

tML<sup>®</sup> Xtended - FO Trunk Cable both sides 1xMPO/MTP<sup>®</sup> with Pins 12E9/125 $\mu$  OS2 LSHF, Type B,  
Length: xx in m



## tML<sup>®</sup> - tde Modular Link

tML<sup>®</sup> is a patented, modular cabling system consisting of the three key components module, trunk cable and rack mount enclosure. The system components are 100 percent manufactured, pre-assembled and tested in Germany. They enable plug-and-play installation on site - especially in data centres, but also in industrial environments - within the shortest possible time. The system is characterized by highest packing density and highest flexibility during migration to higher transmission rates. Fibre optic and TP modules can be combined in one rack mount enclosure. 96x fibre optics LC Duplex or 96x MPO connectors can be used modularly on a 19-inch height unit. Thanks to its patented polarity and dark fibre modules, the tML system offers the simplest migration options to 100G and more.

The tML<sup>®</sup> Xtended - module will be installed in the link on one side rotated 180 degrees. The associated tML<sup>®</sup> Xtended trunk cable has a type B pin out. The complete link corresponds to EIA / TIA "Method B". The advantage is that before and after migration uniformly configured patch cables and modules are used.



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## Technical Data

The tML<sup>®</sup>- FO trunk cable is preterminated with MPO/MTP<sup>®</sup> connectors on both ends. The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP<sup>®</sup>plug has a defined fiber height of 1 - 3.5 $\mu$ . The max. adjacent fiber height difference is 0.2 $\mu$ m and for all fibers 0.3 $\mu$ m. All system components (modules, trunk cables and patch cords) are co-ordinated for the reaching of the performance particularly. The fan-out unit is optimized for tML<sup>®</sup> - Cable Mounting Bracket for Fan-out Units. The module is marked with sequential serial number and article number.

## FO Connectors

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP<sup>®</sup> plug has a defined fiber height of 1 - 3.5 $\mu$ . The max. adjacent fiber height difference is 0.2 $\mu$ m and for all fibers 0.3 $\mu$ m.

### Connector

|                   |   |
|-------------------|---|
| Type              | MPO/MTP <sup>®</sup> APC Male Push Pull Locking with Elite Pins (green) |
| Ferrule           | 12 Fiber SM Elite <sup>®</sup> ferrule, PPS                             |
| Boot colour       | Black   |
| Temperature range | -40°C bis +75°C   |
| Manufacturer      | tde/US Conec  |

### Optical Performance

| Fiber           | Type                     | Wavelength     | Insertion loss typ. | Insertion loss max. | Return loss min. |
|-----------------|--------------------------|----------------|---------------------|---------------------|------------------|
| 9/125 $\mu$ OS2 | MPO/MTP <sup>®</sup> APC | 1310 / 1550 nm | ≤ 0.10 dB           | 0.25 dB             | 75 dB            |

## FO Fan-Out

|                    |                         |
|--------------------|-------------------------|
| Fan-out length     | 50 mm                   |
| Ø Fan-out          | 16 mm                   |
| Ø Single unit      | 3.0 mm                  |
| Single unit length | 78 ± 5 cm (not stepped) |

## FO Cables

### Mechanical characteristics

|                     |   |
|---------------------|---|
| Temperature range   | Storage -25 to +70°C, IEC 60794-1-22 F1 |
|                     | Pulling in -10 to +50°C                 |
|                     | Operation -25 to +60°C                  |
| Tensile performance | IEC 60794-1-21 E1                       |
| Crush resistance    | IEC 60794-1-21 E3                       |
| Impact              | IEC 60794-1-21 E4                       |

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|                   |                    |
|-------------------|--------------------|
| Repeated bending  | IEC 60794-1-21 E6  |
| Torsion           | IEC 60794-1-21 E7  |
| Bend              | IEC 60794-1-21 E11 |
| Water penetration | IEC 60794-1-22 F5  |

