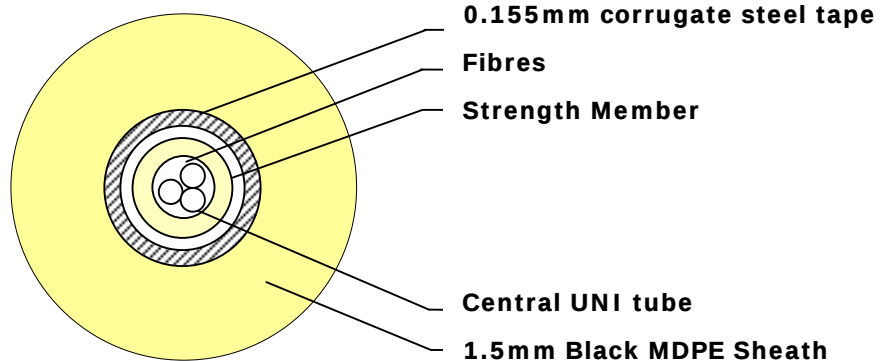


**Cable Specification
2-24 fibre optical cable
UNI tube design**

Corrugated steel armouring tape, 1.5 mm black MDPE Sheath



Application:

- LAN backbones
- Outdoor direct burial
- Tunnels
- Conduits

General

This specifying covers optical cables with 2-24 optical fibres of UNI tube construction; the cable is armored thus making it suitable for installation outdoors in harsh environment

The cables have the following type designation according to DIN/VDE
A-D (ZN) B 2Y n, n is 2 to 24

Cable construction

Optical Fibers

The cable can be supplied with fibers according to Fiber specifications C01 (50um) and C02 (62,5 um) as well as SM fiber with the following attenuation values:

- At 1310 nm max 0.40 dB/km
- At 1550 nm max 0.35 dB/km

Other properties according to fibre Specification C03

The fiber are individually coded for easy identification

The coding is given in "General information Fibre colors and color coding": Sheet B07

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Cable Core

The cable core consists of a central, jelly filled, green polyester tube with the fibres contained within, The tube is water blocked, The tube has an outer diameter of 2.8 mm for cables with up to 16 fibres and 3.5 mm for cables with 18-24 fibres

A layer of strength members is applied over the tube.

The cable sheath consist of a 0.155 mm thick corrugated steel tape armouring, and a 1.5 mm thick black MDPE sheath, The black MDPE is stabilised using 2.5 % carbon black, Futher information regarding the sheathing materials is given in General information sheet B05 " Sheathing types "

Cable properties

The physical properties of the cables are given in table 1 below

Sheath

Table 1: Physical properties

Property	Reference According to IEC 794-1	Reference According to EN 187 000	Value
Nominal outer diameter	-	-	2-16 fibers: 8.6mm 18-24 Fibres:9.5mm
Nominal weight	-	-	2-16 Fibres :60 kg/km 18-24 Fibres:70 kg/km
Tensile strength (dynamic)	E1	501	1000N
Tensile strength (permanent)	E1	501	500N
Compressive strength (Crush)	E3	504	2000N
Impact	E4	505	10Nm
Torsion	E7	508	5cycles+- 1um
Kink	E10	511	The Cables do not form at kink when a loop is drawn together to a diameter of 100mm
Min Bending radius, unloaded	E11	513	R=55mm
Min Bending radius, loaded	-	-	R=110mm
Temperature range	F1	501	Storage and Installation – 40c to 70c Operation :-40 c to 70c The max attenuation variation in the operational temperature range is For M6 and M5 fibres : 0.5dB/km For SM fibres : 0.2dB/km

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Fiber Specification

62.5 um Fibre (M6), Standard properties

General:

The fibre type is a Graded index Multimode Fibre ; dual coated with acrylate coating. The fibre has good transmission properties at 850 nm and at 1300nm.

This fibre fulfils a number of national and international standards, among them are the following.

- IEC 793-2: 1998 Category A1b;
- EN 188202: 1995 (type A1b);
- NF C 93-842 (type A1b);
- EIA /TIA -492AAAA-A

When cabled, the fibres fulfils the requirements for use in a number of cabling systems, among them are:

- ANSI X3 166-1990. (FDDI).
- IEC 9314-3; (FDDI)
- EN 50173
- IBM Fiber Optic Channel Links; ESCON and coupling facility channel (Jumper and trunk cable up to 2 km only)
- ISO/IEC 11801: 1995
- IEEE 802.3:1998 (1000 Base-FX) "Gigabit" Ethernet;

Fibre testing methods are in accordance with the following standards;

- IEC 60793-1
- EN 188 000

Geometrical properties:

Nominal core diameter; 62.5 um

Core diameter tolerance; +-2.5 um

Cladding diameter; 125 um

Cladding diameter tolerance; +-2.0 um

Core concentricity error; Max 1.5 um

Cladding non-circularity: Max 1%

Diameter of outer coating layer; 245 um

Tolerance of coating layer diameter; +-10 um

Coating concentricity error; Max 12.5 um

*Without colouring layer

Materials:

Core Germanium doped core.

Coating

UV-curable dual layer acrylate coating, which ensures excellent microbending and abrasion resistance. Excellent static fatigue resistance.

