraudulent Practices:

It is essential that the Purchaser as well as Bidder / supplier / contractor for the purposes of this provision, the terms set forth below as follows:

(i) "Corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution, and

(ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the purchaser, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the purchaser of the benefits of free and open competition;

(iii) Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(iv) Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing a contract.

41. Use of Contract Documents and Information:

- 41.1 The Supplier will not, without the Purchaser's prior written consent, disclose the Contract, or any provision thereof, of any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Supplier in the performance of the Contract.

Disclosure to any such employed person will be made in confidence and will extend only so far as may be necessary for purposes of such performance.

41.2 The Supplier will not, without the Purchaser's prior written consent, make use of any document or information except for purposes of performing the Contract.

41.3 Any document, other than the Contract itself, will remain the property of the Purchaser and will be returned (in all copies) to the Purchaser on completion of the supplier's performance under the Contract if so required by the Purchaser.

41.4 The Supplier will permit the Purchaser or his authorized representative to inspect the Supplier's accounts and records relating to the performance of the Supplier and to have them audited by auditors appointed by the Supplier.

42. Patent Rights

The Supplier will indemnify the Purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the Materials / equipment or any part thereof.

43. Places / Locations

Particulars of site location to which the equipment / material have to be supplied will be given to successful Bidders. However, it may please be noted that the destinations for supply of materials will be Site/ Stores anywhere in the state of Andhra Pradesh.

44. Delivery:

Delivery period will be reckoned from the date of issue of Letter of Intent. The delivery quoted will be firm, definite, unconditional and on the basis of receipt of materials at destination in good condition without any bearing on the procurement of raw materials or any similar prerequisites. The commencement date and date of delivery will be indicted. The preferred delivery time, which is the essence of this specification, is indicated in the 'Schedule of Requirements'. Final deliveries are however, subject to confirmation at the time of Contract. Delay in delivery of materials FADS (Free at Destination Store/site) due to non-availability of railway booking, non-allotment of wagons and any such reasons will not be considered. It is the responsibility of the supplier to make alternative arrangements for transporting the materials by road or rail so as to see that the material reaches the destination within the stipulated period. The Purchaser reserves its right to defer the delivery date at any time after orders are placed without any change in the conclusion of contract or other conditions of supply. The delivery period, which will be reckoned from the date of the Contract, will be guaranteed under penalty as in Clause-60.

45. Inspections and Tests

i) The supplier will keep the purchaser informed in advanced the time of the starting and the progress of manufacture of equipment in its various stages so that arrangement could be made for inspection. The accredited representative of the APTRANSCO will have access to the supplier's or his subcontractor's work at any time during working hours for the purpose of inspecting the materials during manufacturing of the material/equipment and testing and may select test samples from the materials going into plant and equipment. The supplier will provide the facilities for testing of such samples at any time including access to drawings and production data at no charge to Purchaser. As soon as the materials are ready the supplier will duly send intimation to APTRANSCO by Regd. Post/mail and carry out the tests in the presence of representative of the APTRANSCO.

ii) The APTRANSCO may at its option get the materials inspected by the third party, if it feels necessary and all inspection charges in this connection to be borne by the supplier.

- iii) The dispatches will be affected only if the test results, comply with the specification. The dispatches will be made only after the inspection by the APTRANSCO officer and to be completed for the APTRANSCO's satisfaction or such inspection is waived by the competent authority.
- iv) The acceptance of any quantity of material will in no way relieve off the supplier of the responsibility for meeting all the requirements of this specification and will not prevent subsequent rejection, if such material later found to be defective.
- v) As soon as the material/ equipment are ready the supplier will duly send intimation to APTRANSCO by registered post and carry out the tests in the presence of the representative of APTRANSCO. The Supplier shall give at least 15 days advance intimation to enable the Purchaser to depute his representative for witnessing acceptance and routine tests. **The supplier shall arrange all charges (i.e To & Fro tickets and accommodation charges) for the inspector deputed to their works for witnessing the tests during inspection of material.**
- vi) Should any inspected or tested material/equipment fail to conform to the specification, the Purchaser may reject the material and supplier will either replace the rejected material or make alterations necessary to meet specifications/requirements at free of cost to the Purchaser.
- vii) Inspection will be conducted on 10% of the quantities offered for inspection. Samples will be collected at random to establish that the guaranteed technical parameters as per the submitted Bid by the supplier. In case of non-adherence, the purchaser may take suitable action on the supplier including cancellation of vendor registration and banning further dealings, depending on the gravity of the deviation. These random inspections may be entrusted to a third party.
- viii) **The inspection of the material shall be arranged at the manufacturer premises. In case it is of abroad, the supplier shall bear the to and fro charges, local transport and accommodation at inspection place for the inspecting officer(s).**

45.1 Test Reports :

- a) Four copies of acceptance test reports shall be furnished to the purchaser. One copy will be returned, duly certified by the purchaser and only thereafter shall the materials be dispatched.
- b) All test reports of tests conducted during manufacture shall be maintained by the Bidder. These shall be produced for verification as and when requested for by the purchaser.
- c) All records of routine test reports shall be maintained by the Bidder at his works for periodic inspection by the purchaser.

46. Name Plate:

Equipment should be provided with name plate giving full details of manufacturer, capacities and other details as specified in the relevant ISS or other specification stipulated. The contract number and date and year of supply and the words "APTRANSCO" must be etched on the name plate.

47. Packing and Forwarding

- 47.1 Equipment and material being supplied shall be provided with such packing as required to prevent their damage or deterioration during transit to their final destination and as indicated in the Contract. The packing will be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing case size and weights will take into consideration, where appropriate, the remoteness of the Material/ equipment' final destination and the absence of heavy handling facilities at all points in transit.

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- 47.2 The equipment shall be packed in crates suitable for vertical/ horizontal transport, as the case may be, and suitable to withstand handling during transport and outdoor storage. The cabinets shall be covered with plastic film so as to prevent the cabinet from damage during transportation. The plastic film shall be removed at the time of commissioning.
- 47.3 The Supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by Supplier without any extra cost. Replacement of the damaged equipment and material shall not be linked with the settlement of insurance claims. The packages requiring covered storage shall be compulsorily marked.
- 47.4 The packing, marking, and documentation and outside the packages will comply strictly with such special requirements as will be expressly provided for in the Contract and in any subsequent instructions ordered by the Purchaser. The supplier will be required to make separate packages for each consignee, each package will be marked on three sides with proper paint/ indelible ink with the following;
1. Contract Number
 2. Supplier's name
 3. Packing list reference number
- 47.5 The supplier, whenever dispatches material to a destination should prepare the following information in the form of packing slip in quadruplicate and send the same to the consignee and obtain his acknowledgement. The consignee will return to the supplier one copy of the packing slip with his remarks. The proforma of packing slip will be as follows.

PACKING SLIP

1. Name of the Supplier
 2. Purchase Order reference number
 3. Name and address of the consignee
 4. Details of the items in the package
 5. Bill of material indicating contents of each package.
 6. Gross, Net & Tare weights of the items
 7. Complete address of the destination
8. Handling and unpacking instructions Each equipment/ material shall be packed securely & separately.
- 47.6 The Supplier shall ensure that the packing list and bill of material are approved by the Purchaser and enclosed to dispatches. The Supplier shall arrange for unloading the equipment/ material at destination site/stores at no extra cost.

48. Delivery Documents

- 48.1 Delivery of the materials / equipment will be made by the Supplier in accordance with the terms specified in the contract. The latest test certificates containing the result of the tests as per the relevant IEC/IS or other specification stipulated must be submitted to the Chief Engineer and got approved by him.
- 48.2 The documents for delivery of equipment and material will contain the original and four copies of the following.
Invoice indicating PO Number, goods description, quantity, unit price & total amount,
a) Delivery Note/Packing List/ Lorry Receipt,
b) Evidence towards GST Payment.

- c) Insurance certificate,
- d) Manufacturer's/Supplier's Guarantee Certificate,
- e) Certificate of Origin,
- f) Any other document evidencing payment of statutory levies (wherever applicable),
- g) The items and quantity so far supplied including the present package,
- h) Supplier's certificate certifying that the defects if any pointed out during inspection have been rectified (3 copies),
- i) Manuals in six sets along with a soft copy.

The Purchaser will receive the above documents soon after the dispatch of materials and if not received, the supplier will be responsible for any consequent expenses.

49. Insurance

- 49.1 All the materials / equipment shall be insured by the supplier/contractor for loading, transit, unloading, storage and erection/stringing risks. Any insurance premium payable shall be borne by the supplier/contractor and shall cover the following risks also.
- a) Full cover against damage to other people's property
 - b) Coverage against death or injury caused by the supplier/contractor's acts or omissions to:
 - i. Anyone authorized to be on the site.
 - ii. Third parties who are on the site.
 - c) Full cover against theft and damage to the works and materials during transit, storage and erection/stringing, till to the commissioning and handing over of the project in full shape.

It is the entire responsibility of the supplier/ contractor for the safety of all the materials / equipment and labour till the notified project / work are handed over to APTRANSCO after commissioning. While doing the insurance for the workmen, the Contractors/suppliers are advised to follow the labour department rules in vogue. Any additional insurance premiums if required during the course of project execution shall be borne by bidder.

Freight shall be quoted separately. Quoting as 'Inclusive/Zero' will not be accepted. **As per Memo. No. 683 dt.30.09.2020 insurance charges shall be dispensed for both material & works.** Freight shall be reimbursed only on submission of documentary evidence/proofs.

- 49.2 The bidder shall not quote insurance charges, the same will not be reimbursed.
- 49.3 **All costs on account of insurance liabilities covered under this contract will be on supplier's/contractor's account. The Supplier/Contractor shall provide the purchaser with a copy of all the insurance policies and documents taken over by him in pursuance of the contract. Such copies of documents shall be submitted to the purchaser immediately after such insurance coverage. The Contractor shall also inform the purchaser in writing at least sixty (60) days in advance, regarding expiry, change, any modification, amendments etc., without prior approval of purchaser the Supplier/Contractor shall not cancel any of the Insurance policies made for the project. It is the Supplier's/Contractor's responsibility to ensure revalidation or renewal of the insurance policies well in advance.**

The bidder shall

- a) **Initiate and pursue insurance claim till settlement and**
- b) **Promptly arrange for repair and/or replacement of any damaged items in full irrespective of settlement of insurance claim by the under writers.**

The Goods supplied under this Contract shall be fully insured against loss or damage incidental to manufacture or acquisition, transportation, storage, delivery and erection/stringing. The insurance shall be at least for an **amount equal to 100% of the cost of the goods** from "warehouse to

warehouse (final destination)" and **storage up to commissioning** thereafter on "All Risks" basis.

The risks that are to be covered under the insurance shall be comprehensive and shall include but not limited to, the loss or damage in transit, storage, due to theft, pilferage riot, civil commotion, weather conditions, accident of all kinds, fire, flood, war risk (during ocean transportation) bad or rough handling etc., The scope of such insurance shall cover the entire contract value.

In addition, the following provisions will apply to the portion of the 'Works' to be done by SUPPLIER/CONTRACTOR. Comprehensive Insurance of equipment/materials during erection/stringing and commissioning, Workmen's Compensation Insurance, Comprehensive Automobile Insurance and Comprehensive General Liability Insurance shall be the responsibility of the SUPPLIER/CONTRACTOR.

The Supplier/Contractor shall also maintain an insurance policy against all claims which may be made upon Purchaser whether under the Workmen's Compensation Act or any other statute in force during the currency of the contract or at common law in respect of any employee of supplier/contractor. The Supplier/Contractor shall be responsible for anything which may be excluded from the insurance policies referred to above and also for all other damage to any property or persons out of and incidental to the negligence or defective carrying out of this contract.

49.4 All costs on account of insurance liabilities covered under the contract will be on supplier's account and will be deemed to have been included in the bid price.

50. Transportation

The Supplier is required under the Contract to transport and deliver the material/equipment to the specified place of destination i.e. any site or stores in the state of Andhra Pradesh, transport to such place of destination, including insurance and storage, will be arranged by the Supplier and the related costs will be included in the Contract Price only. **The Supplier shall arrange for unloading the equipment/ material at destination site/stores at no extra cost.**

51. Incidental Services

51.1 The Supplier may be required to provide any or all of the following services at free of cost, including additional services, if any.

- i. Performance or supervision of on-site assembly and/or start-up of the supplied Materials / equipment;
- ii. Furnishing of tools required for assembly and/or maintenance of the supplied Material/ equipment;
- iii. Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Materials / equipment;
- iv. Performance or supervision or maintenance and/or repair of the supplied Materials/ equipment, during warranty period, provided that this service will not relieve the Supplier of any warranty obligations under this contract; and
- v. Training of the Purchaser's personnel, at the Suppliers' plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied material/ equipment.

52. Spare Parts

52.1 The Supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier.

- (a) Such spare parts as the Purchaser may choose to purchase from the Supplier, provided that this selection will not relieve the supplier of any warranty obligations under the contract; and
- (b) In the event of termination of production of the spare parts:
- (c) Advance notification to the Purchaser of the impending termination.
- (d) Time to permit the Purchase to procure needed requirement; and following such termination, furnishing at no cost to the Purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.

53. Warranty/ Guarantee

- 53.1 **The supplier will warrant for the satisfactory functioning of the material/ equipment as per specification for a minimum period of 18 months from the check-measurement date in Form-13 i.e. receipt of the material/ equipment at TLC Stores or site in good condition or minimum 12 months from date of commissioning whichever is later.**
- 53.2 The Supplier warrants that the Materials / equipment supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The supplier further warrants that all Materials / equipment supplied under this Contract will have no defect, arising from a design and / or materials as required by the Purchaser's specifications or from any act of omission of the Supplier that may develop under normal use of the supplied Materials / equipment.
- 53.3 All the material will be of the best class and will be capable of satisfactory operation in the tropics under service conditions indicated in clause-23.1 without distortion or deterioration. No welding filling or plugging of defective parts will be permitted, unless otherwise specified, they will conform to the requirements of the appropriate Indian, British or American Standards. (Where a standard specification covering the material in question has not been published, the standards of the American Society for testing of Materials should be followed).
- 53.4 The entire designs and construction will be capable of withstanding the severest stresses likely to occur in actual service and of resisting rough handling during transport.
- 53.5 Unless otherwise specified the warranty period will be 18 months from the date of acceptance of the Materials / equipment or minimum 12 months from the date of charging whichever is later. The Supplier will, in addition, comply with the performance guarantees specified under the contract. If, for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the supplier will at its discretion either, make such changes, modifications, and/or additions to the Materials / equipment or any part thereof as may be necessary in order to attain the contractual guarantees specified in the contract at its own cost and expense and to carry out further performance tests as per the relevant standards.
- 53.6 The Purchaser will promptly notify the supplier in writing of any claims arising under this warranty.
- 53.7 "Upon receipt of such notice, the Supplier will within 30 days repair or replace the defective Materials/ equipment or parts thereof, free of cost at the ultimate destination. The supplier will take over the replaced parts/ materials/ equipment at the time of their replacement. No claim whatsoever will lie on the Purchaser for the replaced parts/ Materials/ equipment thereafter". In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/replaced material will be extended to a further period of 12 months.
- 53.8 If the Supplier, having been notified, fails to remedy the defect(s) within the above period, the Purchaser may proceed to take such remedial action as may be necessary, at the Supplier's risk

and expense duly deducting the expenditure from subsequent bills/ bank guarantee and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

53.9 Responsibility of the supplier for loss/ damage:

- a) The supplier is responsible for the safe delivery of the goods in good condition at the destination. He should acquaint himself of the conditions obtaining for handling and transport of the goods to destination and shall include and provide for security and protective packing of the goods so as to avoid damage in transit.
- b) External damages or shortages that are prima-facie the results of rough handling in transit or due to defective packing will be intimated. Internal defects, damages or shortages of any internal parts which cannot ordinarily be detected on a superficial visual examination though due to bad handling in transit or defective packing will be intimated separately.

In either case, the defective or damaged materials should be replaced by the supplier free of cost to the APTRANSCO. If no steps are taken in this regard, APTRANSCO may without prejudice to its other rights and remedies cause to be repair or rectify the defective material or replace the same and recover the expenditure incurred there for from the deposit such as Earnest Money, Security and Performance or other monies available with APTRANSCO or by resorting to legal action.

- c) For the purpose of any legal construction, the material shall be deemed to pass into APTRANSCO's ownership only at the final destination where they delivered and accepted.

54. PAYMENT FOR SUPPLY OF MATERIAL/EQUIPMENT AND ERECTION/STRINGING AND COMMISSIONING CHARGES: -

The payment will be made through bank under transfer procedure as per the terms indicated below-

- 54.1. a. 70% payment towards the equipment cost will be arranged within 45 days for the material/ equipment supplied in complete shape subject to their delivery as per the schedule of work and on its receipt in good condition at the destination / stores in good condition (i.e., from check measurement date in Form-13). The supplier will have to predefine the Bank Account details after receipt of LOI and before entering into contract for electronic transfer of payment.
 - b. 20% payment of material will be made after erection/stringing of equipment / material.
 - c. Balance 10% payment towards equipment along with the erection/stringing & commissioning charges will be made after commissioning of equipment/material.
 - d. However, payment in advance may be considered by APTRANSCO after availing a rebate / discount @ 0.3% per week or part thereof for the advancement depending on the availability of funds. **No interest will be payable in case payment is delayed for whatever reason.**
- 54.2 The payment mentioned above is subject to submission of performance security as per clause-39 by the supplier. The bank charges will be made to the account of the supplier an amount of Rs.50/- (Rupees Fifty only) will be recovered from the bill amount per each disbursement on LOA raised by field unit offices.
- 54.3 The supplier should invariably submit test certificates and other documents; the purchaser specifies as soon as dispatch is made so that they can be checked and approved well in advance.

- 54.4 The performance guarantee to be executed in accordance with this specification will be furnished on a stamp paper of value Rs.100/-. The Bank Guarantee will be extended if required suitably in accordance with the provisions of Clause No.39.
- 54.5 If the supplier has received any over payments by mistake or if any amounts are due to the APTRANSCO due to any other reason, when it is not possible to recover such amounts under the contract resulting out of this specification, the APTRANSCO reserves the right to collect the same from any other amount and / or Bank Guarantees given by the company due to or with the APTRANSCO.
- 54.6 When the supplier does not at any time, fulfill his obligations in replacing/ rectifying etc. of the damaged/ defective materials in part or whole promptly to the satisfaction of the APTRANSCO Officers, the APTRANSCO reserves the right not to accept the bills against subsequent dispatches made by the supplier and only the supplier will be responsible for any demurrages, wharfages or damage occurring to the consignments so dispatched.
- 54.7 No payments will be made for the supplies made prior to scheduled delivery or for material which are not in full shape.
- 54.8 Freight will only be reimbursed on submission of documentary evidence/ proofs, limiting to the documentary proof only.
- 54.9 Any incidental charge such as stamp duty, bank charges etc, shall be to the suppliers account and any charges in relation there to shall be received from the payment due to the supplier.

55. Prices

Prices charged by the Supplier for Material/ equipment delivered and Services performed under the Contract will not vary from the prices quoted by the supplier in its bid, with the exception of any price adjustment authorized in the contract.

56. Change Orders

- 56.1 The Purchaser may at any time, by a written order given to the Supplier make changes within the general scope of the Contract in any one or more of the following:
- (a) Drawings, designs, or specifications, where Materials / equipment to be furnished under the Contract are to be specifically manufactured for the Purchaser;
 - (b) The method of shipment or packing;
 - (c) The place of delivery; and/or
 - (d) The Services to be provided by the Supplier.
 - (e) Defer the deliveries and restore them by giving 3 months' notice without any additional financial commitment

57. Contract Amendments

No variation in or modification of the terms of the Contract will be made except by written amendment by the Purchaser and accepted by the supplier.

58. Assignment

The Supplier will not assign, in whole or in part, its obligations to perform under this Contract, except with the Purchaser's prior written consent.

59. Delays in Supplier's Performance

- 59.1 Delivery of the Materials / equipment will be made by the Supplier in accordance with the time schedule prescribed by the Purchaser in the Schedule of Requirements.
- 59.2 If at any time during performance of the Contract, the Supplier should encounter conditions impeding timely delivery of the Materials / equipment, the Supplier will promptly notify the Purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, the Purchaser will evaluate the situation and may at its discretion extend the Supplier's time for performance, with or without liquidated damages, in which case the extension will be ratified by the parties by amendment of the Contract.
- 59.3 Except as provided under force majeure clause a delay by the Supplier in the performance of its delivery obligations will render the Supplier liable to the imposition of liquidated damages unless an extension of time is agreed upon without the application of liquidated damages.

60. Penalty for delay in supplies

The time for and the dates for delivery mentioned in the contract will be deemed to be the essence of the contract. Subject to force majeure Clause No.64, if the Supplier fails to deliver any or all of the Materials / equipment or to perform the Services within the period(s) specified in the Contract, the Purchaser will, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to 0.5% per week on the undelivered portion subject to a maximum of 5% of the total value of the contract. Once the maximum is reached the Purchaser may consider termination of the contract.

The Check Measurement date in Form-13 i.e., the date of receipt of materials at destination stores in good condition will be taken as the date of delivery. Material/ Equipment which are not of acceptable quality or are not confirming to the specification would be deemed to be not delivered. For penalty, the number of days would be rounded off to the nearest week and penalty calculated accordingly.

The penalty specified above will be levied and would be adjusted against subsequent pending bills.

61. Termination for Default

- 61.1 The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate this Contract in whole or in part:
- a) If the Supplier fails to deliver any or all of the Materials / equipment within the period(s) specified in the Contract, or within any extension thereof granted by the Purchaser.
 - b) If the Supplier fails to perform any other obligation(s) under the Contract.
 - c) If the Supplier, in the judgment of the Purchaser has engaged incorrupt or fraudulent practices in competing for or in executing the Contract.
- 61.2 In the event the Purchaser terminates the Contract in whole or in part, the Purchaser may procure, upon such terms and in such manner, as it deems appropriate, Materials/ equipment or services similar to those undelivered, and the Supplier will be liable to the Purchaser for any excess costs for such similar Materials/ equipment or Services. However, the Supplier will continue performance of the Contract to the extent not terminated.

62. Termination for Insolvency

62.1 The Purchaser may at any time terminate the Contract by giving written notice to the Supplier if the Supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the supplier, provided that such termination will not prejudice or not affect any right of action or remedy, which has accrued or will accrue thereafter to the Purchaser.

63. Termination for Convenience

63.1 The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination will specify the termination is for the Purchaser's convenience, the extent to which performance of the supplier under the Contract is terminated, and date upon which termination becomes effective.

63.2 However the Materials / equipment that are complete and ready for shipment within thirty (30) days after the supplier's receipt of notice of termination will be accepted by the Purchaser at the Contract terms and prices.

64. Force Majeure

64.1 The Supplier will not be liable for forfeiture of its performance security, penalty for late delivery, or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

64.2 For purposes of this clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not restricted to, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.

64.3 If a Force Majeure situation arises, the supplier will promptly notify the Purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier will continue to perform its obligations under the Contract as far as is reasonably practice, and will seek all reasonable alternative means for performance not prevented by the Force Majeure event.

64.4 No price variance will be allowed during the period of force majeure.

65. Settlement of Disputes:

65.1 If any dispute or difference of any kind whatsoever will arise between the Purchaser and the Supplier in connection with or arising out of the Contract, the parties will make every effort to resolve amicably such dispute or difference by mutual consultation.

65.2 If, after thirty (30) days the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

65.3 Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause will be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Materials / equipment under the Contract.

65.4 Arbitration proceedings will be conducted in accordance with the following rules of procedure. The dispute resolution mechanism will be as follows:

- (a) In the case of a dispute or difference arising between the Purchaser and a Supplier relating to any matter arising out of or connected with this agreement, such dispute or difference will be settled in accordance with the Arbitration and Conciliation Act, 1996. The Arbitral Tribunal will consist of three Arbitrators one each to be appointed by the Purchaser and the supplier the Third Arbitrator will be chosen by the two Arbitrators so appointed by the parties and will act as Presiding Arbitrator. In case of failure of the two Arbitrators appointed by the parties to reach upon a consensus within period of 30 days from the appointment of the Arbitrator appointed subsequently, the Presiding Arbitrator will be appointed by The Institution of Engineers (India).
- (b) If one of the Parties fails to appoint its Arbitrator in pursuance of Sub-Clause (a) within 30 days after receipt of the notice of the appointment of its Arbitrator by The Institution of Engineers (India), will appoint the Arbitrator. A certified copy of the order of the Institution of Engineers (India), making such an appointment will be furnished to each of the parties.
- (c) Arbitration Proceedings will be held at Purchaser's Headquarters, and the language of the Arbitration Proceedings and that of all documents and communication between the parties will be English.
- (d) The decision of the majority of Arbitrators will be final and binding upon both parties. The cost and expenses of Arbitration Proceedings will be paid as determined by the Arbitral Tribunal. However, the expenses incurred by each party in connection with the preparation, presentation etc., of its proceedings as also the fees and expenses paid to the Arbitrator appointed by such party or on its behalf will be borne by each party itself.
- (e) Where the value of the Contract is Rs.1.00 Crore and below, the disputes or differences arising will be referred to the Sole Arbitrator. The Sole Arbitrator should be appointed by agreement between the parties; failing such agreement, by the appointing authority namely The Institution of Engineers (India).

65.5 Notwithstanding any reference to arbitration herein,

- (a) The parties will continue to perform their respective obligations under the Contract unless they otherwise agree; and
- (b) The Purchaser will pay the Supplier any monies due the Supplier.

66. Jurisdiction

66.1 All and any disputes or differences arising out of or touching this contract will be decided by the Courts or Tribunals situated in Purchaser's Headquarters only. No suit or other legal proceedings will be instituted elsewhere.

67. Notices

67.1 Any notice given by one party to the other pursuant to this Contract will be sent to the other party in writing or by fax and confirmed in writing to the other party's address.

67.2 A notice will be effective when delivered or on the notice's effective date, whichever is later.

68. Foreign Exchange

68.1 No Foreign Exchange is available or expected for this purchase. Offers which do not require release of F.E. or procurement of import license by APTRANSCO only will be considered.

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Where some of the components are to be imported, the manufacturer will have to make their own arrangements for import license etc., and should not look for any assistance from APTRANSCO.

69. Blacklisting/ debaring:

Any Company/ Vendor/ Supplier/ Contractor or their promoters who are blacklisted/ debarred by power utility is not eligible to participate in the tenders. No contract/order/ work will be awarded/ placed on any blacklisted/ debarred Vendor/ Supplier/ Contractor/ Company or their promoters. Bidders have to furnish a declaration/undertaking in this regard along with the bid. Bids without this declaration are liable for rejection.

70. Reverse Tendering:

Reverse tendering is applicable in respect of Procurement of Goods, Services and works with a value of Rs.1.00 Crore as per G.O.Ms.No.79, Finance (HR.V-R)Department,Dt:25.08.2020.

71. The clauses in the purchase manual of APTRANSCO shall govern wherever the specification clauses are silent.

72. If any bidder is silent about any clause of specification it is deemed that the bidder is accepted the same.

73. The discount if any offered shall be indicated in the field provided in e-procurement only. Discount given in anywhere other than the discount field will not be considered for tender evaluation.

74. LIABILITY FOR ACCIDENTS TO PERSONS:

- a. The supplier/contractor shall indemnify the purchaser against all actions, suits, claims, demands, cost or expenses arising in connection with injuries suffered by persons employed by him, on the works whether under the General Law or under the Workers Compensation Act.1923 or any other statute in force at the date of the contract dealing with question of liability of employer for injuries suffered by employees and have taken steps properly to insure against any claims there under.
- b. Supplier/Contractor should take insurance cover to all his workmen for injuries, disablement and death. All compensation against workmen's compensation act should be settled by the Supplier/Contractor.
- c. On the occurrence of an accident which results in the death of workmen employed by the contractor which is due to the contract work and of so serious as to be likely to result in the death of any such workman, the supplier/contractor shall within 24 hours of happening of such accident intimate in writing to the Engineer and such other officers required by the provision of the workmen's compensation act, the fact of such accident. The supplier/contractor shall indemnify the APTRANSCO against all loss or damage sustained by the APTRANSCO resulting directly or indirectly from his failure to give information in the manner aforesaid including the penalties or fines if any payable by the APTRANSCO as a consequence of the APTRANSCO's failure to give notice under the workmen's compensation act or otherwise conform to the provisions of the said act in regard to such accident.
- d. In the event of any claim being made, or action brought against the purchaser involving the supplier/contractor and arising out of the matters referred to and in respect of which the supplier/contractor is liable under the clause of the contract shall be immediately notified thereof, and he shall conduct all negotiations for the settlement of the same or any litigation that may arise there from.

- e. Liability for damage or loss to third party including inspection officers due to act of the contractor or by his representatives connected with the execution of this contract shall be fully borne by the supplier/contractor. The supplier/contractor shall maintain such detailed records to furnish information regarding engagement and discharge of all workmen employed under this contract as to be adequate for the timely and full settlement of claims under the workmen's compensation act. All cases of accidents or injuries shall be reported to the Engineer with full details required for the settlement under the workmen's compensation act.
- f. The supplier/contractor should report about all accidents within 24 hours to the Engineer of the APTRANSCO in the preliminary accident form. He should furnish other particulars such as medical certificates, wage particulars, fitness certificates, and proof of having paid the compensation as per the rules in vogue in the due course without delay.

