



MICRO TUBE FIBER OPTIC CABLES



 **Connecting professionals**

About company



76 years of experience in the cable industry



We are among the eight largest producers of cable products in the CIS



More than 25 000 different brands and sizes of cables and wires



Member of the international associations Electrocable and Intercable



About 1000 employees



23 hectare area



ISO 9001 and ISO 14001 management systems implemented



Among our customers are enterprises of different industries



Cables and cable systems installation and supervising



100% continuous automated testing



Winner of the award Business Initiative Directions — International Gold Star



Testing centre of cable products is accredited in the National agency for accreditation of Ukraine



Recognized supplier of cable products for nuclear power plants

KEMA



KEMA (Netherlands), VDE and innogy SE Eurotest (Germany), IEn (Poland), VNIIEP JSC (Russia) certification

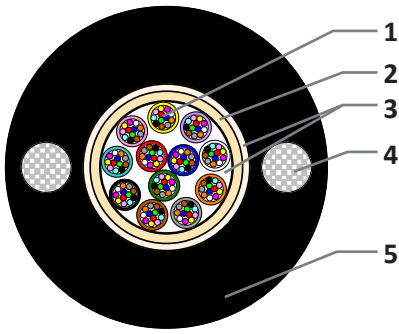


Clients from Armenia, Azerbaijan, Belarus, Bulgaria, France, Georgia, Germany, India, Iran, Israel, Kazakhstan, Kenya, Kyrgyzstan, Lithuania, Moldova, Netherlands, Poland, Romania, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan





Design



1. Micro Tube containing optical fibers and filling compound
2. Strength member (aramid or glass yarns)
3. Water blocking tape and yarns (dry-core)
4. Peripheral strength member (2 FRP Rods)
5. Outer sheath (HDPE or HFFR)

Application

This dielectric optical cable designed for outdoor installation in duct by pulling, jetting or floating technics. Mainly used for distribution and access network.

Advantages

Micro Tube cables offers many advantages compared with using standard loose tube optical cables. The key benefits of denser design and easier handling mean you make major savings in terms of time and cost:

- reduced installation time;
- easier handling, particularly in fiber distribution and termination units;
- fast access to fiber (easy to remove the module material with no tools required – by finger nails);
- small quantity of grease, minimizing clean-up time;
- avoid the risk of tube kinking (potentially causing attenuation increments or fiber breakage);
- simple mid-span breakout enabling single module extraction to aid distribution.

Design option

- HFFR performance: low-smoke halogen free fire retardant sheath compound for indoor applications.
- G.652 D optical fibers performance: standard single mode optical fibers.
- G.657 A1 / G.657 A2 optical fibers performance: single mode optical fibers with reduced sensitivity for bending.

Using G.657 A1 / G.657 A2 optical fibers enables the Micro Tube cable to be wound around tight radius without signal loss; this supports the reduction in size of connectivity units, saving space and providing improved aesthetics.

General data

Description	Value, unit (standard)	Requirements*
Tensile strength (installation)	400-2700 N (IEC 60794-1-2-E1)	$\Delta L/L$ fiber \leq 0.60% $\Delta\alpha \leq$ 0.10 dB under test, reversible
Crush	1500 N/100 mm, max 5 min (IEC 60794-1-2-E3)	$\Delta\alpha \leq$ 0.05 dB under test, reversible, no significant damage
Impact	5 J, 5 impacts, R=300 mm (IEC 60794-1-2-E4)	$\Delta\alpha \leq$ 0.05 dB after the test, no damage
Repeated bending	R=20xOD, 30 N, 15 cycles (IEC 60794-1-2-E6)	$\Delta\alpha \leq$ 0.05 dB after the test, no damage
Torsion	$\pm 180^\circ$, 1 m, 200 N, 3 cycles (IEC 60794-1-2-E7)	$\Delta\alpha \leq$ 0.05 dB after the test, no damage
Bend	D=20xOD, 3 cycles (IEC 60794-1-2-E11A)	$\Delta\alpha \leq$ 0.05 dB after the test, no damage
Temperature cycling	-30 to +70 °C, 2 cycles, 1 cycle = 18 h (IEC 60794-1-2-F1)	$\Delta\alpha \leq$ 0.10 dB/km, reversible
Water penetration	3 m sample, 1 m water column, 24 h (IEC 60794-1-2-F5B)	No water penetration
Minimum bending radius	-	20xOD under tension / 10xOD without tension

