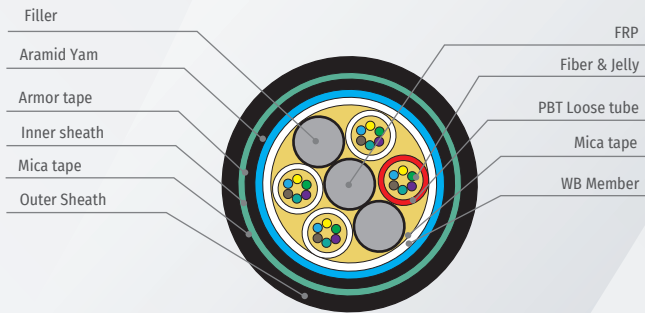


## GYFTZS24B1 Fire Resistant Optical Fiber Cable



Cross-section of Cable (24C)

Lightem offers a board variety of fiber optic cable for different outdoor condition, such as central loose tube armored cable, duct armored cable, direct buried cable, steel wire armored cable, non metallic outdoor cable, ADSS cable and figure 8 cable. Specially designed for projects with confined space, GYFTZS24B1 is the highest grade fire resistant cable, comply the stringent standards in the industry. Full range of fiber type ranging from G652D, G657A1/A2, OM1 62.5/125µm, OM2 50/125µm, OM3 and OM4 are available. Lightem also provides the customization service on the fiber, colours and construction of the cables for catering different cases.

### Features

- Fire resistant, Low Smoke Zero Halogen and UV protection
- For duct and direct buried installation
- Lift cycle of cable shall be 25 years without any significant deterioration.
- Comply to TIA/EIA568B-3, ISO/IEC 11801, IEC 60793 and IEC 60794

### Optical Cable Design

Number of fibers		4-12	13-24	25-48	49-96
Fiber	Construction	Refer to Fiber and loose tube identification			
Filling Compound	Material	Thixotropic Jelly Compound			
Loose Tube (mm)	Material	(PBT) Polybutylene Terephthalate			
	Color Identification	Color Code for fibers			
	Outer Diameter	≤2.1			
Core Filling Compound	Material	Water Blocking Yarn			
Central Strength Member	Material	FRP			
	Diameter (mm)	2.1	2.1	2.1	2.6 PE 3.5
Filler Compound	Material	PE			
Additional Strength	Material	Aramid yarn			
Metal Sheath	Material	Armor tape			
Inner Sheath	Material	LSZH			
	Thickness(mm)	1.0mm	1.0mm	1.0mm	1.5mm
Refractory layer	Material	Mica tape			
Out sheath	Material	LSZH			
	LSZH	1.8mm			
Cable Diameter Approx. (mm)		14.8	14.8	14.8	16

### Fiber and Loose Tube Identification

Fiber Color	Blue	Orange	Green	Brown	Slate	White
	Red	Black	Yellow	Violet	Rose	Aqua

### Fire Performance

Test	Standard
Flame Retardance test (Single Vertical Wire Test)	IEC 60332-1-2: Test for vertical flame propogation for a single vertical insulated cable
Reduced Fire Propogation (Vertically mounted bundled wires & cable test)	IEC 60332-3-24: Tests for bunched wires or cables - Category C
Halogen Free	IEC 60754-1: Test for halogen acid gas content
No Corrosive Gas Emission	IEC 60754-2: Acity (by pH measurement) and conductivity
Oxygen Index	ISO 4589-2: 1996 Ambient-temperature test ISO 4589-3: 1996 Elevated-temperature test
Smoke Emission	IEC 61034-1&2: smoke density of cables buring under defined conditions
Circuit integrity	IEC 60331-25 BS 6387 -CWZ

## Environment Conditions

The cable shall retain the optical properties, detailed in the present specification over the following:

Installation temperature :	-20° C to + 70° C
Operating temperature :	-40° C to + 70° C
Storage / Shipping temperature :	-40° C to + 70° C
Relative humidity :	0 to 90 %

