# Technical description
# For a full dielectric aerial cable
# To be installed on concrete poles of 11.4 kV overhead lines
# Containing standard singlemode optical fibers

Our proposed offer is in full compliance with ITU-T G. 652 and annexes.
The offered cable is fully compliant to the relevant IEC specifications, especially IEEE P 1222.

A technical comment is prepared for optical fiber cables having the following characteristics:

**Cable design:**

- 12 SM-fibers.
- Operating wavelength at 1310 nm and 1550 nm.
- Non metallic strength and anti-buckling element.
- Loose buffer tubes SZ-stranded.
- Buffer tubes fully filled.
- Dry cable core: waterswellable elements over the cable core.
- Inner PE-sheath.
- Dielectric strength members.
- Outer PE-jacket.
- Suitable as: full dielectric aerial cable.

**Cable type:** A-DQ2Y(ZN)2Y 2x6 E9/125 0.36F3.5 + 0.22H18 LG

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## Optical and mechanical characteristics of a standard single mode fiber

| | |
|---|---|
| Mode field diameter (1310 nm) : | 9.2 μm ± 0.4 μm |
| Mode field diameter (1550 nm) : | 10.4 μm ± 0.8 μm |
| Cladding diameter : | 125 μm ± 0.7 μm |
| Mode field concentricity error: | ≤ 0.8 μm |
| Cladding non circularity : | ≤ 1 % |
| Refractive index profile : | step |
| Design : | matched cladding |
| Effective group index of refraction $N_{eff}$ (at 1310nm): | 1.4677 |
| Effective group index of refraction $N_{eff}$ (at 1550nm): | 1.4682 |
| Cut off wavelength of cabled fiber : | ≤ 1260 nm |
| | |
| Attenuation at 1310 nm : | ≤ 0.36 dB/km |
| Attenuation at 1550 nm : | ≤ 0.22 dB/km |
| Dispersion in the range 1288 to 1339 nm : | ≤ 3.5 ps/nm x km |
| Dispersion at 1550 nm : | ≤ 18 ps/nm x km |

### Core material

The core of the optical fiber, with a higher refractive index compared to the cladding, is made of $SiO_2$ (Silicon dioxide) doped with $GeO_2$ (Germanium dioxide).

### Cladding material

The cladding of the optical fiber is made of $SiO_2$ (Silicon dioxide).

### Type of primary coating

The primary coating is made of an UV-curable acrylate. It is applied in two layers, each of a different Young's modulus. The inner layer is somewhat softer than the outer one.
This make-up protects the fiber against microbending losses and against abrasion.

**Fiber colour coding:**

fiber-# 1 : blue
fiber-# 2 : yellow
fiber-# 3 : green
fiber-# 4 : red
fiber-# 5 : purple
fiber-# 6 : white

### Dimension of primary coating

The dimension of the primary coating is 245 ± 10 micron.

## Mechanical characteristics of the primary coating

The primary coating is easily strippable by means of a mechanical stripping tool.
No chemicals are required.

## Mechanical characteristics of fiber

Proof test stress: 8 N for 1 second ; strain: 1 %. Breaking strength of fiber at least: 150 N/mm²

## Loose buffer tube technique

In the losse buffer tube technique the primary coated fiber is accommodated in a secondary coating, called buffer tube. The buffer may contain one or more fibers, which are loosely laying in the tube. The tube is filled with a paraffin oil based non-hygroscope, non-nutritive fungus, electrically non-conductive, homogenous gel in order to prevent water penetration and migration. The gel will be free from dirt and foreign matter and is easily removable with conventional non-toxic solvents.

The losse buffer techniwue is also coping best to temperature induced contractions or dilatations of the cable. The structure also provides good protection against transverse compression.

As a result the whole cable construction is, within a wide range, insensitve to external influences.

## Reverse lay (SZ) stranding

The elements (loose buffer tubes and if necessary filling elements) are stranded around a central member according to the reverse lay method, which means, that the direction of stranding reverses after a predetermined number of revolutions. At the reverse point the elements are laying parallel to the axis of the cable.

A binder is wound around the elements in order to retain them in the proper position.

## Cable core

Around a dielectric central member made of fiber reinforced plastic, buffer tubes and filling elements are stranded to form the core of the cable. The central member serving mainly as anti-buckling element will be coated with a PE-jacket, if this is required to obtain the correct stranding radius.
The buffer tubes contain up to 12 fibers and are filled with a paraffine oil based filling compound.

| | |
|---|---|
| **Colour coding:** | buffer tube-# 1 : blue |
| | buffer tube-# 2 : yellow |

Due to stranding of the buffers an overlength of about 0,3 to 0.5 % is produced. (The overlength depends on stranding radius, tube diameter and lay length).
That means, if a tensile force is applied to the cable and hence to the core, an elongation in a wide range will not result in fiber-strain and no attenuation increase is observed.

**Cable make up**

Waterswellable elements are placed over the cable core on order to block any possible water ingress. Over the cable core an inner PE-sheath (nominal thickness 1.0 mm) is extruded. The polymer shall not promote the growth of fungus and shall be free of holes, splits and blisters.