## General characteristics

|                                   |   |
|-----------------------------------|---|
| Sheath colour                     | green, similar to RAL 6016                        |
| Zero halogen, non corrosive gases | IEC 60754-1/-2, EN 60754-1/-2, VDE 0482-754-1/-2  |
| Flame propagation                 | IEC 60332-1-2, EN 60332-1-2, VDE 0482-332-1-2     |
| Flame spread                      | IEC 60332-3-24, EN 50266-2-4, VDE 0482-266-2-4    |
| Smoke density                     | IEC 61034-1/-2, EN 61034-1/-2, VDE 0482-1034-1/-2 |
| Reaction to fire (Euroclasses)    | EN 13501-6: D <sub>ca</sub> -s2,d1,a1             |

|                      |  |
|----------------------|--|
| Cabletype            | Universal U-DQ(ZN)BH for indoor and outdoor use  |
|                      | non metallic, dry interstices, rodent protection, flame retardant, in accordance with IEC 60332.1and IEC 60332.3 C |
| Fibertype            | E9/125 G.652.D   |
| No. of fibers        | 12   |
| Loose tube           | 1  |
| Sheath $\varnothing$ | 7.6 mm   |
| Weight               | 68 kg/km   |
| Bending radius       | 115 mm   |
| Tensile load         | 1500 N   |
| Crush resistance     | 3000 N continuous  |
|                      | 5000 N short term  |
| Fire load            | 275 kWh/km   |
|                      | 990 MJ/km  |

## FO Fiber

### Optical properties

|   |   |
|---|---|
| Maximum attenuation (cabled)                    | 1310 nm: 0.34 / 1383 nm: 0.34* dB/km (*post hydrogen aging performance) |
| Maximum Chromatic Dispersion                    | 3.5 ps/(nm x km)  |
| Zero Dispersion Wavelength $\lambda_0$          | 1304 $\leq \lambda_0 \leq$ 1324 nm                                      |
| Maximim Zero Dispersion Slope $S_0$             | 0.092 ps/(nm <sup>2</sup> x km)   |
| Mode-Filed Diameter                             | 9.2 +/- 0,4 $\mu$ m   |
| Maximum Cable Cut-off Wavelength $\lambda_{CC}$ | 1260 nm   |
| PDM Link Design Value                           | $\leq$ 0.04 ps/ $\sqrt$ km  |
| Max. individual fibre PMD                       | $\leq$ 0.1 ps/ $\sqrt$ km   |
| Max. individual cable PMD                       | $\leq$ 0.2 ps/ $\sqrt$ km   |
| Refractive Index                                | 1.4676  |

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## Mechanical properties

|  |                       |
|--|-----------------------|
| Cladding diameter                            | 125.0 +/- 1.0 $\mu$ m |
| Maximum Core/Cladding Concentricity Error    | 0.5 $\mu$ m           |
| Maximum Cladding Non-Circularity             | 0.7 %                 |
| Coating diameter                             | 245 +/-5 $\mu$ m      |
| Maximum Cladding/Coating Concentricity Error | 12 $\mu$ m            |
| Operating temperature range                  | -60 to +85°C          |
| Test load                                    | 100 kpsi              |

## Product variants & accessories

| Art.-No.             | Description   |
|----------------------|---|
| TMLMPP/MPP09B12E-Bxx | tML <sup>®</sup> Xtended - FO Trunk Cable both sides 1xMPO/MTP <sup>®</sup> with Pins 12E9/125 $\mu$ OS2 LSHF, Type B, Length: xx in m  |
| TMLMPP/MPP09B24E-Bxx | tML <sup>®</sup> Xtended - FO Trunk Cable both sides 2xMPO/MTP <sup>®</sup> with Pins 24E09/125 $\mu$ OS2 LSHF, Type B, Length: xx in m |
| TMLMPP/MPP09B48E-Bxx | tML <sup>®</sup> Xtended - FO Trunk Cable both sides 4xMPO/MTP <sup>®</sup> with Pins 48E09/125 $\mu$ OS2 LSHF, Type B, Length: xx in m |
| TMLMPP/MPP09B72E-Bxx | tML <sup>®</sup> Xtended - FO Trunk Cable both sides 6xMPO/MTP <sup>®</sup> with Pins 72E09/125 $\mu$ OS2 LSHF, Type B, Length: xx in m |
| TMLMPP/MPP09B96E-Bxx | tML <sup>®</sup> Xtended - FO Trunk Cable both sides 8xMPO/MTP <sup>®</sup> with Pins 96E09/125 $\mu$ OS2 LSHF, Type B, Length: xx in m |