## Mechanical Performance

	Tensile Loading	Impact	Crush Test	Cable Bending Test	Flexing/Repeat Bending Test
Test standard	IEC 60794-1-2-E1	IEC 60794-1-2-E4	IEC 60794-1-2-E3	IEC 60794-1-2-E11A	IEC 60794-1-2-E11A
Loading	3000N		2500 N		
Loading Time	At least 10 min.		At least 1 min.		
Impact energy		450g, 1m height, striking surface Radius: 12.5mm			450g, 1m height, striking surface Radius: 12.5mm
Number of cycles		5 cycle ,2 second/cycle		5 cycle	5 cycle
Steel plate			100 mm		
Radius of mandrel				20 x diameter of cable	20 x diameter of cable
Test result	Change of attenuation <0.1 dB @ 1310/1550nm. No fiber break and no sheath damage. The fiber strain is measured during the cable has been subjected to the installation load 5 min. A fiber strain shall not be greater than 0.33% during and after testing.	Change of attenuation <0.1dB @ 1310/1550nm. No fiber break and no cable damage.	Change of attenuation <0.1 dB @ 1310/1550nm. No fiber break and no cable damage.	Change of attenuation <0.1 dB @ 1310/1550nm. No fiber break and no cable damage.	Change of attenuation <0.1 dB @ 1310/1550nm. No fiber break and no cable damage.

	Twist Torsion Test	Water penetration Test	Circumnutate Test	Temperature Cycling Test	Compound Flow Test
Test standard	IEC 60794-1-2-E7	IEC-794-1-2-F5B	IEC 60794-1-2-E8	IEC 60794-1-2-F1	IEC 60794-1-2-E14
Sample length	2 m	3 m			300±5mm
Sample					5
Number of cycles	10 cycles, ≤ 1 Min./cycle		25 cycles	2 cycle	
High of water length		1 m			
Twist angle	± 180°			5 cycle	
Test Time		At least 24hrs		12 hrs	24 hrs
Radius of mandrel			20 x diameter of cable		
Temperature				-40° C to + 70° C	
Remove length					130±2.5mm
Test result	Change of attenuation <0.1 dB @ 1310/1550nm. No fiber break and no cable damage.	At the end, no water shall have leaked from the opposite end of the cable.	Change of attenuation <0.1 dB @ 1310/1550nm. No fiber break and no cable damage.	Change of attenuation <0.1 dB @ 1310/1550nm	No gel dipped.