Around the inner PE-sheath dielectric yarns are wrapped to provide the required tensile strength.

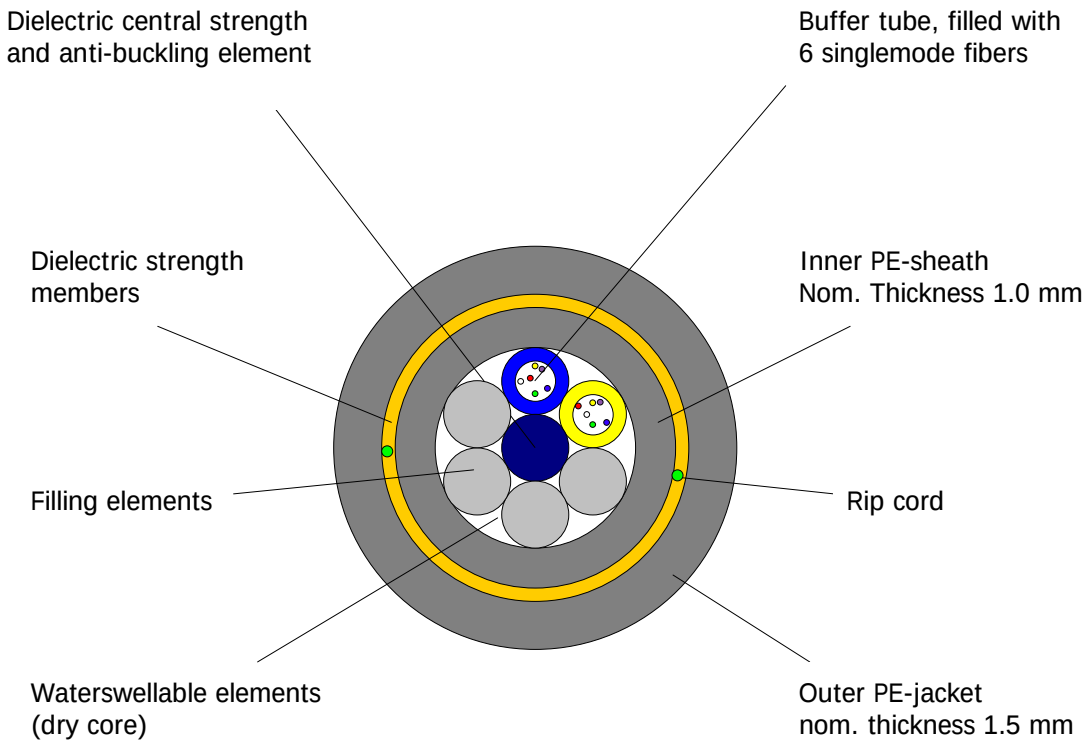
Finally an outer black PE-jacket (nominal thickness 1.5 mm) is extruded. The polymer shall contain carbon black for ultraviolet light protection and shall not promote the growth of fungus and shall be free of holes, splits and blisters.

The cable marking: CORNING 12C ADSS 2003 TPC XXXX(continue meter)

**Technical characteristics:**

| **Cable type : A-DQ2Y(ZN)2Y** | | |
|---|---|---|
| **fiber count** | | 12 |
| Diameter (D) approx. | [mm] | 12.5 |
| Weight approx. | [kg/km] | 160 |
| Min. bending radius | | |
| - during installation | [mm] | 450 |
| - installed | [mm] | 150 |
| Tensile strength | | |
| - max. Operating stress | [N] | 3600 |
| - every day stress | [N] | 1700 |
| - installation | [N] | 6800 |
| Compressive stress/crush (Attenuation increase fully reversible) | [N/10cm] | 2000 |
| Impact resistance (E=3 Nm, r = 300 mm) (Attenuation increase fully reversible) | [impacts] | 3 x1 |
| Operating temperature range | [°C] | -30...+70 |
| Installation temperature range | [°C] | -5...+50 |
| **Cable Data** | | |
| Cable Cross-Sectional Cross Area | (mm2) | 122.7 |
| Nominal Breaking load | (kN) | 32 |
| Cable Modulus of Elasticity | (GPa) | 14.8 |
| Co-efficient of Linear Expansion | 10^-6/℃ | 6.5 |
| Strain window | (%) | 0.44 |
| Fibre Proof Strain | (%) | 1.0 |
| **Every Day Stress Conditions:** | | |
| % Sag for Stringing all Spans | | 1.0 |
| Cable Temperature | (℃) | 25 |
| Wind Speed | (m/sec) | 60 |
| Span length | (m) | Under 100 |
| Max EDS tension as %BL | | 22 |
| **Worst Case Loading Limitations:** | | |
| Maximum Allowed Fibre Strain | (%) | 0.00 |
| Maximum Allowed Tension as percentage of BL | (%) | 21.8 |
| Maximum Allowed Sag as percentage of span | (%) | 3.0 |

**Cable Cross-Section**




| | |
|---|---|
| Outer diameter approx.: | 12.5 mm |
| Weight approx.: | 160 kg/km |

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