

Technical description For a fully dielectric duct cable Containing enhanced standard single mode fibers

Our proposed offer is in full compliance with ITU-T G.652D and annexes.
The offered cable is fully compliant to the relevant IEC specifications, especially IEC 60793-1,2, IEC 60794-3.

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

Cable design:

- 6, 12 SMF 28-eTM -fibers with reduced OH- peak.
- Operating wavelength at 1310 nm and 1550 nm.
- Central buffer tube design.
- Buffer tube fully filled.
- Dielectric strength members.
- Non metallic strength members over the core.
- Outer PE-jacket.
- Suitable as: fully dielectric duct cable

Cable type:

A-DQ(ZN)2Y	1x6 E9/125 0.36F3.5 + 0.22H18
A-DQ(ZN)2Y	1x12 E9/125 0.36F3.5 + 0.22H18



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**Optical and mechanical characteristics of an enhanced single mode fiber SMF 28e™
- low water peak fiber -**

Mode field diameter (1310 nm):	9.2 $\mu\text{m} \pm 0.4 \mu\text{m}$
Mode field diameter (1550 nm):	10.4 $\mu\text{m} \pm 0.8 \mu\text{m}$
Cladding diameter:	125 $\mu\text{m} \pm 0.7 \mu\text{m}$
Mode field concentricity error:	$\leq 0.5 \mu\text{m}$
Cladding non circularity:	$\leq 1 \%$
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:	$\leq 1260 \text{ nm}$
Coating diameter:	245 $\mu\text{m} \pm 5 \mu\text{m}$
Attenuation at 1310 nm *):	$\leq 0.36 \text{ dB/km}$
Attenuation at 1383 nm (OH-peak):	$\leq 0.36 \text{ dB/km}$
Attenuation at 1550 nm *):	$\leq 0.22 \text{ dB/km}$
Dispersion in the range 1288 to 1339 nm:	$\leq 3.5 \text{ ps/nm} \times \text{km}$
Dispersion at 1550 nm:	$\leq 18 \text{ ps/nm} \times \text{km}$

*) measured values

Core material

The core of the optical fiber, with a higher refractive index compared to the cladding, is made of SiO₂ (Silicon dioxide) doped with GeO₂ (Germanium dioxide).

Cladding material

The cladding of the optical fiber is made of SiO₂ (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 : red	fiber-# 7 : grey
fiber-# 2 : green	fiber-# 8 : violet
fiber-# 3 : yellow	fiber-# 9 : black
fiber-# 4 : blue	fiber-# 10 : orange
fiber-# 5 : brown	fiber-# 11 : turquoise
fiber-# 6 : white	fiber-# 12 : pink

Dimension of primary coating

The dimension of the primary coating is 245 $\mu\text{m} \pm 5 \mu\text{m}$.

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.

Central buffer tube technique

In the loose 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 compound in order to prevent water penetration and migration.

In the central buffer tube, the fibers are incorporated with a defined excess length. That means, if a tensile force is applied and hence to the buffer tube, an elongation in a wide range will not result in fiber strain and no attenuation increase is observed.

The loose buffer technique 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, insensitive to external influences.

Cable make up of fiber optic cable

Around the central buffer tube dielectric strength members are applied.

Around the cable core aramid yarns will be wrapped to provide the required tensile strength.

Finally an outer PE jacket (nominal thickness 1.6 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.

Technical characteristics:

**Cable type : A-DQ(ZN)2Y
fiber count**

		6, 12
Diameter (D) approx.	[mm]	9.4
Weight approx.	[kg/km]	64
Min. bending radius		
- during installation	[mm]	215
- installed	[mm]	190
Tensile strength		
- short term (during installation)	[N]	1000
- long term (installed)	[N]	600
Compressive stress/crush	[N/10cm]	2500
(Attenuation increase fully reversible)		
Impact resistance (E=30 Nm, r = 300 mm)	[impacts]	1
(Attenuation increase fully reversible)		
Operating temperature range	[°C]	-20...+60
Installation temperature range	[°C]	-5...+50

Cable Cross-section