Stripping force after conditioning at 23+-5C at 40-60% RH for 24 h.Min:1.0

N,Max:3.5N

Stripping force after ageing in water at 70+-5C for 168 h. Min: 1.0 N, Max: 3.5 N

Optical properties:

Attenuation (of cable with fibres);

At 850 nm; <=3.2 dB/km

At 1300 nm; <=1.0 dB/km

Bandwidth;

At 850 nm; >=200 MHz .km

At 1300 nm; >=600 MHz .km

Numerical aperture; 0.275 0.015

Inhomogeneity of OTDR trace for any two 1000 meter fibre lengths; Max :0. 2 dB/km

Proof test level; 1 %

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Fibre Specification 50 um Fibre (M5), Standard properties

General:

The fibre type is a Graded index Multimode fibre; dual coated with acrylate coating
The fibre has good transmission properties at 850 nm and at 1300nm

This fibre fulfils the requirements of;

- IEC 793-2: 1998, Category A1a;
- PrEN 188201: 1994 (type A1a)
- ITU Recommendation G 651

When cabled, the fibres fulfils the requirements for use in a number of cabling systems,

among them are;

- EN 50173
- ISO/IEC 11801: 1995
- IEEE 802.3: 1998 (1000 Base-FX) "Gigabit" Ethernet

The fibre may be used as an alternation for 62.5 um fibre according to:

- ANSI X3 166-1990
- IEC 9314-3

Testing methods are in accordance with the following standards:

- IEC 793-1: 1998;
- EN 188 000: 1992;

Geometrical properties:

Nominal core diameter: 50 um

Core diameter tolerance: ± 2.5 um

Cladding diameter: 125 um

Cladding diameter tolerance: ± 2 um

Core concentricity error: Max: 1.5 um

Cladding non-circularity: Max: 1 %

Diameter of outer coating layer: 245 um

Tolerance of coating layer diameter ± 10 um

Coating concentricity error: Max: 12.5 um

Without colouring layer

Materials:

Core Germanium doped core

Coating

UV-curable dual layer acrylate coating, which ensures excellent microbending and abrasion resistance

Excellent static fatigue resistance

Stripping force after conditioning at 23 ± 5 C

at 40-60 % RH for 24 h Min: 1.0 N Max: 3.5N

Stripping force after ageing in water

at 70 ± 5 C for 168 h Min: 1.0 N Max: 3.5N

Optical properties:

Attenuation (of cable with fibres):

At 850 nm: ≤ 2.7 dB/km

At 1300 nm: ≤ 0.8 dB/km

Bandwidth

At 850 nm: ≥ 400 MHz. km

At 1300 nm: ≥ 800 MHz. km

Numerical aperture: 0.200 0.015

Inhomogeneity of OTDR trace for any two

1000-metre fibre lengths Max: 0.2 dB/km

Proof test level 1 %

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Fibre Specification

MC Single mode (SM) Fibre, Standard properties

General:

The fibre type is a Matched Cladding Single Mode Fibre dual coated with acrylate coating

The fibre is optimized for operation at 1310 nm and at 1550 nm

This fibre fulfils

- ITU-T Recommendation G 652
- IEC 793-2: 1992, Category B 1.1
- EN 188 101

Testing methods are in accordance with the following standards:

- ITU-T G, 650;
- IEC 793-1;
- EN 188 000

Geometrical properties:

Nominal mode field diameter: 9.3 μm

Mode field diameter tolerance: $\pm 0.5 \mu\text{m}$

Cladding diameter:

125 μm

Cladding diameter tolerance:

$\pm 1 \mu\text{m}$

Mode field concentricity error:

Max: 0.8 μm

Cladding non-circularity:

Max: 2 %

Diameter of outer coating layer:

245 μm

Tolerance of coating layer diameter

$\pm 10 \mu\text{m}$

Coating concentricity error:

Max: 12 μm

Without colouring layer

Materials: Core Germanium doped core with no phosphorus i.e. reduced tendency for hydrogen degradation.

Coating

UV-curable dual layer acrylate coating:

Stripping force after conditioning at

23 $\pm$ 5 C at 40-80% RH for 24 h.

Min: 1.0 N Max: 3.5N

Stripping force after ageing in water

At 70 $\pm$ 5 C for 188 h

Min: 1.0 N Max: 3.5

Optical properties:

Attenuation (of cable with fibres):

At 1310 nm:

$\leq 0.40 \text{ dB/km}$

In the range 1285-1330 nm:

$\leq 0.43 \text{ dB/km}$

At 1550 nm:

$\leq 0.25 \text{ dB/km}$

Cut-off wavelength

High limit: 1330 nm, Low limit: 1180 nm

Cut-off wavelength

High limit: 1260 nm

Loss increase at 1550 nm for 100 turns

Of fibre loosely wound with a 37.5 mm radius; Max: 0.1 dB

Loss due to hydrogen:

Maximum induced permanent loss after 1000 h at 1 bar H₂ at 70 C and outgassing for 72 h at 70 C (valid both at 1310 nm and at 1550 nm): 0.2 dB/km

Dispersion:

Zero dispersion wavelength: 1310 nm

Tolerance of zero dispersion wavelength:

-10/+12 nm

Zero-dispersion slope:

Max: 0.092 ps/(nm . km)

Chromatic dispersion coefficient:

In 1285 nm-1330 nm interval:

Max: 3.6 ps/km . nm

In 1270 nm-1340 nm interval:

Max: 18 ps/km . nm

Polarisation Mode Dispersion (PMD): Max: 0.5 ps/km Inhomogeneity of OTDR trace for any two 1000-metre fibre lengths Max: 0.1 dB/km Proof test level: 1 %

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