* Values for single-mode fibers, all optical measurements performed at 1550 nm

Temperature performance data

Description	Value, unit
Installation	- 10 °C to + 40 °C
Operation	- 30 °C to + 70 °C
Transport and storage	- 30 °C to + 70 °C

Design data

Designation	Micro Tube 12A(1x12)	Micro Tube 24A(2x12)	Micro Tube 36A(3x12)	Micro Tube 48A(4x12)	Micro Tube 60A(5x12)	Micro Tube 72A(6x12)
Fiber type	G.652 D / G.657 A1 / G.657 A2					
Number of fibers per Micro Tube	12					
Number of Micro Tubes	1	2	3	4	5	6
Micro Tube diameter ID/OD (nominal), mm	1,1/1,3					
Peripheral strength member diameter(nominal), mm	2x0,8			2x1,6		
Outer sheath thickness (nominal), mm	1,8			2,6		
Cable diameter (nominal), mm	7,7			9,60		9,9
Cable weight, kg/km	50			80		85
Tensile strength, N						
– long term	500			800		
– short term	1000			1600		

Designation	Micro Tube 96A(8x12)	Micro Tube 144A(12x12)	Micro Tube 192A(16x12)	Micro Tube 288A(24x12)	Micro Tube 360A(30x12)	Micro Tube 432A(36x12)
Fiber type	G.652 D / G.657 A1 / G.657 A2					
Number of fibers per Micro Tube	12					
Number of Micro Tubes	8	12	16	24	30	36
Micro Tube diameter ID/OD (nominal), mm	1,1/1,3					
Peripheral strength member diameter(nominal), mm	2x1,6					
Outer sheath thickness (nominal), mm	2,6					
Cable diameter (nominal), mm	10,5	11,5	12,2	13,9	14,4	15,2
Cable weight, kg/km	95	110	120	155	170	185
Tensile strength, N						
– long term	1100			1350		
– short term	2200			2700		

Designation	Micro Tube 12A(1x12)	Micro Tube 24A(2x12)	Micro Tube 36A(3x12)	Micro Tube 48A(4x12)	Micro Tube 60A(5x12)	Micro Tube 72A(6x12)
Fiber type	G.652 D / G.657 A1 / G.657 A2					
Number of fibers per Micro Tube	12					
Number of Micro Tubes	1	2	3	4	5	6
Micro Tube diameter ID/OD (nominal), mm	1,1/1,3					
Peripheral strength member diameter(nominal), mm	2x0,5					
Outer sheath thickness (nominal), mm	1,1					
Cable diameter (nominal), mm	6,1			6,5		6,9
Cable weight, kg/km	25		30		40	
Tensile strength, N						
– long term	200			250		
– short term	400			500		

Designation	Micro Tube 96A(8x12)	Micro Tube 144A(12x12)	Micro Tube 192A(16x12)	Micro Tube 288A(24x12)	Micro Tube 360A(30x12)	Micro Tube 432A(36x12)
Fiber type	G.652 D / G.657 A1 / G.657 A2					
Number of fibers per Micro Tube	12					
Number of Micro Tubes	8	12	16	24	30	36
Micro Tube diameter ID/OD (nominal), mm	1,1/1,3					
Peripheral strength member diameter(nominal), mm	2x0,5				2x1,6	
Outer sheath thickness (nominal), mm	1,10	1,15		1,45	2,60	
Cable diameter (nominal), mm	7,3	8,6	9,2	11,5	14,2	15,0
Cable weight, kg/km	45	60	70	100	160	175
Tensile strength, N						
- long term	350	500	650	850		
- short term	700	1000	1300	1700		

Designation	Micro Tube 6A(1x6)	Micro Tube 12A(2x6)	Micro Tube 18A(3x6)	Micro Tube 24A(4x6)	Micro Tube 36A(6x6)	Micro Tube 48A(8x6)	Micro Tube 60A(10x6)	Micro Tube 72A(12x6)	Micro Tube 96A(16x6)	Micro Tube 108A(18x6)	Micro Tube 144A(24x6)
Fiber type	G.652 D / G.657 A1 / G.657 A2										
Number of fibers per Micro Tube	6										
Number of Micro Tubes	1	2	3	4	6	8	10	12	16	18	24
Micro Tube diameter ID/OD (nominal), mm	0,8/1,0										
Peripheral strength member diameter(nominal), mm	2x0,8						2x1,6				
Outer sheath thickness (nominal), mm	1,8						2,6				
Cable diameter (nominal), mm	7,0			7,6		7,8	10,0	10,2	10,9	11,1	12,1
Cable weight, kg/km	40				50	55	85	90	100	105	120
Tensile strength, N											
- long term	500					800			1100		
- short term	1000					1600			2200		