75. LIABILITY FOR DAMAGE TO WORKS AND PLANTS:

- 75.1 The supplier/contractor during the progress of the work shall take every reasonable, proper, timely and useful precaution against accident or injury to the workmen from any cause and shall remain answerable and liable for all the accidents or injuries thereto which until the same, or be occasioned by the acts of omissions of the supplier/contractor or his workmen or his representatives and all losses and damages to the works as aforesaid, shall be made in the most complete and substantial manner by and at the sole cost of the supplier/contractor and to the reasonable satisfaction of the Engineer. Should such loss or damage happen to units of works or plant or materials falling outside the scope of this contract and due to the lapses of the supplier/contractor, these shall be replaced or compensated for by the supplier/contractor to the satisfaction of the Engineer.
- 75.2 Until the work shall be or deemed to be taken over as aforesaid, the supplier/contractor shall also be liable for and shall indemnify the purchaser in respect of all damage or injury to any person or to any property of the purchaser or other occasioned by the act of the supplier/contractor or his workmen or his representatives or by defective design, work or materials but not due to cause beyond his reasonable control.
- 76. The removed earth wire of each section shall be weighed as per actuals and shall also be devoluted at APTransco stores at contractor's cost. Further the used cable drums shall also be devoluted at APTransco stores at contractor's cost.
- 77. All the personnel employed in erection/stringing and commissioning of OPGW cable shall be properly insured on par with erection/stringing and commissioning of any transmission lines in live line conditions. They must invariably use PPE kits while executing the works.

SECTION-IV
SCHEDULE OF REQUIREMENTS
SPECN.No. PMM41-e- /2024

Sl.No.	Description	Qty.			APTRANSCO delivery schedule	Destination
		Lot-I (VJA)	Lot-II (VIZAG)	Lot-III (KADAP A)		
I (A)	OPGW cable & Accessories				Entire Delivery of each LOT shall be completed within 4 months from the date of issue of letter of intent (LOI) and erection/stringing & commissioning of the equipment of LOT-I & II shall be completed within eight (8) months and for LOT-III shall be completed within Twelve (12) months from the date of issue of letter of intent (LOI) as indicated in the implementation schedule annexed to this section.	Anywhere in Andhra Pradesh
i)	24Fibre (DWSM) OPGW fibre optic cable	973km	838km	1450km		
ii)	Installation Hardware set for above 24 Fibre OPGW Fibre Optic cabling incl. all cable fittings& accessories except Joint Box	973Set*	838Set*	1450Set*		
iii)	Joint box (24 Fibre)	325Nos	279Nos	483Nos		
iv)	48 Fiber (DWSM) OPGW fibre optic cable	20Km	14Km	118km		
v)	Installation Hardware set for above 48 Fibre OPGW Fibre Optic cabling incl. all cable fittings& accessories except Joint Box	20Set*	14Set*	118Set*		
Vi)	Joint box (48 Fibre)	7Nos	4Nos	40Nos		
I(B)	FODP					
i)	FODP 48F Indoor type, rack mounted with FCPC coupling and pigtails	25Nos	31Nos	45Nos		
ii)	FODP 96F Indoor type, rack mounted with FCPC coupling and pigtails	5Nos	2Nos	9Nos		
I(C)	Fibre Optic Approach Cable					
i)	24 Fibre (DWSM)	27Km	20.5km	30.5Km		
ii)	Installation Hardware set for above 24 Fibre Fibre Optic Approach Cable	27Set*	20.5Set*	30.5Set*		
iii)	48 Fibre (DWSM)	3Km	2Km	8Km		
iv)	Installation Hardware set for above 48 Fibre Fibre Optic Approach Cable	3Set*	2Set*	8Set*		
II	Erection/Stringing and Commissioning					

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i)	Erection/Stringing and commissioning of 24F OPGW including laying, jointing, tensioning, termination with suitable patch cards and testing etc. with necessary accessories on live line duly dismantling earthwire	945km	813Km	1408Km		
ii)	Erection/Stringing and commissioning of 48F OPGW including laying, jointing, tensioning, termination with suitable patch cards and testing etc. with necessary accessories on live line duly dismantling earthwire	19Km	13Km	115Km		
iii)	Erection and commissioning of FODP 48F indoor type, rack mounted with FCPC coupling and pigtails	24Nos	30Nos	44Nos		
iv)	Erection and commissioning of FODP 96F indoor type, rack mounted with FCPC coupling and pigtails	5Nos	2Nos	8Nos		
v)	Erection/Laying and commissioning of 24F Fibre Optic Approach Cable (DWSM) including HDPE Pipe	26Km	20Km	30Km		
vi)	Erection/Laying and commissioning of 48F Fibre Optic Approach Cable (DWSM) including HDPE Pipe	2.5Km	2Km	7.5Km		

(*) One Set of Installation hardware shall contain all installation hardware fittings as may be required for 1Km of OPGW/Approach Fibre Optic Cable.

1. Prices shall be quoted on **Firm** basis. Bidder shall quote for all the items.
2. Prices shall be free at destination site/stores anywhere in the state of Andhra Pradesh.
3. *Conditional discounts are not accepted.*
4. Freight charges shall invariably be quoted separately and quoting them as '0' (zero) or 'inclusive' will not be accepted.
5. **The bidder shall not quote insurance charges, the same will not be reimbursed.**
6. Freight will be reimbursed on submission of documentary proofs only.

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- 7. Evaluation shall be done by considering the cost of equipment/material, Freight, Erection/Stringing and Commissioning charges inclusive of GST.**
- 8. Bidders shall quote all incidental charges inclusive of GST. Quoting GST extra on incidental charges in the remark's column will not be considered for evaluation.**
9. Bidder should meet QR for all the items
10. The removed earth wire of each section shall be weighed as per actuals and shall also be devoluted at APTRANSCO stores at contractor's cost.
11. The used cable drums shall also be devoluted at APTRANSCO stores at contractor's cost.

Signature of the Bidder:

Name in Capitals:

Designation:

Seal of the company:

Address of the company:

ANNEXURE

Implementation Schedule for Lot-I & II

Task	Task Description	8 months period								
		Implementation schedule	1	2	3	4	5	6	7	8
1	Site Survey, Design & Engineering, Manufacturing, Delivery at site									
2	Site Installation & Site acceptance testing									

Implementation Schedule for Lot-III

Task	Task Description	12 months period											
		Implementation schedule	1	2	3	4	5	6	7	8	9	10	11
1	Site Survey, Design & Engineering, Manufacturing, Delivery at site												
2	Site Installation & Site acceptance testing												

SECTION – V

TECHNICAL SPECIFICATION
OPGW CABLE AND ASSOCIATED ACCESSORIES

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Section-1
General Information and General Requirements
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Section 1 General Information and General Requirement

1.1 Scope and General Requirements

The scope of this package is described in following parts:

Overhead Fibre Optic Cable (OPGW)

The broad scope of the procurement of this specification includes the survey, planning, design, engineering, manufacturing, supply, transportation, insurance, delivery at site, unloading, handling, storage, Supervision of erection/installation, installation, splicing, termination, testing and demonstration for acceptance, commissioning and documentation for:

- a) OPGW fibre optic cable including all associated hardware, accessories & fittings
- b) Fibre Optic approach cable including installation material
- c) Fibre Optic Distribution Panels (FODP) & Joint Box
- d) Supply of spares
- e) All other associated work/items described in the technical specifications

Mostly, the OPGW Cable under this specification shall be installed under live line conditions, i.e., with all circuits of the transmission line charged to their voltage. The bill of quantities for the same is specified in the appendices accordingly. However, the actual quantities for the requirement may vary during implementation which shall be finalised after detailed survey. The Contractor has to carry out the detailed survey and collect the required data for preparation of OPGW drum schedule.

The various sections of these specifications define the survey, design, performance, installation, testing & implementation for the fibre optic cable system.

All other associated works/items described in the technical specifications for a viable and fully functional communication network.

1.2 Proposed communication System

The communication network shall be based on bit rate of Synchronous Transport Module – 4/16. (STM-4/16).

Appendix A, depicts the communications network connectivity for proposed under this Project.

The work shall be performed on a Turnkey basis. The Contractor shall execute all temporary and permanent work, whether particularised in these Specifications or not, necessary for a timely and successful taking-over,

1.3 General requirements

The Contractor is encouraged to offer standard products and designs. However, the Contractor must conform to the requirements and provide any special equipment necessary to meet the requirements stated herein.

It should be noted that preliminary design information and bill of quantity (BoQ) specified in these specifications are indicative only. The Contractor shall verify the design data during the site surveys & detail engineering and finalise the BoQ as required for ultimate design & system performance. The Employer reserves the right of execution of works within the stipulated quantity variation provision at places (any where inside Andhra Pradesh) other than those indicated in the appendices at the same rates, terms and conditions.

The Bidder's proposal shall address all functional and performance requirements within this specification and shall include sufficient information and supporting documentation in order to determine compliance with this specification without further necessity for inquiries.

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The Bidder's proposal shall clearly identify all features described in the specifications or in any supporting reference material that will not be implemented; otherwise, those features shall become binding as part of the final contract.

An analysis of the functional and performance requirements of this specification and/or site surveys, design, and engineering may lead the Contractor to conclude that additional items are required that are not specifically mentioned in this specification. The Contractor shall be responsible for providing at no added cost to the Employer, all such additional items such that a viable and fully functional Overhead Fibre Optic Cable System is implemented that meets or exceeds the capacity, and performance requirements specified. Such materials shall be considered to be within the scope of the contract. To the extent possible, the Bidders shall identify and include all such additional items in their proposal.

The offered items shall be designed to operate in varying environments. Adequate measures shall be taken to provide protection against rodents, contaminants, pollutants, water & moisture, lightning & short circuit, vibration and electro-magnetic interference etc.

The Contractor shall demonstrate a specified level of performance of the offered items during well structured factory and field tests.

All equipment provided shall be designed to interface with other equipments and shall be supporting all present requirements and spare capacity requirement identified in the technical specifications.

The Bidders are advised to visit sites (at their own expense), prior to the submission of a proposal, and make surveys and assessments as deemed necessary for proposal submission. The successful bidder (Contractor) is required to visit all sites. The site visits after contract award shall include all necessary surveys to allow the contractor to perform the design and implementation functions. The Contractor shall inform their site survey schedule to the Employer well in advance. The site survey schedule shall be finalised in consultation with the employer, The employer shall also be associated with the contractor during their site/route survey activities.

After the site/route survey the Contractor shall submit to the Employer a survey report on each link and site. This report shall include at least the following items:

- a) List of all span lengths and the total link length for OPGW.
- b) Suitability of low voltage transmission line for OPGW cable installation on the present infrastructure, towers, earth wire, etc.
- c) Tower wise identification of type(s) and numbers of fittings & accessories required. If the vibration analysis is not carried out by the time of survey report submission, the vibration damper placement chart may be submitted separately.
- d) Proposed splice locations, cable drum schedules and types of in-line splice enclosure requirement at each location.
- e) Proposed routing of the approach FO cable from the end tower/gantry to the communication room to be marked on the site layout drawing. The existing cable trenches/cable raceways proposed to be used shall be identified.
- f) The positions of fibre optic distribution panel (FODP) shall also be finalised during survey and the same shall be indicated in the survey report.
- g) Proposed layout of all Communication equipments in the existing rooms and buildings.
- h) Proposed routing of power, earthing, signal cables and patch cords etc.
- i) Identification of facility modifications, if require.
- j) Confirmation of adequacy of Space and AC/DC Power supply requirements
- k) Proposals for new rooms/buildings if required
- l) Identify all additional items required for integration for each site/location.

1.4 General responsibilities and Obligations

This section describes the general responsibilities and obligations of the Contractor and the Employer.

1.4.1. General Responsibilities for the Implementation Plan

The Bidder's technical proposal shall include a project implementation plan and schedule that is consistent with the implementation plan detailed in this specification. The implementation plan shall be modelled such that it provides fibre optic cabling system support for the activation of this Project. The Implementation plan shall include the activities of both the Contractor and the Employer, showing all key milestones and clearly identifying the nature of all information and project support expected from the Employer. The Employer and Contractor shall finalise the detailed Implementation plan following award of the contract.

1.4.2 Contractor's Responsibilities and Obligations

The Contractor shall be responsible for the implementation of the Overhead fibre Optic Cable (OPGW) and associated communication equipments. Contractor's obligations include, but are not limited to, the following:

- (1) Provide a working system that meets the functional and performance requirements of this specification.
- (2) Engineering and design specific to each location including review of, and conformance with local environmental and earthing requirements.
- (3) Inputs for finalisation of installation and safety guidelines and procedures for the stringing, mechanical installation.
- (4) Obtaining statutory clearances from regulatory bodies, statutory bodies such as municipality, highway authority, electrical utilities, forest department, gas authorities etc.
- (5) Development of installation and safety guidelines and procedures for the complete system.
- (6) Development of procedure for splicing of all fibre optic cable, including testing and documentation.
- (7) Project management, project scheduling, including monthly project reports documenting progress during the contract period.
- (8) Coordination with other Project contractors for phased implementation and system integration & commissioning of the overall communications network.
- (9) Engineering and technical assistance during the contract and warranty period
- (10) Site visits, path surveys, and studies necessary to identify and provide all equipment needed to implement the FO Cable installation and communication network.
- (11) For any renovation, expansion or construction of facilities required to be carried out by Employer, the Contractor shall provide in the survey report the details necessary to enable such work to be carried out.
- (12) Assessment of suitability for live line installation of overhead FO cable on the present infrastructure, tower etc.
- (13) Design and Installation of the mechanical assemblies and accessories, including vibration dampers required for installation of all overhead fibre cable. To conduct structural analysis and to carry out tower strengthening if required, any or all additional steel work or modifications required to attach the overhead fibre cables shall also be carried out by the Contractor. Design data of towers shall be provided by the employer.
- (14) Dismantling the existing earthwire & hardware wherever overhead FO cables (OPGW) is to be installed on existing lines, and for the preservation and transportation of the dismantled earthwire & hardware to designated stores.

- (15) Supply, installation and termination of cables and cabling for all interconnection.
- (16) Intimate source power requirements within 30 days after receipt of the order for each cabinet/rack of equipment provided at each location.
- (17) An availability analysis showing MTBF (mean-time-between-failure) and MTTR (mean-time-to-repair) figures for all system components.
- (18) Factory and site acceptance testing of all items including hardware, software & firmware provided.
- (19) Conduct type tests or provide documented evidence of satisfactory Type Test performance to the employer.
- (20) Provide a Quality Assurance Plan ensuring the Employer access to the manufacturing process.
- (21) Providing earthing system and extension of earthing system.
- (22) Supply of cable & all equipment/items required for Terminal equipment system.
- (23) Shipment of all equipment and documentation to the employer designated locations and/or staging areas.
- (24) Storing, Staging, maintenance and security of the staging area up to the operational acceptance including the full responsibility for protection from fire and theft of the supplied equipment.
- (25) Installation of underground armoured fibre optic cable (Approach Cable) along with associated fitting, hardwares and accessories, in line splice enclosures, FODP etc.
- (26) Inter-connection among provided equipments.
- (27) All cabling, wiring including supply, laying and termination etc. of the cables at terminal equipment nodes required for full interconnectivity and proper operation of the telecommunications network including equipment supplied under this package and the connectivity and interfacing of equipment supplied separately.
- (28) Connectivity with the FODP and SDH equipment.
- (29) All Fibre Optic Distribution frame patch facilities.
- (30) Provide all additional Equipment necessary to ensure compatibility with the equipment to be interconnected.
- (31) Implement all minor civil works as per Technical Specification.
- (32) All hardware, software, and firmware required to satisfy the requirements of this Specification.
- (33) Overall integration of communication equipments/subsystem procured under this package.
- (34) All documentation and drawings as specified.
- (35) All required spare parts, maintenance aids, etc.
- (36) Maintenance and support of the items through final acceptance, and maintenance throughout the warranty period.
- (37) Hardware, software, and firmware maintenance, debugging, and support of the equipment through final acceptance, and maintenance on all new equipment through out the warranty period.

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- (38) Due diligence in properly planning and executing the work so as to minimise any physical damage.
- (39) The Contractor shall appoint key personnel for the project such as Project Manager, Site Manager, Design Engineer, Installation Engineer and Commissioning Engineer only after approval of the experience data by the Employer. Approval of the employer shall be obtained, whenever the Contractor wants to change key personnel.
- (40) Availability of service, spare and expansion parts for the supplied items for the designed life of the communication equipment or seven (7) years after the declaration of withdrawal of equipment from production, whichever is earlier. However, the termination of production shall not occur prior to Operational Acceptance of the system by the Employer.
- (41) Notification services for field updates to the hardware, software, and firmware for ensuring the availability of the supplied hardware & software for entire lifespan.

Detailed descriptions of the Contractor's obligations, in relation to individual items and services offered, are delineated in other sections of this specification.

1.4.3 The Employer Responsibilities and Obligations

The Employer will provide the following items and services as part of this Project:

- (1) Review and approval of the contractor's designs, drawings, survey reports and recommendations.
- (2) Review and approval of test procedures.
- (3) Participation in and approval of "Type", factory and site acceptance tests.
- (4) Providing support and access to facilities at the sites.
- (5) Provide to the extent possible drawings for existing sites and facilities for which equipment installations are planned.
- (6) Assistance in obtaining statutory clearances from regulatory bodies.
- (7) Approval of key personnel for the project.
- (8) Overall project management of the project
- (9) Provide to the extent possible drawings for existing sites and facilities for which equipment installations are planned. The details of the survey carried out by the Transmission Line Contractor along with tower spotting data, snow load details and other mechanical loads etc.
- (10) Short circuit calculations and earthing details of sub-stations where terminal equipment is to be installed.
- (11) Provide cable racks, ducts and trenches for fibre optic approach cabling

1.5 General Bidding Requirements

The Bidder shall be responsive to the technical requirements as set forth in this specification. The Bidder's proposal shall include the following:

- (1) The Technical Proposal including the documents listed in the Table 1-1: Bid Documents Checklist shall be provided in the bid.
- (2) The bidder shall submit with their proposal, performance certificate of all the offered equipment from at least one customer. The performance certificates shall provide evidence of successful operation of the proposed equipment as per the Qualifying Requirements of the bidders as on date of opening of the bid.
- (3) A detailed project implementation plan and schedule that is consistent with the scope of the project and Employer’s specified objectives. The plan shall include the activities of both the Contractor and Employer, show all key milestones, and clearly identify the nature of all information and project support to be provided by Employer.
- (4) A commitment and a clearly defined plan to develop a system support organization, based in India and capable of providing a full range of local services (including software and hardware maintenance and upgrade support) for the life of the delivered telecommunications systems.
- (5) The bidder may offer the bought-out items from more than one manufacturer. In case of QR items, the bidder shall provide supporting qualification document also.

**Table 1-1:
Bid Documents Checklist**

S.No.	Description:	Enclosure Reference	
1	Completed Data Requirement Sheets (As per Appendix of Technical Spec)	Page no. Ref no.	
2	Performance certificate	Page no. Ref no.	
3	Quality Assurance Program (As per relevant Sections of Technical Specs)	Page no. Ref no.	
4	Detailed Project Implementation Plan (As per relevant Sections of Technical Specs)	Page no. Ref no.	

1.6 Table of Compliance

Bidder shall use one copy of Specification with all the Sections including “Conditions of Contract,” and “Technical Specifications” to indicate compliance status with those Sections. Within the right-hand margin, Bidder shall indicate compliance status to each paragraph along with a cross-reference to its proposal and an index key for any explanation or comment.

In addition, the Bidder shall annotate the Table of Contents of each of the above stated volumes to provide a high-level summary of compliance status. In both cases, the following symbols, and no others, shall be used:

- C - Bid complies with all requirements in the adjacent paragraph.
- A - Bid is not compliant with the requirements in the adjacent paragraph, but a functional alternative is proposed.
- X - Bid takes exception to the requirements of the adjacent paragraph and no Functional alternative is proposed.

Only one symbol shall be assigned to paragraph and shall indicate the worst-case level of compliance for that paragraph. This annotation may be hand written.

Bidder shall also underline, on the compliance copy, all requirements to which exceptions have been taken (X) or to which alternatives have been proposed (A).

Each alternative shall be clearly and explicitly described. Such descriptions shall use the same paragraph numbering as the bid document sections addressed by the alternatives. All alternative descriptions shall be in one contiguous section of the Bidder's proposal, preferably in the same volume, and titled "Alternatives." A separate section titled "Exceptions" should be provided containing any discussion or explanation Bidder chooses to provide concerning exceptions taken. Alternatives which do not substantially comply with the intent of the bid documents will be considered exceptions.

The Employer will assess the merits of each alternative and exception and will be the sole judge as to their acceptance.

1.7 Organization of the Technical Specification Document

Sections 2 through 7 provide the project requirements of the fibre optic cabling system to be provided.

<u>Section 2</u>	Contains specifications and functional description of OPGW cabling & associated hardware & fittings
<u>Section 3</u>	Contains the requirement for Environment, EMI Supply, Cabling and Earthing
<u>Section 4</u>	Contains the requirement for Inspection & Testing
<u>Section 5</u>	Contains the documentation and deliverables requirements
<u>Section 6</u>	Describes project management, schedule and implementation plan

The following is a list of the Appendices:

<u>Appendix A</u>	-	General Information
<u>Appendix B</u>	-	Bill of Quantity (BoQ)
<u>Appendix C</u>	-	Data Requirement Sheets (DRS)

1.8 Applicable Standards

The applicable standards are mentioned in the respective technical section. The offered equipment shall conform to the standards mentioned in the specification except to the extent modified by this specification. In case of any discrepancy between the description given in the specification and the standards, the provisions of the technical specification shall be followed. The parameters not specifically mentioned in this specification shall conform to the standard mentioned in this specification.

Specifications and codes shall be the latest version, inclusive of revisions, which are in force at the date of the contract award. Where new specifications, codes, and revisions are issued during the period of the contract, the Contractor shall attempt to comply with such, provided that no additional expenses are charged to the employer without Employer's written consent.

In the event the Contractor offers to supply material and/or equipment in compliance to any standard other than Standards listed herein, the contractor shall include with their proposal, full salient characteristics of the new standard for comparison.

In case values indicated for certain parameters in the specification are more stringent than those specified by the standards, the specification shall override the standards.

The following standards and codes shall be generally applicable to the equipment and works supplied under this Contract:

- (i) IEEE 802.3
- (ii) ITU-T/CCITT Recommendations, G.652, G701, G703, G711/12/14/35/36, G721, G811 and G823

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- (iii) ITU-TCCITT Recommendations, G801, G821, G822, G823, G826.
- (iv) ITU-TCCITT Recommendations of the V Series
- (v) ITU-TCCITT Recommendations R35, R37, and R38A (or R38B)
- (vi) ITU-TCCITT Recommendations M3010, G771
- (vii) Internet Activities Board, RFC-1157 (SNMP)
- (viii) International Electrotechnical Commission standards, IEC 60801-2/34/5, IEC-60255-4, IEC-60255-5, IEC-60870-2-1, IEC-60721-3-3, IEC-60529.
- (ix) International Electrotechnical Commission standards, IEC 1000-4-xx series,
- (x) IEC publication 60068, 60068-2-2, 60068-2-3, 60068-2-14, 60068-2-27, 60068-2-32.
- (xi) ITU-TCCITT Recommendations K.11, K.17, K.20.
- (xii) International CISPR standards

1.9 References

- (1) CIGRE Guide for Planning of Power Utility Digital Communications Networks
- (2) CIGRE Optical Fibre Planning Guide for Power Utilities
- (3) CIGRE New Opportunities for Optical fibre Technology in Electricity Utilities
- (4) CIGRE guide to fittings for Optical Cables on Transmission Lines

Section-2**Technical Specification of OPGW cable and associated hardware & fittings**
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Section-2**Technical Specification of OPGW cable and associated hardware & fittings**

This section describes the functional & technical specifications of OPGW cabling and associated hardware & fittings.

2.1 Fibre Optic Cabling

This section defines the requirements for G.652D & G655 Dual-window Single mode (DWSM) telecommunication grade fibre optic cable. Bidders shall furnish with their bids, detailed descriptions of the fibres & cable(s) proposed.

All optical fibre cabling including fibre itself and all associated installation hardware shall have a minimum guaranteed design life span of 25 years. Documentary evidence in support of guaranteed life span of cable & fibre shall be submitted by the Contractor during detailed engineering.

2.1.1 Required Optical Fibre Characteristics

This section describes the characteristics of optical fibre to be provided under this specification.

2.1.1.1 Physical Characteristics

Dual-Window Single mode (DWSM), G.652D optical fibres shall be provided in the fibre optic cables. DWSM optical fibres shall meet the requirements defined in Table 2-1 (a).

2.1.1.2 Attenuation

The attenuation coefficient for wavelengths between 1525 nm and 1575 nm shall not exceed the attenuation coefficient at 1550 nm by more than 0.05 dB. The attenuation coefficient between 1285 nm and 1330 nm shall not exceed the attenuation coefficient at 1310 nm by more than 0.05 dB. The attenuation of the fibre shall be distributed uniformly throughout its length such that there are no point discontinuities in excess of 0.10 dB. The fibre attenuation characteristics specified in Table 2-1 (a) shall be “guaranteed” fibre attenuation of any & every fibre reel.

The overall optical fibre path attenuation shall not be more than calculated below:

Maximum attenuation @ 1550nm: $0.21 \text{ dB/km} \times \text{total km} + 0.05 \text{ dB/splice} \times \text{no. of splices} + 0.5 \text{ dB/connector} \times \text{no. of connectors}$.

Maximum attenuation @ 1310nm: $0.35 \text{ dB/km} \times \text{total km} + 0.05 \text{ dB/splice} \times \text{no. of splices} + 0.5 \text{ dB/connector} \times \text{no. of connectors}$.

Table 2-1 (a)
DWSM Optical Fibre Characteristics

Fibre Description:	Dual-Window Single-Mode
Mode Field Diameter:	8.6 to 9.5 μm ($\pm 0.6 \mu\text{m}$)
Cladding Diameter:	125.0 $\mu\text{m} \pm 1 \mu\text{m}$
Model field concentricity error	$\leq 0.6 \mu\text{m}$
Cladding non-circularity	$\leq 1\%$
Cable Cut-off Wavelength λ_{cc}	$\leq 1260 \text{ nm}$
1550 nm loss performance	As per G.652 D
Proof Test Level	$\geq 0.69 \text{ Gpa}$

Attenuation Coefficient:	@ 1310 nm ≤ 0.35 dB/km @ 1550 nm ≤ 0.21 dB/km
Chromatic Dispersion; Maximum:	18ps/(nm x km) @ 1550 nm 3.5 ps/(nm x km) 1288-1339 nm 5.3 ps/(nm x km) 1271-1360 nm
Zero Dispersion Wavelength:	1300 to 1324 nm
Zero Dispersion Slope:	0.092 ps/(nm ² xkm) maximum
Polarization mode dispersion coefficient	≤ 0.2 ps/km ^{1/2}
Temperature Dependence:	Induced attenuation ≤ 0.05 dB (-60°C - +85°C)
Bend Performance:	@ 1310 nm (75±2 mm dia Mandrel), 100 turns: Attenuation Rise ≤ 0.05 dB @1550 nm (30±1 mm radius Mandrel), 100 turns; Attenuation Rise ≤ 0.05 dB @ 1550 nm 32±0.5 mm dia Mandrel, 1 turn; Attenuation Rise ≤ 0.50 dB

2.1.2 Fibre Optic Cable Construction

Overhead Fibre Optic Cables shall be OPGW (Optical Ground Wire). The OPGW cable is proposed to be installed on the 400kV/220kV/132kV EHV transmission lines spread across Andhra Pradesh State, the list is enclosed at Appendices. The design of cable shall account for the varying operating and environmental conditions that the cable shall experience while in service. The OPGW cable to be supplied shall be designed to meet the overall requirements of all the transmission lines. Normally the tower span of the lines shall not exceed 600m, however some of the spans may be upto around 1000m or more. The exact details shall be collected by the Contractor during survey. To meet overall requirement of all the transmission lines, the contractor may offer more than one design without any additional cost to Employer, in case span length of more than 600m is found during survey. It may also be noted that some of the transmission lines route may be added during the engineering stage.

2.1.2.1 Transmission Line Details

Typical details of transmission lines are indicated in the Appendices. Any other details, as required for cable design etc, shall be collected by the Contractor during survey.

2.1.2.2 Optical Fibre Cable Link Lengths

The estimated optical fibre link lengths are provided in Appendices as transmission line route length. However, the Contractor shall supply & install the optical fibre cable as required based on detailed site survey to be carried out by the Contractor during the project execution. The Contractor shall verify the transmission line route length during the survey and the Contract price shall be adjusted accordingly.

