

Bend-Insensitive OM4-Plus Multimode Fibre for 40, 100 GbE Chromatic Dispersion Compensating (CDC) Fibre

Product Type: MaxCap-BB-OM4-Plus Multimode Fibre
Coating Type: Dual Layer Primary Coating (DLPC9)

Issue date: 03-2013
Supersedes: 09-2012



Bend-Insensitive 850 nm Laser-Optimized 50 µm **MaxCap-OM4-Plus** Multimode Fibre for 40 and 100 Gb/s applications.

A new Draka 850 nm laser-optimized 50 µm bend-insensitive **MaxCap-OM4-Plus** multimode fibre has been designed on top of Draka's already robust OM4 multimode fibre family. This fibre further optimizes the overall dispersion in VCSEL launched multimode fibre systems, not only taking care of traditional modal dispersion, but also compensating chromatic dispersion introduced by selective coupling of transverse VCSEL modes (operating at different wavelength) into fibre modes. So far IEEE does not take care of this Modal and Chromatic Dispersion Interaction (MCDI), but with increasing line speeds (e.g. to 25 Gb/s) and longer distances (>150m), this interaction cannot be ignored anymore. The overall dispersion behaviour of this new fibre is defined by a new parameter: **EB (Effective Bandwidth)**, a combination of modal bandwidth (EMB) and chromatic bandwidth, see: *D. Molin, et al., "Chromatic Dispersion Compensated Multimode Fibres for Data Communications", ECOC 2011.*

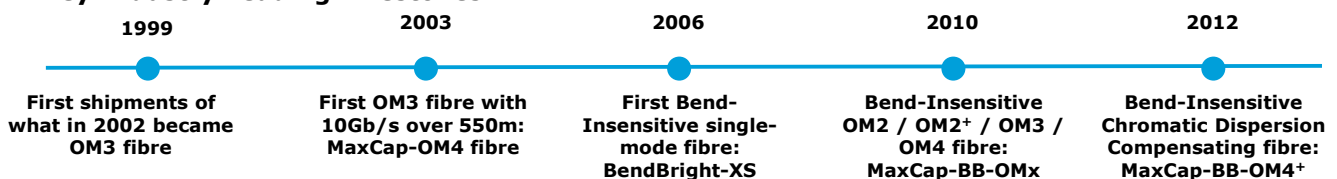
The outstanding bending performance of this bend-insensitive fibre combines improved fibre and cable management with superior bandwidth for 40 Gb/s and (future) 100 Gb/s system applications (e.g. 25 Gb/s line speeds) for extended reach.

Standards references

The **MaxCap-BB-OM4-Plus** multimode fibres entirely comply with or exceed IEC 60793-2-10 type A1a.3 Optical Fibre Specification, ISO/IEC 11801 OM4 specification, TIA/EIA-492AAAD detail specification and Telcordia GR-20-CORE and GR-409-CORE specifications.

| Features | Advantages |
|--|---|
| MaxCap-BB-OM4-Plus multimode fibres optimize both modal as well as chromatic dispersion | For higher bit rate and longer distances chromatic dispersion cannot be ignored anymore. MaxCap-BB-OM4-Plus multimode fibres offer the unique advantage in optimizing modal and chromatic dispersion influences when used with typical 850nm VCSEL sources |
| MaxCap-BB-OM4-Plus multimode fibres show very low bending sensitivity | MaxCap-BB-OM4-Plus multimode fibres allow the use of smaller, high density fibre management systems in space limited data centres, computer rooms and LANs, improving overall system network reliability (uptime) |
| MaxCap-BB-OM4-Plus multimode fibres are characterized by the well known EMB parameter for modal dispersion and a new EB parameter for combined chromatic and modal dispersion | MaxCap-BB-OM4-Plus multimode fibres offer increased robustness for higher speed links (e.g. 25 Gb/s) and longer reach (e.g. increasing the max. distance with several tens of metres) |
| MaxCap-BB-OM4-Plus multimode fibres are coated with the dual layer UV Acrylate | MaxCap-BB-OM4-Plus multimode fibres show excellent micro-bending behaviour, which results in easy cabling and installation, supporting a max. cabled attenuation of 3.0 dB/km at 850 nm |