Designation	Micro Tube 6A(1x6)	Micro Tube 12A(2x6)	Micro Tube 18A(3x6)	Micro Tube 24A(4x6)	Micro Tube 36A(6x6)	Micro Tube 48A(8x6)	Micro Tube 60A(10x6)	Micro Tube 72A(12x6)	Micro Tube 96A(16x6)	Micro Tube 108A(18x6)	Micro Tube 144A(24x6)
Fiber type	G.652 D / G.657 A1 / G.657 A2										
Number of fibers per Micro Tube	6										
Number of Micro Tubes	1	2	3	4	6	8	10	12	16	18	24
Micro Tube diameter ID/OD (nominal), mm	0,8/1,0										
Peripheral strength member diameter(nominal), mm	2x0,5										
Outer sheath thickness (nominal), mm	1,10								1,15		1,45
Cable diameter (nominal), mm	5,4			6,0		6,3	7,0	7,2	7,8	8,2	9,7
Cable weight, kg/km	25				30	35	40	45	50	55	75
Tensile strength, N											
- long term	200								250	350	500
- short term	400								500	700	1000

















































Optical fiber characteristics

Description	Value		
	G.652 D	G.657 A1	G.657 A2
Fiber type	G.652 D	G.657 A1	G.657 A2
Attenuation, dB/km – at 1310 nm – at 1550 nm	≤ 0.36 ≤ 0.22	≤ 0.35 ≤ 0.22	≤ 0.36 ≤ 0.22
Chromatic dispersion, ps/nm·km – 1285÷1330 nm – 1550 nm	≤ 3.5 ≤ 18	≤ 3.5 ≤ 18	≤ 3.5 ≤ 18
Zero dispersion wavelength, nm	1300÷1324	1302÷1322	1310÷1324
Zero dispersion slope, ps/nm ² ·km	≤ 0.092	≤ 0.092	≤ 0.092
Polarization mode dispersion, ps/√km	≤ 0.2	≤ 0.1	≤ 0.1
Cut-off wavelength (lcc), nm	≤ 1260	≤ 1260	≤ 1260
Mode field diameter at 1310 nm, μm	9.3 ± 0.5	8.9 ± 0.4	9.2 ± 0.4
Core/cladding concentricity error, μm	≤ 0.6	≤ 0.5	≤ 0.5
Cladding diameter, μm	125 ± 1	125 ± 0.7	125 ± 0.7
Cladding non-circularity, %	≤ 1	≤ 0.7	≤ 0.7
Coating diameter (uncolored), μm	245 ± 10	240 ± 5	242 ± 5

Attenuation with bending optical fiber

Fiber type	Wavelength, nm	Number of turns	Mandrel radius, mm	Induced attenuation, dB
G.652 D	1310	100	25	≤ 0.05
		100	25	≤ 0.10
	1550	1	16	≤ 0.50
		100	37.5	≤ 0.50
G.657 A1	1550	100	25	≤ 0.01
		10	15	≤ 0.20
		1	10	≤ 0.20
		100	25	≤ 0.05
	1625	10	15	≤ 0.50
		1	10	≤ 0.50
		10	15	≤ 0.03
		1	10	≤ 0.10
G.657 A2	1550	1	7.5	≤ 0.50
		10	15	≤ 0.10
		1	10	≤ 0.20
	1625	10	15	≤ 0.10
		1	10	≤ 0.20
		1	7.5	≤ 1.00

Colour codes

Optical Fiber Colours												
Colour	red	blue	green	yellow	violet	white	orange	grey	brown	black	aqua	pink
												
Micro Tube Colours												
Colour	red	blue	green	yellow	violet	white	orange	grey	brown	black	aqua	pink
												
Colour	red	blue	green	yellow	violet	white	orange	grey	brown	green	aqua	pink
												
Colour	red	blue	green	yellow	violet	white	orange	grey	brown	green	aqua	pink
												

Length tolerance on the drum (-1; +3) %



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