## Fiber Specifications (Singlemode)

Characteristics		G652D	G657A1	G657A2
<b>Optical Characteristics</b>				
Attenuation	1310nm	$\leq 0.40$ dB/km	$\leq 0.40$ dB/km	$\leq 0.40$ dB/km
	1383nm*	$\leq 0.34$ dB/km	$\leq 0.35$ dB/km	$\leq 0.35$ dB/km
	1460nm*	-	$\leq 0.25$ dB/km	$\leq 0.25$ dB/km
	1490nm*	-	-	$\leq 0.23$ dB/km
	1550nm*	$\leq 0.30$ dB/km	$\leq 0.30$ dB/km	$\leq 0.30$ dB/km
	1625nm	$\leq 0.23$ dB/km	$\leq 0.23$ dB/km	$\leq 0.23$ dB/km
Attenuation vs. Wavelength	1285-1330nm*	$\leq 0.03$ dB/km	$\leq 0.03$ dB/km	$\leq 0.03$ dB/km
Max. $\alpha$ difference	1525-1575nm*	$\leq 0.02$ dB/km	$\leq 0.02$ dB/km	$\leq 0.02$ dB/km
Dispersion coefficient	1285-1340nm	$\geq -3.4 \leq 3.4$ ps/(nm · km)	$\geq -3.4 \leq 3.4$ ps/(nm · km)	-
	1550nm	$\leq 18$ ps/(nm · km)	$\leq 18$ ps/(nm · km)	-
	1625nm	$\leq 22$ ps/(nm · km)	$\leq 22$ ps/(nm · km)	-
Zero dispersion wavelength		1312±12 nm	1300-1324 nm	1300-1324 nm
Zero dispersion slope		$\leq 0.091$ ps/nm <sup>2</sup> · km	$\leq 0.092$ ps/nm <sup>2</sup> · km	$\leq 0.092$ ps/nm <sup>2</sup> · km
Typical value		0.086 ps/nm <sup>2</sup> · km	0.086 ps/nm <sup>2</sup> · km	0.04 ps/nm <sup>2</sup> · km
<b>PMD</b>				
Maximum Individual Fibre		$\leq 0.1$ ps/√km	$\leq 0.1$ ps/√km	$\leq 0.1$ ps/√km
Link Design Value(M=20,Q=0.01%)		$\leq 0.06$ ps/√km	$\leq 0.06$ ps/√km	$\leq 0.06$ ps/√km
Typical value		0.04 ps/√km	0.04 ps/√km	0.04 ps/√km
Cable cutoff wavelength $\lambda_{cc}$		$\leq 1260$ nm	$\leq 1260$ nm	$\leq 1260$ nm
Mode field diameter(MFD)	1310nm	8.7-9.5 $\mu$ m	8.4-9.2 $\mu$ m	8.4-9.2 $\mu$ m
	1550nm	9.9-10.9 $\mu$ m	9.3-10.3 $\mu$ m	9.3-10.3 $\mu$ m
Effective group index of refraction(Neff)	1310nm	1.466	1.466	1.466
	1550nm	1.467	1.467	1.467
Point discontinuities	1310nm	$\leq 0.05$ dB	$\leq 0.05$ dB	$\leq 0.05$ dB
	1550nm	$\leq 0.05$ dB	$\leq 0.05$ dB	$\leq 0.05$ dB
<b>Geometrical Characteristics</b>				
Cladding diameter		125.0±0.7 $\mu$ m	125.0±0.7 $\mu$ m	125.0±0.7 $\mu$ m
Cladding non-circularity		$\leq 1.0$ %	$\leq 0.7$ %	$\leq 0.7$ %
Coating diameter		245.0±7 $\mu$ m	245.0±5 $\mu$ m	245.0±5 $\mu$ m
Coating-cladding concentricity error		$\leq 12.0$ $\mu$ m	$\leq 12.0$ $\mu$ m	$\leq 12.0$ $\mu$ m
Coating non-circularity		$\leq 6.0$ %	$\leq 6.0$ %	$\leq 6.0$ %
Core-cladding concentricity error		$\leq 0.6$ $\mu$ m	$\leq 0.5$ $\mu$ m	$\leq 0.5$ $\mu$ m
Curl(radius)		$\geq 4$ m	$\geq 4$ m	$\geq 4$ m
Delivery length		2.1 to 50.4 km/reel	2.1 to 50.4 km/reel	2.1 to 50.4 km/keel

