

1. General

The purpose of the document is to provide general installation instructions of Fig8 Cables using Telenco's cable accessories on existing poles.

Each installation condition must be considered according climatic respective climatic zone.

Please refer to safety regulation proper for respective country.

This recommendation concern Self Supporting cables.

2. Safety recommendation

- Use appropriate protective gloves (leather, rubber gloves etc)
- Use a safety harness, safety body belt, support tether, anti-fall tether etc. to reduce the rick of falling and injuries.
- Inspect the poles for deteriorations, inadequate unfixed wires, presence of unsheathed power wires etc.
- Avoid exhausts of equipment engines towards work places
- Keep away from equipment under tension
- Climbing with accuracy on poles or ladder. Keep hands free of tools or materials.
- Do not step on existing poles equipment or cables.
- Be careful and use isolation equipment in case of installations on electrical lines.
- Use road signs to be visible in case work over roads

3. Specific of Optical cables

Fiber optic cable is sensitive to excessive pulling, bending, torsion and crushing forces.

The cable drums must be handled transported, stored only on vertical position.

Doing so may cause damage of optical fibers or can alter the transmission characteristics of the cable. In this case the cable may have to be replaced.

If the cable must be unreeled during installation, use the figure-eight configuration to prevent kinking or twisting.

4. Hardware Telenco

See the different types of fiber optic cables are available on markets Telenco have developed several dead-ends and suspension sets. In order to use the most adapted solutions it is necessary to select the proper one for the cable design and spans.

The installer must know the following elements:

- nominal OD and weight of the cable
- spans length

The cable is tensioned and terminated into dead-end fittings. The cable between dead-ends, on the intermediate poles, is installed on permanent suspension fittings.

On offsets:

- ⇒ Line offset from 0 up to 20° (horizontal or vertical) suspension set to be used.
- ⇒ Line offset beyond 20° (horizontal or vertical) or at the ends of the cable: dead-end set to be used.

Because the intermediate poles are not configured for lateral stress the gradual tensioning is required. In this case the so-called “false dead-end” are used to maintain in tension the cables.

Conventional rules for quantities estimation of the set:

On 1/5 of poles – should be used dead-ends: on end of line one set per pole and on false-dead end two sets per pole.

On 4/5 of poles – should be used suspension sets : one set per pole.

Specific of Telenco fittings:

Easy

Telenco anchoring clamps installation procedures are basic, which reduces possible misuse or risks of injuries during installation. Because this technology is so easy to use it can be quickly introduced with installation teams at no training cost and without radically changing other working practices.

Quick

By using Telenco anchoring clamps you can cut down installation times to just few seconds. Just forget the time usually spent to prepare the cable (separation and stripping of the messenger) and the use of tools like spanners, knives, cable strippers...

Safe

No cutting tools are required when using Telenco clamps to secure the cables, thus reducing the risks of injuries for the linemen, of faulty installations and of damage to the cables. Also there is no need to cut the messenger, which means its electrical continuity is preserved.

Reliable

Tests carried out in laboratories have proved that Telenco clamps offer a great protection of figure-8 cables against wind induced vibrations, thus improving the reliability of aerial telecom networks.

Savings

In installation time, training time, products, maintenance...

Please contact your Telenco's sales representative for fitting recommendation.

5. Tensioning

CALCULATION FORMULA FOR TENSION LOAD OF CABLES

$$Tension = \frac{Weight \times (Span)^2}{8 \times Sag}$$

Tension (in daN or kg) :	Average calculated tension load in the cable.
Weight (in kg/m) :	Weight of one meter of the cable for which the tension is calculated. This data is available from the cable manufacturer.
Span (in m) :	Average distance between two poles on the network.
Sag (in m) :	Average sag on the network, as decided in the installation methods book for a given temperature of installation. Usually the average sag is set up at 1% of the average span at 15 or 20°C. For instance, given an average span of 50 meters, the sag would be 0.5 m.

