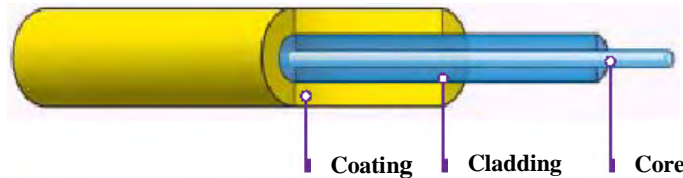


OPTICAL & GEOMETRICAL PROPERTIES OF FIBERS

General Description

There are various types of fibers with their unique properties and specifications that made them suitable for certain applications and not for other applications. Therefore, the choice of correct fiber pertaining to a specific application is important. This document will show us the type of fibers with their specifications and properties.



Typical Construction of a Fiber

Specification & Properties

Multimode Fibers

Parameter		50/125 μm			62.5/125 μm	Units	
Fiber Code		050	053	054	062		
ISO/IEC 11801 Classification		OM2	OM3	OM4	OM1		
Attenuation (Bare Fiber)	@850nm	≤3.0	≤3.0	≤2.2	≤3.0	dB/km	
	@1300nm	≤0.8	≤1.0	≤0.5	≤0.8	dB/km	
Attenuation (Cabled)	@850nm	≤3.2	≤3.2	≤2.4	≤3.2	dB/km	
	@1300nm	≤1.0	≤1.2	≤0.7	≤1.0	dB/km	
Bandwidth	@850nm	≥500	≥1500	≥3500	≥200	MHz*km	
	@1300nm	≥800/500	≥500	≥500	≥500/600	MHz*km	
Numerical Aperture		0.20±0.015			0.275±0.015	-	
Core Diameter		50±3	50±2	50±2	62.5±3	um	
Cladding Diameter		125±2			125±2	um	
Core/Cladding Concentricity		≤1.5			≤1.5	um	
Core Non-Circularity		≤6			≤6	%	
Cladding Non-Circularity		≤2			≤2	%	
Core/Cladding Offset		≤3			≤3	um	
Coating Diameter		245±10			245±10	um	
Proof-Test Level		100 (0.7)			100 (0.7)	Kpsi (GN/m ²)	
Fatigue Coefficient		≥20			≥20		
Temperature Dependence between 0°C ~ +70°C		0.1			0.1	dB	
Gigabit Ethernet	Sx (850nm)	VCSL(m)	-	1100	1100	-	m
	Lx (1310nm)	Laser(m)	-	550	550	-	m
10 Gigabit Ethernet	Sx (850nm)	VCSL(m)	-	300	550	-	m
	Lx (1310nm)	WWDM(m)	-	300	300	-	m

