

# Optical Fibre Cable Technical Specification

## Duct or Burial Cable

### GYFS(ALL DRY)-nB1.3/B6a1

Yangtze Optical Fibre and Cable Joint Stock Limited Company

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Customer Approval			
	Name	Signature	Date
Approved by			

## 1. General

### 1.1 Scope

This Specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. YOFC ensures a stable quality control system for our cable products through several programs including ISO 9001, ISO 14001 and OHS.

Cable type	Application
GYFS(ALL DRY)-nB1.3/B6a1 n represent the number of fibres in the cable.	Duct or Burial installation

### 1.2 Reference

The cable offered by YOFC are designed, manufactured and tested according to the standards as follows:

IEC 60794-1-1	Optical fibre cables-part 1-1: Generic specification-General
IEC 60794-1-21	Optical fiber cables- part1-2-Generic specification-Basic optical cable test procedure-Mechanical test methods
IEC 60794-1-22	Optical fiber cables- part1-2-Generic specification-Basic optical cable test procedure-Environmental test methods
IEC 60794-3	Optical fibre cables-part 3: Sectional specification-Outdoor cables
IEC 60794-3-10	Optical fibre cables-part 3-10: Outdoor cables-Family specification for duct and direct buried optical communication cables
IEC 60794-3-11	Optical fibre cables-Part 3-11: Outdoor cables-Detailed specification for duct and directly buried single-mode optical fibre telecommunication cables

### 1.3 Life Time

Optical fibre cables supplied in compliance with this specifications is capable to withstand the typical service condition for a period of twenty-five (25) years without detriment to the operation characteristics of the cable.

### 1.4 Application

Item	Value
Operation temperature	-40 °C~+70 °C
Storage temperature	-40 °C~+70 °C
Static bending radius	10 times the cable diameter
Dynamic bending radius	20 times the cable diameter

## 2. Optical Fibre

Optical Fibres supplied in this specification meet the requirements of ITU-T G.652D

Parameters	Specification
MFD (1310nm)	9.2+/-0.4um
MFD (1550nm)	10.4+/-0.5um
Cladding diameter	125um±1.0um
Fiber diameter	245+/-7um, with UV coating, and colored to : 250+/-15um
Core/cladding concentricity error	≤ 0.6um
Coating/cladding concentricity error	≤ 12.0um
Cladding non circularity	≤ 1.0%
Cut off wavelength	$\lambda_{cc} \leq 1260\text{nm}$
Attenuation coefficient	1310nm: 0.35dB/km max after cabling 1383nm: 0.35dB/km max after cabling 1550nm: 0.25dB/km max after cabling
Bending-loss performance of optical fiber @1310nm&1550nm	≤0.05dB (100 turns around a mandrel of 50mm diameter)
Polarization mode dispersion link value	≤0.1ps/√km
Zero-dispersion wavelength	1312+/-12nm
Zero-dispersion slope	≤0.091ps/nm <sup>2</sup> .km

Optical Fibres supplied in this specification meet the requirements of ITU-T G.657

Parameters	Specification
MFD (1310nm)	8.8+/-0.4um
MFD (1550nm)	9.8+/-0.5um
Cladding diameter	125+/-0.7um
Fiber diameter	245+/-5um, with UV coating, and colored to : 250+/-15um
Core/cladding concentricity error	≤ 0.5um
Coating/cladding concentricity error	≤ 12.0um
Cladding non-circularity	≤ 0.7%