For the purpose of payment, the optical fibre link lengths are defined as transmission line route lengths from Gantry at one terminating station to the Gantry in the other terminating station. The actual cable lengths to be delivered shall take into account various factors such as sag, service loops, splicing, working lengths & wastage etc, and no additional payment shall be payable in this regard. The unit rate for FO cable quoted in the Bid price Schedules shall take into account all such factors.

2.1.2.3 Optical Fibre Identification

Individual optical fibres within a fibre unit and fibre units shall be identifiable in accordance with EIA/TIA 598 OR IEC 60304 or Bellcore GR-20 colour-coding scheme.

Colouring utilized for colour coding optical fibres shall be integrated into the fibre coating and shall be homogenous. The colour shall not bleed from one fibre to another and shall not fade during fibre preparation for termination or splicing.

Each cable shall have traceability of each fibre back to the original fibre manufacturer's fibre number and parameters of the fibre. If more than the specified number of fibres are included in any cable, the spare fibres shall be tested by the cable manufacturer and any defective fibres shall be suitably bundled, tagged and identified at the factory by the vendor.

2.1.2.4 Buffer Tube

Loose tube construction shall be implemented. The individually coated optical fibre(s) shall be surrounded by a buffer for protection from physical damage during fabrication, installation and operation of the cable. The fibre coating and buffer shall be strippable for splicing and termination. Each fibre unit shall be individually identifiable utilizing colour coding. Buffer tubes shall be filled with a water-blocking gel.

2.1.2.5 Optical Fibre Strain & Sag-tension chart

The fibre optic cable shall be designed and installed such that the optical fibres experience no strain under all loading conditions defined in IS 802. Zero fibre strain condition shall apply even after a 25year cable creep.

For the purpose of this specification, the following definitions shall apply;

- Maximum Working Tension (MWT) is defined as the maximum cable tension at which there is no fibre strain.
- The no fibre strain condition is defined as fibre strain of less than or equal to 0.05%, as determined by direct measurements through IEC/ETSI(FOTP) specified optical reflectometry techniques.
- The Cable strain margin is defined as the maximum cable strain at which there is no fibre strain.
- The cable Maximum Allowable Tension (MAT) is defined as the maximum tension experienced by the Cable under the worst case loading condition.
- The cable max strain is defined as the maximum strain experienced by the Cable under the worst case loading condition
- The cable Every Day Tension (EDT) is defined as the maximum cable tension on any span under normal conditions.
- The Ultimate / Rated Tensile Strength (UTS/RTS/breaking strength) is defined as the maximum tensile load applied and held constant for one minute at which the specimen shall not break.

While preparing the Sag-tension charts for the OPGW cable the following conditions shall be met:

- The Max Allowable Tension (MAT) / max strain shall be less than or equal to the MWT/Strain margin of the cable
- The Sag shall not exceed the earth wire sag in all conditions.
- The Max Allowable Tension shall also be less than or equal to 0.4 times the UTS.
- The 25 years creep at 25% of UTS (creep test as per IEEE 1138) shall be such that the 25 years creep plus the cable strain at Max Allowable Tension (MAT) is less than or equal to the cable strain margin.

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- The everyday tension (EDT) shall not exceed 20% of the UTS for the OPGW cable.

The Sag-tension chart of OPGW cable indicating the maximum tension, cable strain and sag shall be calculated and submitted along with the bid under various conditions mentioned below:

1. 53°C, no wind and no ice
2. 32°C, no wind and no ice
3. 0°C, no wind and no ice
4. 32°C, full wind and no ice
5. 32°C, 75% full wind and no ice
6. 0°C, 2/3rd / 36% of full wind (IS 802:1977/1995)

The above cases shall be considered for the spans from 100 m to 600 m or higher span length in the range of 50 m spans. Max. vertical sag, max. tension and max sag at 0° C & no wind shall be considered for in line with the design parameter of transmission line. The typical details are indicated in the appendices. The full wind load shall be considered as the design wind load for all the specified transmission lines as per relevant IS 802 version and the sag-tension chart shall be submitted considering the transmission lines. In case of any span higher than 600m, suitable OPGW cable meeting Sag- Tension requirements of transmission line shall also be provided by the contractor. The contractor shall submit the stringing chart for review of Employer.

2.1.2.6 Cable Materials

The materials used for optical fibre cable construction, shall meet the following requirements:

2.1.2.6.1 Filling Materials

The interstices of the fibre optic unit and cable shall be filled with a suitable compound to prohibit any moisture ingress or any water longitudinal migration within the fibre optic unit or along the fibre optic cable. The water tightness of the cable shall meet or exceed the test performance criteria as per IEC-794-1-F-5.

The filling compound used shall be a non-toxic homogenous waterproofing compound that is free of dirt and foreign matter, nonhygroscopic, electrically nonconductive and non-nutritive to fungus. The compound shall also be fully compatible with all cable components it may come in contact with and shall inhibit the generation of hydrogen within the cable.

The waterproofing filling materials shall not affect fibre coating, colour coding, or encapsulant commonly used in splice enclosures, shall be dermatologically safe, non-staining and easily removable with a non-toxic cleaning solvent.

2.1.2.6.2 Metallic Members

When the fibre optic cable design incorporates metallic elements in its construction, all metallic elements shall be electrically continuous.

2.1.2.7 Marking, Packaging and Shipping

This section describes the requirements for marking, packaging and shipping the overhead fibre optic cable.

- (a) **Drum Markings:** Each side of every reel of cable shall be permanently marked in white lettering with the vendors' address, the Purchaser's destination address, cable part number and specification as to the type of cable, length, number of fibres, a unique drum number including the name of the transmission line & segment no., factory inspection stamp and date.

- (b) Cable Drums: All optical fibre cabling shall be supplied on strong drums provided with lagging of adequate strength, constructed to protect the cabling against all damage and displacement during transit, storage and subsequent handling during installation. Both ends of the cable shall be sealed as to prevent the escape of filling compounds and dust & moisture ingress during shipment and handling. Spare cable caps shall be provided with each drum as required.

The spare cable shall be supplied on sturdy, corrosion resistant, steel drums suitable for long periods of storage and re-transport & handling.

There shall be no factory splices allowed within a continuous length of cable. Only one continuous cable length shall be provided on each drum. The lengths of cable to be supplied on each drum shall be determined by a “schedule” prepared by the Contractor.

2.1.3. OPGW cable Installation requirements

Most of the OPGW fibre optic cables to be installed under this project shall be installed under live line conditions, i.e., with all the circuits of the transmission line charged to their rated voltage. The tentative bill of quantities for both live- line as well as off-line OPGW cable system installations have been specified in the appendices and the actual quantities for both types shall be finalized during project execution after detailed survey.

The OPGW cable shall be installed at the top of the tower by replacing the existing ground wire. The Contractor shall carry out re-tensioning of the existing earth wire wherever required to maintain the adequate clearances for live line stringing of fibre optic cables. However, in exceptional cases installation of OPGW cable below conductor may also be considered on low voltage lines which shall be decided during detailed engineering.

Supervision of Installation – The Contractor shall supervise the stringing at site as per the approved stringing procedure. Site visit for supervision shall be carried out as per instruction of Employer. However, the contract price shall be adjusted as per the actual requirement. The Supervision/Inspection work in Contractor’s scope shall mainly include inspection as per stringing procedure, proper location of drum site, installation of stringing blocks/pulleys, proper sagging, proper installation of hardware, proper tension as per Sag-Tension chart, provision of service loops of OPGW in jointing locations etc.

2.1.4. Optical Ground Wire (OPGW)

OPGW cable construction shall comply with IEEE-1138, 1994. The cable provided shall meet both the construction and performance requirements such that the ground wire function, the optical fibre integrity and optical transmission characteristics are suitable for the intended purpose. The cable shall consist of optical fibre units as defined in this specification. There shall be no factory splices within the cable structure of a continuous cable length.

The composite fibre optic overhead ground wire shall be made up of multiple buffer tubes (fibres in the buffer tube) embedded in a water tight aluminium / aluminium alloy / stainless steel with aluminium coating protective central fibre optic unit surrounded by concentric-lay stranded metallic wires in single or multiple layers. Each buffer tube shall have maximum 12 no. of fibres. All fibres in single buffer tube or directly in central fibre Optic unit is not acceptable. The dual purpose of the composite cable is to provide the electrical and physical characteristics of conventional overhead ground wire while providing the optical transmission properties of optical fibre.

2.1.4.1 Central Fibre Optic Unit

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The central fibre optic unit shall be designed to house and protect multiple buffered optical fibres units from damage due to forces such as crushing, bending, twisting, tensile stress and moisture. The central fibre optic unit and the outer stranded metallic conductors shall serve together as an integral unit to protect the optical fibres from degradation due to vibration and galloping, wind and ice loadings, wide temperature variations, lightning and fault current, as well as environmental effects which may produce hydrogen.

Central fibre optic unit may be of aluminium or stainless-steel tube with aluminium protective coating. In case of aluminium protective coating, the coating must completely cover the tubes leaving no exposed areas of tubing that can make electrical contact either directly or indirectly through moisture, contamination, protrusions etc., with the surrounding stranded wires. The tube may be fabricated as a seamless tube, seam welded, or a tube without a welded seam.

2.1.4.2. Basic Construction

The cable Construction shall conform to the applicable requirements of this specification, applicable clauses of IEC 61089 related to standard conductors and Table 2.2(a) OPGW Mechanical and Electrical Characteristics. In addition, the basic construction shall include bare concentric-lay-stranded metallic wires with the outer layer having left hand lay. The wires may be of multiple layers with a combination of various metallic wires within each layer. The direction of lay for each successive layer shall be reversed. The finished wires shall contain no joints or splices unless otherwise agreed to by the Employer and shall conform to all applicable clauses of IEC 61089 as they pertain to stranded conductors.

The wires shall be so stranded that when the complete OPGW is cut, the individual wires can be readily regrouped and then held in place by one hand.

2.1.4.3. Breaking Strength

The rated breaking strength of the completed OPGW shall be taken as no more than 90 percent of the sum of the rated breaking strengths of the individual wires, calculated from their nominal diameter and the specified minimum tensile strength.

The rated breaking strength shall not include the strength of the optical unit. The fibre optic unit shall not be considered a load bearing tension member when determining the total rated breaking strength of the composite conductor.

2.1.4.4. Electrical and Mechanical Requirements

Table 2-2(a) provides OPGW Electrical and Mechanical Requirements for the minimum performance characteristics. Additionally, the OPGW mechanical & electrical characteristics shall be similar to that of the earth wire being replaced such that there is no or minimal consequential increase in stresses on towers. For the purpose of determining the appropriate Max Working Tension limit for the OPGW cable IS 802:1995 and IS 875:1987 shall be applied. However, the OPGW installation sag & tension charts shall be based on IS 802 version to which the line is originally designed. For the OPGW cable design selection and preparation of sag tension charts, the limits specified in this section shall also be satisfied. The Bidder shall submit sag-tension charts for the above cases with their bids.

Table 2.2(a)
OPGW Electrical and Mechanical Requirements

(1)	Everyday Tension	≤ 20% of UTS of OPGW
(2)	D.C. Resistance at 20°C:	< 1.0 ohm/Km
(3)	Short Circuit Current:	≥ 6.32 kA for 1.0 second

2.1.4.5. Operating conditions

Since OPGW shall be located at the top of the EHV transmission line support structure, it will be subjected to Aeolian vibration, Galloping and Lightning strikes. It will also carry ground fault currents. Therefore, its electrical and mechanical properties shall be same as those required of conventional ground conductors.

2.1.5. Installation

OPGW installed under live line condition, i.e., with all circuits charged to the rated line voltage as specified in this section shall be generally in accordance with the IEEE Guide to the Installation of Overhead Transmission Line Conductors (IEEE STD. 524 with latest revisions), with additional instructions and precautions for live line working and for fibre optic cable handling. Some of the cable may be installed in off-line condition also. The stringing procedure shall be submitted by the Contractor prior to stringing for Employer's approval.

A tower structural analysis shall be carried out by the contractor, based on the relevant data to be provided by Employer, to ensure that with the replacement of existing earthwire with the OPGW cable, the tower members remain within statutory safety limits as per Indian Electricity rules and if required the Contractor shall carry out the tower strengthening as necessary. The OPGW cable sections shall normally be terminated & spliced only on tension towers. In exceptional circumstances, and on Employer specific approval, cable may be terminated on Suspension towers, but in this case tower strength shall be examined to ensure that tower loads are within safe limits and if required, necessary tower strengthening shall be carried out by the Contractor.

2.1.5.1. Installation Hardware

The scope of supply of the optical cable includes the assessment, supply and installation of all required fittings and hardware such as Tension assembly, Suspension assembly, Vibration dampers, reinforcing rods, Earthing clamps, Downlead clamps, splice enclosure etc. The Bidder shall provide documentation justifying the adequacy and suitability of the hardware supplied. The quantity of hardware & fittings to meet any eventuality during site installation min 3@1% shall also be provided as part of set/km for each transmission line without any additional cost to Employer. The Contractor shall determine the exact requirements of all accessories required to install and secure the OPGW.

The OPGW hardware fittings and accessories shall follow the general requirements regarding design, materials, dimensions & tolerances, protection against corrosion and markings as specified in clause 4.0 of EN 61284:1997 (IEC 61284). The shear strength of all bolts shall be at least 1.5 times the maximum installation torque. The OPGW hardware & accessories drawing & Data Requirement Sheets (DRS) document shall consist of three parts: (1) A technical particulars sheet (2) An assembly drawing i.e., level 1 drawing and (3) Component level drawings i.e., level 2 & lower drawings. All component reference numbers, dimensions and tolerances, bolt tightening torques & shear strength and ratings such as UTS, slip strength etc shall be marked on the drawings.

The fittings and accessories described herein are indicative of installation hardware typically used for OPGW installations and shall not necessarily be limited to the following:

- (a) Suspension Assemblies: Preformed armour grip suspension clamps and aluminium alloy armour rods/reinforcing rods shall be used. The suspension clamps shall be designed to carry a vertical load of not less than 25 KN. The suspension clamps slippage shall occur between 12kN and 17kN as measured in accordance with type test procedures.

The Contractor shall supply all the components of the suspension assembly including shackles, bolts, nuts, washers, split pins, etc. The total drop of the suspension assembly shall not exceed 150 mm (measured from the center point of attachment to the center point of the OPGW). The design of the assembly shall be such that the direction of run of the OPGW shall be the same as that of the conductor.

- (b) Dead End Clamp Assemblies: All dead-end clamp assemblies shall preferably be of performed armoured grip type and shall include all necessary hardware for attaching the assembly to the tower strain plates. Dead end clamps shall allow the OPGW to pass through continuously without cable cutting. The slip strength shall be rated not less than 95% of the rated tensile strength of the OPGW.
- (c) Clamp Assembly Earthing Wire: Earthing wire consisting of a 1500 mm length of aluminium or aluminium alloy conductor equivalent in size to the OPGW shall be used to earth suspension and dead-end clamp assemblies to the tower structure. The earthing wire shall be permanently fitted with lugs at each end. The lugs shall be attached to the clamp assembly at one end and the tower structure at the other.
- (d) Structure Attachment Clamp Assemblies: Clamp assemblies used to attach the OPGW to the structures, shall have two parallel grooves for the OPGW, one on either side of the connecting bolt. The clamps shall be such that clamping characteristics do not alter adversely when only one OPGW is installed. The tower attachment plates shall locate the OPGW on the inside of the tower and shall be attached directly to the tower legs/cross-members without drilling or any other structural modifications.
- (e) Vibration Dampers: Vibration dampers type 4R Stockbridge or equivalent, having four (4) different frequencies spread within the Aeolian frequency bandwidth corresponding to wind speed of 1m/s to 7 m/s, shall be used for suspension and tension points in each span. The Contractor shall determine the exact numbers and placement(s) of vibration dampers through a detailed vibration analysis as specified in technical specifications.

One damper minimum on each side per OPGW cable for suspension points and two dampers minimum on each side per OPGW cable for tension points shall be used for nominal design span of 400 meters. For all other ruling spans., the number of vibration damper shall be based on vibration analysis.

The clamp of the vibration damper shall be made of high strength aluminium alloy of type LM-6. It shall be capable of supporting the damper and prevent damage of chaffing of the conductor during erection or continued operation. The clamp shall have smooth and permanent grip to keep the damper in position on the OPGW cable without damaging the strands or causing premature fatigue failure of the OPGW cable under the clamp. The clamp groove shall be uniform contact with the OPGW cable over the entire clamping surface except for the rounded edges. The groove of the clamp body and clamp cap shall be smooth, free from projections, grit or other materials which could cause damage to the OPGW cable when the clamp is installed. Clamping bolts shall be provided with self locking nuts and designed to prevent corrosion of threads or loosening in service.

The messenger cable shall be made of high strength galvanized steel/stain less steel. It shall be of preformed and post formed quality in order to prevent subsequent droop of weight and to maintain consistent flexural stiffness of the cable in service. The messenger cable other than stainless steel shall be hot dip galvanized in accordance with the recommendations of IS:4826 for heavily coated wires.

The damper mass shall be made of hot dip galvanized mild steel/cast iron or a permanent mould cast zinc alloy. All castings shall be free from defects such as cracks, shrinkage, inclusions and blow holes etc. The surface of the damper masses shall be smooth.

The damper clamp shall be casted over the messenger cable and offer sufficient and permanent grip on it. The messenger cable shall not slip out of the grip at a load less than the mass pull-off value of the damper. The damper masses made of material other -than Zinc alloy shall be fixed to the messenger cable in a suitable manner in order to avoid excessive stress concentration on the messenger cables which shall cause premature fatigue failure of the same. The messenger cable ends shall be suitably and effectively sealed to prevent corrosion. The damper mass made of Zinc alloy shall be casted over the messenger cable and have sufficient and permanent grip on the messenger cable under all service conditions.

The contractor must indicate the clamp bolt tightening torque to ensure that the slip strength of the clamp is maintained between 2.5kN and 5kN. The clamp when installed on the OPGW cable shall not cause excessive stress concentration on the OPGW cable leading to permanent deformation of the OPGW strands and premature fatigue failure in operation.

The vibration analysis of the system, with and without damper and dynamic characteristics of the damper as detailed in Technical Specification, shall have to be submitted. The technical particulars for vibration analysis and damping design of the system are as follows:

Sl. No.	Description	Technical Particulars
1	Span Length in meters (i). Ruling design span: (ii). Maximum span: (iii). Minimum Span:	400 meters 1100 meters 100 meters
2	Configuration:	As per specification
3.	Tensile load in each:	As per sag tension calculations
4.	Armour rods used:	Standard preformed armour rods/AGS
5.	Maximum permissible dynamic strain:	± 150 micro strains

The damper placement chart for spans ranging from 100m to 1100m shall be submitted by the bidder. Placement charts should be duly supported with relevant technical documents and sample calculations.

The damper placement charts shall include the following

- (1). Location of the dampers for various combinations of spans and line tensions clearly indicating the number of dampers to be installed per OPGW cable per span.
- (2). Placement distances clearly identifying the extremities between which the distances are to be measured.
- (3). Placement recommendation depending upon type of suspension clamps (viz. free center type /Aemour grip type etc.)
- (4). The influence of mid span compression joints, repair sleeves and armour rods (standard and AGS) in the placement of dampers.

Vibration damper clamps shall be made of aluminium or aluminium alloy, shall support the dampers during installation and shall maintain the dampers in position without damage to the OPGW and without causing fatigue. Armour or patch rods made of aluminium or aluminium alloy shall be provided as required to reduce clamping stress on the OPGW. The vibration damper body shall be hot-dip galvanized mild steel/cast iron or shall be permanent mould cast zinc alloy.

2.1.6. Fibre Optic Splice Enclosures (Joint Box)

All splices shall be encased in Fibre Optic Splice Enclosures. Suitable splice enclosures shall be provided to encase the optical cable splices in protective, moisture and dust free environment. Splice enclosures shall comply to ingress protection class IP 66 or better. The splice enclosures shall be designed for the storage and protection of required number of optical fibre splices and equipped with sufficient number of splice trays for splice trays for splicing all fibres in the cable. No more than 6 fibres shall be terminated in a single splice tray. They shall be filled with suitable encapsulate that is easily removable should re-entry be required into the enclosures.

Splice enclosures shall be suitable for outdoor use with each of the cable types provided under this contract. Splice enclosures shall be appropriate for mounting on transmission line towers above anti-climb guard levels at about 10 metres from top of the tower and shall accommodate pass-through splicing. The actual mounting height and location shall be finalized after Survey. Contractor shall be responsible for splicing of fibres and installation of splice enclosures.

2.1.6.1. Optical Fibre Splices

Splicing of the optical fibre cabling shall be minimized through careful contractor planning. There shall be no mid-span splices allowed. All required splices shall be planned to occur on tower structures. All optical fibre splicing shall comply with the following:

- (a) All fibre splices shall be accomplished through fusion splicing.
- (b) Each fibre splice shall be fitted with a splice protection sheath fitted over the final splice.
- (c) All splices and bare fibre shall be neatly installed in covered splice trays. No more than six (6) fibres shall be installed in each splice tray.
- (d) For each link, bi-directional attenuation of single mode fusion splices, shall not average more than 0.05 dB and no single splice loss shall exceed 0.1 dB when measured at 1550 nm.
- (e) For splicing, fibre optic cable service loops of adequate length shall be provided so that all splices occurring at tower structures can be performed at ground level.

2.1.7. Fibre Optic Approach Cables

For purposes of this specification, a fibre optic approach cable is defined as the Armoured underground fibre optic cable required to connect Overhead Fibre Optic Cable (OPGW) between the final in line splice enclosure on the gantry / tower forming the termination of the fibre cable on the power line and the Fibre Optic Distribution Panel (FODP) installed within the building. The estimated fibre optic approach cabling length requirements are indicated in the appendices. However, the Contractor shall supply & install the optical fibre approach cable as required based on detailed site survey to be carried out by the Contractor during the project execution and the Contract price shall be adjusted accordingly.

2.1.7.1. Basic Construction

The cable shall be suitable for direct burial, laying in trenches & PVC/Hume ducts, laying under false flooring and on indoor or outdoor cable raceways.

2.1.7.2. Jacket Construction & Material

The approach cable shall be a UV resistant, rodent proof, armoured cable with metallic type of armoring. The outer cable jacket for approach cable shall consist of carbon black polyethylene resin to prevent damage from exposure to ultra-violet light, weathering and high levels of pollution. The jacket shall conform to ASTM D1248 for density.

2.1.7.3. Optical, Electrical and Mechanical Requirements

Approach cable shall contain fibres with identical optical/physical characteristics a those in the OPGW cables. The cable core shall comprise of tensile strength member(s), fibre support/bedding structure, core wrap/bedding, and an overall impervious jacket.

2.1.7.4. Installation of Approach cable

The existing cable trenches/cable raceways proposed to be used shall be identified in the survey report. The Contractor shall make its best effort to route the cable through the existing available cable trenches. Where suitable existing cable trenches are not available, suitable alternatives shall be provided after Employer approval. However, the approach cable shall be laid in the HDPE pipe in all condition.

Suitable provisions shall be made by the contractor to ensure adequate safety earthing and insulated protection for the approach cable.

All required fittings, supports, accessories, ducts, inner ducts, conduits, risers and any item not specially mentioned but required for laying and installtion of approach cables shall be supplied and installed by the Contractor.

2.1.8. Optical Fibre Termination and Splicing

Optical fibre terminations shall be installed in Fibre Optical Distribution Panels (FODP) designed to provide protection for fibre splicing of preconnectorized pigtailed and to accommodate connectorized termination and coupling of the fibre cables. The contractor shall provide rack/wall mounted fibre optic distribution panels (FODPs) sized as indicated in the appendices and shall terminate the fibre optic cabling up to the FODPs. The location of FODP rack shall be fixed by the Contractor, with the Employer's approval.

2.1.9. Fibre Optic Distribution Panel

At each location requiring the termination of at least one fibre within a cable, all fibres within that cable shall be connectorized and terminated in Fibre Optic Distribution Panels in a manner consistent with the following:

- a) All fibre optic terminations shall be housed using FODPs provisioned with splice organizers and splice trays. All fibres within a cable shall be fusion spliced to preconnectorized pigtailed and fitted to the "Back-side" of the provided fibre optic couplings.
- b) FODPs shall be suitable for use with each of the cable types provided as part of this contract. FODPs shall accommodate pass-through splicing and fibre terminations.
- c) FODPs for indoor use shall be supplied in suitable cabinets/racks with locking arrangement.

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- d) ALL FODPs shall be of corrosion resistant, robust construction and shall allow both top or bottom entry for access to the splice trays, Ground lugs shall be provided on all FODPs and the Contractor shall ensure that all FODPs are properly grounded. The FODP shall meet or exceed ingress protection class IP55 specifications.
- e) Flexible protection shall be provided to the patch cord bunches going out from FODP to other equipment.

2.1.9.1. Optical Fibre Connectors

Optical fibres shall be connectorised with FC-PC type connectors preferably. Alternatively, connector with matching patch cord shall also be acceptable. Fibre optic couplings supplied with FODPs shall be appropriate for the fibre connectors to be supported. There shall be no adapters.

2.1.10. Service Loops

For purposes of this specification, cable and fibre service loops are defined as slack (extra) cable and fibre provided for facilitating the installation, maintenance and repair of the optical fibre cable plant.

- (a) Outdoor Cable Service Loops: In-line splice enclosures installed outdoors and mounted on the utility towers, shall be installed with sufficient fibre optic cable service loops such that the recommended minimum bend radius is maintained while allowing for installation or maintenance of the cable to be performed in a controlled environment at ground level.
- (b) Indoor Cable Service Loops: FODPs shall provide at least three (3) metres of cable service loop. Service loops shall be neatly secured and stored, coiled such that the minimum recommended bend radius' are maintained.
- (c) Fibre Units Service Loops: For all fibre optic cable splicing, the cable shall be stripped back a sufficient length such that the fan-out of fibre units shall provide for at least one (1) metre of fibre unit service loop between the stripped cable and the bare fibre fan-out.
- (d) Pigtail Service Loops: Connectorised pigtails spliced to bare fibres shall provide at least 1 metre of service loop installed in the FODP fibre organizer and at least one (1) metre of service loop to the couplings neatly stored behind the FODP coupling panels.
- (e) Fibre Service Loops: At least 0.5 metre of bare fibre service loop shall be provided on each side of all fibre splices. The bare fibre service loops shall be neatly and safely installed inside covered splice trays.

2.1.11. Methodology for Installation and Termination

All optical fibre cable termination, installation, stringing and handling plans, guides and procedures, and engineering analysis (e.g. tension, sag, vibration etc.) shall be submitted to the Employer for review and approval in the engineering/design phase of the project, prior to establishing the final cable lengths for manufacture. Installation procedures including details of personnel and time required shall be documented in detail and submitted to Employer for approval. All installation practices shall be field proven and ISO accredited.

All cable segments shall include service loops as specified in this specification. The maximum allowable stringing tension, maximum allowable torsional shear stress, crush strength and other physical parameters

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of the cable shall not be exceeded. The preventative measures to be taken shall be documented in detail and submitted to Employer in advance of installation.

Optical fibre attenuation shall be measured after installation and before splicing. Any increase in attenuation or step discontinuity in attenuation shall not be acceptable and shall constitute a cable segment failure. In the event of cable damage or any fibre damage, the complete section (tension location to tension location) shall be replaced as mid-span joints are not acceptable.

Any or all additional steel work or modifications required to attach the fibre cabling to the overhead transmission/distribution line towers shall also be carried out by the contractor. It shall be the Contractors responsibility to provide adequate communications among all crew members and support staff to ensure safe and successful installations.

2.1.12. Cable Raceways

To the extent possible, existing cable raceways shall be utilized. The Contractor is required to provide and install any additional indoor cable raceways which maybe required for proper implementation of fibre optic cabling system. This requirement shall be finalized during survey. The cable raceways shall conform to the following:

- (a) All cable raceways shall be sized to support full loading requirements plus at least a 200% safety loading factor
- (b) Indoor cable raceways shall be fabricated from construction grade aluminium, galvanized iron or anodized sheet metal or any other suitable material approved by the Employer. Suitable anticorrosion measures shall be provided. Steel fabricated raceways shall be finished inside and out, treated to resist rust and to form a metal-to-paint bond.
- (c) Mechanical construction drawings of the cable raceways shall be submitted for Employer's information & review.

----- End of this Section -----

Section-3**Environment, EMI, Power Supply, Cabling and Earthing****INDEX**

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Section-3

Environment, EMI, Power supply, Cabling and Earthing

The purpose of this section is to describe the minimum general equipment characteristics and specifications for environmental conditions, source power conditioning and backup, equipment construction and installation. The section also highlights the stringent Electro Magnetic Compatibility (EMC) guidelines for Equipment that will be operated under the severest Electro Magnetic Interference (EMI) and Electro Static Discharge (ESD) conditions expected in an Extra High Voltage (EHV) power system environment.

3.1 Environmental Requirements

Equipment and their components provided under this specification shall operate reliably under The following environmental conditions.

