

Section-1

Introduction, General Information and General Requirement

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Section 1

Introduction, General Information and General Requirement

This part of the Tender Documents describes the technical specifications of OPGW and associated hardware & fittings including joint box etc. This specification describes the functional and performance requirements of the system.

This part of specification describes the functional and performance requirement of the Fibre Optic cable and its associated hardware & fittings.

1.1 Scope and General Requirements

The scope of OPGW requirement is described as follows:

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

- (i.) 24F OPGW cable/ 48F OPGW Cable
- (ii.) All associated hardware, fittings and accessories (Tension assembly, Suspension assembly, Vibration dampers, Reinforcing rods, Earthing clamps, Downlead clamps etc.) required for installation of OPGW cable.
- (iii.) Joint box for above OPGW cable
- (iv.) Fibre Optic approach cable including associated installation material (as required if specified in BoQ).
- (v.) Underground Fiber Optic cable(UGFO)/All Dielectric Self Supporting(ADSS) cable including installation material, accessories and fixtures
- (vi.) Fibre Optic Distribution Panels (FODP) (as required if specified in BoQ).

The various Sections of this specification define the design, performance, test and implementation requirements for OPGW Cable system.

1.2 General Requirements

The Contractor must conform to the requirements and provide any special equipment necessary to meet the requirements stated herein.

It should be noted that parameters for OPGW cable design has been specified in the tender. Standard OPGW designs are to be used for various voltage levels & wind zones of transmission lines that are mentioned at Section-02 of Technical Specifications . In case of constraints in adopting standard design for any of the transmission line(s) or for any specific sections such as higher spans (>600m), Valley crossings, snow covered sections or for other voltage levels & wind zones etc., the Contractor may propose customized design(s) during detailed engineering to meet the requirement.

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

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.

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.

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 tests and field testing wherever required.

1.2.1 General Technical Requirements

List of items, goods, services or works from Class-I Local supplier meeting the Minimum Local Content notified in Annexure-1 of Ministry of Power (MoP) order on 'Public Procurement (Preference to Make In India) to provide for purchase preference (linked with local content) in respect of Power Sector ' dated 16.11.2021 is enclosed at Appendix-J to this Technical Specifications.

List of items, goods, services or works from Local supplier meeting the Minimum Local Content notified in Table-A, B & C of Department of Telecommunications(DoT), Ministry of Communications order dated 29.08.2018 on 'Public Procurement (Preference to Make In India) Order 2017 –Notification of Telecom products, Services or Works – regarding “ is enclosed at Appendix-K to this Technical Specifications.

Fibre Optic Cable

Fibre Optic Approach Cable and Under Ground Fibre Optic Cable shall be offered from a manufacturer(s) **who is a “Local Supplier” as per latest DPIIT and DoT notification.**

Aerial Fibre Optic (ADSS) Cable manufacturer

The Aerial Fibre Optic cable shall be offered from a manufacturer(s) who is a “Local Supplier” as per latest DPIIT and DoT notification and has been manufacturing Aerial Fibre Optic cable for the last three (3) years and at least 100 Km of Aerial Fibre Optic cable manufactured by such manufacturer(s) shall have been in satisfactory operation for at least two (2) years as on the date of bid opening.

Provision to be complied as per latest guidelines of GOI/ MOP/DPIIT/DOT.

- 1) Mandatory Testing and Certification of Telecom Equipments (MTCTE) under Indian Telegraph(Amendment) Act, 2017 : Mandatory Testing and Certification of Telecom Equipment (MTCTE)' under the provision of Indian Telegraph (Amendment) Rules 2007 shall apply on all equipment to be supplied under subject Package. Contractor has to supply only certified equipment as per MTCTE. Please refer the weblink

<https://www.mtcte.tec.gov.in> for more details

2) The Contractor shall ensure following things and at their own cost,:-

- (i) *Any imported equipment/material/item/parts/component to be supplied under the contract shall be tested in the certified laboratories to check for any kind of embedded malware/trojans/cyber threats and for adherence to Indian Standards as per the directions issued by Ministry of Power/Govt. of India from time to time. In case of such import from specified “prior reference” countries, the requirement of prior permission from the Govt. of India including protocol for testing in certified and designated laboratories by Ministry of Power/Govt. of India shall also be complied with by the contractor.*
- (ii) *The equipment offered by the contractor shall at least conform to the requirements specified under relevant IS standard. In case of discrepancy between IS and other international standard, provisions of IS shall prevail. The Contractor shall also note that the list of standards presented in this specification is not complete. Whenever necessary, the list of standards shall be considered in conjunction with specific IS. If the IS standard is not available for an equipment/material, then other applicable International standard (IEC/Equivalent), as per the specification, shall be accepted.”*
- (iii) *The bidder/contractor shall list out the products and components producing Toxic e-waste under the contract and shall furnish to the Employer the procedure of safe disposal at the time of closing of the contract.*
- (iv) *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.*

1.3 Organization of the Technical Specification Document

Section 3 through 4 and Appendices provide the project requirements of the fibre optic cabling system to be provided.

<u>Section 2</u>	contains specifications for OPGW cabling & associated hardware & fittings
<u>Section 3</u>	contains the requirement for Inspection & Testing requirement
<u>Section 4</u>	contains the Support Services & documentation
<u>Section 5</u>	contains specifications for ADSS

Technical Specifications for UGFO is also provided.