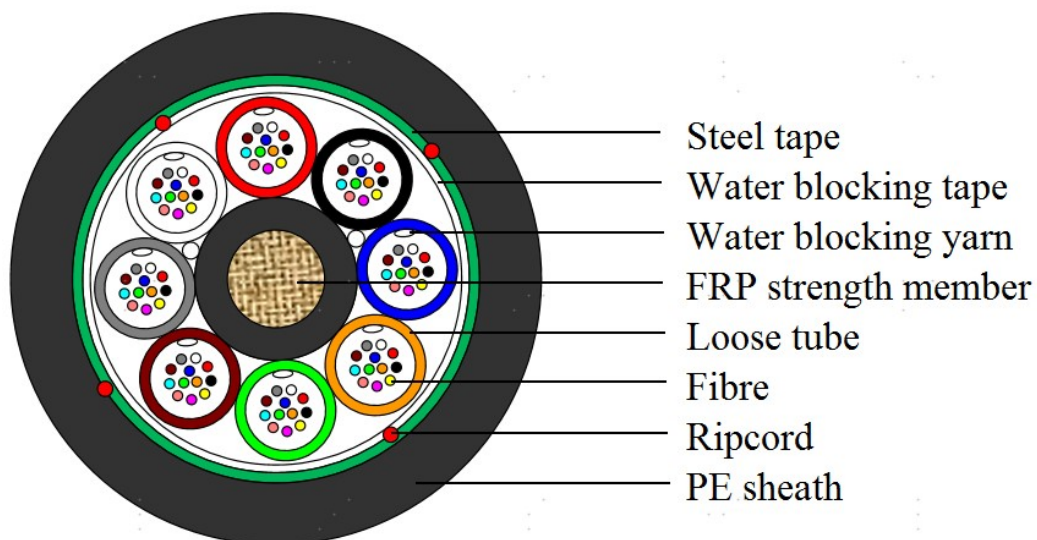
Cut-off wavelength	$\lambda_{cc} \leq 1260\text{nm}$
Attenuation coefficient	1310nm: 0.35dB/km max after cabling 1383nm: 0.35dB/km max after cabling 1550nm: 0.25dB/km max after cabling
Bending-loss performance of optical fibers @1550nm	$\leq 0.03\text{dB}$ (10 turns around a mandrel of 30mm diameter)
Polarization mode dispersion link value	$\leq 0.1\text{ps}/\sqrt{\text{km}}$
Zero-dispersion wavelength	1312 $\pm$ 12nm
Zero-dispersion slope	$\leq 0.092\text{ps}/\text{nm}^2.\text{km}$

### 3. Optical Cable

#### 3.1 Technical Characteristics

- The unique second coating and stranding technology provide the fibres with enough space and bending endurance, which ensure good optical property of the fibres in the cable
- Accurate process control ensures good mechanical and temperature performance
- High quality raw material guarantees the long service life of cable

#### 3.2 Cross Section of Cable



**GYFS(ALL DRY)-96B1.3/B6a1**

Structure of other fibre counts refer to 3.4

Schematic for reference only

### 3.3 Fibre and Loose Tube Identification

The color code of fibres and loose tube will be identification in accordance with the following color sequence, other sequence also is available. The color of the fillers will be natural.

Fibre color code	1	2	3	4	5	6
	Blue	Orange	Green	Brown	Slate	White
	7	8	9	10	11	12
	Red	Black	Yellow	Purple	Pink	Aqua
	13	14	15	16	17	18
	Blue with black ring	Orange with black ring	Green with black ring	Brown with black ring	Slate with black ring	White with black ring
19	20	21	22	23	24	
Red with black ring	Natural with black ring	Yellow with black ring	Purple with black ring	Pink with black ring	Aqua with black ring	

Tube color code	≤ 12 tube	1	2	3	4	5	6
		Blue	Orange	Green	Brown	Slate	White
		7	8	9	10	11	12
		Red	Black	Yellow	Purple	Pink	Aqua

Tube color code	18 tube	Inner1	Inner 2	Inner 3	Inner 4	Inner 5	Inner 6
		Blue	Orange	Green	Brown	Slate	White
		Outer 1	Outer 2	Outer 3	Outer 4	Outer 5	Outer 6
		Red	Black	Yellow	Purple	Pink	Aqua
		Outer 7	Outer 8	Outer 9	Outer 10	Outer 11	Outer12
		Blue with black Stripe	Orange with black Stripe	Green with black Stripe	Brown with black Stripe	Slate with black Stripe	White with black Stripe

Tube color code	24 tube	Inner1	Inner 2	Inner 3	Inner 4	Inner 5	Inner 6
		Blue	Orange	Green	Brown	Slate	White
		Inner 7	Inner 8	Inner 9	Outer 1	Outer 2	Outer 3
		Red	Black	Yellow	Purple	Pink	Aqua
		Outer 4	Outer 5	Outer 6	Outer 7	Outer 8	Outer 9
		Blue with black Stripe	Orange with black Stripe	Green with black Stripe	Brown with black Stripe	Slate with black Stripe	White with black Stripe
		Outer 10	Outer 11	Outer12	Outer 13	Outer 14	Outer 15
Red with black Stripe	Black with Yellow Stripe	Yellow with black Stripe	Purple with black Stripe	Pink with black Stripe	Aqua with black Stripe		

### 3.4 Dimensions and Descriptions

The standard optical cable structure is shown in the following table, other structure and fibre count are also available according to customer requirements.