3.1.1 Temperature and Humidity

Most of the equipment will not be installed in environmentally controlled shelters. Therefore, equipment shall operate in accordance with limits shown in Table 3-1

Table 3-1
Environmental Operating Limits

Temperature Range: Specification Operation without damage Shipping/storage	(Un Controlled Environment) 0 to 45 ⁰ C -10 to 55 ⁰ C -40 to 60 ⁰ C
Relative Humidity, non-condensing	Upto 90%
Elevation: Operating Non-operating	to 3,000 m to 10,000 m

For each location, the contractor is required to assess the environmental conditions for the equipment to be installed under this specification. The contractor is responsible for all necessary enclosure, rack or equipment upgrades to ensure the proper operation of the installed equipment.

3.1.2 EMI and Electrostatic Interference

At each location, the Contractor shall assess the need for shielding against radiated emission and shall provide recommended solutions for any EMI problem found at each location. Specifications provides the type of immunity tests for which the equipment shall be required to pass without failure. For the individual tests to be carried out different interfaces, references are made to the relevant IEC and ITU-T recommendations.

3.1.3 Vibration and Resistance

As per testing requirement indicated in this specification.

3.1.4 Topicalization

Communications equipment will often be stored and operated in uncontrolled environment areas and will be subject to mould, growth of fungus, corrosion and oxidation. The equipment and components shall be suitably tropicalized during manufacture through commissioning, as necessary.

3.1.5 Contaminants

Communication equipment may be located in areas of poor air quality with the main contaminant being dust. Cabinets shall be tight fitting utilizing filtered ventilation openings only.

3.2 Equipment construction, Assembly and Installation

All equipment supplied under this specification shall be constructed, assembled and installed in accordance with the following requirements:

3.2.1 Identification

All cabling, racks/enclosures, equipment, modules and materials shall be uniquely identifiable as per the following:

Signal Cabling

Connectorised signal cabling/wiring requires marking with a unique identifier at each connectorised end. The signal cable/wire identifier shall include a cable identifier and the location of both terminations.

Signal cable/wiring installed in the terminal blocks requires marking with the cable identifier and distant end location. The cable tag shall be clearly visible at the cable fanout point.

All signal cable, wiring and terminations shall be clearly labelled/tagged with identifiers consistent with Contractor supplied cable plant records. Marking techniques are subjected to approval by the Employer.

3.3 Equipment Racks and Enclosures

All distribution frames, shall be clearly labelled with unique identifiers consistent with Contractor supplied floor plans and rack elevations.

Installation Hardware

Equipment racks, enclosures, cable raceways and installation hardware shall, at a minimum comply with the following requirements:

Equipment Sub-Racks and Cabinets (Enclosures)

All equipment provided under this specification, shall be physically mounted in sub-racks and cabinets (enclosures). The Contractor shall determine and propose for the Employer approval, the type, size, weight and manner of installation for each location.

Selection of equipment sub-racks and cabinets (enclosures) shall meet the following requirements:

(A) Equipment Sub Rack Construction

Equipment Sub Racks provided for installation in environmentally controlled facilities, shall meet the following minimum requirements:

- (1) Equipment Sub Racks shall be steel/ aluminium fabricated and finished on all surfaces. All metal and welds shall be thoroughly cleaned and sanded to obtain a smooth finish. All surfaces shall be treated for rust and primed to form a bond between metal and the finish coats of paint.
- (2) Equipment covers shall be provided for exposed components mounted in equipment sub Racks.
- (3) Dust and moisture protection shall meet or exceed IP20 standards.

(B) Equipment Cabinet (Enclosure) Construction

- (1) Equipment cabinets (enclosures) shall be steel/ steel & Aluminium extrusion fabricated and finished on all surfaces. All metal and welds shall be thoroughly cleaned and sanded to obtain a smooth finish. All surfaces shall be treated for rust and primed to form a bond between metal and the finish coats of paint.
- (2) Equipment cabinets (enclosures) shall be designed free-standing but shall be mounted to the floor. Cabinets (enclosures) shall have secure fitting, lockable, full-length front doors for access to hardware and wiring. Equipment covers for exposed components mounted inside cabinets are not required unless specifically recommended.
- (3) All doors and removable panels shall be fitted with long life rubber beading. All panels shall be fabricated from minimum 2.0mm thickness steel sheet. However, for racks with load bearing Aluminium extrusion frame, door panels and side panels may be fabricated from Aluminium 1.6mm thickness steel sheet and the top & bottom panels shall be fabricated from minimum 2.0mm thickness steel sheet.
- (4) Equipment cabinets (enclosures) shall be dust and moisture-proof as per IP41 specifications, or better (supporting certificates/documents shall be submitted during detailed engineering).

3.3.1 Cable Raceways

The Contractor is required to provide and install all additional necessary indoor and outdoor cable raceways. The cable raceways shall be in conformance with the following:

- (1) Signal cabling and power cabling shall require separate cable raceways. Signal and power cabling shall not share the same raceways and shall be installed as far apart as is practical. Adequate shielding shall be provided as required.
- (2) All cables raceways shall be sized to support full loading requirement plus at least a 200% safety loading factor.

- (3) Outdoor cable raceways shall be of corrugated construction and shall be fitted with solid covers overlapping all sides of the cable raceways.
- (4) Outdoor cable raceways shall be fabricated from construction grade aluminium, galvanized iron or anodized sheet metal or any other suitable material approved by the Employer. Suitable anti-corrosion measures shall be taken. Steel fabricated raceways shall be finished inside and out, treated to resist rust and to form a metal-to-paint bond.
- (5) Indoor cable raceways fabricated of aluminium or galvanized iron, shall not normally need special finishing painting, unless otherwise stipulated by the Employer. Steel fabricated raceways shall require a red oxide primer coat at a minimum.

3.3.2 Lightning and Transient Voltage Protection

The Contractor shall be required to provide protection from lightning and transient voltages for all wideband communications equipment, in accordance with the following:

- (1) At the outside cable plant point-of-entry of all cabling penetrations for all cabling installed by the Contractor, the Contractor shall provide lightning and transient voltage isolation for the inside plants cabling, wiring, and all terminations and equipment.
- (2) All equipment installed under this specification that requires 240V AC primary power, shall be surge protected.

3.3.3 Station Safety Earthing and Signal Grounding

For each facility, the Contractor is responsible for meeting the following station and equipment earthing requirements:

- (1) All safety earthing and signal grounding shall be in full compliance with EMI/EMC requirements as per relevant international standards.
- (2) Each cabinet (enclosure) or cabinet (enclosure) group shall include suitable signal ground and safety earth networks. The signal ground network shall terminate at a separate signal ground stud connection isolated from safety earth.
- (3) Each earth/ground network shall utilize copper bus bars, copper braids and /or 16 sqmm or bigger earth cable. All equipment earth/ground connections shall be made directly to the equipment chassis utilizing grounding lugs and secured metal-to-metal with star washers. Use of the enclosure frame, skin or chassis mounting hardware as part of the earthing/grounding networks, is not acceptable.
- (4) The safety earth network shall be connected to “earth ground” at the safety earth stud. The earth stud connection shall be sized for an external earthing cable equipped with a 2/0 solid copper lug secured metal-to-metal with star washers. Primary AC feeds and distribution within enclosures requires earthing wire connection to the safety earth stud.
- (5) The safety earth and signal ground networks shall be inter-connected only at the safety earth stud and signal ground stud.

The Contractor shall extend the existing station earth to the equipment room using suitable G.I. earthing strip (50 x 6 mm), wherever required.

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The Contractor is responsible for providing all required earthing/grounding cable and installation. Cabinet (Enclosure) and equipment safety earthing and signal grounding shall be subject to the Employer's approval.

The Contractor shall be responsible for determining the stability of existing station earth for the equipment to be supplied under this contract. In case existing earthing arrangement at the site is not adequate, the Contractor shall either make improvement in the existing earthing arrangement or make new earthing as per requirement.

3.3.4 Interconnections

All power and signal cabling between component units of the communication systems shall be supplied and installed by the Contractor and shall be shown on contractor-supplied as-built drawings.

The Contractor shall supply and install all primary power cords, power strips, receptacles, circuit breakers, fuse panels, switches, earth fault detectors, surge protectors, distribution cabling, and power connectors required to support all equipment enclosures and system components furnished and installed under this specification, except as specifically excluded.

Plug-type power connectors with captive fastening (such as "Twist-Lock") shall be used for interconnection of source power to the equipment enclosures or racks.

Plug-type connectors with captive fasteners (ie. DB-25, etc) shall be used for the interconnection of all inter and intra-enclosure signalling cable

3.3.5 Finish Colours

Unless otherwise specified, finish colour for enclosures shall be gloss white enamel on the inside, and semi-gloss medium grey enamel in the outside. Only brushed aluminium trim shall be used. Employer reserves the right to approve the proposed colour scheme.

3.4 Location of Equipment, Cable Routes and Associated Civil Works

During the site surveys, the Contractor shall determine and propose locations for all equipment to be supplied under this contract. Further, the Contractor shall locate and identify proposed routing for all the cabling between all equipment locations including existing and planned equipment not provided under this contract, but required to be connected under the scope of this contract. This subsection defines for requirements and clarifies the responsibilities of the Employer and the Contractor regarding equipment siting, intra and inter facility interconnectivity and necessary associated civil works.

3.4.1 Associated Civil Works

The Contractor shall provide all required minor civil works necessary for full connectivity as required in the Contractor's scope of work as follows:

- (1) All wall and floor penetrations necessary for the installation of all cabling to be performed in accordance with the requirements of this specification.
- (2) installation of racks, cabinets, cable raceways, and cabling supplied as part of this contract.

3.4.2 Cable Trenches

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A network of cable trenches and/or ducts may exist at some sites but shall require expansion and/or new connection at some stations. It shall be a responsibility of the contractor to cooperate fully with the Employer and all other on-going project contractors in the planning and efficient use of existing and new cable trenchers. The existing cable trenches/cable raceways proposed to be used shall be identified in the survey report. The contractor shall make its best effort to route the cable through the existing available cable trenches. Where suitable existing cable trenches are not available, suitable alternatives shall be proposed for Employer approval. The Employer shall provide any additional cable trenches required for such approved alternatives.

It may be noted that in order to utilize the existing trenches, the Contractor supplied cables may be required to be co-located with LV cables. Accordingly, the contractor shall ensure that selection and installation of cables is suitable for the purpose. The contractor shall be responsible for new building penetrations required for supplied cabling, Caution shall be taken to ensure existing equipment and site personal are protected from the dust and debris incident to the cable penetration work. Penetration shall be neatly formed and sealed for protection from moisture, dust wind and vermin intrusion.

All required fitting, supports, accessories, ducts, inner ducts, conduits, raiser and any item not specially mentioned but required for lay and installation of cables in trenches shall be supplied and installed by the Contractor.

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Inspection & Testing
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Section – 4

INSPECTION & TESTING

All materials furnished and all work performed under this contract shall be inspected and tested. Deliverables shall not be shipped until all required inspections and tests have been completed, and all deficiencies have been corrected to comply with this Specification and approved for shipment by the Employer.

Except where otherwise specified, the Contractor shall provide all manpower and materials for tests, including testing facilities, logistics, power and instrumentation, and replacement of damaged parts. The costs shall be borne by the Contractor and shall be deemed to be included in the contract price.

The entire cost of testing for factory & site acceptance, routine tests, production tests and other test during manufacture & activities specified here in shall be treated as include in the quoted unit price of materials, except for the expenses of Inspector/Employer's representative.

Acceptance or waiver of tests shall not relieve the contractor from the responsibility to furnish material in accordance with the specifications.

All tests shall be witnessed by the Employer and/or its authorized representative (hereinafter referred to as the Employer) unless the Employer authorizes testing to proceed without witness. The Employer representative shall sign the test form indicating approval of successful tests.

Should any inspections or tests indicate that specific item does not meet Specification requirements, the appropriate items shall be replaced, upgraded, or added by the Contractor as necessary to correct the noted deficiencies at no cost to the Employer. After correction of a deficiency all necessary retests shall be performed to verify the effectiveness of the corrective action.

The Employer reserves the right to require the Contractor to perform, at the Employer's expense, any other reasonable test(s) at the contractor's premises, on site, or elsewhere in addition to the specified Type, Acceptance, Routine, or Manufacturing tests to assure the Employer of specification compliance.

All security related features shall be demonstrated during FAT/SAT as required by the Employer.

4.1 Inspection

Access to the Contractor's facilities system manufacturing and testing and to any facility where systems/equipment are being produced/tested/integrated for the fibre optic communication network, shall be available to the Employer. At all times the Employer shall have full facilities for unrestricted inspection of such materials or equipment. To facilitate this, the Contractor shall submit for the Employer approval, a comprehensive Quality Assurance Plan using ISO 9000 as a general guideline. In addition, the Quality Assurance Plan shall satisfy the following:

- (a) Sufficient office facilities, equipment, and documentation necessary to complete all inspections and to verify that the Equipment is Being Fabricated and maintained in accordance with the Specification shall be provided by the Contractor to the Employer.
- (b) Inspections to be performed by the Employer will include visual examination of hardware, cable dressing and labeling. Contractor's documentation will also be examined to verify that it adequately identifies and describes all offered items and spare parts.
- (c) Access to inspect the Contractor's standards, procedures, and records that are applicable to the supplied equipment shall be provided to the Employer. Documents will be inspected to verify that the Contractor has performed the required quality assurance activities.

- (d) The inspection rights described above shall also apply to sub-Contractors who are responsible for supplying major components described in this Specification. These items shall be inspected and tested at the sub-Contractor’s factory by the Employer’s representatives prior to shipping this equipment to the Contractor’s facility or directly to the Employer.
- (e) The above inspection rights shall also apply to sub-Contractors supplying assemblies, subassemblies and Components. However, such items will normally be inspected and tested by the Employer’s representatives at the Contractor’s site before acceptance.

4.2 Test Plans and Procedures

Test plans and test procedures for both factory and site acceptance tests shall be provided by the Contractor. Test plans and test procedures shall ensure that each factory and site test is comprehensive and verify all the features of the equipment to be tested. Test plans and test procedures shall be modular to allow individual test segments to be repeated upon request.

The Contractor shall submit a Test Schedule for the Employer’s approval with one (1) week after award of contractor for Type Tests and three (3) months after the award of contract for all other tests. The test schedule shall list the tests to be carried out, and the approximate test duration. The test periods shall also be indicated in PERT chart or equivalent for the work.

The contractor shall give the Employer twenty-one (21) days written notice of any material being ready for testing. Fifteen days prior to the scheduled testing, the Employer shall provide written notice to the Contractor of any drawings, equipment, material, or workmanship which, in the Employer’s opinion, are not compliant to the specification. The Contractor shall give due consideration to such objections, if valid, effecting the corrections as necessary or shall prove, in writing, that said modifications are unnecessary for contract compliance.

4.2.1 Factory and site Test Plans

A test plan for factory and site acceptance tests shall be submitted for approval, at least four (4) weeks before the start of testing. The test plan shall be a single overview document that defines the overall schedule and individual responsibilities associated with conducting the tests, documenting the test results, and successfully completing the test criteria. Test Plans shall include, at a minimum, the information contained in Table 4-1.

**Table 4-1
Factory & field Test Plan Requirements**

Item:	Description
1.	Test schedule
2.	Record-keeping assignments, procedures and forms
3.	Procedures for monitoring, correcting and resting variances
4.	Procedures for controlling and documenting all changes made to the communications equipment after the start of testing

4.2.2 Test Procedures

Test procedures for factory and site testing shall be submitted for the Employer approval at least four (4) weeks before each individual test. Fully approved test procedures shall be submitted to the Employer at least four weeks prior to the commencement of testing. Testing shall not commence without approved test procedures. At a minimum, test procedures shall include the items listed in Table 4-2.

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All test equipment and/or instruments shall bear calibration stickers indicating valid calibration on and beyond the testing date. The time lapsed since last calibration shall not exceed the test equipment/jig manufacturer recommended calibration interval or the interval recommended in the test lab’s internal quality procedures.

The Contractor shall ensure that all testing will be performed by qualified testing personnel well experienced in performing such tests.

**Table 4-2
Test Procedure Requirements**

Item:	Description:
1.	Test Title and Revision Level, if applicable
2.	List of Standard(s) complied with
3.	Function(s) /parameters (s) to be tested
4.	Purpose of each test segment
5.	List of required test equipment
6.	Description of any special test conditions or special actions required. This includes complete descriptions, listings and user interface procedures for all special hardware and software tools and/or display formats to be used during the test.
7.	Test setup including test configuration block diagrams and/or illustrations.
8.	Test procedures to be followed.
9.	Required inputs and expected outputs for each test segment
10	Acceptance criteria for each test segment.
11.	List of test data to be supplied by the contractor(s) and copies of any certified data to be used
12.	Form of test reports.

4.2.3 Test Records

Complete and indexed records of all factory and site acceptance tests results shall be maintained and provided to the Employer by the Contractor in hardcopy. The records shall be keyed to the steps enumerated in the test procedures. The minimal items required in the test records are described in Table 4-3

**Table 4-3
Test Record Requirements**

Item	Description:
1.	Test Title and Revision Level, if applicable; contract references
2.	Date and time for test start and test completed
3.	Test title and reference to the appropriate section of the test procedures
4.	Description of any special test conditions or special actions taken (includes test- case data)
5.	Test results for each test segment including an indication of Passed, Conditional Pass, Incomplete or Failed.
6.	Test procedure modifications made during testing.
7.	Variance Report(s) tracking information and copies (if variance(s) was detected).
8.	Contractor’s test engineer(s) identification, signature and remarks
9.	Employer’s test witness identification, signature and remarks
10.	List of all attachments
11.	Attachments (including System logs, printouts, variances, hard copies of visual

All principles test records, test certificates and performance curves shall be supplied for all tests carried out as proof of compliance with the specifications and/or each and every specified test. These test certificates,

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records and performance curves shall be supplied for all tests whether or not they have been witnessed by the Employer within the specified duration after the completion of test. Information given on such test certificates and curves shall be sufficient to identify the material or equipment to which the certificates refer, and shall also bear the Contractor's reference and heading.

4.2.4 Rejection of Elements

Any item or component which fails to comply with the requirements of this specification in any respect, at any stage of manufacture, test, erection or completion at site may be rejected by the Employer neither in whole or part as considered necessary.

Material or components with defects of such a nature that do not meet the requirements of the Specification by adjustment or modification shall be replaced by the Contractor at his own expense. After adjustment or modification, the contractor shall submit the items to the Employer for further inspection and/or tests.

4.2.5 Test Period Defined

The terminology used in the Section General Conditions of Contract and their correlation with the tests requirements described within this section is as follows:

Pre-Commissioning & Commissioning period- the Site Acceptance test (SAT)

Operational Acceptance- Successful completion of SAT

4.3 Type Testing

"Type Tests" shall be defined as those tests which are to be carried out to prove the design, process of manufacture and general conformity of the material to this Specification. Type Testing shall comply with the following:

- (a) All cable & equipment being supplied shall conform to type tests as per technical specification.
- (b) The test reports submitted shall be of the tests conducted for Telecom equipment & OPGW cable prior to the date of bid opening as specified in the Qualifying requirements. In case the test reports are older than as specified in the Qualifying Requirements, the bid of the bidder will be evaluated as specified in the specification. At the request of the purchaser the contractor shall repeat these tests at no extra cost to the purchaser.
- (c) The Contractor shall submit, within 30 days of Contract Award, copies of test report for all of the Type Tests that are specified in the Specifications and that have previously (before Contract award) been performed. These reports may accepted by the Employer only if they apply to materials and equipment that are essentially identical to those due to be delivered under the contract and only if test procedures and parameter values are identical to those specified in this specifications carried out at accredited labs witnessed by third party/customer's representatives.

In the event of any discrepancy in the test reports or any type tests not carried out, same shall be carried out by contractor without any additional cost implication to the Employer.

- (d) Type Tests shall be certified or performed by reputed laboratories using material and equipment data sheets and test procedures that have been approved by the Employer. The test procedures shall be formatted as defined in the technical specifications and shall include a complete list of the applicable reference standards and submitted for employer approval at least four (4) weeks before commencement of tests(s). The contractor shall provide the Employer at least 30 days written notice of the planned commencement of each type test.
- (e) The contractor shall provide a detailed schedule for performing all specified type tests. These Tests shall be performed in the presence of a representative of the Employer.

- (f) The Contractor shall ensure that all type tests can be completed within the time schedule offered in this Technical Proposal.
- (g) In case of failure during any type test, the supplier is either required to manufacture a fresh sample lot and repeat all type tests successfully or repeat that particular type test(s) at least three times successfully on the samples selected from the already manufactured lot at his own expenses. In case a fresh lot is manufactured for testing then the lot already manufactured shall be rejected.

4.3.1 Type Test Samples

The contractor shall supply equipment/material for sample selection only after the quality Assurance Plan has been approved by the Employer. The sample material shall be manufactured strictly in accordance with the approved Quality Assurance plan. The Contractor shall submit for Employer approval, the type test sample selection procedure. The selection process for conducting the types tests shall ensure that samples are selected at random. At least three samples of each of the proposed equipment/item cable drum except FO cable installation hardware & Fittings Shall be offered for selection. For FO cable installation hardware & fittings at least ten (10) samples be offered for selection.

4.3.2 List Type Tests

The type testing shall be conducted on the following equipment/items

- (a) Optical fibres
- (b) OPGW Cable
- (c) OPGW Cable fittings
- (d) Vibration Damper
- (e) Splice Enclosure (Joint Box)
- (f) Approach Cable

4.3.2.1 Type Tests for Optical Fibres

The type tests listed below in Table 4.6 shall be conducted on DWSM fibres to be supplied as part of overhead cables. The tests specific to the cable type are listed in subsequent sections.

Table 4.6

Type Tests for Optical Fibres

S.No.	Test Name	Acceptance Criteria	Test procedure
1	Attenuation	As per section-02 of TS	IEC 60793-1-40 Or EIA/TIA 455-78A
2	Attenuation Variation with Wavelength	As per section-02 of TS	IEC 60793-1-40 Or EIA/TIA 455-78A
3	Attenuation at Water Peak	As per section-02 of TS	IEC 60793-1-40 Or EIA/TIA 455-78A
4	Temp. Cycling (Temp dependence of Attenuation)		IEC 60793-1-52 Or EIA/TIA 455-3A cycles
5	Attenuation with bending (bend performance)		IEC 60793-1-47 Or EIA/TIA 455-62A

6	Mode Field dia		IEC 60793-1-45 Or EIA/TIA 455- 164A/167A/174
7	Chromatic Dispersion		IEC 60793-1-42 Or EIA/TIA 455- 168A/169A/175A
8	Cladding Diameter		IEC 60793-1-20 Or EIA/TIA 455-176
9	Point Discontinuities of attenuation		IEC 60793-1-40 Or EIA/TIA 455-59
10	Core-Clad concentricity error		IEC 60793-1-20 Or EIA/TIA 455-176
11	Fibre Tensile proof testing		IEC 60793-1-30 Or EIA/TIA 455-31B
- End of table -			

4.3.2.2. Type Test for OPGW cables

The type tests to be conducted on the OPGW cable are listed in Table 4.7 Type Tests for OPGW Cables. Unless specified otherwise in the technical specifications or the referenced standards, the optical attenuation of the specimen, measured during or after the test as applicable, shall not increase by more than 0.05 dB/Km.

Table 4.7
Type tests for OPGW Cable

S.No.	Test Name	Test Description	Test Procedure	
1	Water Ingress Test	IEEE 1138-2009	IEEE 1138-2009 (IEC 60794-1-2 Method F5 or EIA/TIA 455-82B): Test duration: 24 hours	
2	Seepage of filling compound	IEEE 1138-2009	IEEE 1138-2009 EIA/TIA 455-81B	Preconditioning period: 72 hours. Test duration: 24 hours
3	Short Circuit Test	IEEE 1138-2009	IEEE 1138-2009	Fibre attenuation shall be continuously monitored and recorded through a digital data logging system or equivalent means. A suitable temperature sensor such as thermocouple shall be used to monitor and record the temperature inside the OPGW tube in addition to monitoring & recording the temperatures between the strands and between optical tube and the strand as required by IEEE 1138. Test shall be conducted with the tension clamps proposed to be supplied. The cable and the clamps shall be visually inspected for mechanical damage and photographed after the test.

		Or IEC60794-4-10/IEC 60794-1-2 (2003) Method H1		Initial temperature during the test shall be greater than or equal to ambient field temperature.
4	Aeolian Vibration Test	IEEE 1138-2009 Or IEC 60794-4-10/IEC 60794-1-2, Method E19	IEEE 1138-2009	Fibre attenuation shall be continuously monitored and recorded through a digital data logging system or equivalent means. The vibration frequency and amplitude shall be monitored and recorded continuously. All fibres of the test cable sample shall be spliced together in serial for attenuation monitoring. Test shall be conducted with the tension/suspension clamps proposed to be supplied. The cable and the clamps shall be visually inspected for mechanical damage and photographed after the test.
5	Galloping test	IEEE 1138-2009	IEEE 1138-2009	Test shall be conducted with the tension/suspension clamps proposed to be supplied. The cable and clamps shall be visually inspected for mechanical damage and photographed after the test. All fibres of the test cable sample shall be spliced together in serial for attenuation monitoring.
6	Cable Bend Test	Procedure 2 in IEC 60794-1-2 Method E11		The short-term and long term bend tests shall be conducted in accordance with procedure 2 in IEC 60794-1-2 E11 to determine the minimum acceptable radius of bending without any increase in attenuation or any other damage to the fibre optic cable core such as bird caging, deformation, kinking and crimping.
7	Sheave Test	IEEE 1138-2009 OR IEC 60794-1-2 (2003) Method E1B	IEEE 1138-2009	Fibre attenuation shall be continuously monitored and recorded through a digital data logging system or equivalent means. The Sheave dia. Shall be based on the pulling angle and the minimum pulley dia employed during installation. All fibres of the test cable sample shall be spliced together in serial for attenuation monitoring.

8	Crush Test	IEEE 1138-2009	IEEE 1138-2009 (IEC 60794-1-2, Method E3/EIA/TIA 455-41B)	The crush test shall be carried out on a sample of approximately one (1) metre long in accordance with IEC 60794-1-2 E3. A load equal to 1.3 times the weight of a 400 – metre length of fibre optic cable shall be applied for a period of 10 minutes. A permanent or temporarily increase in optical attenuation value greater than 0.1 dB change in sample shall constitute failure. The load shall be further increased in small increments until the measured attenuation of the optical waveguide fibres increases and the failure load recorded along with results.
9	Impact Test	IEEE 1138-2009	IEEE 1138-2009, (IEC 60794-1-2 E4/EIA/TIA 455-25B)	The impact test shall be carried out in accordance with IEC 60794-1-2 E4. Five separate impacts of 0.1-0.3kgm shall be applied. The radius of the intermediate piece shall be the reel drum radius $\pm 10\%$. A permanent or temporary increase in optical attenuation value greater than 0.1 dB/km change in sample shall constitute failure.
10	Creep Test	IEEE 1138-2009	IEEE 1138-2009	As per Aluminium Association Method, the best-fit straight line shall be fitted to the recorded creep data and shall be extrapolated to 25 years. The strain margin of the cable at the end of 25 years shall be calculated. The time when the creep shall achieve the strain margin limits shall also be calculated.
11	Fibre Strain Test	IEEE 1138-2009	IEEE 11-38-1994	
12	Strain Margin Test	IEEE 1138-2009	IEEE 1138-2009	
13	Stress strain test	IEEE 1138-2009	IEEE 1138-2009	
14	Cable Cut-off wavelength test	IEEE 1138-1994	IEEE 1138-1994	
15	Temperature Cycling Test	IEEE 1138-2009	IEEE 1138-2009 Or IEC 60794-1-2, Method F1	

16	Corrosion (Salt Spary) test	EIA/TIA 455-16A	
17	Tensile performance test	IEC 60794-1-2 E1/EIA/TIA 455-33B	The test shall be conducted on a sample of sufficient length in accordance with IEC 60794-1-2 EI. The attenuation variation shall not exceed 0.05 dB/Km up to 90% of RTS of fibre optic cable. The load shall be increased at a steady rate up to rated tensile strength and held for one (1) minute. The fibre optic cable sample shall not fail during the period. The applied load shall then be increased until the failing load is reached and the value recorded.
18	Fault current/lightning test	IEC 60794-4-10/IEC 60794-1-2 (2003)	The OPGW cable construction shall be tested in accordance with IEC 60794-1-2, Method H2 for Class 1.
19	DC Resistance Test (IEC 60228)	On a fibre optic cable sample of minimum 1 metre length, two contact clamps shall be fixed with a predetermined bolt torque. The resistance shall be measured by a Kelvin double bridge by placing the clamps initially zero metre and subsequently one metre apart. The tests shall be repeated at least five times and the average value recorded after correcting at 20°C.	
- End of table -			

4.3.2.3 Type Test on OPGW cable fittings

The type tests to be conducted on the OPGW cable fittings and accessories are listed below:

(i) **Mechanical Strength Test for suspension/tension assembly**

Applicable Standards: IEC 61284, 1997

Suspension Assembly

The armour rods/reinforcement rods are assembled on to the approved OPGW using the Installation Instructions to check that the assembly is correctly fitted and is the same that will be carried out during installations.

