Appendix-D

GUIDELINES FOR OPGW CABLE OFF-LINE INSTALLATION

1.General

Installation procedure for OPGW is basically similar to that for conventional overhead ground wires in overhead transmission line construction, however particular care required to be taken for protection of optical fibers in OPGW cable from damage by handling the same properly during transportation , unloading and installation at site. Off line installation to be carried out using power operated winch machines and pulley blocks on each tower using experienced installation team comprising of minimum 25 persons. The installation team shall have one team leader/crew in-charge along with 15 skilled and 10 unskilled persons minimum in one installation crew.

List of Tools and Plants to be used are as per enclosed Annexure.

Following aspects are to be kept in mind before taking up live-line installation:

a) Tools and Plant suitability
b) Working conditions, specially following:

- Strong winds more than 7 m/sec
- Rain or snow
- Foggy
- Lightening

2. Safety **measures**

All site workers must follow the Electricity Rules and Employer specified safety procedures. They must use safety belts, safety shoe, safety helmet and other safety items required.

Assign foremen/Crew In-charge for each erection crew for enforcing installation guidelines. It may be ensured that only authorized person is climbing the tower during live-line installation of OPGW. Fix the warning red flag on the tower, in order to keep the workers from encroaching into unsafe zones.

2.1 Permission **to Work (PTW) :**

Permit to work to be obtained by the representative of installation agency from concerned sub-station staff in coordination with employer project manager prior to commencement of installation in case of power line crossings and the same is to be returned after completion of the work in all respect within the specified time duly following the PTW conditions.

2.2 Preparedness to tackle untoward incidents:

a) Safety Engineer has to make sure the availability of First Aid Box with each team. b) Maintain a record of the details of list of all nearby hospitals/clinics in each area, with contact details and Emergency contact nos. of Ambulances.

c) In case of any untoward situation, Safety engineer/crew incharge must act fast and provide the necessary first aid to the affected person(s). Ambulance to be arranged immediately from the nearby area and coordinate with hospital for immediate medical assistance as required.

3. Off-line Installation Process

3.1 Installation plan:

Following measures are to be taken in advance for smooth completion of the installation.

- Coordination with employer project manager
- Erection crew mobilization along with T&Ps
- Safety aspects
- Field quality aspects
- Transportation arrangement

3.2 Materials handling:

Check the material with respect to the approved documentation. All materials shall be visually examined for any physical damage. Any material, which is not as per documentation or is damaged, shall not be used.

OPGW Drums checks:

- Packing condition
- Packing list (Object, Type, Length, OPGW Weight, Drum No. etc)
- Attenuation results of OPGW

Hardware Fittings Checks:

- Bolts, Nuts Pitch
- Type & Quantity

Handling of OPGW:

OPGW contains optical fibers which are very delicate and to be handled with due care. For the safety of optical fibers, it is very important to avoid the bending at sharp angle. Manufacturer guidelines are to be followed strictly while handling the same.

In order to avoid undue tension on OPGW, it is not recommended to pay off OPGW together with phase conductors or other wires tied in parallel. The tension during stringing works should be well managed within permissible limits.

Adequate length of OPGW shall be ensured as loop at each joint location after stringing so that it is possible to bring OPGW up to the ground level for carrying out jointing work.

4. OPGW Stringing

- Hang the pulley blocks on one of the earth wire peaks for the whole section (Section is a consecutive group of towers needed to support the installation of scheduled length of OPGW Drum)
- Carry out paying of pilot wire for entire section and connect the same with OPGW on drum side and winch machine on other side suitably.
- Pull the Pilot Wire with the use of winch machine to pay out the OPGW.
- Maintain proper tension while pulling OPGW so as to avoid damage to fibers inside the OPGW. In no case pulling tension should exceed 15 % of UTS of OPGW.
- **Set the Come-along and Lever Block to the OPGW.**With this OPGW paying fora section gets completed.

5. OPGW sagging

Use the pre-calculated Sag & Tension Table as sag reference. Avoid fixing the sag if the wind is strong.