Example :

Cable weight : 0.2 kg/m

Average span : 50 m

Sag : 1% of the span for an installation temperature of 20°C, so 50/100 = 0.5 m

The tension of installation of this cable at 20°C would be :

$$T = \frac{0,2 \times 50 \times 50}{8 \times 0,5} = 125 \text{ daN}$$

Note :

This tension load is calculated for the average temperature of installation (20°C).

If the temperature is higher, the tension load should be reduced.

If the temperature is lower, the tension load should be increased.

6. Aerial cable installation methods

6.1 Stationary Reel Method

This method is used when the cable is installed on existing poles by the way of temporary cable pulley/rollers. The pulleys are first installed on poles consoles or temporary pole consoles. Next, a pull rope is installed through the pulleys and attached to the outside end of the cable using a swivel and a cable pulling-grip. The pull rope is then used to pull the cable through the pulleys into position. (See Fig1)

When the cable is in place between splice points, the cable is tensioned at each dead-end pole. The cable spans are then lifted out of the temporary pulleys and placed in suspension clamps at each intermediate pole.

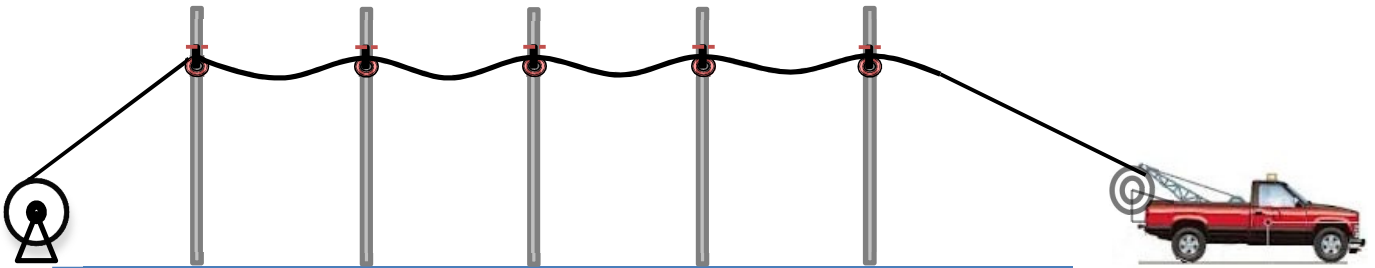
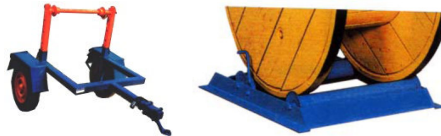


Fig 1 : Stationary Reel Method

Steps:

1. Install the poles brackets (UPB) on dead-end poles and temporary pulley set (THB) or suspension console (CS+BQC12x50 or CS1500) on intermediate poles. Once bracket installed, hang the pulleys. On corner and angle poles adequate size of pulleys shall be used to respect the bending radius of the cable.
2. A non-metallic pulling rope or winch line rope shall be passed through the pulleys. The rope can be passed in the pulleys in the same time with installation of pulleys.
3. Place the cable drum in line with the poles to allow the natural payoff of cables. Keep a distance about the double of the height of cable installation position. The unwinding of cable by the top of drum is suitable. The cable drum can be installed on the drum trailer or on reel unrolls.



4. Install the pulling grip on the cable, mount the swivel and attach the pulling rope. Enrolling with tape of the cable grip is recommended. (See Fig. 2)



Fig 2: Cable grip and swivel

5. Start the pulling slowly. Use the tension-limiting winch or dynamometer to survey the pulling force is recommended.
6. Once the cable in place install the first dead-end (Anchoring clamp) adjust the tension on next pole with dead-end and then install the second one dead-end. (See Fig.3). After installation of dead-ends the pulleys shall be removed.

Warning: Tension measurement is critical for right and safety installation of cable.