Part 1:

The suspension assembly shall be increased at a constant rate up to a load equal to 50% of the specified minimum failure load increased and held for one minute for the test rig to stabilize. The load shall then be increased at a steady rate to 67% of the minimum failure load and held for five minutes. The angle between the cable, the suspension assembly and the horizontal shall not exceed 16°. This load shall then be removed in a controlled manner and the protection splice disassembled. Examination of all the components shall be made and any evidence of visual deformation shall be documented.

Part 2:

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The suspension clamp shall then be placed in the testing machine. The tensile load shall gradually be increased up to 50% of the specified Minimum failure load of the suspension assembly and held for one minute for the test rig to stabilize and the load shall be further increased at a steady rate until the specified minimum failure load is reached and held for one minute. No fracture should occur during this period. The applied load shall then be increased until the failing load is reached and the value shall be documented.

Tension Assembly

The Tension Assembly is correctly fitted and is the same that will be carried out during installations.

Part 1:

The tension assembly (excluding tension clamp) shall be increased at a constant rate up to a load equal to 50% of the specified of the specified minimum failure load increased at a constant rate and held for one minute for the test rig to stabilize. The load shall then be increased at a steady rate to 67% of the minimum failure load and held of five minutes. This load shall then remove in a controlled manner and the tension assembly disassembled. Examination of the tension dead-end and associated components shall be made and any evidence of visual deformation shall be documented.

Part 2:

The Tension Dead-End and associated components shall then be reassembled and bolts tightened as before. The tensile load shall gradually be increased up shall gradually be increased up to 50% of the specified minimum failure load of the tension assembly and held for one minute for the test rig to stabilize and the load shall be further increased at a steady rate until the specified minimum failure load is reached and held for one minute. No fracture should occur during this period. The applied load shall then be increased until the failing load is reached and the value shall be documented.

Acceptance Criteria for Tension/Suspension assembly:

- No evidence of binding of the Nuts or Deformation of components at end of Part 1 of test.
- No evidence of fracture at the end of one minute at the minimum failure load during Part 2 of the test.

Any result outside these parameters shall constitute a failure.

(ii) Clamp slip strength test for suspension assembly

The suspension assembly shall be vertically suspended by means of a flexible attachment. A suitable length fibre optical cable shall be fixed in the clamps. Once the suspension clamp has been assembled, the test rig is tensioned to 1 KN and the position scale on the recorder 'zeroed'. The test rig is then tensioned to 2.5 KN and the relative positions of the Reinforcing Rods, Armour Rods and suspension clamp shall be marked by a suitable means to confirm any slippage after the test has been completed. The relative positions of the helical Armour Rods and associated Reinforcing Rods at each end shall be marked and also 2 mm relative position between clamp body and Armour Rods shall be marked on one side. The load shall be increased to 12KN at a loading rate of 3 KN/min and held for one minute. At the end of this one-minute period, the relative displacement between clamp body and the armour rods shall be observed. If the slippage is 2mm or above, the test shall be terminated. Otherwise, at the end of the one minute the position of the clamp body and 2mm. relative positions between clamp body and armour rods shall be marked on the other side. After the one-minute pause, the load shall be further increased at a loading rate of 3 KN/min, and recording of load and displacement shall continue until either the relative position displacement between clamp body and armour rods reaches more than 2 mm or the load reaches the maximum slip load of 17 KN. On reaching

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either of the above values the test is terminated. Visual examination of all paint marks shall be recorded, and a measurement of any displacement recorded in the table of results.

Acceptance Criteria:

The suspension clamp has passed the slip test if the following conditions are met:

- No slippage* shall occur at or below the specified minimum slip load.

* Definition of no slippage in accordance with IEC 61284, 1997: - Any relative movement less than 2 mm is accepted. The possible couplings or elongations produced by the cable as a result of the test itself are not regarded as slippage.

- Slippage shall occur between the specified maximum and minimum slip load of 12-17KN.
- There shall be no slippage of the Reinforcing Rods over the cable, and no slippage of the Armour Rods over the Reinforcing Rods.
- The relative movement (i.e., more than 2 mm between Armour Rods & Clamp body) between minimum 12KN and maximum slip 17KN, shall be considered as slip.
- The Armour Rods shall not be displaced from their original lay or damaged**.

** Definition of no damage in accordance with convention expressed in IEC 61284: 1997 no damage, other than surface flattening of the strands shall occur.

Any result outside these parameters is a failure.

(iii) Slip strength test of tension clamp

Tension clamps shall be fitted on a 8 m length of fibre optic cable on both ends. The assembly shall be mounted on a tensile testing machine and anchored in a manner similar to the arrangement to be used in service. A tensile load shall gradually be applied up to 20% of the RTS of OPGW. Displacement transducers shall be installed to measure the relative movement between the OPGW relative to the Reinforcing Rods and Tension Dead – End relative to Reinforcing Rods. In addition, suitable marking shall be made on the OPGW and Dead – End to confirm grip. The load shall be gradually increased at a constant rate up to 50% of the UTS and the position scale of the recorder is zeroed. The load shall then gradually increase up to 95% of the UTS and maintained for one minute. After one minute pause, the load shall be slowly released to zero and the marking examined and measured for any relative movement.

Acceptance Criteria:

- No movement* shall occur between the OPGW and the Reinforcing Rods, or between the Reinforcing Rods and the Dead-End assembly.
- No failure or damage or disturbance to the lay of the Tension Dead – End, Reinforcing Rods or OPGW.

*Definition of no movement as defined in IEC 61284: Any relative movement less than 2 mm is accepted. The possible couplings or elongations produced by the conductor as a result of the test itself are not regarded as slippage.

Any result outside these parameters shall constitute a failure.

(iv) Grounding Clamp and Structure Mounting Clamp Fit Test

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For structure mounting clamp, one series of test shall be conducted with two fibre optic cables installed, one series of tests with one fibre optic cable installed in one groove, and one series of tests with one fibre optic cable in the other groove. Each clamp shall be installed including clamping compound as required on the fibre optic cable. The nut shall be tightened on to the bolt by using torque wrench with a torque of 5.5 kgm or supplier's recommended torque and the tightened clamps shall be held for 10 minutes. After the test remove the fibre optic cable and examine all its components for distortion, crushing or breaking. Also the fibre optic cable shall be checked to ensure free movement within the core using dial callipers to measure the diameter of the core tube. The material shall be defined as failed if any visible distortion, crushing, cracking or breaking of the core tube is observed or the fibre optic cable within the core tube is not free to move, or when the diameter of the core tube as measured at any location in the clamped area is more than 0.5 mm larger or smaller of the core diameter as measured outside the clamped area.

(v) Structure Mounting Clamp Strength Test

The clamp and mounting assembly shall be assembled on a vertical 200 mm x 200 mm angle and a short length of fibre optic cable installed. A vertical load of 200 kg shall be applied at the end of the mounting clamp and held for 5 minutes. Subsequently, the load shall be increased to 400 kg and held for 30 seconds. Any visible distortion, slipping or breaking of any component of the mounting clamp or assembly shall constitute failure.

4.3.2.4 Type Test on Vibration Damper

(a) Dynamic Characteristic Test

The damper shall be mounted with its clamp tightened with torque recommended by the manufacturer on shaker table capable of simulating sinusoidal vibrations for Critical Aeolian Vibration frequency band ranging from $0.18/d$ to $1.4/d$ – Where d is the OPGW cable diameter in meters. The damper assembly shall be vibrated vertically with a ± 1 mm amplitude from 5 to 15 Hz frequency and beyond 15 Hz at 0.5 mm to determine following characteristics with the held of suitable recording instruments.

- (i) Force Vs frequency
- (ii) Phase angle Vs frequency
- (iii) Power dissipation Vs frequency

The force Vs frequency curve shall not show steep peaks at resonance frequencies and deep troughs between the resonance frequencies. The resonance frequencies shall be suitably spread within the Aeolian vibration frequency-band between the lower and upper dangerous frequency limits determined by the vibration analysis of fibre optic cable without dampers.

Acceptance criteria for vibration damper:

- (i) The above dynamic characteristics test on five damper shall be conducted.
- (ii) The mean reactance and phase angle Vs frequency curves shall be drawn with the criteria of best fit method.
- (iii) The above mean reactance response curve should lie within following limits:

$$V.D. \text{ for OPGW} - 0.060 f \text{ to } 0.357 f \text{ kgf/mm}^*$$

Where f is frequency in Hz.

- (iv) The above mean phase angle response curve shall be between 25° to 130° within the frequency range of interest.
- (v) If any above curve lies within the envelope, the damper design shall be considered to have successfully met the requirement.
- (vi) Visual resonance frequencies of each mass of damper is to be recorded and to be compared with the guaranteed values.

(b) Vibration Analysis

The vibration analysis of the fibre optic cable shall be done with and without damper installed on the span. The vibration analysis shall be done on a digital computer using energy balance approach. The following parameters shall be taken into account for the purpose of analysis.

- (i) The analysis shall be done for single fibre optic cable without armour rods. The tension shall be taken as 25% of RTS of fibre optic cable for a span ranging from 100 m to 1100 m.
- (ii) The self damping factor and flexural stiffness (EI) for fibre optic cable shall be calculated on the basis of experimental results. The details to experimental analysis with these data shall be furnished.
- (iii) The power dissipation curve obtained from damper characteristics test shall be used for analysis with damper.
- (iv) Examine the Aeolian Vibration level of the fibre optic cable with and without vibration damper installed at the recommended location or wind velocity ranging from 0 to 30 Km per hour, predicting amplitude, frequency and vibration energy input.
- (v) From vibration analysis of fibre optic cable without damper, antinode vibration amplitude and dynamic strain levels at clamped span extremities as well a antinodes shall be examined and thus lower and upper dangerous frequency limits between which the Aeolian vibration levels exceed the specified limits shall be determined.
- (vi) From vibration analysis of fibre optic cable with damper(s) installed at the recommended location, the dynamic strain level at the clamped span extremities, damper attachment point and the antinodes on the fibre optic cable shall be determined. In addition to above damper clamp vibration amplitude and antinodes vibration amplitudes shall also be examined.

The dynamic strain levels at damper attachment point, clamped span extremities and antinodes shall not exceed the specified limits. The damper clamp vibration amplitude shall not be more than that of the specified fatigue limits.

(c) Fatigue Tests

(i) Test Set Up

The fatigue tests shall be conducted on a laboratory set up with a minimum effective span length of 30m. The fibre optic cable shall be tensioned at 25% of RTS of fibre optic cable and shall not be equipped with protective armour rods at any point.

Constant tension shall be maintained within the span by means of level arm arrangement. After the fibre optic cable has been tensioned, clamps shall be installed to support the fibre optic cable at both ends and thus influence of connecting hardware fittings are eliminated from the free span. The clamps shall not be used for holding the tension on the fibre optic cable. There shall be no loose parts, such as suspension clamps, U bolts, on the test span supported between clamps mentioned above. The span shall be equipped with vibration

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inducing equipment suitable for producing steady standing vibration. The inducing equipment shall have facilities for step less speed control as well as step less amplitude arrangement. Equipment shall be available for measuring the frequency, cumulative number of cycles and amplitude of vibration at any point along the span.

(ii) Fatigue Test

The vibration damper shall be installed on the test span with the manufacturer's specified tightening torque. It shall be ensured that the damper shall be kept minimum three loops away from the shaker to eliminate stray signals influencing damper movement.

The damper shall be vibrated at the highest resonant frequency of each damper mass. For dampers involving torsional resonant frequencies, tests shall be done at torsional modes also in addition to the highest resonant frequencies at vertical modes. The resonance frequency shall be identified as the frequency at which each damper mass vibrates with the maximum amplitude on itself. The amplitude of vibration of the damper clamp shall be maintained not less than $\pm 25/f$ mm where f is the frequency in Hz.

The test shall be conducted for minimum ten million cycles at each resonant frequency mentioned above. During the test, if resonance shift is observed, the test frequency shall be tuned to the new resonant frequency.

The clamp slip test as mentioned herein shall be repeated after fatigue tests without retorquing or adjusting the damper clamp, and the clamp shall withstand a minimum load equal to 80% of the slip strength for a minimum duration of one minute.

After the above tests, the damper shall be removed from fibre optic cable and subjected to dynamic characteristics test. There shall not be any major deterioration in the characteristics of the damper. The damper then shall be cut open and inspected. There shall not be any broken, loose, or damaged part. There shall not be significant deterioration or wear of the damper. The fibre optic cable under clamp shall also be free from any damage.

For purpose of acceptance, the following criteria shall be applied:

- (1) There shall not be any resonant frequency shift before and after the test by more than $\pm 20\%$
- (2) The power dissipation of the damper before and after test at the individual resonant frequencies do not differ by more than $\pm 20\%$

Beside above tests, the type tests listed below in the table shall also be conducted on vibration damper.

S.No.	Test Name	Test Procedure
1	Visual examination & Dimensional and material verification	IEC 61897 Clause 7.1 & 7.2
2	Clamp Slip test	IEC 61897 Clause 7.5
3	Clamp bolt tightening test	IEC 61897 Clause 7.7
4	Attachments of weights to messenger cable	IEC 61897 Clause 7.8
5	Attachment of clamps to messenger cable	IEC 61897 Clause 7.8
6	Damper effectiveness evaluation	IEC 61897 Clause 7.11.3.2

4.3.2.5 Type Tests for Splice Enclosures (Joint Box)

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Following type tests shall be demonstrated on the splice enclosure(s) (Splice Enclosure/Box). For certain tests, lengths of the fibre optic cable shall be installed in the splice box, and the fibres must be spliced and looped in order to simulate conditions of use. The attenuation of the fibres shall be measured, during certain tests, by relevant fibre optic test procedures (EIA/TIA 455 or IEC 60794-1 procedures).

(i) Temperature Cycling Test

FO cable is installed in the splice enclosure and optical fibres spliced and looped. The box must be subjected to 5 cycles of temperature variations of -40°C to $+65^{\circ}\text{C}$ with a dwell time of at least 2 hours on each extreme.

Fibre loop attenuation shall be measured in accordance with EIA 455-20/IEC 60794-1-C10. The variation in attenuation shall be less than $\pm 0.05\text{dB}$. The final humidity level, inside the box, shall not exceed the initial level, at the closing of the box.

(ii) Humid Heat test

The sealed splice enclosure, with fibres spliced and looped inside, must be subjected to a temperature of $+55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ with a relative humidity rate of between 90% and 95% for 5 days. The attenuation variation of the fibres during the duration of the test shall be less than $\pm 0.05\text{dB}$, and the internal humidity rate measured, less than 2%.

(iii) Rain Withstand Test/Water Immersion test

The splice enclosure with optical fibres cable installed and fibres spliced fixed, shall be subjected to 24 hours of simulated rain in accordance with IEC 60060 testing requirements. No water seepage or moisture shall be detected in the splice enclosure. The attenuation variation of the fibres after the test shall be less than $\pm 0.05\text{dB}$.

(iv) Vibration Test

The splice enclosure, with fibres united inside, shall be subjected to vibrations on two axes with a frequency scanning of 5 to 50 Hz. The amplitude of the vibrations shall be constant at 0.450mm, peak to peak, for 2 hours, for each of the vibrations' axes. The variation in attenuation, of the fibres, shall be less than $\pm 0.05\text{dB}$. The splice enclosure shall be examined for any defects or deformation. There shall be no loosening or visible damage of the FO cable at the entry point.

(v) Bending and Torsion test

The splice enclosure, with fibres spliced inside, shall be firmly held in place and be subjected to the following sequence of mechanical stresses on the cable:

- a) 3 torsion cycles of $\pm 180^{\circ}$ shall be exercised on the cable. Each cycle shall be less than one minute.
- b) 3 flexure cycles of the cable, of $\pm 180^{\circ}$ with one cycle less than one minute.

The variation in the attenuation, of the fibres, shall be less than $\pm 0.05\text{dB}$. The cables connection ring shall remain securely fixed to the box with the connection maintained firmly. No defects/fissures shall be noted on the joint ring or on the splice enclosure.

(vi) Tensile test

The splice enclosure with cable fixed to the boxes shall be subjected to a minimum tension of 448 N for a period of two minutes. No fissure shall be noted in the connections or on the box.

(vii) Drop test

With 2 lengths of 11 metres of cable fixed to the box, it shall be dropped five times from a height of 10 metres. There shall be no fissure, at all, of the box, and the connections shall remain tight. The test surface shall be carried out in accordance with IEC 60068-2-32.

4.3.2.6 Type tests for Fibre Optic Approach Cable

The type tests to be conducted on the Fibre Optic Approach Cable are listed in Table 4-8: type tests for Fibre Optic Approach Cable. Unless specified otherwise in the technical specifications or the referenced standards, the optical attenuation of the specimen, measured during or after the test as applicable, shall not increase by more than 0.05dB/km.

**Table 4-8:
Type tests Fibre Optic Approach Cable**

S.No.	Test Name	Test Procedure
1	Water Ingress Test	(IEC 60794-1-F5/EIA 455-82B) Test duration : 24 hours.
2	Seepage of filling compound	(EIA 455-81A) Preconditioning :72 hours Test duration : 24 hours
3	Crush test	(IEC 60794-1-E3/EIA 455-41)
4	Impact Test	(IEC-60794-1-E4/E1A 455-25A)
5	Stress Strain Test	(E1A 455-33A)
6	Cable Cut-off wavelength Test	(E1A 455-170)
7	Temperature Cycling Test	(IEC60794-1-F1/E1A-455-3A_-2 cycles
-End of Table-		

4.3.2.6.1 Impact Test

The impact test shall be carried out in accordance with IEC:60794-1-E4. Five separate impacts of 2.0kg shall be applied at different locations. The radius of the intermediate piece shall be the reel drum radius \pm 10%. A permanent or temporary increase in optical attenuation value greater than 0.05dB/km shall constitute failure.

4.4 Factory Acceptance Tests

Factory acceptance tests shall be conducted on randomly selected final assemblies of all equipment to be supplied. Factory acceptance testing shall be carried out on OPGW cable and associated hardware & fittings, Approach Cable and associated hardware fitting, Joint box, FODP, SDH Equipments, associated line & Tributary cards, Termination Equipments (Drrop/Insert Multiplexer, DACS, associated subscriber line interface cards etc), Network Management System, RTUs & associated equipment etc. and all other items for which price has been identified separately in the Bid Price schedules.

Material shall not be shipped to the employer until required factory tests are completed satisfactorily, all variances are resolved, full test documentation has been delivered to the employer, and the employer has issued material inspection & clearance certificate (MICC). Successful completion of the factory tests and the employer approval to ship shall in no way constitute final acceptance of the system or any portion thereof.

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These tests shall be carried out in the presence of the employer's authorized representatives unless waiver for witnessing by employer's representatives is intimated to the contractor.

Factory acceptance tests shall not proceed without the prior delivery to and approval of all test documentation by the employer.

The factory acceptance test shall demonstrate the technical characteristics of the equipment in relation to these specifications and approved drawings and documents. List of factory acceptance tests for fibre optic transmission system. Termination equipment Sub-system, NMS are given in specified tables in this section. This list of factory acceptance tests shall be supplemented by the contractor's standard FAT testing program. The factory acceptance tests for the other items shall be proposed by the contractor in accordance with technical specifications and contractor's (including Sub-Contractor's/supplier's) standard FAT testing program. In general, the FAT for other items shall include at least: Physical verification, demonstration of technical characteristics, various operational modes, functional interfaces, alarms and diagnostics etc.

For Test equipment & clock, FAT shall include supply of proper calibration certificates, demonstration of satisfactory performance, evidence of correct equipment configuration and manufacturer's final inspection certificate/report.

4.4.1 Sampling for FAT

From each batch of equipment presented by the contractor for factory acceptance testing, the employer shall select random sample(s) to be tested for acceptance. Unless otherwise agreed, all required FAT tests in the approved FAT procedures, shall be performed on all samples. The sampling rate for the factory acceptance tests shall be minimum 10% of the batch size (minimum 1) for all items. The physical verification shall be carried out on 100% of the offered quantities as per the approved FAT procedure. In case any of the selected samples fail, the failed sample is rejected and additional 20% samples shall be selected randomly and tested. In case any sample from the additional 20% also fails the entire batch may be rejected. In case a number of equipments are required for demonstration of the performance of any equipment during FAT, the sample size shall be taken as that number of equipments which are necessary to demonstrate the performance, irrespective of the percentage.

For the OPGW cable hardware fittings & accessories, the minimum sampling rate, and batch acceptance criteria shall be as defined in IS 2486.

The sampling rate for the factory acceptance tests shall be 10% of the batch size (minimum 2) for FO cable drums, FODPs Joint box and other similar items.

Since FAT testing provides a measure of assurance that the quality control objectives are being met during all phases of production, the employer reserves the right to require the contractor to investigate and report on the cause of FAT failures and to suspend further testing/approvals until such a report is made and remedial actions taken, as applicable.

4.4.2 Production Testing

Production testing shall mean those tests which are to be carried out during the process of production by the contractor to ensure the desired quality of end product to be supplied by him. The production tests to be carried out at each stage of production shall be based on the contractor's standard quality assurance procedures. The production tests to be carried out shall be listed in the Manufacturing Quality Plan (MQP), along with information such as sampling frequency, applicable standards, acceptance criteria etc.

The production tests would normally not be witnessed by the employer. However, the employer reserves the right to do so or inspect the production testing records in accordance with inspection rights specified for this contract.

4.4.3 Factory Acceptance Tests on Optical fibre to be supplied with OPGW

The factory acceptance tests listed in table below are applicable for the Optic fibres to be supplied. The listed tests follow testing requirements set forth in IEEE standard 1138, 1994 section 4.2.1. The referenced sections specify the detailed test description. The acceptance norm shall be as specified in the above-mentioned IEEE standards unless specified otherwise in the technical specifications.

Table 4.9 Factory Acceptance Tests for Optical Fibres: Optical Tests

Sl.No.	Test Name	Acceptance Criteria	Test procedure
1	Attenuation Coefficient	Table 2-1 (a)	EIA/TIA 455-78A
2	Point Discontinuities of attenuation	Section 2.1.1.2	EIA/TIA 455-59
3	Attenuation at Water Peak	Table 2-1 (a)	EIA/TIA 455-78A
4	Chromatic Dispersion		EIA/TIA 455-168A/ 169A/175A
5	Core-Clad Concentricity Error		EIA/TIA 455-176
6	Cladding diameter		EIA/TIA 455-176
7	Fibre Tensile proof testing		EIA/TIA 455-31B
- End of table -			

The test report for the above tests for the fibers carried out by the fiber manufacturer and used in the OPGW cables shall be shown to the inspector during OPGW cable FAT and shall be submitted along with the OPGW cable FAT report.

4.4.4. Factory Acceptance Test on OPGW cable

The factory acceptance tests for OPGW cable specified below in table follow the requirements set forth in IEEE standard 1138/IEC 60794. The FAT shall be carried out on 10% of offered drums in each lot as specified in technical specifications and the optical tests shall be carried out in all fibres of the selected sample drums. The Rated Tensile strength test shall be carried out on one sample in each lot.

Table 4-10
Factory Acceptance Tests on OPGW
Applicable standard: IEEE 1138/IEC 60794

Sl.No.	Factory Acceptance Test on Manufactured OPGW
1	Attenuation Co-efficient at 1310 nm and 1550 nm
2	Point discontinuities of attenuation
3	Visual Material verification and dimensional checks as per approved DRS/Drawings
4	Rate Tensile Strength
5	Lay Length Measurements

4.4.5 Factory Acceptance Tests on OPGW Fittings

The factory acceptance tests for OPGW fittings as specified below in Table 4-11. The sampling plan shall be as per relevant standard:

Table 4-11**Factory Acceptance Tests on OPGW Fittings**

Sl.No.	Factory Acceptance Test
Suspension Assembly	
1	UTS/Mechanical Strength of the assembly
2	Clamp Slip Test
3	Visual Material verification and dimensional checks as per approved DRS/Drawings
4	Mechanical Strength of each component
5	Galvanising test
Tension Assembly	
6	Clamp Slip Strength Test
7	Visual Material verification and dimensional checks as per approved DRS/Drawings
8	Mechanical Strength of each component
9	Galvanising test
Vibration Damper	
10	Galvanising test on damper, masses and messenger wires
11	Damper response (resonant frequencies)
12	Clamp Slip test
13	Strength of messenger wires
14	Attachments of weights to messenger cable
15	Attachments of clamps to messenger cable
16	Clamp bolt tightening test
17	Clamp bolt torque test
18	Dynamic characteristic test
19	Visual Material verification and dimensional checks as per approved DRS/Drawings
Structure Mounting Clamp	
20	Clamp fit test
21	Clamp Strength Test
22	Visual Material verification and dimensional checks as per approved DRS/Drawings
- End of Table -	

4.4.6 Factory Acceptance Test on Approach Cable

The factory acceptance tests for Approach Cable specified below in Table 4-12:

Table 4-12**Factory Acceptance Tests on Approach Cable**

S. No.	Factory Acceptance Test
1	Attenuation Co-efficient at 1310 nm and 1550nm
2	Point discontinuities of attenuation
3	Visual Material verification and dimensional checks as per approved DRS/Drawings.

4.4.7 Factory Acceptance Tests on Splice Enclosure (Joint Box)/FODP

The factory acceptance tests for Splice Enclosures/FODP as specified below in Table 4-13:

Table 4-13**Factory Acceptance Tests on Splice Enclosures (Joint Box)/FODP**

Sl.No.	Factory Acceptance Tests
1.	Visual check of quantities and specific component number for each component of splice enclosure/FODP and dimensional checks against the approved drawings

4.4.8 Factory Acceptance Tests on Pigtail & other items

As per technical specification and approved DRS/Documents.

4.5 Site Acceptance Tests

The contractor shall be responsible for the submission of all equipment & test equipment supplied in this contract for site tests and inspection as required by the employer. All equipment shall be tested on site under the conditions in which it will normally operate.

The tests shall be exhaustive and shall demonstrate that the overall performance of the contract works satisfies every requirement specified. At a minimum Site Acceptance Testing requirement for FO cable is outlined in following section. This testing shall be supplemented by the contractor's standard installation testing program, which shall be in accordance with his quality plan(s) for FO equipment installation.

During the course of installation, the Employer shall have full access for inspection and verification of the progress of the work and for checking workmanship and accuracy, as may be required. On completion of the work prior to commissioning, all equipment shall be tested to the satisfaction of the employer to demonstrate that it is entirely suitable for commercial operation.

4.5.1 Minimum Site Acceptance Testing Requirement for FO Cabling

Prior to installation, every spooled fibre optic cable segment shall be tested for compliance with the pre-shipment data previously received from the manufacturer. This requirement will preclude the installation of out of specification cable segments that may have been damaged during shipment.

4.5.1.1 Phases of Site Acceptance Testing

SAT shall be carried out link from FODP to FODP. SAT may be performed in parts in case of long links.

The tests, checks, adjustments etc conducted by the contractor prior to offering the equipment for SAT shall be called Pre-SAT activities. The Pre-SAT activities shall be described in the installation manuals and field quality plan documents.

Sag and tension of OPGW shall generally be as per approved sag-tension chart and during installation, sag and tension of OPGW shall be documented. Upon completion of a continuous cable patch, all fibres within the cable patch shall be demonstrated for acceptance of the cable path. Fibre Optic cable site testing minimum requirements are provided in Table 4-14(a) through 4-14(c) below:

Table 4-14(a)
Fibre Optic cable Pre-Installation Testing

Item	Description
1	Physical Inspection of the cable assembly for damage
2	Optical fibre continuity and fibre attenuation with OTDR at 1550 nm
3	Fibre optic cable length measurement using OTDR

Table 4-14(b)
Fibre Optic Cable Splicing Testing

Item	Description
1	Pre splice bi-directional average attenuation with OTDR
2	Physical inspection of splice box/enclosure for proper fibre/cable routing techniques
3	Physical inspection of sealing techniques, weatherproofing, etc.

Table 4-14(c)
Fibre Optic Cable Commissioning Testing

Item	Description
1	End to End (FODP to FODP) bi-directional average attenuation of each fibre at 1310 nm and 1550 nm by OTDR
2	End to End (FODP to FODP) bi-directional average attenuation of each fibre at 1310 nm and 1550 nm by Power meter.
3	Bi-directional average splice loss by OTDR of each splice as well as for all splices in the link (including at FODP also)
4	Proper termination and labeling of fibres & fibre optic cables at FODP as per approved labeling plan.
- End of Table -	

Section-05
Documentation and Deliverables
Index

5.1	System Functional Description Document
5.2	System Documentation
5.3	Supplementary Documentation
5.4	Test Documentation
5.5	Drawings
5.6	Drawing and Document Approval Procedure
5.7	Final Documentation

Section-05
Documentation and Deliverables

This section describes the documentation requirements and provides a list of deliverables that the Contractor shall provide of the Employer. Complete documentation necessary for the operation and maintenance of the communication system is required. All the documentation shall be provided in hard copy and also on CD-ROMs in full compliance with the specification. Conditions pertaining to Document Review and Approval Rights and Document Submission Scheduling are specified in this specification.

As detailed in subsequent sections the documentations shall include the following:

- (a) Detailed list of the deliverables
- (b) Description of the products
- (c) Technical particulars
- (d) Installation manuals
- (e) Maintenance manuals
- (f) Quality assurance manuals, Manufacturing Quality Plan (MQP) & Field Quality Plan (FQP).
- (g) Tests (type test, production, FAT, SAT) documentation.