The following is a list of the Appendices:

<u>Appendix A</u>	- General Information
<u>Appendix B</u>	- Data Requirement Sheets (DRS)
<u>Appendix C</u>	- Guidelines for Live Line Installation
<u>Appendix D</u>	- Guidelines for Off Line Installation
<u>Appendix E</u>	- Splicing Guide Lines
<u>Appendix F</u>	- Type Test Procedure
<u>Appendix G</u>	- FAT Procedure
<u>Appendix H</u>	- SAT Procedure

- Appendix I - Guidelines for Approach Cable Installation
Appendix J - Annexure-1 of Ministry of Power (MoP) order on 'Public Procurement (Preference to Make In India)
- Appendix K - Table-A, B & C of Department of Telecommunications(DoT), Ministry of Communications order dated 29.08.2018 on 'Public Procurement (Preference to Make In India)

1.4 Applicable Standards

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

(1) **American Society for Testing and Materials ASTM**

ASTM-B415 Standard Specification for Hard-Drawn Aluminium-Clad Steel Wire

(2) **Bell Communication Research**

GR-20 Generic requirements for optical fibre and optical fibre cable

(3) **ITU-T/CCITT Recommendations**

G.650 Definitions and test methods for the relevant parameters of single-mode fibres

G.652 Characteristics of a single-mode optical fibre cable

(4) **IEEE**

IEEE-1138, 2021 IEEE Standard for Testing and Performance for Optic Ground Wire (OPGW) for Use on Electric Utility power Lines

(5) **Telecommunication Industry Association EIA/TIA**

EIA/TIA-455-3 Procedure to Measure Temperature Cycling Effects on Optical Fibres, Optical Cable, and Other Passive Fiber Optic Components

EIA/TIA-455-16 Salt Spray (Corrosion) Test for Fibre Optic Components

EIA/TIA-455-20 Measurement of Change in Optical Transmittance

EIA/TIA-455-25 Repeated Impact Testing of Fibre Optic Cables and Cable Assemblies

EIA/TIA-455-32 Fibre Optic Circuit Discontinuities

EIA/TIA-455-33 Fibre Optic Cable Tensile Loading and Bending Test

EIA/TIA-455-41 Compressive Loading Resistance of Fibre Optic Cables

EIA/TIA-455-59 Measurement of Fibre Point Defects Using an OTDR

EIA/TIA-455-62 Measurement of Optical Fibre Macrobend Attenuation

EIA/TIA-455-78 Spectral Attenuation Cutback Measurement for Single- Mode Optical Fibres

EIA/TIA-455-80 Measurement of Cut-Off Wavelength of Single-Mode Fibre

	by Transmitted Power
<i>EIA/TIA-455-81</i>	Compound Flow (Drip) Test for Filled Fibre Optic Cable
<i>EIA/TIA-455-82</i>	Fluid Penetration Test for Fluid-Blocked Fibre optic Cable
<i>EIA/TIA-455-91</i>	Fibre Optic Cable Twist-Bend Test
<i>EIA/TIA-455-164</i>	Single-Mode Fibre, Measurement of Mode Field Diameter by Far-Field Scanning
<i>EIA/TIA-455-167</i>	Mode Field Diameter Measurement, Variable Aperture Method in the Far-Field
<i>EIA/TIA-455-168</i>	Chromatic Dispersion Measurement of Multimode Graded Index and Single-Mode Optical Fibres by Spectral Group Delay Measurement in the Time Domain
<i>EIA/TIA-455-169</i>	Chromatic Dispersion Measurement of Single-Mode Optical Fibres by the Phase-Shift Method
<i>EIA/TIA-455-170</i>	Cable Cut-off Wavelength of Single-Mode Fibre by Transmitted Power
<i>EIA/TIA-455-174</i>	Mode Field Diameter Measurement
<i>EIA/TIA-455-175</i>	Chromatic Dispersion Measurement of Single-Mode Optical Fibres by the Differential Phase-Shift Method
<i>EIA/TIA-455-176</i>	Method of Measuring Optical Fibre Cross-Sectional Geometry by Automated Grey-Scale Analysis
<i>EIA/TIA-598</i>	Optical Fibre Cable Colour Coding

(6) International Electrotechnical Commission IEC standards

<i>IEC-60793-1 series</i>	Optical fibres – Generic & product specifications, measurement methods & test procedures specification
<i>IEC-60794-1-1</i>	Optical fibre cables – Generic specification
<i>IEC-60794-1-2</i>	Optical fibre cables – Basic optical cable test procedure
<i>IEC-60794-3</i>	Optical fibre cables – Duct, buried and aerial cables – sectional specification
<i>IEC-60794-4</i>	Optical fibre cables – Overhead cables
<i>IEC-61089</i>	Round wire concentric lay overhead electrical stranded conductors
<i>IEC-61232</i>	Aluminium-clad steel wires for electrical purposes
<i>IEC-61284</i>	Overhead lines-Requirements and tests for fittings
<i>IEC-61395</i>	Overhead electrical conductors – Creep test procedures for stranded conductors

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 specifications are more stringent than those specified by the standards, the specification shall override the standards.

1.5 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
-**End of this section**.....