Key Industry Leading Milestones



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| Characteristics | Conditions | Specified Values | Units |
|--|--|---|------------------------|
| OPTICAL SPECIFICATIONS (Uncabled fibre) | | | |
| Attenuation Coefficient | 850 nm 1300 nm | ≤ 2.3 ≤ 2.4 ≤ 0.5 ≤ 0.6 | dB/km |
| Numerical Aperture | | 0.200 ± 0.015 | |
| Chromatic Dispersion | | | |
| Zero Dispersion Wavelength, λ_0 | | $1295 \leq \lambda_0 \leq 1340$ | nm |
| Zero Dispersion Slope, S_0 | $1295 \text{ nm} \leq \lambda_0 \leq 1310 \text{ nm}$ $1310 \text{ nm} \leq \lambda_0 \leq 1340 \text{ nm}$ | ≤ 0.105 $\leq 0.000375 (1590 - \lambda_0)$ | ps/nm ² .km |
| Fibre Capacity | 40GBASE-SR4 / 100GBASE-SR10 10GBASE-SR 1GBASE-SR | 200 ^{1,2} 600 ^{1,2} 1200 ² | m |
| Overfilled Modal Bandwidth (min.) | 850 nm 1300 nm | 350 500 | MHz.km |
| Effective Modal Bandwidth (EMB) (min.) | 850 nm | 4700 | MHz.km |
| Effective Bandwidth (EB) ³ (min.) | 850 nm | 5000 | MHz.km |
| Bending Loss | 2 turns, Radius=7.5 mm; 850 nm / 1300 nm 2 turns, Radius=15 mm; 850 nm / 1300 nm | ≤ 0.2 / ≤ 0.5 ≤ 0.1 / ≤ 0.3 | dB |
| Backscatter Characteristics⁴ | | | |
| Point Discontinuity ⁵ | 850 nm, 1300 nm | ≤ 0.1 | dB |
| Irregularities over fibre length | 850 nm, 1300 nm | ≤ 0.1 | dB |
| Reflections | | Not allowed | |
| Group Index of Refraction (Typ.) | 850 nm 1300 nm | 1.482 1.477 | |
| GEOMERICAL SPECIFICATIONS | | | |
| Core Diameter | | 50 ± 2.5 | μm |
| Core Non-Circularity | | ≤ 5 | % |
| Core/Cladding Concentricity Error | | ≤ 1 | μm |
| Cladding Diameter | | 125.0 ± 1.0 | μm |
| Cladding Non-Circularity | | ≤ 0.7 | % |
| Coating Diameter | | 242 ± 5 | μm |
| Coating Non-Circularity | | ≤ 5 | % |
| Coating/Cladding Concentricity Error | | ≤ 10 | μm |
| Length | Standard lengths up to Other lengths available on request | 8.8 | km |
| MECHANICAL SPECIFICATIONS | | | |
| Proof Test | Off line | $> 0.7 (100)$ | GPa (kpsi) |
| Dynamic Tensile Strength (median value) | 0.5 meter gauge length, unaged and aged ⁶ | $> 3.8 (550)$ | GPa (kpsi) |
| Fatigue Parameter (Typical) | Dynamic fatigue, unaged and aged ⁶ | $n_d > 25$ | |
| Coating Strip Force | Average strip force, unaged and aged ⁷ Peak strip force, unaged and aged ⁷ | 1 to 3 1.3 to 8.9 | N N |
| ENVIRONMENTAL SPECIFICATIONS | | | |
| Temperature Cycling | 850 nm, 1300 nm; -60°C to +85°C | ≤ 0.1 | dB/km |
| Temperature-Humidity Cycling | 850 nm, 1300 nm; -10°C to +85°C, 4-98% RH | ≤ 0.1 | dB/km |
| Water Immersion | 850 nm, 1300 nm; 23°C, 30 days | ≤ 0.1 | dB/km |
| Dry Heat | 850 nm, 1300 nm; 85°C, 30 days | ≤ 0.1 | dB/km |
| Damp Heat | 850 nm, 1300 nm; 85°C; 85% RH, 30 days | ≤ 0.1 | dB/km |

- 1). For maximum cabled fibre attenuation of 3.0 dB/km at 850 nm, a maximum total connector loss of 1.0 dB.
- 2). Preliminary reach, under investigation.
- 3). For definition of EB see: D. Molin, et al., "Chromatic Dispersion Compensated Multimode Fibres for Data Communications", ECOC 2011.
- 4). OTDR measurement with 0.5 μs pulse width.
- 5). Mean of bi-directional measurement.
- 6). Aging at 85°C, 85% RH, 30 days.
- 7). Aging at 23°C, 0°C and 45°C; 30 days at 85°C and 85% RH; 14 days water immersion at 23°C.