5.1 System Functional Description Document

The document shall include an overview of the system configuration. This document shall be designed to serve as a complete introduction to the supplied system and to the more specific documents that are defined in technical specifications. The document shall be oriented to the Employer user's point of view and be subject to the Employers review and approval. Users will include Employer's operating personnel communication support staff and maintenance personnel.

5.2 System Documentation

A detailed documentation plan and document submission schedule shall be prepared and submitted for approval. The guidelines specified in Table 5-1 and 5-2 shall be followed.

5.3 Supplementary Documentation

If while performing maintenance on such equipment during the warranty period, the Employer determines that additional information is required to perform the maintenance function, the Contractor and/ or its subcontractors shall provide the specific supplemental information necessary to perform the maintenance function. This information shall be documented in a form suitable for incorporation into the appropriate maintenance document

5.4 Test Documentation

The Contractor shall provide documentation for all factory and field tests.

The test documentation shall include the following

- (a) Test Procedure Document
- (b) Type test documents
- (c) Factory Acceptance Test Documents
- (d) Site Acceptance Test Documents.

5.5 Drawings

All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, dimensions, material description, Bill of Materials, weight of each component, break-up for packing and shipment, shipping arrangement required the dimensions required for installation and any other information specifically requested in the Specifications.

Each drawing submitted by the Contractor shall be clearly marked with the Employer name, the unit designation, the specification title, the specification number and the name of the project. All titles, notes, markings and writings so on the drawing revision level/issue no, issue date shall be marked on each drawing and the drawing shall carry issue history information and appropriate signatures (eg: originator, checker and approving authority).

5.6 Drawing and Document Approval Procedure

The drawing/documents submitted by the Contractor shall be reviewed by the Employer as far as practicable within stipulated duration and shall be modified by the Contractor if any modifications and/or corrections are required by the Employer in compliance with the Specifications. The Contractor shall incorporate such modifications and/or corrections and submit the final drawings for approval. Any delays arising out of failure by the Contractor to rectify the drawings in good time shall not affect the contract completion date.

The drawings/documents submitted for approval to the Employer shall be in triplicate. One print of such drawings shall be returned to the Contractor by the Employer marked with one of the categories as listed below: -

Category	Inference
Cat I	Approved/Released for implementation
Cat II	Approved/Released for implementation subject to incorporation for comments.
Cat III	To be resubmitted for approval after incorporating comments.
Cat IV	For information and record.

The approval of the drawing/document conveyed vide above marked copy shall neither relieve the Contractor of its contractual obligations and its responsibilities towards weights, qualities, design details, assembly fits, performance particulars and conformity of suppliers with the Indian Statutory Laws as may be applicable, nor shall it limit Employers right under the contract.

Depending upon the category of approval the Contractor shall resubmit the drawings/documents for review by Employer after incorporating all corrections.

Further work by the Contractor shall be strictly in accordance with the Cat-I, Cat-II or Cat-IV approved drawings and no deviation shall be permitted without the written approval of the Employer.

All manufacturing and fabrication work in connection with the equipment/material prior to the approval of the drawings shall be at the Contractor's risk. The Contractor may make any changes in the design which are necessary to make the equipment/material conform to the provisions and intent of the Contract and such

changes will again be subject to approval by the Employer. Approval of Contractor’s drawing or work by the Employer shall not relieve the Contractor of any of his responsibilities and liabilities under the Contract.

5.7 Final Documentation

Final documentation shall consist of the documents approved in Cat IV listed in Table 6-1. The documents will be used by the Employer personnel for operating and maintaining the equipment after acceptance.

Until acceptance of the equipment by the Employer. The Contractor shall be responsible for supplying documentation revisions or changes necessitated by inaccuracies, installation requirements, omissions determined by usage, and design or production alterations to the equipment. All changes shall be issued in the form of replacements for the affected drawings, diagrams, charts, graphs, tables, lists, and pages in the various documentation such that all documentation describes the equipment “as delivered”.

For all CAT-I & CAT-IV approved documents listed in Table (except Type, FAT&SAT related), Three (3) sets of the final approved documentation shall be provided to the Employer in CD-ROM and two sets in hard copy.

All final Contractor-supplied documentation shall be easily reproducible by the Employer.

**Table 5-1
Documentation Plan for Fiber Optic Cabling Package**

S. No	Document	Applicable Equipments/Item	Brief Description	Category Of Approval
1.	Documentation plan & schedule		This Document shall contain the list of all documents to be submitted for approval and their submission/approval schedule.	1
2.	Survey guidelines		As per Technical Specifications	1
3.	Data Requirement Sheet (DRS) and Guaranteed Technical Parameters & Drawings	For each and every item to be supplied including OPGW Cable, Optical, Fiber, OPGW hardware & fittings, Approach cable, joint Box, FODP, Power and signal cables, earthing cables, patch cords etc	These document(s) shall describe all the technical parameters of the equipment being offered.	Cat-I(for DRS) & CAT-IV(for brochure)
4.	Sag Tension charts	For OPGW cable	Shall accompany the DRS document	1
5.	Mechanical Drawings	As applicable	This document shall fully describe the equipment racks/enclosures, MDF, peripherals and related hardware with particular reference to mechanical construction. Materials and dimensions. Appearance, mounting methods, earthing clearances required from walls/roof/other panels, cable entry details, dust and moisture ingress protection provisions etc.	1

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6.	Equipment Manuals & Standard Documents	For all items	Complete set of all equipment Manuals (Construction, Installation, Maintenance, Reference etc) for that product, A set of product brochures, photograph etc.	1 & IV
7	Previous type test reports	For all items for which testing is envisaged.	Shall be complete in all respect including all test graphs, curves, calculations, Photographs etc.	IV
8	Type test procedures	For all items for which testing is required.	Shall be formatted as per the technical specifications.	1
9	Manufacturing Quality Plan	For all items to be supplied		1
10	Type Test Schedule	For all items for which testing is required.	Shall indicate the start & finish data for each test & sequence of tests it applicable, test labs.	1
11	Type test report	For all items for which testing is required.		1
12	Link and site survey reports & engineering analysis	For each Fiber Optic Link and site	Link wise survey reports as per specifications, link budget calculations etc.	1
13	Bill of Quality	For each item and each link		1
14	Numbering, marking, labeling Document	As applicable	Must include numbering, marking, labeling and naming conventions for channels, cables, connectors, sub racks, cubicles etc.	1
15	Physical planning/site preparation manuals	As applicable	Must contain data gathered during the site survey, including test results, if any. The Document shall also contain floor plan, cable trenching/raceways drawings, station block diagrams, rack/cabinet elevation drawings, air-conditioning and power supply requirements, and power supply distribution and earthing system details.	1
16	Factory Acceptance tests: test plan, procedures and report format	For all items to be supplied	This Document shall include the list of Site acceptance tests, the administrative & functional test plans, test procedures and formats	1

			for recording & reporting factory acceptance test results.	
17	Factory acceptance test report	For all items to be supplied		Acceptance letter by Employer
18	Transportation & Handling Procedures	For all items	This Document shall describe the procedures & precautions to be observed during overseas & inland transportation, equipment handling during transport, storage & pre-installation. It shall also include packing details and package labeling details.	IV
19	FO Cable installation manual	OPGW	The expected content of this document is presented in the Table 6.2 below	1
20	Jointing Manual	For each type of FO cable/joint box to be supplied	This Document shall describe the installation of joint box (splice enclosures) and other jointing gang activities.	1
21	Site Drawings	Site wise complete Documentation	This Document must include, general details of equipment, cubicles, cables, connectors, MDFs, DDFs, network diagram, earthing connections, power supply connections and specific details i.e. site layout, floor plans, cubical layout, sub rack layout, channel routing, signal connections, cable routing, MDF and DDF cross connections etc.	1
22	Site Acceptance tests (SAT) test plan, procedures and report format	System Document	This Document shall include the list of Site acceptance tests, the administrative & functional test plans, test procedures and formats for recording & reporting site Acceptance test results. This Document shall be restricted to describing the acceptance tests listed in this technical specification, and other similar tests which shall be conducted in Employer presence for Site acceptance.	1

23	Field Quality Plan	One Document with multiple subdocuments if required	Field Quality Plan shall describe the quality control to be exercised during the field activities. This Document can include the following information: (a) The list of performance & safety checks applied to installation equipment, tools & tackles, checks check on physical health & Training records of installation crew etc. (b) the list of site acceptance tests (including statement of acceptance criteria). The inclusion of list of site acceptance tests in FQP is analogous to the inclusion of list of FAT in the MQP. The formats for recording & reporting Site acceptance tests can also be reproduced	1
24	Approach Cable Installation Document General	Approach cable	This Document shall describe the general approaches to be adopted for installation of Approach cables, for example the document shall try to answer questions such as weather cable trenches or cable raceways shall be used? Or weather any conduits/ducts will be used, if so, of what type? etc. This Document shall describe all allowable, alternative installation methodologies, such that the actual implementation at a particular site shall be one or a combination of the methods described. The approach followed at a described based on this site-by-site documentation to be submitted later.	Cat-1
25	Approach Cable & FODP layout document –site wise	For each site	To describe the layout of approach cable at each site and the floor plan of the FODP.	Cat-1
26	Training Manuals	System Document	An advance copy of all training material.	IV
27	Maintenance Philosophy & Procedures	System Document	Shall cover breakdown maintenance procedures, prevention maintenance schedules and procedures	IV
28	SAT reports	Per link and per Location		

Note: To be reviewed & approved by site.

Table 5-2(a)
Expected Contents & Structure of Equipment Installation Manual

1.	Installation Procedure	<u>Description of activities of installing gangs:</u> Preparation & Setting up, Stringing, sagging, attaching hardware, attaching down lead clamps & cable routing on the lower, securing cable ends (For protection before work by jointing gang). Precautions for preventing damage etc., shall be highlighted.
2.	Safety instructions	<u>Instructions & procedures related to ensuring installation crew safety:</u> - personal grounding & safety, installation equipment safety, Safety for power system & environment (viz preventing accidental tripping, precaution for railway crossing etc.
3	Describing of Installation Equipment	Sketches, drawings, photographs, safe working ratings of installation equipment, tools & tackles etc., handling instructions & precautions.
4	Cabling routing	Illustrations of the position of tower attachments clamps (down load clamps), routing of FO cable on the tower, services loop(s), joint box position, various possible cable routing (Intra cabinet and inter cabinet, with in the same room and located in different rooms/buildings etc) methods.
5	References	References to other related documents covering the installation, joining & testing, such as 1. SAT Administrative & functional test plans & test procedures 2. Field Quality plan & Field Quality Audit 3. Storage & Handling Instructions 4. Drawings, Technical parameters, DRS etc 5. Employer & Statutory safety rules, safety manuals, standards, codes of practices etc.

Table 5-2(b)
Expected Contents & Structure of Equipment Installation Manual

1.	Installation Procedure	<u>Description of activities of installing gangs:</u> Preparation & Setting up, Stringing, sagging, attaching hardware, attaching down lead clamps & cable routing on the lower, securing cable ends (For protection before work by jointing gang). Precautions for preventing damage etc shall be highlighted.
2.	Safety instructions	<u>Instructions & procedures related to ensuring installation crew safety:</u> - personal grounding & safety, installation equipment safety, Safety for power system & environment (viz preventing accidental tripping, precaution for railway crossing etc.
3	Describing of Installation Equipment	Sketches, drawings, photographs, safe working ratings of installation equipment, tools & tackles etc., handling instructions & precautions.
4	Cabling routing	Illustrations of the position of tower attachments clamps (down load clamps), routing of FO cable on the tower, service loop(s), joint box position.
5	References	References to other related documents covering the installation, joining & testing, such as 1. SAT Administrative & functional test plans & test procedures 2. Field Quality plan & Field Quality Audit 3. Storage & Handling Instructions 4. Drawings, Technical parameters, DRS etc 5. Employer & Statutory safety rules, safety manuals, standards, codes of practices etc.

_____ End Of This Section _____

Section -6

Project Management, Schedule and Implementation Plan

6.1 Project Management
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6.1.3 Transmittals
6.1.4 Quality Assurance
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Section -6

Project Management, Schedule and Implementation Plan

This section describes the project management, schedule, quality assurance, and implementation plan requirements for the package.

6.1 Project Management

The Contractor shall assign a project manager with all authority to make commitments and decisions that are binding on the Contractor. The project manager's responsibility shall include interface and coordination with the project Contractor(s). The Employer will designate a project manager to coordinate all the Employer project activities. All Project correspondence and communications between the Employer and the Contractor shall be coordinated through the project managers.

The project shall be staffed from the list of project management and engineering personnel presented in the proposal. Principle participants shall have previous experience in the similar position on at least two other projects of similar scope to this project. The Assignment and reassignment of the Contractor's principle participants in the project shall be subjected to the Employer's approval.

6.1.1 Reporting Period

The Project Manager shall provide updated project schedules and complete progress reports on monthly basis for the duration of the project. All references to the reporting period throughout this Specification shall refer to this monthly period.

6.1.2 Progress Meetings

The project manager shall schedule and attend Progress Meetings as deemed necessary but no less than once every two months.

6.1.3 Transmittals

Every document, letter, progress report, change order, and any other written or electronic media transmissions exchanged between Contractors and the Employer shall be assigned a unique transmittal number. Discussions and phone calls where project related information is exchanged shall be documented in a transmittal. The Contractor shall maintain a correspondence index and assign transmittal numbers consecutively for all Contractor documents. The Employer will maintain a similar correspondence numbering scheme identifying documents and correspondence that the Employer initiates.

6.1.4 Quality Assurance

6.1.4.1 General

The Contractor shall adhere to a Quality Assurance (QA) Program for the preparation of All Contract deliverable, including documentation, hardware, firmware and software. The Program shall provide for early detection of actual or potential deficiencies, timely and effective corrective action, and a method of traceability of all such deficiencies.

The Bidder's proposal shall include the relevant ISO 9000 certificates from the main Bidder and from all subcontractors which have a major part (over 10%) of the delivery.

The Relevant ISO 9000 standards to be provided are the following:

- ISO 9001: Model for quality assurance in design, development, production, installation and servicing
- ISO 9002: Model for quality assurance in production and installation
- ISO 9003: Model for quality assurance in final inspection and testing

The Quality Assurance procedures, documentation standards, and software development procedures which were included with the Bidder's proposal will be incorporated into the Contract.

6.1.4.2 Quality Assurance System and Requirements

The ISO 9001 Certificate and the assessment and visit reports shall be finally accepted by the Employer after discussions before the award of contract. A Quality Assurance program of the Contractor shall generally cover but not limited to the following:

- (a) Organization structure for the management and implementation of the proposed quality assurance program.
- (b) Documentation control system.
- (c) Qualification data for Contractor's key personnel.
- (d) The procedure for purchases of materials, parts/components and selection of sub-Contractor's services including vendor analysis, source inspection, incoming raw materials inspection, verification of material purchases etc.
- (e) System for shop manufacturing including process controls and fabrication and assembly controls.
- (f) Control of non-conforming items and system for corrective action.
- (g) Control of calibration and testing of measuring and testing equipments.
- (h) Inspection and test procedures for manufacture.
- (i) System for indication and appraisal of inspection status.
- (j) System for quality audits
- (k) System for authorizing release of manufactured product to the Employer.
- (l) System for maintenance for records.
- (m) System for handling storage and delivery.
- (n) A Quality plan detailing out the specific quality control procedure adopted for controlling the quality characteristics of the product.

The Quality Assurance plan shall be mutually discussed and approved by the Employer after incorporating necessary corrections by the Contractor as may be required.

This Quality Assurance Plan shall then form part of the contractual documentation and shall not be changed without prior agreement with the Employer. The Contractor shall be required to submit all the Quality Assurance Documents as stipulated in the Quality Assurance Plan at the time of the Employer's inspection of equipment/material.

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The Employer or his duly authorized representatives reserve the right to carry out Quality Audit and Quality Surveillance of the system and procedures of the Contractor/his vendor's Quality Management and Control Activities.

6.1.4.3 Variance Reporting and Processing

An automated variance recording and tracking system shall be placed in service at least one month before the initially scheduled beginning of the FAT. This system shall be designed to record and track variances for documentation deficiencies, functional deficiencies, performance deficiencies, procedural deficiencies (as when deviation from contractually required QA procedures are observed), and test deficiencies (as when the system cannot satisfactorily pass a step within a test procedure).

Variances may be initiated by both Contractor and the Employer personnel and shall be classified as follows:

- a) Open (recorded but not necessarily agreed to)
- b) Assigned (denoting acceptance by the Contractor)
- c) Pending (denoting fixed, in the Contractor's opinion, and awaiting retest or verification)
- d) Resolved (denoting the Employer acceptance or verification).

For the tracking of the various and to support the automatic printout of subset lists, The following information fields shall be stored for each variance:

- e) Variance number (automatically assigned)
- f) Date initially recorded
- g) Status (open/assigned/pending/resolved)
- h) Date current status recorded
- i) Names of the involved Employer personnel
- j) Names of assigned Contractor personnel
- k) Subsystem involved
- l) Test name (where applicable)
- m) Description (up to five lines in a full printout and part of the first line in a one-line-per-variance printout)
- n) Urgency description (1, 2 or 3)

The variance recording and tracking system shall allow full printouts of all of the above information, condensed printout of abbreviations of the above information (one-line-per-variance) and shall produce subsets of the variances based on searches of the field singly or in combinations. For example, it shall be possible to produce a printout of all the variances (and only those variances) that were at level 1 of 2 urgency, concerning a specific named subsystem, had open or assigned status, and initiated within a named period.

Depending on its impact, each variance shall be assigned to one of three urgency levels by the contractor with the employer having level assignment approval rights.

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- Level 1 Testing will stop for immediate evaluation and correction by the Contractor.

- Level 2 Testing will continue and the variance will be corrected at the end of the current session or day.

- Level 3 Testing will continue and the variance will be corrected and tested at a mutually agreed upon time (e.g., at the end of the test or later in the test period prior to shipment)

A variance status summary shall be included in the monthly project progress reports, and up-to-date variance reports shall be made available to the Employer on demand.

The variance recording and tracking system shall be subject to approval by the Employer.

6.1.4.4 Additional Quality Assurance Requirements

The Employer 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 arise. The Employer shall also be able to conduct on site reviews as mutually agreed.

The Employer shall have access to any relevant documentation for verification that quality procedures are in accordance with the contract-specific quality plan.

6.1.5. Software Configuration Management

All software development performed by the contractor shall be under a formal, documented software configuration management procedure. The procedure shall encompass the following aspects:

- (a) Inventory control
- (b) Version control
- (c) Change control
- (d) Build management.

The software configuration management scheme shall be managed by a designated software administrator(s). In case, the software is already a developed product, software configuration management shall begin at the time software is initially installed on the system. In case of new or continuing development, software configuration management shall begin at the time software is initially installed on the system. In case of new or continuing development, software configuration management shall be immediately initiated during the earliest phases of development. The administrator(s) shall work closely with the Contractor software staff and shall be responsible for enforcing the software management procedures.

6.1.6 Document Review and approval rights

To ensure that the proposed systems conform to the specific provisions and general intent of the Specification, the Contractor shall submit documentation describing the systems to the Employer for review and approval.

The Employer will respond with written comments to the Contractor within thirty (30) calendar days after receipt of the documents. Documents requiring correction must be resubmitted by the Contractor to the Employer within 30 calendar days. The Employer will respond to resubmitted documents within fifteen (15) calendar days after receipt of the document. No implementation schedule relief is to be implied for documents requiring correction and resubmission to the employer.

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The Employer shall have the right to require the contractor to make any necessary documentation changes at no additional cost to the employer to achieve conformance with the Specification.

Any purchasing, manufacturing, or programming implementation initiated prior to written the Employer approval of the relevant documents or drawings shall be performed at the Contractor risk. Review and approval by the Employer shall not relieve the Contractor of its overall responsibilities to satisfy system functions and performance requirements in accordance with the Specification.

To help the Employer manage the review and approval of documents during any given period, the Contractor shall stagger the release of documents over the time allocated in the project schedule. The number and size of documents shall be factored into the document release schedule. At any time, no more than five documents shall be submitted to the Employer for review and approval.

6.2 Project Schedule

The project schedule shall consist of an implementation schedule and documentation schedule.

6.2.1 Implementation Schedule

The Contractor shall produce and maintain the implementation schedule. A copy of the implementation schedule files on a CD-ROM shall also be provided to the Employer. The overall project plan shall consist of a Milestone Plan and a detailed Schedule Plan.

The Contractor shall provide a critical path analysis report and a manpower resources analysis report. Other standard reports will be defined during the work statement.

Within two weeks of contract signing, the Contractor shall submit detailed project schedule, as described below. The project schedule shall include all tasks to track overall direction and integration of the project from inception through completion.

The Schedule Plan shall be developed utilizing the concept of Work Breakdown Structures. No task shall be greater than 3 weeks in duration.

The implementation schedule shall include the project milestones defined intender Specification, The Contractor activities and the Employer activities defined in this Section. The project schedule shall be an accurate representation of the progress and planned activities of the project.

The actual progress made to date and the scheduled delivery date for the completed systems shall be closely monitored by both the Contractor and the Employer project managers. The following information shall be reported to the Employer in a clear and concise manner using the tabular and graphic capabilities of the project management software:

- (a) An overview and general assessment of all the Employer and Contractor activities and any progress or delays in these activities since the last reporting period.
- (b) Identification of tasks in the critical path together with an analysis indicating any required remedial action.
- (c) The amount of contingency time (flat) remaining in the schedule.
- (d) Information on each task, including:
 - 1) Estimated start and finish dates

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- 2) Any change in the estimated dates since the last reporting period
 - 3) Estimated total number of calendar-days to complete the task
 - 4) Present of task completed
 - 5) An indication of whether the start date was manually entered or computed.
- (e) Total projects resources
 - (f) The tasks to begin in the next two reporting periods
 - (g) The tasks to be completed in the next two reporting periods
 - (h) The tasks completed in the last two reporting periods

The content and format of the project schedule shall be subject to the Employer approval. The Contractor shall update and submit the project schedule to the Employer at least one week prior to each progress meeting.

6.2.1.1 Contractor Activities

The Implementation schedule shall be compiled by the Contractor summarizing all activities, and shall include but not be limited to the following:

- (a) Survey, Design & Engineering
- (b) Hardware purchase, development and integration
- (c) Hardware production schedules
- (d) Documentation preparation and release
- (e) Documentation revision and release following the Employer review
- (f) Software design, coding, unit testing, and integration
- (g) System Integration
- (h) Type test and Factory testing
- (i) Shipment
- (j) Receipt, forwarding and staging
- (k) Installation
- (l) Site Acceptance testing
- (m) Availability Test

Each scheduled task shall have an estimated duration for completion and predefined relationships with other tasks. Relationships shall be used to enforce the logical progression of work in as much as certain tasks cannot start until others have been completed.

6.2.1.2 The Employer Activities

The implementation schedule shall contain all the Employer Activities required in order for the Contractor to complete their system and integration tasks, including the following:

- (a) Document reviews and approvals

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- (b) Licensing and Regulatory Clearances, if any
- (c) Participating in all levels of testing
- (d) Any site preparation, if required.
- (e) Assistance NMS data base, display and report definition

6.2.2 Documentation Schedule

The Documentation schedule shall include an entry for each document and drawing to be delivered throughout the project. Each documentation schedule entry shall include the document or drawing title, number, revision level, actual or future submittal date for the Employer review of approval, date of completion of review or approval by the Employer, and outcome of review or approval by the Employer. When the employer requires correction to any document, the documentation schedule shall be updated with a new entry for the next revision of the document. The content and format of the documentation schedule shall be subject to the Employer approval.

The Documentation schedule shall allow for at least two submissions of each document requiring review or approval. The time schedule for document review or approval by the Employer shall be as specified in this section.

6.3 Progress Reporting

With the intent to assure quality management and Project progress as per the implementation schedule, progress reports submitted for each reporting period and Progress Review Meetings shall focus on the following:

6.3.1 Monthly Progress Reports

A monthly Progress Report shall be prepared by the Project Manager that includes inputs from all its subsystem. The Report shall be made available to the Employer as a hard copy and soft copy, by the 10th working day of each month and shall include but not be limited to:

- (a) Updated project schedule highlighting any deviations from the previous issue of the project schedule.
- (b) Explanation and anticipated effect of each schedule deviation and its implication to the Employer.
- (c) Schedule recovery plan for any deviation incurring a delay in delivery date (All delays shall be factored into the project schedule as soon as they are known to the Contractor).
- (d) A summary of activities performed by the Contractor and the Employer during the previous reporting period.
- (e) An updated list of all correspondence transmitted and received by the Contractor.
- (f) Updated documentation schedule.
- (g) List of all contractor personnel and the Employer personnel resident at the Contractor facility, identifying all activities performed by each person and the activities scheduled for the next two reporting periods.
- (h) Updated the list of Contractor and Employer action items with status, description of required information, and required resolution dates.
- (i) Summary of pending and upcoming Contractor and the Employer activities during the next two reporting periods along with required completion dates.

- (j) Status of unresolved contract questions and change requests.
- (k) Summary of variances.
- (l) Log of invoice status.
- (m) Description of current and anticipated project problems and steps to be taken to resolve each problem.

6.3.2 Quarterly Progress Review Meetings

Progress Review Meetings shall be scheduled by the project managers and attended by the Contractor and Employer to review progress of the project. Progress meetings shall be used to review the progress reports for the previous reporting periods, written correspondence exchanged since the last meeting, and open access items.

The Contractor shall also attend technical meetings as required to discuss technical aspects of the project and to review the Employer comments on approval documents. When appropriate, these splint meetings shall be conducted as extensions to the progress meetings.

At least one-half of all meetings shall be held at the Employer’s office. Record the minutes of each meeting shall be prepared and provided as hard copies to all attendees on the same day whenever possible, but not later than within two working days after the meeting. Table 6-1 provides a suggested agenda for Progress Review Meetings.

**Table 6-1:
Suggested Progress Review Meeting Agenda**

Item:	Title:	Description:
1	Meeting Minutes:	Review minutes from previous meeting, with comments
2	Open Action Items:	Review all outstanding action
3	Progress Review:	Review with participating Project Managers and Contractor, most recent project schedule. Update schedule and develop action Items.
4	Technical Discussion:	Discuss Technical Issues.
5	Action Items:	Assign responsibilities for new action items.
6	Administrative Matters:	Discuss Administrative matters
7	Action Items:	Assign responsibilities for new action items.
8	Next Meeting:	Schedule time and place for the next meeting and agree on agenda
9	Adjourn:	Adjourn meeting.

6.4 Implementation Plan

The bidder shall submit a preliminary project implementation schedule along with the bid. The detail project implementation schedule shall be submitted by the Contractor after award for Employer’s approval, which shall include at least the following activities:

- (a) Site Survey
- (b) Documents, DRS, Drawing submission and approval
- (c) Type Testing Schedule
- (d) Manufacturing

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- (e) Factory Testing Schedule
- (f) Dispatch Schedule
- (g) Receipt, Storage, Installation Schedule
- (h) Site Testing Schedule

6.4.1 Implementation Steps

The basic implementation steps pertaining to telecommunication system of the project are:

- (a) Design & parameterize the fibre optic cable network, integrated wideband network, including implementation strategies.
- (b) Conduct site & route surveys, identify equipment locations and required site preparations.
- (c) Subsystem design, manufacture, factory & type test (if applicable)
- (d) Shipping, installation and field testing for above.
- (e) Design, manufacture, factory & type test (if applicable) of termination equipment and other related equipment.
- (f) Shipping, installation and field testing of above.
- (g) Integration of FOTS, associated equipment, inside plant, PLC and integration with existing network.
- (h) Field testing of the integrated telecommunication network including the NMS subsystem.
- (i) Acceptance test and cutover support of the Project requirements of the integrated telecommunications network.

Though not detailed, the above steps are intended to encompass all relevant work required to provide the Employer a fully working integrated telecommunication network supporting all Project Commitments.

6.4.2 Implementation Phases

The above implementation steps shall be organized and managed in various over lapping phases

6.5 Implementation Schedule

The Implementation schedule for this package shall be Fifteen (**15**) months from the date of award.

Appendix to this Technical Specifications provides an Implementation schedule guideline consistent with the phased implementation plan described herein and the Implementation Schedule for this Package.