7. Return on poles with suspension clamps and secure the cable in suspension clamps. Then remove the suspension pulley.
8. Conserve a cable over length on cable storage brackets FOSB to allow the cable splicing on the ground. The length depending of the installation height or project requirements.

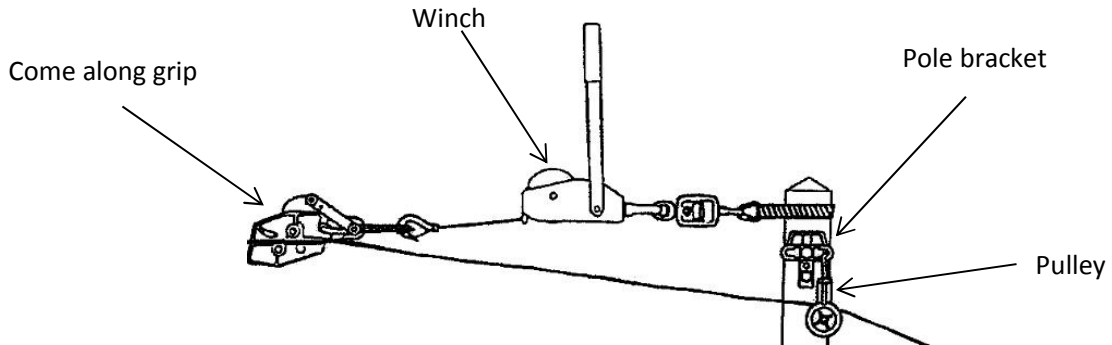


Fig 3 : Tension adjustment

Note: During pulling the personnel must survey the entire pull route. Provide a means of communication.

6.2 Moving Reel Method

Moving reel method permit the payoff of cable directly from moving of cable drum placed on vehicle or drum trailer. This method has advantages over the stationary reel method in that temporary cable blocks and pulling rope in some situations are not required (See Fig. 4). But in case of obstructions (trees, road crossing etc.) on the line the combination of the booth methods should be not excluded. The vehicle with cable drum passes poles by poles the cable is placed on suspension clamps (J hook type) or suspension pulleys (for other types). When the vehicle reach the pole with dead-end the tension is adjusted (See Fig .3) and the cable is secured in dead-end. After cable tensioning cable is secured on intermediate poles in the suspension clamps.

Warning: Do not forget survey the minim bending radius of the cable.

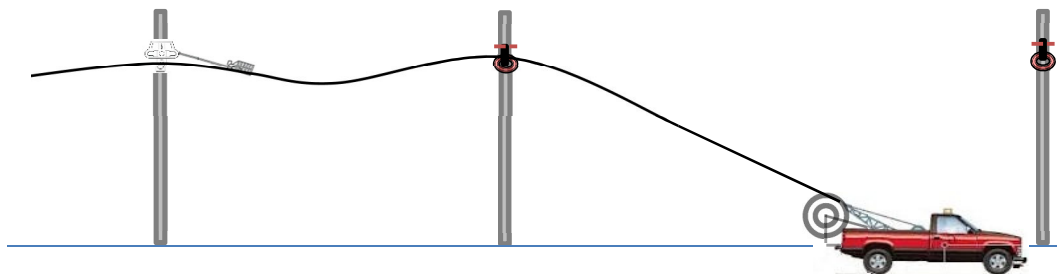


Fig 4: Moving reel method

7. Slack storage

Slack cable allow reserve additional length of cable to be used on futures line extend duty to civil works (road extend etc.), to repair in case accidents and for cable splicing.

Consider the slack location on line route in terms of cable ends, in-line closures and distribution closures. Closure place must be chosen to be easy accessible.

Slack cable length must permit reach the splice location on the ground and the fiber reserve on the closure.

The specific Telenco slack cable storage system FOSB (90x90cm) allow the cable storage respecting bending radius of most commonly used cables.

