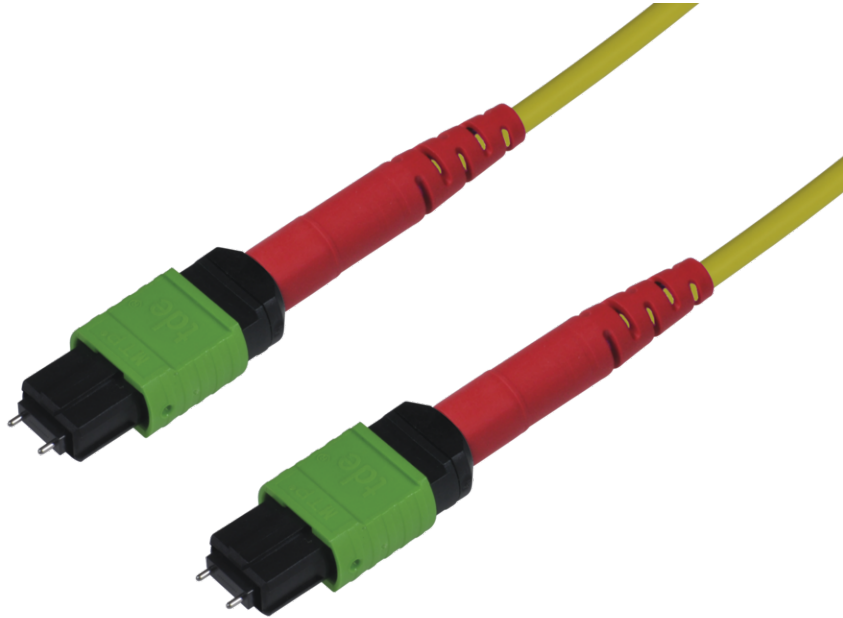


tML<sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125µ OS2 LSOH, Type A, Length: xx in m



## 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> - FO Micro Distribution cable is intended for the connection of two tML<sup>®</sup> 24 - FO Modules.



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tML<sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125 $\mu$  OS2 LSOH, Type A, Length: xx in m

## Technical Data

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.

Cable	Round cable 3.6 mm, loose tube, LSOH, yellow
Connectors	MPO/MTP <sup>®</sup> Push Pull (yellow)
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

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	24 Fiber SM Elite <sup>®</sup> 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.
9/125 $\mu$ OS2	MPO/MTP <sup>®</sup> APC	1550 nm	≤ 0.10 dB	0.25 dB	75 dB

## FO Cables

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

### Construction

Type	IVH24E09
Fiber	24 primary coated fibres nominally 242 $\mu$ m, arranged in 2 groups of 12 fibres, Group 1: Red id tread Group 2: Green id tread

tML<sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125µ OS2 LSOH, Type A, Length: xx in m

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 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	Yellow, RAL 1021

## 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
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## Physical properties IEC60974-1-2

Outer diameter cable	∅3.6 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 SMF-28e+ <sup>®</sup> 09/125µ OS2 G.652.D singlemode fiber
Maximum Attenuation	At 1310 nm max. 0.33 - 0.35 dB/km At 1383 ± 3 nm max. 0.31 - 0.35 dB/km At 1490 nm max. 0.21 - 0.24 dB/km At 1550 nm max. 0.19 - 0.20 dB/km At 1625 nm max. 0.20 - 0.23 dB/km
Attenuation vs. Wavelength	Range: 1285 - 1330 nm; Ref. λ: 1310 nm; Max. Difference: 0.03 dB/km Range: 1525 - 1575 nm; Ref. λ: 1550 nm; Max. Difference: 0.02 dB/km

tML<sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125 $\mu$  OS2 LSOH, Type A, Length: xx in m

