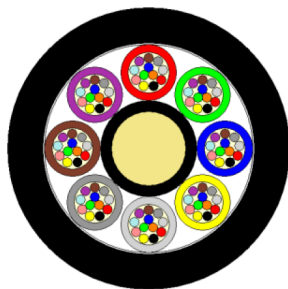


## Optical Microcables for Indoor/Outdoor Applications

### CDS-3211E



-not to scale-

#### Cable Design

According to IEC/EN 60794

- **Central Strength Member (CSM):** glass fibre reinforced plastic rod (FRP), with plastic oversheathing when needed.
- **Loose Tube:** thermoplastic material, containing optical fibres and filled with a suitable water tightness compound.
- **Filler Elements:** thermoplastic rods, where needed.
- **Stranding:** loose tubes (and fillers), SZ stranded around the CSM.
- **Longitudinal Water Tightness:** dry core with water swellable elements.
- **Outer Sheath:** LSZH, one ripcord beneath.

#### Cable Application

These Sirocco microduct optical fibre cables are optimized for installation in ducts. Please refer to our Installation Guides, please ask to our sales office.

#### Technical Data

No. of Fibres		12	24	36	48	60	72	96	144
Number of Fibres/Tube	-	12	12	12	12	12	12	12	12
Number of Tubes	-	1	2	3	4	5	6	8	12
Cable Diameter (maximum)	mm	7.0	7.0	7.0	7.0	7.0	7.0	8.2	8.8
Cable Weight	kg / km	45	45	45	45	45	45	60	80
Minimum Bending Radius	mm	Under Maximum Tension: 20 x Cable Ø				Without Tension: 10 x Cable Ø			
Temperature Range	°C	Transport & Storage: -40 → +70			Installation: -10 → +50		Operation: -40 → +70		

#### Main Characteristics

Test	Standard	Specified Value	Acceptance Criteria*
Max. Installation Tension	IEC 60794-1-21-E1	12 → 72: 700 N 96: 1000 N 144: 2000 N	$\Delta\alpha$ reversible, fibre strain $\leq 0.5\%$
Max. Operation Tension	IEC 60794-1-21-E1	130 N	$\Delta\alpha \leq 0.05$ dB, no fibre strain
Crush	IEC 60794-1-21-E3	350 N / 100mm, max 15 min	$\Delta\alpha \leq 0.05$ dB, no damage
Impact	IEC 60794-1-21-E4	2 J, 3 impacts, R = 300 mm	$\Delta\alpha \leq 0.05$ dB after test
Torsion	IEC 60794-1-21-E7	100 N, $\pm 180^\circ$ , L=2m, 5 cycles	$\Delta\alpha \leq 0.05$ dB after test, no damage
Bend	IEC 60794-1-21-E11	R = 10 x OD, 4 turns, 3 cycles	$\Delta\alpha \leq 0.05$ dB, no damage
Temperature Cycling	IEC 60794-1-22-F1	-15 °C to +60 °C -30 °C to +70 °C -40 °C to +70 °C	$\Delta\alpha \leq 0.05$ dB/km $\Delta\alpha \leq 0.10$ dB/km $\Delta\alpha \leq 0.15$ dB/km
Water Penetration	IEC 60794-1-22-F5C	3 m sample, 1 m water, 24 h	no water leakage

\*Values for single mode fibres, all optical measurements at 1550 nm.

#### Flame Resistance

EN 50399: Class E<sub>ca</sub>

LSHF (FRNC): IEC 60332-1-2, IEC 60754-1, IEC 60754-2



## Optical Characteristics

See the attached cabled optical fibre data sheet.

## Identification

### Fibre Colours <sup>(1)</sup>:

No.	1	2	3	4	5	6	7	8	9	10	11	12
Colour	red	green	blue	yellow	white	grey	brown	violet	aqua	black	orange	pink

### Tube Colours <sup>(1)</sup>:

No.	1	2	3	4	5	6	7	8	9	10	11	12
Colour	red	green	blue	yellow	white	grey	brown	violet	aqua	black	orange	pink

(1) Other colour set available upon agreement.

### Sheath Colour:

The outer sheath colour is black. Other colours available on demand (not advised for installation in sunlight)

### Sheath Marking <sup>(2)</sup>:

The outer sheath is marked in 1-meter intervals as follows:

<Optional: customer name> <Manufacturer> <year of manufacture> <no. and type of fibre>  
<length marking in meter>

(2) Customized marking available upon agreement.

## Logistic

**Packing:** Plywood drums with protection.

**Delivery Lengths <sup>(3)</sup>:** Standard delivery length is 4 km with a tolerance of -1% / +3%.

(3) Other delivery lengths available upon agreement.