General Information & Implementation Schedule

Fig A-1

Implementation Schedule for Lot-I & II

Task	Task Description	8 months period							
		1	2	3	4	5	6	7	8
1	Site Survey, Design & Engineering, Manufacturing, Delivery at site								
2	Site Installation & Site acceptance testing								

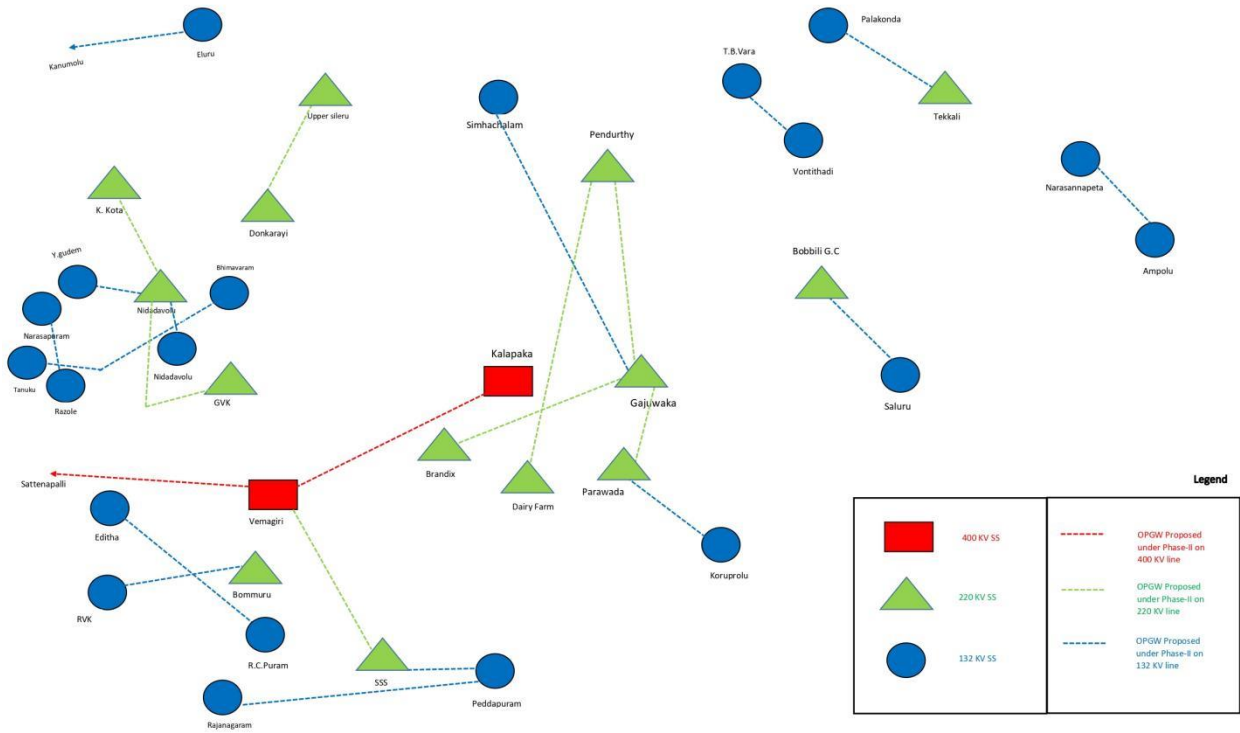
Implementation Schedule for Lot-III

Task	Task Description	12 months period											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Site Survey, Design & Engineering, Manufacturing, Delivery at site												
2	Site Installation & Site acceptance testing												

Fig A-2

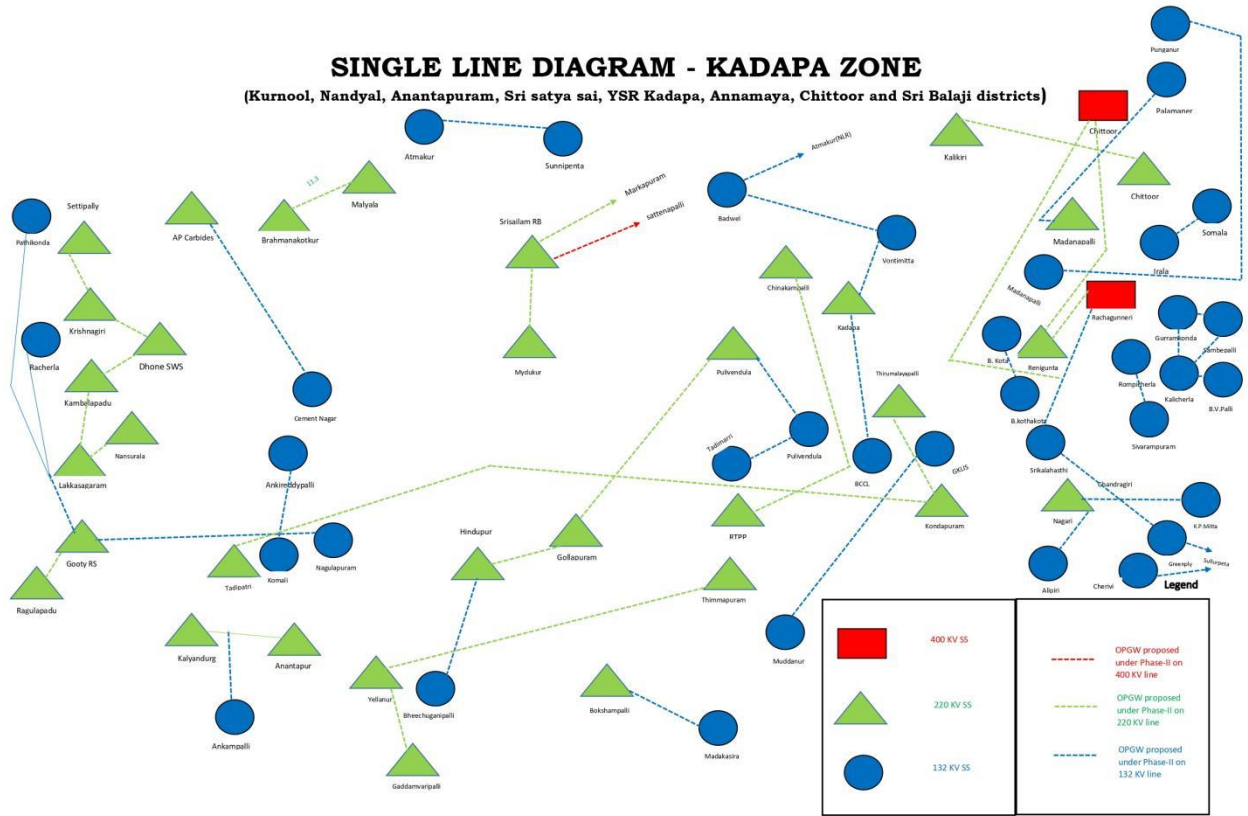
SINGLE LINE DIAGRAM-VISAKHAPATNAM ZONE

(Srikakulam, Manyam, Vijayanagaram, Visakhapatnam, Alluri Sitaramaraju, Anakapally, East Godavari, Kakinada, Konaseema, Eluru & West Godavari districts)



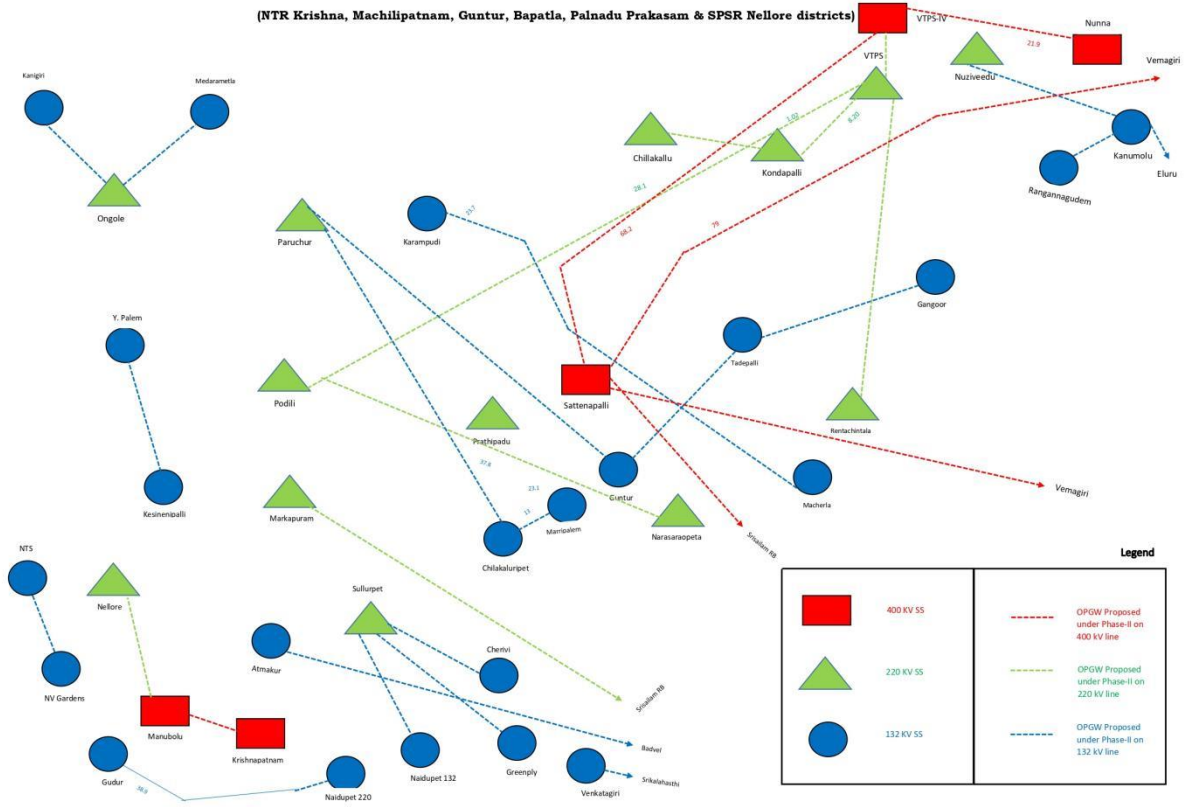
Proposed Fibre Optic Communication Network

SINGLE LINE DIAGRAM - KADAPA ZONE (Kurnool, Nandyal, Anantapuram, Sri satya sai, YSR Kadapa, Annamaya, Chittoor and Sri Balaji districts)



SINGLE LINE DIAGRAM-VIJAYAWADA ZONE

(NTR Krishna, Machilipatnam, Guntur, Bapatla, Palnadu Prakasam & SPSR Nellore districts)



Proposed OPGW Links

Table A-1

**List of lines OPGW proposed under Reliable communication System up to 132kV (Phase-II)
Project**

Sl. No.	Name of the line on which OPGW proposed	Voltage Level KV	Route Length of the line (Km)	
			48F	24F
Telecom Circle, Visakhapatnam				
1	Kalapaka-Vemagiri	400		167.44
2	Vemagiri-Sattenapalli	400		240.36
3	Pendurthy-Dairy Farm	220		12.21
4	Pendurthy-Gajuwaka (Loc.439 to Gantry of Gajuwaka)	220		14.52
5	Nidadavolu 220 KV-K. Kota 220KV (Nidadavolu gantry to Loc.No.378)	220	0.45	0.86
6	Uppersileru-Donkarai	220		27.82
7	Vemagiri-SSS	220		41.44
8	GVK-Nidadavolu 220 KV (Vijjeswaram LILO to GVK)	220		18.13
9	Gajuwaka-Brandix with Parawada LILO	220		35.65
10	Narasannapeta-Srikakulam (Ampolu)	132		19.19
11	Tekkali-Palakonda (Loc.No.148 to 220 KV SS Tekkali)	132		46.52
12	Vontithadi-T.B. Vara (Vontithadi gantry to Tower Loc.No.112)	132	5.44	
	Vontithadi-T.B. Vara (Tower Loc.No.112 to Gantry at T.B. Wara)	132		27.04
13	Bobbili Growth Centre-Saluru	132		15.19
14	Razole-Narasapuram	132		29.59
15	Eluru-Kanumolu	132		15.91
16	Nidadavolu-Yernagudem	132		23.37
17	Bhimavaram-Tanuku	132		6.1
18	Nidadavolu 220 KV-Nidadavolu 132 KV	132		2.63
19	SSS-Peddapuram	132		8.52
20	Ramachandrapuram – Editha	132	4.93	16.97
21	Rajanagaram – Peddapuram	132		21.7
22	Bommuru – RVK	132	1.81	6.2
23	Gajuwaka – Simhachalam	132		15.79
Telecom Circle, Vijayawada				
24	Sattenapalli - Srisailam RB	400	1.2	157
25	VTPS Tower No.532/1-Sattenapalli	400		57.94

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26	VTPS Tower No.532/1 - Nunna 400 KV	400		13.52
27	VTPS Tower No.532/1-VTPS IV	400	5.13	
28	Manubolu-Krishnapatnam	400		36.27
29	Kondapalli-VTPS	220		5.82
30	LILO of Podili-VTPS to Narasaraopeta	220	3.17	
31	Podili-VTPS	220		146.65
32	Loc.No.224 Markapur LILO point to Srisailam	220		59.73
33	Kondapalli – Chillakallu	220		59.48
34	VTPS – Rentachintala	220		116.82
35	Manubolu – Nellore	220		28.12
36	Rangannagudem-Kanumolu	132		11.87
37	Gangoor-Tadepalli	132		18.6
38	Macherla-Karampudi	132		33.41
39	Y. Palem- Kesinenipalli	132		14.35
40	Naidupet-Sullurpet (Naidupeta Gantry to Tower Loc.No.210)	132	0.65	
	Naidupet-Sullurpet (Tower Loc.No.210 to Gantry at Sullurpet)			23
41	Cherivi-Sullurpet	132		29.49
42	NTS- N.V. Gardens	132		8.68
43	Ongole-Medarametla (Ongole to LILO of Medarametla- Kanigiri)	132	7	
44	Kanumolu – Nuzividu	132		26.09
45	Guntur – Tadepalli	132		25.81
46	Guntur - Parchuru (Parchuru gantry to LILO point Tower Loc.No.268/1)	132	1.08	
	Guntur - Parchuru (LILO point Tower Loc.No.268/1 to Gantry at Guntur)			41.07
47	Marripalem – Chilakaluripeta	132		14.5
48	Chilakaluripeta – Parchuru	132		16.71
49	Gudur - Naidupeta & Gudur-Menakur (Loc.No 126 to Loc.No.129 of Gudur- Naidupeta line)	132	0.95	
Telecom Circle, Kadapa				
50	Mydukur-Srisailam RB	220	1.5	169
51	Ragulapdu-Gooty RS	220		58
52	Thimmapuram-Yellanur	220		9
53	Yellanur-G V Palli	220		5
54	Brahmanakotkur-Malyala	220		11.6
55	Dhone-Kambalapadu	220		11.77
56	Dhone-Krishnagiri	220		11.37
57	Kambalapadu-Lakkasagaram	220		9.13
58	Lakkasagaram-Nansurala	220		6.84
59	LILO of Renigunta -Nagari to Chittoor 400 KV	220		60

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60	RTPP-Chinakampalli	220		58
61	Krishnagiri-Settipalli	220		10.64
62	Hindupur - Gollapuram (Gollapuram gantry to LILO point at Tower Loc.No.61)	220	17	
	Hindupur - Gollapuram (Hindupur gantry to LILO point at Tower Loc.No.61)			12.5
63	Gollapuram – Pulivendula	220	3	115
64	Kalikiri - Chittoor 220KVSS (Tower Loc.No.339/T1 to Chittoor gantry)	220	1	63.00
65	Madanapalli – Palamaner	220		59
66	Kondapuram-Tadipatri	132		30
67	GKLIS-Muddanur	132		35
68	Vontimitta-Kadapa (Kadapa gantry to LILO Loc.769)	132		18
	Vontimitta-Kadapa (LILO Loc.769 to Vontimitta gantry)		11	
69	Bharathi Cements-Kadapa	132		35
70	Vontimitta-Badvel (LILO Loc.769 to 630/1 of Badvel line)	132		25
71	LILO of Anantapur-Kalyandurg to Ankampalli	132	9	
72	Hindupur-Beechuganipalli	132		11
73	Gooty RS-Nagalapuram	132		28
74	Tadimarri-Pulivendula	132		48
75	Bokshampalli-Madakasira	132		38
76	Gooty RS-Pathikonda & Gooty RS-Racherla (Gantry at Gooty RS to TN-3A/4)	132	1.1	
77	Cement Nagar-A.P. Carbides	132		37
78	Irala-Somala	132		17.05
79	B. Kota-B. Kotha Kota	132		10.39
80	Kalicherla-Bandlavandla Palli	132		16.49
81	Gurramkonda-Sambepalli	132	4	32.3
82	LILO of Kalikiri-Rompicherla to Sivaramapuram SS	132		10.53
83	LILO of Chandragiri-Tirumala to Alipiri SS	132	7.05	
84	Greenply - LILO Loc.	132		4.5
	Greenply LILO – Srikalahasthi			8.00
85	Greenply LILO -Sullurpeta	132		25.00
86	Pulivendula 220 KV - Pulivendula 132 KV	132	3.1	9
87	Gurramkonda-Kalicherla	132		17.47
88	Madanapalli-Punganur	132		29
89	Thirumalayapalli - Kondapuram (Gantry at Thirumalayapalli to LILO loc.No.70/1)	132	5	

	Thirumalayapalli - Kondapuram (LILO loc.No.70/1 to loc No.24 of Kondapuram)			13.5
	Thirumalayapalli - Kondapuram (loc No.24 of Kondapuram to Kondapuram gantry)		5.5	
90	Sundipenta – Atmakur	132	2.2	44.48
91	Ankireddypalli – Komali	132		6.1
92	Kalicherla – Sambepalli	132		25.5
93	Chittoor 220KVSS – Pakala (Chittoor gantry to LILO Loc.No.23)	132	6.5	
	Chittoor 220KVSS - Pakala (LILO Loc.No.23 to LILO loc No.57 of Pakala-KP Mitta)			16.37
	Chittoor 220KVSS - Pakala (LILO loc No.57 of Pakala-KP Mitta to Pakala gantry)		16.37	
94	K.P.Mitta – Nagari	132		49
95	Renigunta - Rachagunneri (Renigunta Gantry to LILO point)	132	1	
	Renigunta - Rachagunneri (LILO point to Rachagunneri gantry)			20
96	Atmakur - Badwel (Badwel gantry to LILO point at Tower Loc.No.630)	132	7	
	Atmakur - Badwel (LILO point at Tower Loc.No.630 to Gantry at Atmakur)			64
97	Rachagunneri - Srikalahasthi (Rachagunneri gantry to LILO point at Tower Loc.No.37)	132	13.5	
	Rachagunneri - Srikalahasthi (LILO point at Tower Loc.No.37 to gantry at Srikalahasthi)			14
Total			146.63	3165.61
Or say			147	3166

Table A-2

Existing Galvanised stranded steel wires (7/3.15mm & 7/3.66mm) used as Earthwire.

Sl.No.	Description	Technical Particulars	
		132kV & 220kV	400kV
1.	Total weight	426Kg/Km (standard)	583Kg/Km (standard)
2.	Standard of compliance	IS 2141/IS 12776	
3.	Ultimate Tensile Strength	58.45KN	68.4KN
4.	Overall diameter	9.45mm	10.98mm
5.	Modulus of elasticity	19.33×10^3 Kgs/mm ²	19.33×10^3 Kgs/mm ²
6.	Co-efficient of liner expansion	11.5×10^{-6} per °C	11.5×10^{-6} per °C

Appendix – B

Bill of Quantities (BOQ)

Sl. No.	Item Description	Unit	VJA	VIZAG	KADAPA	Total Qty
A	OPGW cable & Accessories					
(i)	24Fibre (DWSM) OPGW fibre optic cable	Km	945	813	1408	3166
(ii)	Installation Hardware set for above 24 Fibre OPGW Fibre Optic cabling incl. all cable fittings& accessories except Joint Box	Set*	945	813	1408	3166
(iii)	Joint box (24 Fibre)	No.	315	271	469	1055
(iv)	48 Fiber (DWSM) OPGW fibre optic cable	Km	19	13	115	147
(v)	Installation Hardware set for above 48 Fibre OPGW Fibre Optic cabling incl. all cable fittings& accessories except Joint Box	Set*	19	13	115	147
(vi)	Joint box (48 Fibre)	No.	6	4	39	49
B	FODP					
(i)	FODP 48F Indoor type, rack mounted with FCPC coupling and pigtails	No.	24	30	44	98
(ii)	FODP 96F Indoor type, rack mounted with FCPC coupling and pigtails	No.	5	2	8	15
C	Fibre Optic Approach Cable					
(i)	24 Fibre (DWSM)	Km	26	20	30	76
(ii)	Installation Hardware set for above 24 Fibre Fibre Optic Approach Cable	Set*	26	20	30	76
(iii)	48 Fibre (DWSM)	Km	2.5	2	7.5	12
(iv)	Installation Hardware set for above 48 Fibre Fibre Optic Approach Cable	Set*	2.5	2	7.5	12
II	Mandatory spares					
A	OPGW cable & Accessories					
(i)	24Fibre (DWSM) OPGW fibre optic cable	Km	28	25	42	95
(ii)	Installation Hardware set for above 24 Fibre OPGW Fibre Optic cabling incl. all cable	Set*	28	25	42	95

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	fittings& accessories except Joint Box					
(iii)	Joint box (24 Fibre)	No.	10	8	14	32
(iv)	48 Fibre (DWSM) OPGW fibre optic cable	Km	1	1	3	5
(v)	Installation Hardware set for above 48 Fibre OPGW Fibre Optic cabling incl. all cable fittings& accessories except Joint Box	Set*	1	1	3	5
(vi)	Joint box (48 Fibre)	No.	1		1	2
B	FODP					
(i)	FODP 48F Indoor type, rack mounted with FCPC coupling and pigtails	No.	1	1	1	3
(ii)	FODP 96F Indoor type, rack mounted with FCPC coupling and pigtails	No.			1	1
C	Fibre Optic Approach Cable					
(i)	24 Fibre (DWSM)	Km	1	0.5	0.5	2
(ii)	Installation Hardware set for above 24 Fibre Fibre Optic Approach Cable	Set*	1	0.5	0.5	2
(iii)	48 Fibre (DWSM)	Km	0.5		0.5	1
(iv)	Installation Hardware set for above 48 Fibre Fibre Optic Approach Cable	Set*	0.5		0.5	1
III	Erection/Stringing and Commissioning					
(i)	Erection/Stringing and commissioning of 24F OPGW including laying, jointing, tensioning, termination with suitable patch cards and testing etc. with necessary accessories on live line duly dismantling earthwire	Km	945	813	1408	3166
(ii)	Erection/Stringing and commissioning of 48F OPGW including laying, jointing, tensioning, termination with suitable patch cards and testing etc. with necessary accessories on live line duly dismantling earthwire	Km	19	13	115	147
(iii)	Erection and commissioning of FODP 48F indoor type, rack mounted with FCPC coupling and pigtails	No.	24	30	44	98

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(iv)	Erection and commissioning of FODP 96F indoor type, rack mounted with FCPC coupling and pigtails	No.	5	2	8	15
(v)	Erection/Laying and commissioning of 24F Fibre Optic Approach Cable (DWSM) including HDPE Pipe	Km	26	20	30	76
(vi)	Erection/Laying and commissioning of 48F Fibre Optic Approach Cable (DWSM) including HDPE Pipe	Km	2.5	2	7.5	12

Note : (*)One set of Installation hardware shall contain all installation hardware fittings as may be required for 1 km of OPGW/Approach Fibre Optic Cable.

APPENDIX – C**Data Requirement Sheets**

The following sets of Data Requirement Sheets are required to be filled up by the bidders to aid in the evaluation process. The response shall be brief and to the point and shall be supported by the panted product description and other literature. The DRS duly filled and the relevant drawings shall also be submitted during the detailed engineering along with the relevant technical brochures.

DRS Form-1
Data Requirement sheets for Overhead Fibre Optic cable
OPTICAL GROUND WIRE (OPGW) - 24 Fibre:

Manufacturer :
 Part# :
 Configuration :

Cable Construction			
Seq	Parameter	As per Technical Specification	As per Bidder Offering
1.	Make & Model		
2.	No. of Fibres in OPGW	24	
3.	Mode	DW-SM	
4.	Buffer type	Loose	
5.	Buffer tube diameter	2.0 mm ± 0.05mm	
6.	Buffer tube material	PBT	
7.	No. of buffer tubes	4	
8.	No. of fibres per tube	6	
9.	Identification /numbering of individual tubes	Blue, Orange, Green and Brown	
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.	Aluminium clad steel wire (Diameter & number)10% IACS 20.3% IACS	2.24 mm & 12 Nos. 2.40mm & 12Nos.	
15.	Cable diameter	12.00 mm ± 0.5 mm	
16.	Cable cross section area	113 mm ²	
17.	Min. Breaking load /Ultimate Tensile Strength	81.00 k N	
18.	Fibre Strain margin	0.6%	
19.	Weight	475 kgs / km	
20.	Crush strength	1000 kg with a 10 cm ² piste	
21.	Modulus of Elasticity	103.4 kN / mm ²	
22.	Minimum bending radius	180 to 200 mm (Operation)	
23.	Maximum bending radius	250 mm (Installation)	
24.	Permissible CTS Tensile stress	0.669 k N / mm ²	
25.	Coefficient of inner expansion	15.3 X 10 ⁻⁶ Per °C	
26.	Coefficient of expansion Cladding Core	23 × 10 ⁻⁶ Per °C 11.5 × 10 ⁻⁶ Per °C	
27.	Nominal operating temperature range	- 10 °C to 70 °C	
28.	Short circuit current rating	≥6.32KA for 1 second	
29.	Maximum allowable temperature for lightning strike	200°C	
30.	Available length of cable per drum: Min Max	2500mtrs. 3500mtrs.	
31.	Splice loss (Max. & Min. allowable)	0.05 dB, 0.01dB	
32.	Operating Temperature range	- 10 °C to 70 °C	

33.	Expected Cable Life	40years	
Optical Parameters			
Seq	Parameter	As per Technical Specification	As per Bidder Offering
1.	Fibre Manufacturer(s)/Type:		
2.	Attenuation Coefficient @1310nm - @1550nm -	0.35 dB /km 0.21 dB /km	
3.	Attenuation variation With Wavelength (+/-5nm Temperature-	0.05 d B /km 0.05d B /km	
	Mode field diameter	9.2 ± 0.4 µm at 1310nm 10.4 ± 1.0 µm at 1550nm	
4.	Mode field non-Circularity	≤ 1%	
5.	Chromatic Dispersion At 1310 nm At 1550 nm	3.5 ps/ (nm.km) 18 ps/ (nm.km)	
Physical and Mechanical Properties			
6.	Core diameter	8.2 ± 0.4 µm	
7.	Core non circularity	≤ 1%	
8.	Cladding diameter	125 ± 1.0 µm	
9.	Core-Clad Concentricity Error	< 1µm	
10.	Cladding non circularity	≤ 1%	
11.	Protective coating type & material Primary Secondary	Acrylate Acrylate	
12.	Coating concentricity	≤ 10 µm	
13.	Colour coding scheme compliant with EIA395A/IEC3047	Yes	

DATA REQUIREMENT SHEETS FOR OVERHEAD FIBER OPTIC CABLE
OPTICAL GROUND WIRE (OPGW) – 48 Fibre

Manufacturer :
Part# :
Configuration :

Cable Construction			
Seq	Parameter	As per Technical Specification	As per Bidder Offering
1.	Make & Model		
2.	No. of Fibres in OPGW	48	
3.	Mode	DW-SM	
4.	Buffer type	Loose	
5.	Buffer tube diameter	2.2 mm ± 0.05mm	
6.	Buffer tube material	PBT	
7.	No. of buffer tubes	4	
8.	No. of fibres per tube	12	
9.	Identifiacation/numbering of individual tubes	blue, orange, green and brown	
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.	Aluminium clad steel wire (Diameter & number) 10% IACS 20.3% IACS	2.24 mm & 12 Nos. 2.50 mm & 12 Nos.	
15.	Cable diameter	12.40 mm ± 0.5 mm	
16.	Cable cross section area	120.5 mm ²	
17.	Min. Breaking load /Ultimate Tensile Strength	83 k N	
18.	Fibre Strain margin	0.6%	
19.	Weight	500 kgs / km	
20.	Crush strength	1000 kg with a 10 cm ² piste	
21.	Modulus of Elasticity	137.1 kN / mm ²	
22.	Minimum bending radius	180 to 200 mm (Operation)	
23.	Maximum bending radius	250 mm (Installation)	
24.	Permissible CTS Tensile stress	0.669 k N / mm ²	
25.	Coeffieicnt of inner expansion	15.3 X 10 ⁻⁶ Per °C	
26.	Coefficient of expansion Cladding Core	23 × 10 ⁻⁶ Per °C 11.5 × 10 ⁻⁶ Per °C	

27.	Nominal operating temperature range	- 10 °C to 70 °C	
28.	Short Circuit current rating	≥6.32KA for 1 second	
29.	Maximum allowable temperature for lightning strike	200°C	
30.	Available length of cable per drum: Min Max	2500mtrs. 3500mtrs.	
31.	Splice loss (Max. & Min. allowable)	0.05 dB, 0.01dB	
32.	Operating Temperature range	- 10 °C to 70 °C	
33.	Expected Cable Life	40 years	
Optical Parameters			
Seq	Parameter	As per Technical Specification	As per Bidder Offering
1.	Fibre Manufacturer(s)/Type:		
2.	Attenuation Coefficient @ 1310nm - @ 1550nm -	0.35 dB /km 0.21 dB /km	
3.	Attenuation variation With Wavelength (+/-5nm Temperature-)	0.05 d B /km 0.05d B /km	
	Mode field diameter	9.2 ± 0.4 μm at 1310nm 10.4 ± 1.0 μm at 1550nm	
4.	Mode field non-circularity	≤ 1%	
5.	Chromatic Dispersion At 1310 nm At 1550 nm	2.8 ps/ (nm.km) 18 ps/ (nm.km)	
Physical and Mechanical Properties			
6.	Core diameter	8.5 ± 0.7 μm	
7.	Core non circularity	≤ 1 %	
8.	Cladding diameter	125.0 ± 1.0 μm	
9.	Core-Clad Concentricity Error	< 1μm	
10.	Cladding noncircularity	≤ 1 %	
11.	Protective coating type & material Primary Secondary	Acrylate Acrylate	
12.	Coating concentricity	≤ 10 μm	
13.	Colour coding scheme compliant with EIA395A/IEC3047	Yes	

SECTION – VI
QUALIFICATION REQUIREMENTS
Bid.No. PMM41-e- /2024

1. **QR-Supply** : The bidder should be a manufacturer/authorised agent who must have designed, manufactured, tested and supplied to power utilities at least 40% of the tendered quantity for each Lot of the goods/equipment of same or higher voltage class as indicated in the “Schedule of Requirements” in one continuous period of 12 months in the last five years as on the date of opening of bid.
2. **QR-Performance**: At least 20% of the similar material offered for each Lot against each item as indicated in the ‘Schedule of Requirements’ should be in successful operation since two years as on the date of opening of the Bid.
3. **QR-Turnover**: The financial turnover of the bidder, during any one year of the last five years should have been equal or more than 100% value of the estimated contract value for each Lot.
4. **QR-Type Test Reports**: The bidder shall furnish Type Test Reports. The type tests must have been conducted on the material offered as per the relevant IEC/IS in recognized laboratory as per the latest revision of the relevant standards applicable and Technical Specification. The date of type tests shall not be later than **Five** years as on the date of bid opening. If any change in design was made latest type tests shall be furnished along with approved drawing. The Bids received without type test reports will be treated as Non-Responsive.
5. Class-I local suppliers are eligible for bidding as per the Public Procurement Policy-Make in India (PPP-MII orders).
6. The bidder should furnish the information on all past supplies and satisfactory performance as per proforma under Form-5 of Section-VII, along with documentary evidence in support of the same such as copies of purchase orders, invoices, delivery challans etc.
7. In case the bidder is an authorized agent, the erection/stringing, Testing and commissioning of OPGW cable and associated accessories shall be done under the supervision of manufacturer who has given Manufacturing Authorisation Form (Undertaking from the manufacturer in support of this shall be enclosed).
8. The bidder should furnish Mandatory Testing and Certification of Telecom equipment (MTCTE) from Department of Telecommunication, Government of India.
9. All bids submitted will also include the following information:
 - a) Copies of original documents defining the constitution or legal status, place of registration and principal place of business of the company or firm or partnership, etc.
 - b) The bidder should furnish a brief write-up, backed with adequate data, explaining his available capacity and experience (both technical and commercial) for the manufacture

and supply of the required equipment within the specified time of completion after meeting all their current commitments.

