

tML[®] 24 - FO Patch cord both sides 1x 24F MPO Female 24G50/125µ OM4, Type A, Length: xxx in m



tML[®] - tde Modular Link

tML[®] 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. Heart of the system are the rear MPO/MTP[®] and Telco connectors, which can be used to connect at least six or twelve ports at a time. Depending on the module configuration, transfer rates of up to 200G are currently possible with SR4. The fibre optic and TP modules can be used together in a module carrier with a very high port density. The tde offers its tML[®] cabling system as a proven tML[®] standard system and in the highly innovative variants tML[®] Xtended, tML[®] 24 System and now tML[®] 32 System for extreme scalability and very easy migration to higher transmission rates such as 40G, 100G, 200G and 400G.



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Technical Data

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP[®] plug has a defined fiber height of 1 - 3.5μ. The max. adjacent fiber height difference is 0.2μm and for all fibers 0.3μm.

| | |
|------------|--|
| Cable | Round cable 3.6 mm, loose tube, LSOH, magenta |
| Connectors | MPO/MTP [®] Push Pull (magenta) |
| Pin out | Type A |
| Tests | Interferometer, Insertion Loss, Return Loss and Visual Final Inspection; all measured values are electronically archived |
| | QS-Managementsystem ISO 9001, ISO 14001 and TL 9000 |

FO Connectors

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Connector

| | |
|-------------------|---|
| Type | MPO/MTP [®] Female Push Pull Locking (magenta) |
| Ferrule | 24 Fiber MM Elite [®] ferrule, PPS |
| Boot colour | Red |
| Temperature range | -40°C to +75°C |
| Manufacturer | tde/US Conec |

Optical Performance

| Fiber | Type | Wavelength | Insertion loss typ. | Insertion loss max. | Return loss min. |
|-------------|----------------------|------------|---------------------|---------------------|------------------|
| 50/125μ OM4 | MPO/MTP [®] | 850 nm | ≤ 0.12 dB | 0.25 dB | 35 dB |

FO Cables

| | |
|-----------|----------------|
| Standards | EN 50173-5 |
| | IEC 60794-2-20 |
| | ISO/IEC 24764 |

Construction

| | |
|--------------|--|
| Type | IVH24G50-OM4 |
| Fiber | 24 primary coated fibres nominally 242 μm, arranged in 2 groups of 12 fibres, Group 1: Red id tread Group 2: Green id tread |
| Fiber colors | According to TIA/EIA 598-C also in agreement with IEC 60304: 1-12: Blue, orange, green, brown, grey, white, red, black, yellow, violet, pink and aqua |

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| | |
|-----------------|---|
| | 13-24: Blue, orange, green, brown, grey, white, red, transparent, yellow, violet, pink and aqua (with add. ring mark) |
| Strength member | Ultra high modulus Aramid yarns |
| Sheath | Halogen free, flame resistant thermoplastic sheathing compound acc. to EN 50290-2-27, UV stabilised |
| Sheath colors | Magenta, RAL 4003 |

Fire rating

| | |
|---------------|-----------------|
| IEC 60332-1-2 | Pass |
| IEC 60332-2-2 | Pass |
| IEC 60754-1 | No halogens |
| IEC 60754-2 | No acid matters |
| IEC 61034-2 | No dense smoke |

Heat of combustion

| | |
|-----------|-----------|
| 200 MJ/km | 0.5 KWh/m |
|-----------|-----------|

Physical properties IEC60974-1-2

| | |
|------------------------------|---|
| Outer diameter cable | ø3.6 mm +0.1 mm -0.3 mm |
| Diameter PVC-core tube | 2.0 ± 0.1 mm |
| Wall thickness PVC-core tube | 0.35 mm – 0.40 mm |
| Weight | 11 kg/km |
| Tensile strength (dynamic) | 220 N |
| Tensile strength (permanent) | 110 N |
| Compressive strength (crush) | 400 N |
| Impact | 4 Nm, R= 12.5 mm |
| Kink | No Kink |
| Min. Bending radius | R = 20 mm |
| Temperature range | Operation and installation: -0°C to 50°C. Storage: -20°C to 50°C |