All optical measurements in accordance with ITU-T G650 recommendations

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## Properties of cable with BendBright™ A1 Single-Mode Fibre

### C17



#### Applicable Standards

- IEC / EN 60793-2-50 Category B-657.A1 and B-652.D
- ITU-T Recommendation G.657.A1 and G.652.D
- EN 50173-1: Category OS2 and OS1a
- ISO/IEC 11801: Category OS2 and OS1a

#### Optical properties

Attribute	Measurement method	Units	Limits
Mode field diameter at 1310 nm	IEC/EN 60793-1-45	µm	9.0 ± 0.4
Mode field diameter at 1550 nm		µm	10.1 ± 0.5
Chromatic Dispersion coefficient: In the interval 1285 nm – 1330 nm	IEC/EN 60793-1-42	ps/km • nm	≤  3
At 1550 nm		ps/km • nm	≤ 18.0
At 1625 nm		ps/km • nm	≤ 22.0
Zero Dispersion Wavelength, λ <sub>0</sub>		nm	1300 - 1324
Zero Dispersion Slope		ps/(nm <sup>2</sup> • km)	≤ 0.092
Cut-off Wavelength	IEC/EN 60793-1-44	λ <sub>cc</sub> nm	≤ 1260 *
Polarisation Mode Dispersion (PMD) coefficient	IEC/EN 60793-1-48	ps/√km	≤ 0.1
PMD <sub>0</sub> Link Design Value (computed with Q=0.01%, N=20)	IEC/EN 60794-3	ps/√km	≤ 0.06

\* guaranteed value according to the ITU-T (ATM G650) method

#### Attenuation

Attribute	Measurement method	Units	Limits
Maximum attenuation value of cable in the interval 1310nm–1625nm**	IEC/EN 60793-1-40	dB/km	≤ 0.39
Maximum attenuation value of cable at 1550 nm	IEC/EN 60793-1-40	dB/km	≤ 0.22
Local discontinuity at 1310 and 1550 nm	IEC/EN 60793-1-40	dB	max 0.1

\*\* Including H2-ageing according to IEC 60793-2-50, type B.1.3, @1383nm

#### Attenuation variation vs Bending

Attribute	Measurement method	Units	Limits
100 turns on a mandrel R = 30 mm at 1625nm	IEC/EN 60793-1-47	dB	≤ 0.05
10 turns on a mandrel R = 15 mm at 1550nm	IEC/EN 60793-1-47	dB	≤ 0.25
10 turns on a mandrel R = 15 mm at 1625nm	IEC/EN 60793-1-47	dB	≤ 1.0
1 turn on a mandrel R = 10 mm at 1550nm	IEC/EN 60793-1-47	dB	≤ 0.75
1 turn on a mandrel R = 10 mm at 1625nm	IEC/EN 60793-1-47	dB	≤ 1.5

## Group index of refraction

Attribute	Measurement method	Units	Values
1310 nm	IEC/EN 60793-1-22	-	1.467
1550 nm	IEC/EN 60793-1-22	-	1.467
1625 nm	IEC/EN 60793-1-22	-	1.468

## Rayleigh Backscatter coefficient (1ns pulse width)

Attribute	Measurement method	Units	Values
1310 nm	-	dB	-79.4
1550 nm	-	dB	-81.7
1625 nm	-	dB	-82.5

## Geometrical properties

Attribute	Measurement method	Units	Limits
Cladding diameter	IEC/EN 60793-1-20	µm	125.0 ± 0.7
Cladding non-circularity	IEC/EN 60793-1-20	%	≤ 0.7
Core-cladding concentricity error	IEC/EN 60793-1-20	µm	≤ 0.5
Coating diameter – ColorLock <sup>XS</sup> and natural	IEC/EN 60793-1-21	µm	245 ± 10
Coating non-circularity	IEC/EN 60793-1-21	%	≤ 5
Coating-Cladding concentricity error	IEC/EN 60793-1-21	µm	≤ 12

## Mechanical properties

Attribute	Measurement method	Units	Limits
Proof stress level	IEC/EN 60793-1-30	GPa	≥ 0.7 (≈ 1 %)
Strip force (average)	IEC/EN 60793-1-32	N	$1 \leq F_{\text{average.strip}} \leq 3$
Strip force (peak)	IEC/EN 60793-1-32	N	$1.2 \leq F_{\text{peak.strip}} \leq 8.9$
Dynamic fatigue resistance, aged and unaged	IEC/EN 60793-1-33	-	$n_d \geq 20$

All measurements in accordance with ITU-T G650 recommendations

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