Macrobend Loss	Mandrel Diameter:32mm; Number of Turns: 1; Wavelength: 1550nm; Induced Attenuation: $\leq 0.03$ dB Mandrel Diameter:50mm; Number of Turns: 100; Wavelength: 1310nm; Induced Attenuation: $\leq 0.03$ dB Mandrel Diameter:50mm; Number of Turns: 100; Wavelength: 1550nm; Induced Attenuation: $\leq 0.03$ dB Mandrel Diameter:60mm; Number of Turns: 100; Wavelength: 1625nm; Induced Attenuation: $\leq 0.03$ dB
Point Discontinuity	Wavelength: 1310 nm; Point Discontinuity: $\leq 0.05$ dB Wavelength: 1550 nm; Point Discontinuity: $\leq 0.05$ dB
Cable Cutoff Wavelength ( $\lambda_{ccf}$ )	$\lambda_{ccf} \leq 1260$ nm
Mode-Field Diameter	At 1310 nm = $9.2 \pm 0.4$ $\mu$ m At 1550 nm = $10.4 \pm 0.5$ $\mu$ m
Dispersion	At 1550 nm = $\leq 18.0$ [ps/(nm*km)] At 1625 nm = $\leq 22.0$ [ps/(nm*km)]
	Zero Dispersion Wavelength ( $\lambda_0$ ): 1310 nm $\leq \lambda_0 \leq 1324$ nm Zero Dispersion Slope ( $S_0$ ): $\leq 0.092$ ps/(nm <sup>2</sup> *km)
Polarization Mode Dispersion (PMD)	PMD Link Design Value = $\leq 0.06$ ps/ $\sqrt$ km Maximum Individual Fiber = $\leq 0.1$ ps/ $\sqrt$ km
Norm	ITU-T Recommendation G.652 (Tables A, B, C, and D) IEC Specifications 60793-2-50 Type B1.3 TIA/EIA 492-CAAB Telcordia Generic Requirements GR-20-CORE ISO 11801 OS2

## Dimensional Specifications

Fiber Curl	$\geq 4.0$ m radius of curvature
Cladding Diameter	$125.0 \pm 0.7$ $\mu$ m
Core-Clad Concentricity	$\leq 0.5$ $\mu$ m
Cladding Non-Circularity	$\leq 0.7\%$
Coating Diameter	$242 \pm 5$ $\mu$ m
Coating-Cladding Concentricity	$< 12$ $\mu$ m

## Environmental Specifications

Environmental Test	Test Condition	Induced Attenuation 1310 nm, 1550 nm & 1625 nm
Temperature Dependence	-60°C to +85°C	$\leq 0.05$
Temperature Humidity Cycling	-10°C to +85°C up to 98% RH	$\leq 0.05$
Water Immersion	23°C $\pm$ 2°C	$\leq 0.05$
Heat Aging	85°C $\pm$ 2°C	$\leq 0.05$
Operating Temperature Range	-60°C to +85°C	

## Mechanical Specifications

Proof Test	The entire fiber length is subjected to a tensile stress $\geq 100$ kpsi (0.7 GPa).
Length	Fiber lengths available up to 63.0 km/spool.

tML<sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125 $\mu$  OS2 LSOH, Type A, Length: xx in m

## Performance Characterizations

Core Diameter	8.2 $\mu$ m
Numerical Aperture	0.14
Zero Dispersion Wavelength ( $\lambda_0$ )	1317 nm
Zero Dispersion Slope ( $S_0$ )	0.088 ps/(nm <sup>2</sup> *km)
Effective Group Index of Refraction	1310 nm: 1.4676 1550 nm: 1.4682
Fatigue Resistance Parameter (nd)	20
Coating Strip Force	Dry: 0.6 lbs (3N) Wet: 14 days room temperature: 0.6 lbs (3N)
Rayleigh Backscatter Coefficient (for 1 ns Pulse Width)	1310 nm: -77 dB 1550 nm: -82 dB

## Product variants & accessories

Art.-No.	Description
TMLM2P/M2P09I24E-Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125 $\mu$ OS2 LSOH, Type A, Length: xx in m
TMLM2P/M2P50I24G3Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125 $\mu$ OM3 LSOH, Type A, Length: xx in m
TMLM2P/M2P50I24G4Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125 $\mu$ OM4 LSOH, Type A, Length: xx in m
TMLM2P/M2P50I24G5Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125 $\mu$ OM5 LSOH, Type A, Length: xx in m