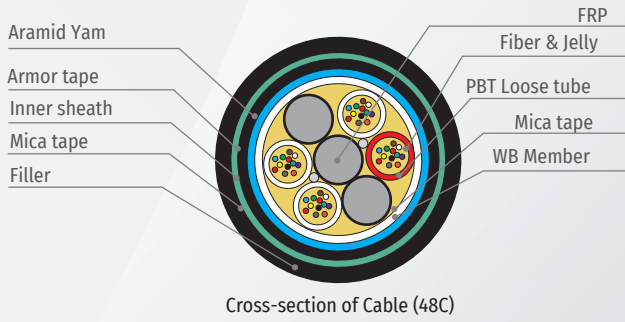
\*Attenuation loss of barefiber

## Fiber Specifications (Multimode)

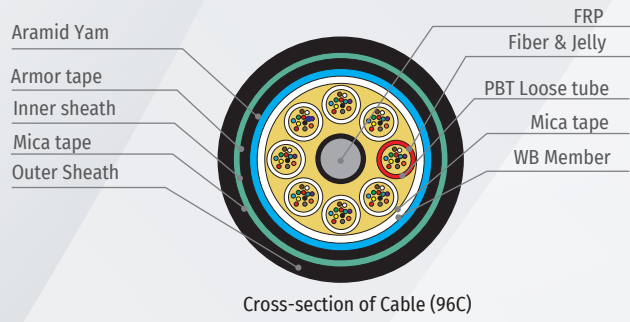
Characteristics		62.5/125 (OM1)	50/125 (OM2)	OM3/OM4	OM5
<b>Geometry Characteristics</b>					
Core Diameter		62.5±2.5 $\mu$ m	50±2.5 $\mu$ m	50±2.5 $\mu$ m	50±2.5 $\mu$ m
Core Non-circularity		$\leq 5.0$ %	$\leq 5.0$ %	$\leq 5.0$ %	$\leq 5.0$ %
Cladding Diameter		125.0±1.0 $\mu$ m	125.0±1.0 $\mu$ m	125.0±1.0 $\mu$ m	125.050±1.0 $\mu$ m
Cladding Non-circularity		$\leq 1.0$ %	$\leq 1.0$ %	$\leq 0.6$ %	$\leq 0.6$ %
Coating Diameter		245±7 $\mu$ m	245±7 $\mu$ m	245±7 $\mu$ m	245±7 $\mu$ m
Coating/Cladding Concentricity Error		$\leq 10.0$ $\mu$ m	$\leq 10.0$ $\mu$ m	$\leq 10.0$ $\mu$ m	$\leq 10.0$ $\mu$ m
Coating Non-circularity		$\leq 6.0$ %	$\leq 6.0$ %	$\leq 6.0$ %	$\leq 6.0$ %
Core/Cladding Concentricity Error		$\leq 1.5$ $\mu$ m	$\leq 1.5$ $\mu$ m	$\leq 1.0$ $\mu$ m	$\leq 1.0$ $\mu$ m
Delivery Length		up to 17.6 km/reel	up to 17.6 km/reel	up to 8.8 km/reel	up to 8.8 km/reel
<b>Optical Characteristics</b>					
Attenuation	850nm	$\leq 3.5$ dB/km	$\leq 3.5$ dB/km	$\leq 3.5$ dB/km	$\leq 3.5$ dB/km
	953nm*	-	-	-	$\leq 1.7$ dB/km
	1300nm	$\leq 1.5$ dB/km	$\leq 1.5$ dB/km	$\leq 1.5$ dB/km	$\leq 1.5$ dB/km
Overfilled Modal Bandwidth	850nm	$\geq 200$ MHz · km	$\geq 500$ MHz · km	$\geq 1500 / \geq 3500$ MHz · km	$\geq 3500$ MHz · km
	953nm	-	-	-	$\geq 1850$ MHz · km
	1300nm	$\geq 500$ MHz · km	$\geq 500$ MHz · km	$\geq 500 / \geq 500$ MHz · km	$\geq 500$ MHz · km
Effective Modal Bandwidth	850nm	-	-	$\geq 2000 / \geq 4700$ MHz · km	$\geq 4700$ MHz · km
	953nm	-	-	-	$\geq 2470$ MHz · km
10Gb/sWDM		-	-	-100/150 m	150 m
40Gb/sWDM		-	-	300/500 m	440 m
40GBASE-SR4 / 100GBASE SR10	850nm	-	-	1000/1100 m	200 m
10GBASE-SR	850nm	-	-	-	-
1000BASE-SR	850nm	-	-	-	-
<b>DMD Specification</b>					
Numerical Aperture		0.275±0.015	0.200±0.015	0.200±0.015	0.200±0.015
Group Refractive index		1,496	1,482	1,482	1,482
		1,491	1,477	1,477	1,477
Zero Dispersion Wavelength, $\lambda_0$		1320-1365 nm	1295-1340 nm	1295-1340 nm	1297-1328 nm
Zero Dispersion Slope, $S_0$		-	-	-	$\leq 4(-103)/(840\lambda\sqrt{840})^4$
		-	-	-	ps/nm <sup>2</sup> · km
Zero Dispersion Slope, $S_{0295nm} \leq \lambda_0 \leq 1310nm$		-	$\leq 0.105$ ps/nm <sup>2</sup> · km	$\leq 0.105$ ps/nm <sup>2</sup> · km	-
	1310nm $\leq \lambda_0 \leq 1340nm$	-	$\leq 0.000375(1590-\lambda_0)$ ps/nm <sup>2</sup> · km	-	-
	1320nm $\leq \lambda_0 \leq 1348nm$	$\leq 0.11$ ps/nm <sup>2</sup> · km	-	$\leq 0.000375(1590-\lambda_0)$ ps/nm <sup>2</sup> · km	-
	1348nm $\leq \lambda_0 \leq 1365nm$	$\leq 0.001(1458-\lambda_0)$ ps/nm <sup>2</sup> · km	-	-	-

\*Attenuation loss of barefiber

# Product Diagram



Cross-section of Cable (48C)



Cross-section of Cable (96C)

# Ordering Information

\* Ordering Code Example