FIBER PROPERTIES & SPECIFICATIONS

Singlemode Fibers

Parameter		Standard Single Mode Fiber as per ITU-T G.652D	Non-zero Dispersion Shifted Fiber as per ITU-T G.655	Bend Insensitive Fiber as per ITU-T G.657A1	Bend Insensitive Fiber as per ITU-T G.657A2	Units
Fiber Code		009	095	7A1	7A2	
Attenuation (Loose Tube Cable)	@1310nm	≤ 0.35	NA	≤ 0.35	≤ 0.35	dB/km
	@1550nm	≤ 0.22	≤ 0.22	≤ 0.22	≤ 0.22	dB/km
	@1625nm	≤ 0.25	≤ 0.26	≤ 0.23	≤ 0.23	dB/km
Attenuation (Tight & Semi-Tight Buffered Cable)	@1310nm	≤ 0.38	NA	≤ 0.38	≤ 0.38	dB/km
	@1550nm	≤ 0.28	NA	≤ 0.28	≤ 0.28	dB/km
Chromatic Dispersion	Between 1260 and 1360nm (O Band)	≤ 3.5	NA	≤ 3.5	≤ 3.5	ps/(nm*km)
	Between 1460 and 1530nm (S Band)	NA	NA	NA	NA	ps/(nm*km)
	Between 1530 and 1565nm (C Band)	≤ 18	1.0-10.0	≤ 18	≤ 18	ps/(nm*km)
	Between 1565 and 1625nm (L Band)	≤ 22	7.0-12.0	≤ 22	≤ 22	ps/(nm*km)
Zero Dispersion Wavelength		1310±11	1530 - 1560	1300 -1324	1300 -1324	nm
Zero Dispersion Slope		0.093	0.093	≤ 0.092	≤ 0.092	ps/(nm ² .km)
Point Discontinuity at 1310nm& 1550nm		0.1	0.1	≤ 0.05	≤ 0.05	dB
Mode Field Diameter	@1310nm	9.3±0.5	NA	8.8±0.4	8.8±0.4	um
	@1550nm	10.4±0.8	8.5±0.6	9.8±0.5	9.8±0.5	um
Cable Cut-off Wavelength		≤ 1260	≤ 1450	≤ 1260	≤ 1260	nm
PMD (Individual fiber)		≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	ps/km 1/2
Cladding Diameter		125±1	125±1	125±0.7	125±0.7	um
Core Cladding Concentricity Error		≤ 0.5	≤ 0.5	≤ 0.5	≤ 0.5	um
Cladding Non-Circularity		≤ 1.0	≤ 1.0	≤ 0.7	≤ 0.7	%
Coating Non-Circularity		≤ 6.0	≤ 6.0	≤ 6.0	≤ 6.0	%
Primary Coating Diameter		245±10	245±10	245±5	245±5	um
Proof-Test Level		100 (0.7)	100 (0.7)	100 (0.7)	100 (0.7)	Kpsi (GN/m ²)
Fatigue Coefficient		≥ 20	≥ 20	27	27	
Temperature Dependence between 0°C ~ +70°C @ 1310 & 1550nm		0.1	0.1	0.05	0.05	dB/km
Induced Macrobend Loss (1 turn around mandrel)						
Wavelengths / Mandrel Radius		@ 1550nm at 10mm radius		≤ 0.75	≤ 0.1	dB
		@ 1625nm at 10mm radius		≤ 1.5	≤ 0.2	dB
		@ 1550nm at 7.5mm radius		NA	≤ 0.5	dB
		@ 1625nm at 7.5mm radius		NA	≤ 1.0	dB



FIBER PROPERTIES & SPECIFICATIONS

Hard Polymer Clad Fibers (HPCF)

Parameter	200/230μm	200/250μm	Units
Fiber Code	230	250	
Transmission Characteristics			
Value	Typical	Typical	
Wavelength	810	880	nm
Attenuation	≤ 7	≤ 6	dB/km
Bandwidth	10	10	MHz.km
Geometrical and Mechanical Properties			
Numerical aperture	0.4 ± 0.04	0.46 ± 0.04	-
Core diameter	200 ± 5	200 ± 5	μm
Core non-circularity	≤ 6	≤ 6	%
Core-cladding concentricity error	≤ 10	≤ 10	μm
Cladding diameter	230 ± 5	250 ± 5	μm
Coating diameter	500 ± 50	500 ± 50	μm
Test load	150	150	kpsi

Plastic Optic Fibers (POF)

Parameters	960/1000μm	Units
Fiber Code	100	
Core Material	PMMA, Fluorinated Polymer	
Transmission Characteristics		
Parameters	Value (typical)	Unit
Application Wavelength	650 or 530	nm
Attenuation	≤ 180	dB/km
Bandwidth	40MHz / 50 m	MHz.km
Refractive index	1.49	-
Geometrical and Mechanical Properties		
Numerical aperture	0.5 ± 0.04	-
Core diameter	960 ± 6	μm
Cladding diameter	1000 ± 6	μm



FIBER PROPERTIES & SPECIFICATIONS

Fiber Colour Code

The colours of the fibers are according to IEC60793-2 and TIA/EIA-598.

Fiber Core No.	Colour of Fiber
01	Blue
02	Orange
03	Green
04	Brown
05	Grey (Slate)
06	White
07	Red
08	Black
09	Yellow
10	Violet
11	Pink (Rose)
12	Turquoise (Light Blue)
13	Blue – with black ring
14	Orange – with black ring
15	Green – with black ring
16	Brown – with black ring
17	Grey (Slate) – with black ring
18	White – with black ring
19	Red – with black ring
20	Black – with yellow ring
21	Yellow – with black ring
22	Violet – with black ring
23	Pink (Rose) – with black ring
24	Turquoise (Light Blue) – with black ring

