Chapter-03

Installation for OPGW Cabling

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3.1 OPGW cable installation requirements

The OPGW cable shall be installed at the top of the tower by replacing the existing ground wire in case of existing lines and in place of earthwire in case of lines under construction. 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 which shall be decided during detailed engineering. After the installation of OPGW cable, the Earthwire wherever removed shall have to be handed over to Employer at their store.

After installation of OPGW cable, the testing of each section shall be carried out in presence of Employer representative. In case of any damage/high loss in the fibre, the total length of that particular section of OPGW cable shall be replaced.

3.1.1 Installation

OPGW installed under live line condition, i.e. with all circuits charged to the rated line voltage 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 fibre optic cable handling. The stringing procedure shall be submitted by the Contractor prior to stringing for Employer's approval.

OPGW to be installed on 33kV lines shall be provided with suitable standard hardware fittings for clamping with the tower. Contractor to offer appropriate design for 33kV hardware fittings during detail engineering and same shall be finalised & approved by Employer as per suitability.

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 (if applicable) with the OPGW cable, the tower members remain within the 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.

3.1.2 Installation Hardware

All required hardware's shall be installed alongwith OPGW Cable.

3.2 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 installation of approach cables shall be supplied and installed by the Contractor.

3.3 Optical Fibre Termination and Splicing

Optical fibre terminations shall be installed in Fibre Optic Distribution Panels (FODP) designed to provide protection for fibre splicing of preconnectorized pigtails 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.

3.4 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 pre-connectorized pigtails and fitted to the "Back-side" of the provided fibre optic couplings.

(b) Flexible protection shall be provided to the patch cord bunches going out from FODP to other equipment.

3.5 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 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 damaged section shall be replaced.

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.

3.6 Cable Raceways

To the extent possible, existing cable raceways shall be utilised. The Contractor is required to provide and install any additional indoor cable raceways which may be required for proper implementation of the fibre optic cabling system. This requirement shall be finalised 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 anti-corrosion 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.

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