Item	contents	Value												
		12	24	36	48	72	96	108	144	192	288	432	576	
Loose tube	Number	1	2	3	4	6	8	9	12	16	24	18	24	
	Outer diameter(mm)	2.4										2.9		
Filler	Number	5	4	3	2	0	0	1	0	2	0	0		
Max. fiber counts per tube		12										24		
Central strength member	Material	FRP												
	Diameter (mm)	2.6					3.5	3.5	3.5	2.6	3.5	3.2	3.5	
	PE layer diameter (mm)	-					4.2	5.6	7.2	-	4.8	-	5.8	
Water Blocking Material	Material	Water Blocking Tape & Yarn												
Armor	Material	Steel tape (Special)												
Sheath	Material	PE												
	Color	Black												
	Thickness(Nominal: mm)	1.6										1.8	2	
Ripcord	Number	2+2												
	Color	Red												
Cable diameter(mm) Approx.		12.5					14.3	15.5	17.2	19.6	20.5	23.2		
Cable weight(kg/km) Approx.		140					165	200	240	290	330	265		

### 3.5 Main Mechanical and Environmental Performance

#### Main mechanical performance

Tension(N)		Crush(N/100mm)	
Short term	Long term	Short term	Long term
2700	900	2200	1100

## 4. Mechanical, Physical and Environmental Test Characteristics

The mechanical and environmental performance of the cable are in accordance with the following table. Unless otherwise specified, all attenuation measurements required in this section shall be performed at 1550nm.

Items	Test Method	Requirements
<b>Tension</b>	<u>IEC 60794-1-21-E1</u> Load: According to 3.5 Sample length: Not less than 50m. Duration time: 1min.	Additional attenuation: $\leq 0.1$ dB after test No damage to outer jacket and inner elements
<b>Crush</b>	<u>IEC 60794-1-21-E3</u> Load: According to 3.5 Duration of load: 1min	Additional attenuation: $\leq 0.1$ dB after test No damage to outer jacket and inner elements
<b>Impact</b>	<u>IEC 60794-1-21-E4</u> Radius: 300 mm Impact energy: 4.5 J Impact number: 1 Impact points: 3	Additional attenuation: $\leq 0.1$ dB No damage to outer jacket and inner elements
<b>Bend</b>	<u>IEC 60794-1-21-E11A</u> Mandrel radius: 10*D Turns:4 Cycles:3	Additional attenuation: $\leq 0.1$ dB No damage to outer jacket and inner elements
<b>Repeated bending</b>	<u>IEC 60794-1-21-E6</u> Bending radius: 20*D Cycles: 25 Load: 150N	Additional attenuation: $\leq 0.1$ dB No damage to outer jacket and inner elements
<b>Torsion</b>	<u>IEC 60794-1-21-E7</u> Cycles:10 Length under test: 1m Turns: $\pm 180^\circ$ Load: 150N	Additional attenuation: $\leq 0.1$ dB No damage to outer jacket and inner elements
<b>Water Penetration</b>	<u>IEC 60794-1-22-F5B</u> Time : 24 hours Sample length : 3m Water height : 1m	No water leakage.
<b>Temperature cycling</b>	<u>IEC 60794-1-22-F1</u> Sample length: at least 1000m Temperature range: $-40^\circ\text{C}\sim+70^\circ\text{C}$ Cycles: 2 Temperature cycling test dwell time: 12 hours	The change in attenuation coefficient shall be less than 0.1dB/km.
<b>Other parameters</b>	According to <u>IEC 60794-1</u>	

## **5. Packaging and Drum**

### **5.1 Cable Sheath Marking**

Unless otherwise specified, the cable sheath marking shall be as follows:

Color: white

Contents: YOFC, the year of manufacture, the type of cable, cable number, length marking

Interval: 1 m

Outer sheath marking legend can be changed according to user's requests.

### **5.2 Reel Length**

Standard reel length: 2/3 km/reel, other length is also available.

### **5.3 Cable Drum**

The cables are packed in fumigated wooden drums.

### **5.4 Cable Packing**

Both ends of the cable will be sealed with suitable plastic caps to prevent the entry of moisture during shipping, handling and storage. The inner end is available for testing.