FO Fiber

| | |
|-----------------------------------|--|
| Type | Corning ClearCurve [®] 50/125μ OM4 multimode fiber |
| Optimized Data Rate over Distance | 40/100 Gb over 170 m* 10 Gb/s over 550 m 1 Gb/s over 1100 m |
| Standard Compliance | ISO/IEC 11801: type OM4 fiber** IEC 60793-2-10: type A1a.3 fiber** TIA/EIA: 492AAAD ITU: ITU G651.1 |
| * | Distances specified in the 40G/100G per IEEE 802.3ba standard are 150m on OM4 and 100m on OM3; Corning fibers are manufactured to tighter dispersion specifications and thereby support the extended distances shown in the table (assuming cable attenuation ≤3.0 dB/km and same 1.0 dB of connector loss for OM3 that the standard requires for OM4) |

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| | |
|----|---|
| ** | Assumes IEC draft standard is harmonized with 492AAAD which was approved by TIA |
|----|---|

Optical Specifications

| | |
|--------------------|---|
| Bandwidth | High Performance EMB* (MHz.km): 4700 at 850 nm only Legacy Performance EMB** (MHz.km): 3500 at 850 nm / 500 at 1300 nm |
| Attenuation | At 850 nm max. ≤ 2.3 dB/km At 1300 nm max. ≤ 0.6 dB/km |
| Macrobend Loss | Mandrel Radius (mm): 37.2 / 15 / 7.5 Number of Turns: 100 / 2 / 2 Induced Attenuation (dB) at 850 nm: ≤ 0.05 / ≤ 0.1 / 0.2 Induced Attenuation (dB) at 1300 nm: ≤ 0.15 / ≤ 0.3 / ≤ 0.5 |
| Numerical Aperture | 0.200 ± 0.015 |
| * | Ensured via miniEMBc, per TIA/EIA 455-220A and IEC 60793-1-49, for high performance laser-based systems (up to 10Gb/s) |
| ** | OFL BW, per TIA/EIA 455-204 and IEC 60793-1-41, for legacy and LED-based systems (typically up to 100 Mb/s) |

Dimensional Specifications

| | |
|--------------------------------|----------------|
| Core Diameter | 50.0 ± 2.5 µm |
| Cladding Diameter | 125.0 ± 1.0 µm |
| Core-Clad Concentricity | ≤ 1.5 µm |
| Cladding Non-Circularity | ≤ 1.0% |
| Core Non-Circularity | ≤ 5.0% |
| Coating Diameter | 242 ± 5 µm |
| Coating-Cladding Concentricity | < 12 µm |

Environmental

| Environmental Test | Test Condition | Induced Attenuation 850 nm & 1300 nm (dB/km) |
|------------------------------|---------------------------------|--|
| Temperature Dependence | -60°C to +85°C | ≤ 0.10 |
| Temperature Humidity Cycling | -10°C to +85°C and 4% to 98% RH | ≤ 0.10 |
| Water Immersion | 23°C ± 2°C | ≤ 0.20 |
| Heat Aging | 85°C ± 2°C | ≤ 0.20 |
| Damp Heat | 85°C at 85% RH | ≤ 0.20 |
| Operating Temperature Range | -60°C to +85°C | |

Mechanical Specifications

| | |
|------------|--|
| Proof Test | The entire fiber length is subjected to a tensile stress ≥ 100 kpsi (0.7 GN/m²). |
| Length | Fiber lengths available up to 17.6 km/spool. |

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Performance Characterizations

| | |
|-------------------------------------|---|
| Refractive Index Difference | 1% |
| Effective Group Index of Refraction | 850 nm: 1.480 1300 nm: 1.479 |
| Fatigue Resistance Parameter (nd) | 20 |
| Coating Strip Force | Dry: 0.6 lbs (2.7N) Wet: 14 days in 23°C water soak: 0.6 lbs (2.7N) |
| Chromatic Dispersion | Zero Dispersion Wavelength (λ_0): 1295 nm $\leq \lambda_0 \leq$ 1315 nm Zero Dispersion Slope (S_0): ≤ 0.101 ps/(nm ² *km) |

Product variants & accessories

| Art.-No. | Description |
|-----------------------|---|
| TML-M2/M2-09I24E-Axxx | tML® 24 - FO Patch cord both sides 1x 24F MPO Female 24E9/125µ OS2, Type A, Length: xx in m |
| TML-M2/M2-50I24G3Axxx | tML® 24 - FO Patch cord both sides 1x 24F MPO Female 24G50/125µ OM3, Type A, Length: xxx in m |
| TML-M2/M2-50I24G4Axxx | tML® 24 - FO Patch cord both sides 1x 24F MPO Female 24G50/125µ OM4, Type A, Length: xxx in m |
| TML-M2/M2-50I24G5Axxx | tML® 24 - FO Patch cord both sides 1x 24F MPO Female 24G50/125µ OM5, Type A, Length: xxx in m |