5.1 Sagging:

1) Methods and procedures for sagging of OPGW are the same as those of normal overhead ground wire.

After stringing the OPGW shall be sagged using information furnished on the sag and tension chart. The sag of the OPGW should not exceed the existing

ground-wire sag.

3) Sagging thermometers shall be used to determine accurate temperature and OPGW sag of each sag section. Sagging thermometer shall be used sufficiently prior to the actual sagging operation to represent the temperature of the OPGW.

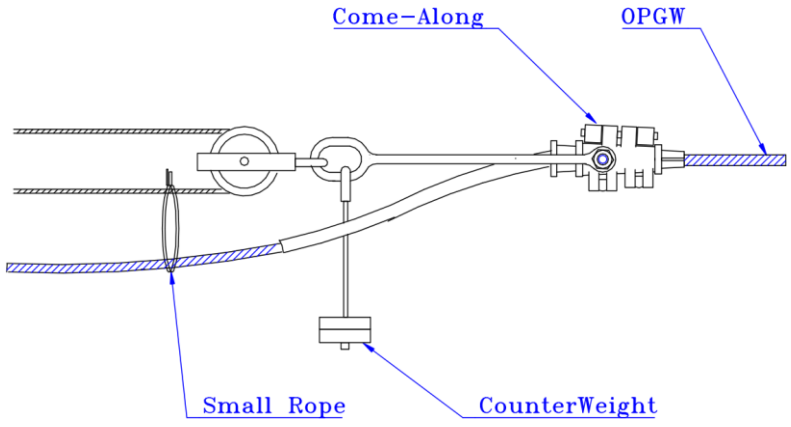
5) At the time of sagging OPGW, the sag should be within 6 inches of the theoretical value for existing temperature condition.

7) OPGW tension between each sag section shall be equalized and this shall be determined by the vertical position of the suspension clamps on the last clipped structure of the preceding sag section.

8) For pulling the OPGW with tension, the device of come-along is to be recommended.

9) Personnel should be specifically deployed for keeping watch on sag at a different section of the line during stringing.

10) Waterproof caps shall be fixed at both ends of the OPGW cable after installation.