- c) The bidder should clearly confirm that all the facilities exist in his factory for inspection and testing and these will be made available to the purchaser or his representative for inspection.
 - d) Reports on financial standing of the Bidder such as profit and loss statement, balance sheets and auditor's report for the past three years, bankers certificates etc.
7. Even though the bidder meets the above qualifying criteria, they are subject to be disqualified if they have...
- a) made misleading or false representations in the forms statements and attachments submitted in proof of qualification requirements and / or,
 - b) record of poor performance such as not properly completing the contract, inordinate delays in supply completion, litigation history or financial failure etc.
8. Bidders should quote for 100% of the tender quantity against all the items indicated in the 'Schedule of Requirements' of Bid specification on single responsibility basis. Offers less than the prescribed quantity will be treated as non-responsive and liable for rejection.
9. Notwithstanding anything stated above the purchaser reserves the right to assess bidders' capability and capacity to perform the contract should circumstances warrant such an assessment in the overall interest of the Purchaser.
10. **Bidders shall also submit Affidavit of Self certification regarding Minimum Local Content, if applicable, duly signed and stamped on each page and Certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of Local Content, if applicable, duly signed and stamped on each page, in line with PPP-MII order and MoP Order.**

SECTION - VII
SAMPLE FORMS

FORM - 1 : QUALIFICATION & PERFORMANCE PARTICULARSBid Specification No. : **PMM41-e- /2024**Material Description : **Supply, Erection/Stringing & Commissioning of OPGW cable and associated accessories under PSD funding****I. Qualification Requirements as per Bid Specification:****For Lot-I : Vijayawada Zone**

S. No	QR		OPGW 24F & 48F of DWSM type	
			24F	48F
a)	Quantity as per schedule of requirement		973 km	20 km
b)	Supply	40%	389km	8 km
c)	Performance	20%	195 km	4 km
d)	Turnover	Rs. 29,51,83,282/-		
e)	Type Test Reports : Not earlier than Five years from the date of Bid opening			

For Lot-II: Vizag Zone

S. No	QR		OPGW 24F & 48F of DWSM type	
			24F	48F
a)	Quantity as per schedule of requirement		838 km	14 km
b)	Supply	40%	335km	6km
c)	Performance	20%	168 km	3 km
d)	Turnover	Rs. 25,27,32,215/-		
e)	Type Test Reports : Not earlier than Five years from the date of Bid opening			

For Lot-III: Kadapa Zone

S. No	QR		OPGW 24F & 48F of DWSM type	
			24F	48F
a)	Quantity as per schedule of requirement		1450 km	118 km
b)	Supply	40%	580km	47km
c)	Performance	20%	290 km	24 km
d)	Turnover	Rs. 46,93,74,546/-		
e)	Type Test Reports : Not earlier than Five years from the date of Bid opening			

II. Bidders past supply details to be furnished by the Bidder

Sl No	Particulars	Name of the Purchaser and quantity						Total
		(1)		(2)		(3)		
		Purchaser Name	Quantity	Purchaser Name	Quantity	Purchaser Name	Quantity	
	Quantity supplied during the last five years							
1.	2019							
	Supply Qty							
	Turnover Amount							
2.	2020							
	Supply Qty							
	Turnover Amount							
3	2021							
	Supply Qty							
	Turnover Amount							
4	2022							
	Supply Qty							
	Turnover Amount							
5	2023							
	Supply Qty							
	Turnover Amount							
6	Maximum supply in continuous 12 months period in last 5 years. From To							
7	Performance for similar eqpt. Qty							
8	Year of Type Test Reports enclosed							

- Note :
- 1) Documentary evidence in support of the above shall be furnished along with Bid. Month wise supply details for the above shall also be furnished.
 - 2) If any of the information furnished above is found to be false the firm will be debarred.
 - 3) If the Bidder has supplied to more than three purchasers to meet the qualifying requirement a separate sheet may be enclosed to include the other purchasers and total indicated.
 - 4) This above schedule shall be enclosed to the qualification bid.
 - ii) Place :
 - iii) Date
- Signature of Bidder :
Name in Capitals :
Designation :
Name of the firm :
Seal of the company :
Address of the Company :

2. BID SECURITY FORM

Whereas. (hereinafter called "the Bidder") has submitted its Bid dated (date of submission of bid) for the supply of.(name and /or description of the Materials / equipment) (hereinafter called "the Bid").

KNOW ALL PEOPLE by these presents that WE.(name of bank) having our registered office at.(address of bank)(hereinafter called "the Bank"), are bound unto.(name of Purchaser) (hereinafter called "the Purchaser") in the sum of _____for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this ____day of _____ 2024 .

THE CONDITIONS of this obligation are:

- 1. If the Bidder
 - a) withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or
 - b) does not accept the correction of errors in accordance with the Bid Specification, or
- 2. If the Bidder, having been notified of the acceptance of its bid by the Purchaser during the period of bid validity;
 - (a) fails or refuses to furnish the performance security, in accordance with the Bid Specification.
 - (b) fails or refuses to execute the Contract Form if required; or

We undertake to pay the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including sixty (60) days after(Specification Date) the period of the bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

.
(Signature of the Bank)

NOTE: This will be executed on a Rs.100/- non-judicial stamp paper issued by a scheduled Bank.

3. CONTRACT FORM

THIS AGREEMENT made the. day of. 2024 Between.(Name of Purchaser) of the one part and.(Name of Supplier) of the other part:

WHEREAS the Purchaser invited bids for certain Materials / equipment and ancillary services viz.,(Brief description of Materials / equipment and Services) and has accepted a bid by the Supplier for the supply of those Materials / equipment and services in the sum of.(Contract Price in Words and Figures)(hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions will have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.
2. The following documents will be deemed to form and be read and construed as part of this Agreement, viz.:
 - (a) the Bid Form and the Price Schedule submitted by the Bidder;
 - (b) the Schedule of Requirements;
 - (c) the Technical Specifications;
 - (d) the General Conditions of Contract;
 - (e) the Purchaser's Notification of Award.
3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Materials / equipment and services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Materials / equipment and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

Brief particulars of the Materials / equipment and services which will be supplied/ provided by the Supplier are as under:

Sl. No.	Brief Description of Materials / Equipment & services	Quantity to be supplied	Unit Price Rs.	Total Price Rs.	Delivery Terms

TOTAL VALUE: (Rupees _____ only)

DELIVERY SCHEDULE:

IN WITNESS whereof the parties hereto have caused this Agreement to be executed on the day and year first above written.

Signed, Sealed and Delivered by the said.(for the Purchaser) in the presence of.

Signed, Sealed and Delivered by the said.(for the Supplier) in the presence of.

NOTE: To be executed on a Rs.100/- Non-judicial stamp paper.

4. PERFORMANCE SECURITY FORM

To: _____(Name of Purchaser)

WHEREAS.....(Name of Supplier) (hereinafter called "the Supplier") has undertaken, in pursuance of Contract No.....dated.....2024 to supply.(Description of Materials / equipment and Services) (hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Supplier will furnish you with a Bank Guarantee by a recognized Bank for the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Supplier a Guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of. (Amount of the Guarantee in Words and Figures) and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the Contract and without cavil or argument, any sum or sums within the limit of..... (Amount of Guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the. ... day of. year.

Signature and Seal of Guarantors

.....
Date.2024.

.....
.....
Address:.....

.....
.....

NOTE: This will be executed on a Rs.100/- non-judicial stamp paper by a scheduled Bank.

5. PROFORMA FOR PERFORMANCE STATEMENT

Bid No. _____

Date of Opening _____

Time _____ Hours

Name of the Firm _____

Order placed by (full address of purchaser)	Order No. and Date	Description and quantity of ordered equipment	Date of Completion of Delivery	
			As per Contract	Actual

Remarks indicating reasons for late delivery, if any	Has the equipment been satisfactorily functioning? (Attach a Certificate from the Purchaser)

Signature of the Bidder _____

FORM 6 : DETAILS TO BE FURNISHED BY THE MANUFACTURER

1.	Specification No.	:	
2.	Name of the Material	:	
3.	Bidder's vendor Registration No. for this item	:	
4.	Quantity to be procured	:	
5.	Last date and time for submission of Bid	:	
6.	Date and time for opening of Bid	:	
7.	State whether Bid Security is enclosed or Permanent Bid Security available	:	
8.	Whether willing to furnish performance Security B.G. @ 10 % if order is placed	:	
9.	Whether a local SSI Unit/ Local Unit	:	
10.	Whether APTRANSCO delivery schedule accepted?	:	
11.	Prices whether variable / Firm	:	
12.	Whether any other tax / duty payable. If so give details and the same is included / not included.	:	
13.	State whether APTRANSCO terms of payment are accepted.	:	
14.	Quantity offered for supply	:	
15.	State whether 90 days validity offered	:	
16.	Whether sample is enclosed (if specified)	:	
17.	Whether the material / equipment offered conforms to the relevant APTRANSCO Specification	:	
18.	Whether you have executed orders of the APTRANSCO previously for these items. (Please give details)	:	
19.	Similar details in respect of supplies made to other utilities	:	
20.	Whether Bid Security exemption letter enclosed, if exempted.	:	
21.	Whether GST clearance certificate enclosed	:	
22.	Whether Income-tax clearance certificate Enclosed.	:	
23.	Furnish the max production capacity per month of your plant for each type of the quoted materials.		
24.	Whether APTRANSCO penalty clause accepted		
25.	Whether APTRANSCO Guarantee clause accepted		

**7. SCHEDULE OF DEVIATION
TECHNICAL**

Sl. No.	Requirements / Equipment	Specification Clause No.	Deviations	Remarks

It is hereby conformed that except for deviations mentioned above, the offer conforms to all the other features specified in Technical Specification Section ____ of this Bid Document

Place :

Signature of the Bidder :

Date :

Name :

Business address :

**SCHEDULE OF DEVIATION
COMMERCIAL**

Sl. No.	Requirements / Equipment	Specification Clause No.	Deviations	Remarks

It is hereby conformed that except for deviations mentioned above, the offer conforms to all the other features specified in Commercial Specification Section ____ of this Bid Document

Place :

Signature of the Bidder :

Date :

Name :

Business address:

8. DECLARATION FORM
UNDERTAKING TO BE GIVEN BY THE COMPANY / PARTNERSHIP FIRM / CONTRACTOR
ALONG WITH THE TENDER

(Regarding Relatives)

I, _____ representing the
 Company / Partnership Firm / Supplier responding to the bid invitation by the APTRANSCO / APEPDCL
 / APSPDCL / APNPDCCL / APCPDCL vide Specification No. _____
 hereby sincerely and solemnly affirm and state as follows:

(STRIKE OUT THAT WHICH IS NOT APPLICABLE)

(a) that myself or any of the representatives of my company / firm do not have any relatives as defined
 in the appended Annexure III in the APTRANSCO / DISCOM.

OR

(b) that the following officers / employees of the APTRANSCO / DISCOM are related to me and to
 the representatives of my company / firm and their status in the APTRANSCO / DISCOMS is as
 under:

Sl.No .	Name of the Officer Employee	Designation and Place of working	APTRANSCO / DISCOM	Relationship
1.				
2.				
3.				
4.				
5.				
6.				

It is certified that the information furnished above is true to the best of my knowledge and belief.

It is hereby undertaken that in the event of any of the above information found to be false or incorrect at
 the later dated the APTRANSCO / DISCOM is entitled to terminate the contract / agreement entered into
 besides recovering damages as may be found necessary, with due notice.

Signature of the Authorised Representative

**9. DECLARATION TO BE GIVEN BY THE COMPANY / PARTNERSHIP FIRM / SUPPLIER
AT THE TIME OF ENTERING INTO AGREEMENT WITH APTRANSCO / DISCOMS:**
(STRIKE OUT THAT WHICH IS NOT APPLICABLE)

- (a) I declare that myself or any one of the representative of my company / firm do not have any relatives as defined in the appended annexure II in the APTRANSCO / DISCOM.

OR

- (b) that the following officers / employees of the APTRANSCO / DISCOM are related to me and to the representatives of my company / firm as mentioned hereunder:

Sl.No	Name of the Officer Employee	Designation and Place of working	APTRANSCO / DISCOM	Relationship
1.				
2.				
3.				
4.				
5.				
6.				

It is certified that the information furnished above is true to the best of my knowledge and belief.

It is hereby undertaken that in the event of any of the above information found to be false at the later dated the APTRANSCO / DISCOM is entitled to terminate the contract / agreement entered into besides recovering damages as may be found necessary, with due notice.

Signature of the Authorised Representative

LIST OF RELATIVES:

- | | |
|---------------------------------------|--------------------------------------|
| 1. Father | 14. Daughter's Husband |
| 2. Mother (including step mother) | 15. Daughter's Son |
| 3. Son (including step son) | 16. Daughter's Son's Wife |
| 4. Son's Wife | 17. Daughter's Daughter |
| 5. Daughter (including step daughter) | 18. Daughter's Daughter's Husband |
| 6. Father's Father | 19. Brother (including step brother) |
| 7. Father's Mother | 20. Brother's Wife |
| 8. Mother's Mother | 21. Sister (including step sister) |
| 9. Mother's Father | 22. Sister's Husband |
| 10. Son's son | 23. Son's Wife's Father |
| 11. Son's Son's Wife | 24. Son's Wife's Mother |
| 12. Son's Daughter | 25. Daughter's Husband's Father |
| 13. Son's Daughter's Husband | 26. Daughter's Husband's Mother |
- } and their siblings

10. FORM : : BANK ACCOUNT DETAILS FOR RTGS

1. Name of the Bank :
2. Name of the Branch :
3. Branch code :
4. City :
5. Account No.
6. MICR No.
7. IFSC No.
8. Income Tax PAN Number :
9. GST Registration Number :
10. Date of GST Registration :
11. Place of GST Registration :

Signature of the Bidder

11. MANUFACTURERS' BIDDING AUTHORISATION FORM

No. _____ dated

To

Dear Sir,

SPECIFICATION No. PMM41-e- /2024

We _____ (Name & complete Address) who are established and reputable manufacturers of _____ (Name & descriptions of Materials / equipment offered) having factory at _____ (address of factory) do hereby authorize _____ (Full name and Designation) whose specimen signature is attested here under to submit the bid, and sign the contract with you for the above Materials / equipment manufactured by us against the above Specification No..

Specimen Signature

Yours faithfully,

(Name)

(Name of manufacturers)

Note: This letter of authority should be on the letterhead of the manufacturer .It should be included by the Bidder in its bid.

The Bidder's complete postal address and their factory complete postal address with phone and fax numbers shall be invariably mentioned in the above proforma.

.....

FORM - 12

**UNDERTAKING TO BE GIVEN BY THE COMPANY ALONG WITH THE BID REGARDING
BANNING/BLACK LISTING**

I, _____ representing
the Company responding to the bid invitation by the APTRANSCO vide Specification No.
_____ hereby sincerely and solemnly affirm and state as follows:

- (a) We, _____ (Name of Company) or our
promoter's firm(s) have not been banned/ black-listed/debarred by any Govt. Department/
undertaking or Power Utility for non-performance or malpractice or due to any reasons.

It is certified that the information furnished above is true to the best of my knowledge and belief. It is hereby
undertaken that in the event of any of the above information found to be false or incorrect at the later dated,
the APTRANSCO / DISCOM is entitled to terminate the contract / agreement entered into besides recovering
damages as may be found necessary, with due notice.

Signature of the Authorised Representative

13. FORM: : BANKERS CERTIFICATE

TO WHOM SO EVER IT MAY CONCERN

This is to certify that M/s. _____,
having their plant at _____ is our customers
and have satisfactory record of transactions. They are having the credit limits of
Rs. _____ lakhs in our Bank.

Place:
Date:

Signature of the Manager
Name:
Bank address and Seal.

FORM-14

Format for Affidavit of Self certification regarding Local Content in line with PPP-MII order and MoP Order, if applicable, to be provided on a non-judicial stamp paper of Rs. 100/-.

Date:

I _____ S/o, D/o, W/o, _____ Resident of _____ hereby solemnly affirm and declare as under:

I am the << Designation of the Authorized signatory >> of _____ and I am duly authorized to furnish this undertaking declaration on behalf of -----

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Order, 2017 of Government of India issued vide Notification No:P-45021/2/2017 -BE-II dated 15/06/2017, its revision dated 04/06/2020(hereinafter PPP-MII order).

‘Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content)’ order dated 28/07/2020 issued by Ministry of Power (hereinafter MoP order) and Revised on 17/09/2020 in respect of Power Sector.

Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content), Further Revised Order No. A-1/2021-FSC-Part(5) dt. 16/11/2021 issued by Ministry of Power (MoP Order) .

As per Orders vide G.O.Ms.NO.9, Industries and Commerce (PROG-I) Department Dt.25.02.2021

and any subsequent modifications/Amendments, if any and

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity/ POWERGRID or any other Government authority for the purpose of assessing the local content of goods/services/works supplied by me for (Enter the name of the package).

That the local content for all inputs which constitute the said goods/services/works has been verified by me and I am responsible for the correctness of the claims made therein.

That the ‘Local Content ‘as defined in the PPP-MII order and MoP order in the goods/services/works supplied by me for (Enter the name of the package/procurement) is percent (%).

That the goods/services/works supplied by me for (Enter the name of the package/ procurement) meet the ‘Local Content’ requirements defined in the PPP-MII order and MoP order for ‘Class -I local supplier’/‘Class-II Local supplier (choose as applicable).

That the value addition for the purpose of meeting the ‘Local Content ‘has been made by me at (Enter the details of the location(s) at which value addition is made).

That in the event of the local content of the goods/services/works mentioned herein is found to be incorrect and not meeting the prescribed Local Content criteria, based on the assessment of procuring agency (ies)/ APTransco/Government Authorities for the purpose of assessing the local content, action shall be taken against me in line with the PPP-MII order, MoP order and provisions of the Integrity pact/ Bidding Documents.

8875035/2024/EEPR4-ENE51

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authority.

i Name and details of the Local Supplier

(Registered Office, Manufacturing unit location, nature of legal entity)

ii. Date on which this certificate is issued

iii. Goods/services/works for which the certificate is produced

iv. Procuring entity to whom the certificate is furnished

v. Percentage of local content claimed and whether it meets the Local Content prescribed for '**Class -I local supplier**'/'**Class-II Local supplier** (*choose as applicable*)

vi. Name and contact details of the unit of the Local Supplier (s)

vii. Sale Price of the product

viii Ex-Factory Price of the product

ix. Freight, insurance and handling

x. Total Bill of Material

xi List and total cost value of input used to manufacture the Goods/to provide services/in construction of works

xii. List and total cost of input which are domestically sourced. Value addition certificates from suppliers, if the input is not in-house to be attached

xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of..... (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)

<Insert Name, Designation and Contact No.>

FORM-15

Certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of Local Content, in line with PPP-MII order **and MoP order** , if applicable[*to be submitted on the letter head of the issuer.*]

Dear Sir,

We have read and understood the provisions of “Public Procurement (Preference to Make in India) Order, 2017” dated 15/06/2017, its revision dated **04/06/2020**[hereinafter, “PPP-MII Order”] issued by **Department for promotion of Industry and Internal Trade (DPIIT)**, Ministry of Commerce and Industry, Government of India,

‘Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content)’ order dated 28/07/2020 issued by Ministry of Power [hereinafter, “MoP order”]

As per Orders vide G.O.Ms.NO.9, Industries and Commerce (PROG-I) Department Dt.25.02.2021

and any subsequent modifications/ Amendments, if any.

In line with the provisions of the PPP-MII Order **and MoP Order**, M/s.[*Enter the name of the Bidder*] [here in after, **“Class-I Local Supplier”/“Class-II Local Supplier”(choose as applicable)**] have submitted an Affidavit of self-certification to M/s. APTRANSCO regarding Local Content in Goods/Services/Works to be supplied by the **“Class-I Local Supplier”/“Class-II Local Supplier”(choose as applicable)**for [*Enter the name of the package*], wherein they have agreed to abide by the terms and conditions of the PPP-MII Order **and MoP Order**.

Further, in line with the PPP-MII Order, the statutory auditor or cost auditor of the company (**in the case of companies**) or a practicing cost accountant or practicing chartered accountant (**in respect of suppliers other than companies**) shall provide a certificate giving the percentage of Local Content in the Goods/Service/Works to be supplied by the **“Class-I Local Supplier”/“Class-II Local Supplier”(choose as applicable)**for [*Enter the name of the package*].

Accordingly, we, the Statutory Auditor(s) / Cost auditor of the **“Class-I Local Supplier”/“Class-II Local Supplier”/** a practicing cost accountant or practicing chartered accountant [*choose as applicable*], certify that the Local Content as defined under the PPP-MII **and MoP Order**, in the Goods/Service/Works to be supplied by the **“Class-I Local Supplier”/“Class-II Local Supplier”(choose as applicable)**for [*Enter the name of the package*]is percentage [*specify the percentage of Local content*].

For and on behalf of,

Date:

<<Statutory Auditor’s/Cost auditor’s/ Cost accountant’s/Chartered accountant’s attestation>>

Firm Reg No. Membership No.

Note: This is a guiding format. In case the bidder submits the certificate in a format different from the above, the same may be considered provided it meets the intent and purpose, as may be ascertained by APTRANSCO.

FORM-16

Certification by the Bidder per order no. F.No.6/18/2019-PPD dated 23/07/2020 issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India(DoE Order) in line with NIB 19.0

(In case of a Joint Venture bid, declaration/certification shall be given by the by all partners of the Joint Venture)

- Bidder’s Name and Address:
- To:
- Name:.....
- Name:.....
- Address:.....
- Address:.....
-
-
-

Dear Sir,

We have read and understood the provisions of Order no. F.No.6/18/2019-PPD(Order Public Procurement no.1) dated 23/07/2020 regarding “Restriction under Rule 144(xi) of General Financial Rules” and F.No.6/18/2019-PPD (Order Public Procurement no.2) dated 23/07/2020 regarding “Exclusions from Restriction under Rule 144(xi) of General Financial Rules” issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, Government of India [hereinafter collectively “DoE Order”] and any subsequent modifications/ Amendments, if any.

Particularly, we, the Bidder, have read the clause regarding restrictions on procurement from a ‘Bidder of a country which shares a land border with India’ and on sub-contracting to contractors from such countries.

We certify that we, the bidders/are not from such a country or, if from such a country, has been registered **as per provisions of the Bidding Documents** with the Competent Authority and will not sub contract any work to a sub contractor/sub vendor from such countries unless such sub contractor/sub vendor fulfils all requirement in this regard and is eligible to be considered. [*Where applicable, evidence of valid registration by the Competent Authority shall be attached.*]

We further declare that any misrepresentation or submission of false/forged document/information in this regard shall be dealt with as per the provisions of Integrity Pact and/or Bidding Documents and/or APTRANSCO’s policy and procedures.

- Date:
- Printed Name:
- Place:
- Designation:

SECTION-VIII**General guidelines to be Followed.**

1. The bidder shall have to be an entity registered in India in accordance with law.
2. The bids shall be in the language as prescribed by the tenderer /procurer.
3. The bids shall be in Indian Rupees (INR) (in respect of local content only).
4. The bidder shall follow Indian laws, regulations and standards.
5. The technologies /products offered shall be environmentally friendly, consuming less energy safe, energy efficient durable and long lasting under the prescribed operational conditions.
6. The supplier shall ensure supply of spares, materials and technological support for the entire life of the project.
7. Minimum local content requirement for goods, services or works shall be in accordance with the conditions laid down in respective order(s) of the sectors on Public Procurement (Preference to make in India) to provide for purchase preference (linked with local content).
8. The equipment/material sourced from foreign companies may be tested in accredited labs in India before acceptance wherever such facilities are available.
9. The tender fee and the Bank Guarantee (BG) shall be in Indian Rupees only.
10. The bidder shall have to furnish a certificate regarding cyber security/safety of the equipment/process to be supplied/services to be rendered as safe to connect.
11. Applicable safety requirements shall be met. Regular safety audit shall be carried out by the manufacturer.
12. Statutory laws/regulations including the labour and environmental laws shall be strictly complied with during supply, storage, erection/stringing, commissioning and operation process. A regular compliance report shall be submitted to the procurer/appropriate authorities.
13. Formation of new joint venture in India shall be permitted only with the Indian companies.
14. Tendering by the agent shall not be accepted.
15. In case local testing is not considered necessary by the procurer, the original test report in the language prescribed by the procurer may be accepted. The translated test report shall not be accepted unless it is notarized.
16. Certificate/compliance as per the Indian Standards/International standards/Indian Regulations /specified standards shall be mandatory, wherever applicable.
17. Quality assurance of the product shall be carried out by the procurer or an independent third-party agency appointed by the procurer. Manufacturing quality plan as approved by the procurer shall be followed by the manufacturer.

LIST OF SCHEDULED BANKS APPROVED BY APTRANSCO	
Sl. No.	NAME OF THE BANK
1	Central Bank Of India.
2	Federal Bank, Hyderabad.
3	Bank Of India, Hyderabad.
4	Bank Of Baroda, Hyderabad.
5	Punjab National Bank Secunderabad.
6	APCO. Bank, Hyderabad.
7	Allahabad Bank, Hyderabad.
8	Indian Overseas Bank, Hyderabad.
9	Bank Of Maharashtra, Hyderabad.
10	Central Bank Of India, Hyderabad.
11	Andhra Bank, Hyderabad.
12	Corporation Bank, Hyderabad.
13	Syndicate Bank, Hyderabad.
14	Karur Vysya Bank, Secunderabad.
15	Oriental Bank Of Commerce, Hyderabad.
16	Lakshmi Vilas Bank, Hyderabad.
17	U.T.I. Bank Ltd., Hyderabad.
18	I.D.B.I. Bank, Hyderabad.
19	Vijaya Bank, Hyderabad.
20	Standard Chartered Bank, Hyderabad.
21	I.C.I.C.I. Bank, Hyderabad.
22	ING Vysya Bank Ltd., Hyderabad.
23	Union Bank Of India, Hyderabad.
24	Bank Of Punjab Ltd., Secunderabad.
25	Indian Bank, Hyderabad.
26	Centurion Bank Ltd., Hyderabad.
27	YES Bank Ltd., Hyderabad.
28	HDFC Bank, Secunderabad.
29	Kotak Mahindra Bank, Hyderabad.
30	State Bank Of India
31	HSBC, Hyderabad.
32	Citi Bank, Hyderabad.