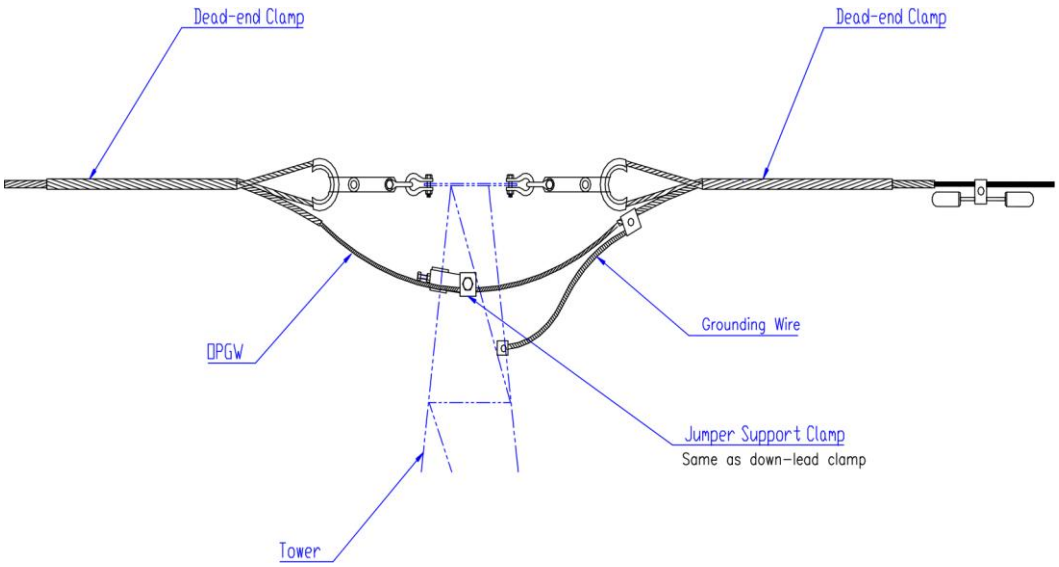


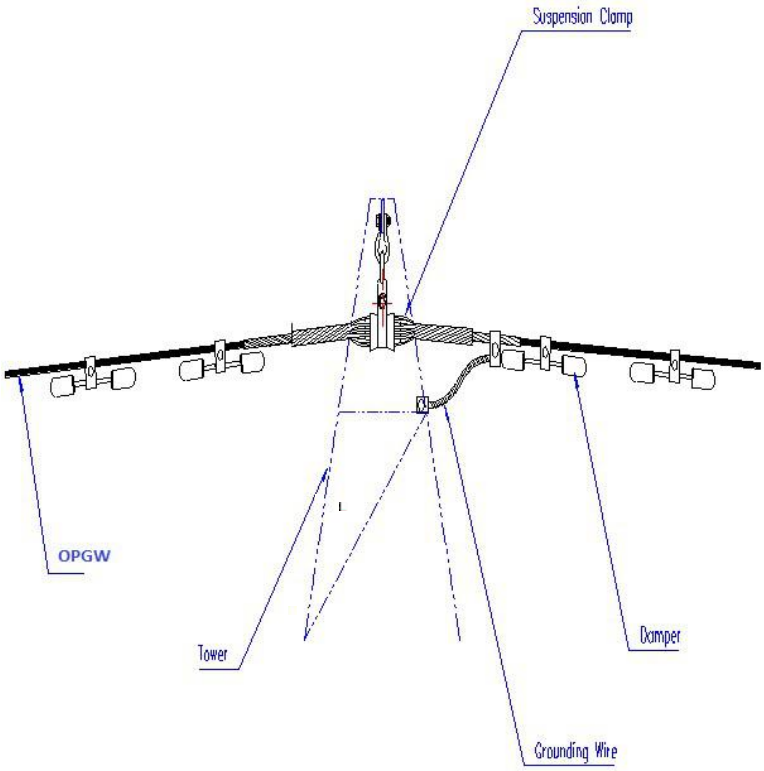
6. OPGW Clamping

6.1 Make sure to install and tighten the bolt of clamp properly.

6.2 Tightening must be made sequentially from the support point.

TENSION TOWER





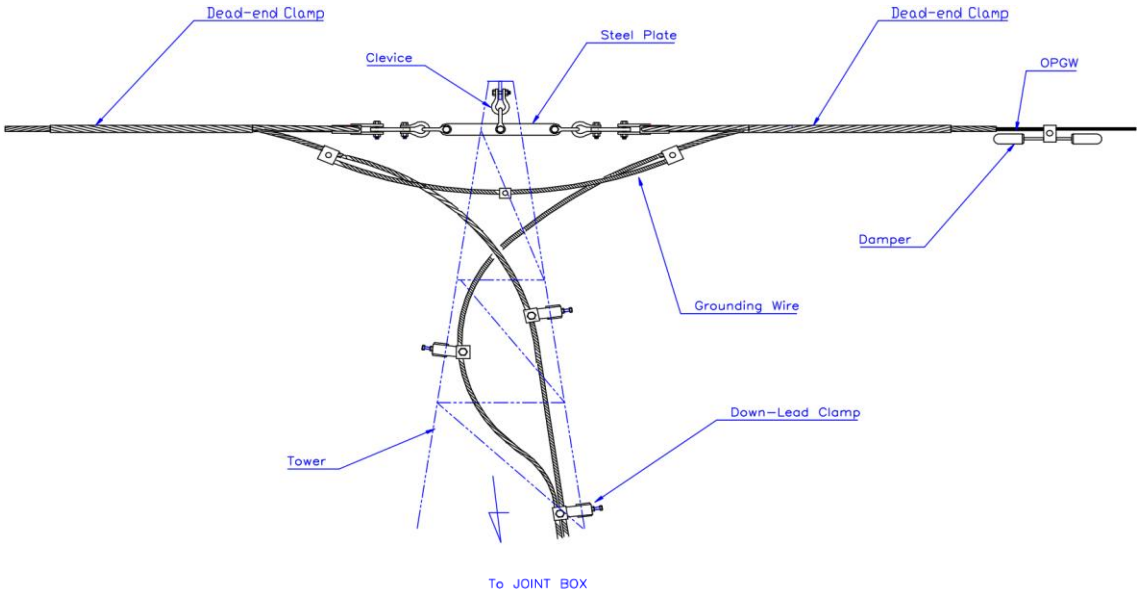
7. OPGW down Leading

7.1 Make sure to clip the OPGW with down lead clamp to the tower in a careful manner.

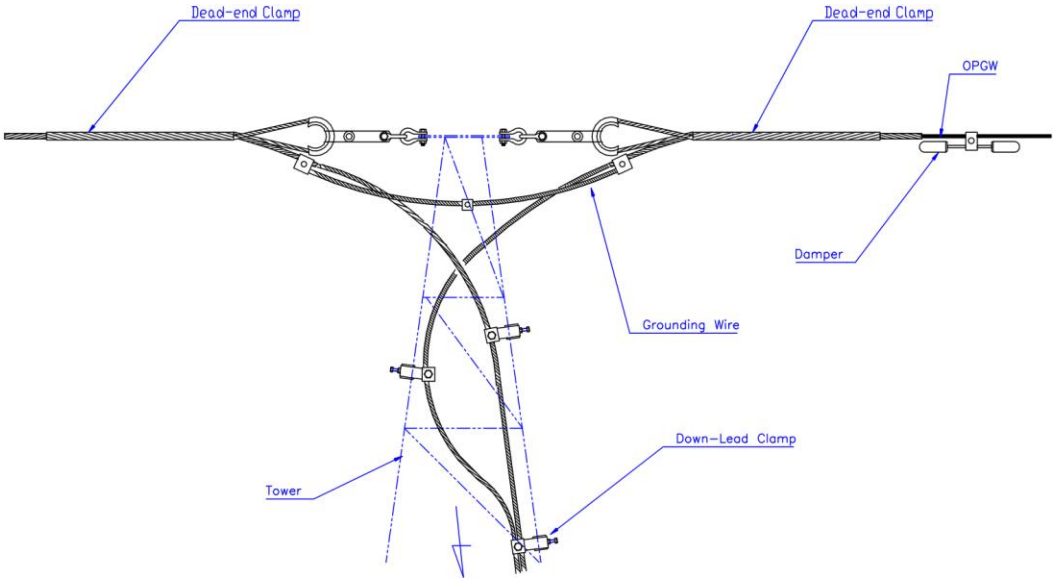
7.2 Make sure to tighten the bolt of down-lead clamp properly.

7.3 Install the down-lead clamp at appropriate interval .

SUSPENSION TOWER FOR JOINTING TOWER



TENSION TOWER OF JOINTING TOWER



Annexure-1

List of Tools:

S. No	Description	Specifications
01	Pulley block(Aluminum roller) 300 mm	20 Nos
02	Pulley block(Aluminum roller) 450 mm	20 Nos
03	Pulley block(Aluminum roller) 600 mm	6 Nos
04	Pilot Wire (14 mm)	1000 M
05	Pilot Wire (16 mm)	7000 M
06	Pilot Rope 12 mm Nylon Rope	600 M
07	Earthing roller	3-way roller
08	Winch machine (3 Tons)	2 Nos
09	Drum stand	2 sets
10	Reel winder	6 Nos
11	Come along clamp	8 Nos
12	Torque Wrench (1 Ton)	2 Nos
13	Running Board (20 Kg)	4 Nos
14	D-shackle	30 Nos
15	Snatch Block (1 way 2 ton)	8 Nos
16	Snatch Block (2 way 2 ton)	4 Nos
17	Chain Block (3 Ton)	4 Nos
18	Wire Connector	20 Nos
19	Braid Clamp	6 Nos
20	Wire Clamp	20 Nos
21	Swivel (3 ton)	10 Nos