

Optical Fibre Cable Technical Specification

Duct Cable

GYHS(ALL DRY) –12/24/48/96/144B1.3_PBT tube

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1. General

This specification covers the design requirements and performance standard for the supply of optical fibre cable in the industry. It also includes YOFC premium designed cable with optical, mechanical and geometrical characteristics.

Cable type	Application
GYHS(ALL DRY)-12/24/48/96/144B1.3	Duct installation

1.1 Cable Description

YOFC cable has excellent optical transmission and physical performance, to meet customer requirements.

1.2 Quality

YOFC ensures a stable quality control system for our cable products through several programs including ISO 9001, ISO 14001 and OHS.

1.3 Reliability

Initial and periodic qualification tests for raw material and cable product are performed to assure the cable's performance and durability in the field environment.

1.4 Reference

ITU-T G.657	Characteristics of a single-mode optical fibre
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

1.5 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.

2. Optical Fibre In Cable

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

Parameter	Specification	
MFD (1310nm)	8.7~9.5 μm	
Cladding diameter	125 \pm 1.0 μm	
Fiber diameter	235~255 μm , with UV coating, and colored to : 250 \pm 15 μm	
Core/cladding concentricity error	$\leq 0.6\mu\text{m}$	
Coating/cladding concentricity error	$\leq 12.0\mu\text{m}$	
Cladding non circularity	$\leq 1.0\%$	
Cut off wavelength	$\lambda_{cc} \leq 1260\text{nm}$	
Attenuation coefficient	1310nm: 0.35dB/km max before cabling	1310nm: 0.36dB/km max after cabling
	1383nm: 0.34dB/km max before cabling	1383nm: 0.35dB/km max before cabling
	1550nm: 0.22dB/km max before cabling	1550nm: 0.23dB/km max after cabling
	1625nm: 0.24dB/km max before cabling	1625nm: 0.25dB/km max after cabling
Bending-loss performance of optical fiber @ 1310nm&1550nm	$\leq 0.05\text{dB}$ (100 turns around a mandrel of 50mm diameter)	
Polarization mode dispersion maximum individual fibre	$\square \leq 0.2\text{ps}/\sqrt{\text{km}}$	
Polarization mode dispersion link value	$\square \leq 0.1\text{ps}/\sqrt{\text{km}}$	
Zero-dispersion wavelength	1300~1324nm	
Zero-dispersion slope	$\leq 0.092\text{ps}/\text{nm}^2 \cdot \text{km}$	

3. Optic Cable

3.1 General Design

Optical fibres are housed in loose tubes that are made of high-modulus plastic and filled without any waterproof compounds except water block yarns, and there is no any jelly in the cable core, so the cable is totally dry type and different from those semi-dry cables.

FRP is applied as central strength member.

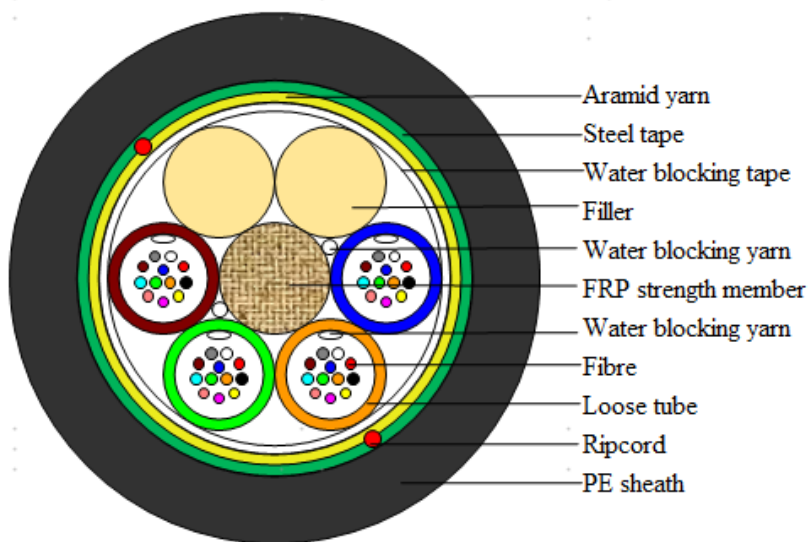
PBT loose tubes are SZ stranded around the central strength member.

Dry water blocking material is used in and over the cable core to prevent it from water ingress.

Polyethylene sheath are applied as outer sheath.

3.2 Construction

3.2.1 Cross Section of Cable



GYHS(ALL DRY)-48B1.3

Structure of other fibre counts refer to 3.2.3

Schematic for reference only

3.2.2 Color Code of the Fibre and Loose tube

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

Color Code	1	2	3	4	5	6
	Blue	Orange	Green	Brown	Grey	White
	7	8	9	10	11	12
	Red	Black	Yellow	Purple	Pink	Aqua

The color of the fillers will be natural.

3.2.3 Dimensions and Descriptions of Cable Constructions

The standard structure of GYHS(ALL DRY) cable is shown in the following table, other structure and fibre count are also available according to customer requirements.

Item	Contents	Value				
		12	24	48	96	144
Loose tube	Number	2	4	4	8	12
	Outer diameter (mm)	2.1	2.1	2.4	2.4	2.4
Filler	Number	4	2	2	0	0
	Material	PP				
Max. fiber counts per tube	G652.D	6	6	12	12	12
Central strength member	Material	FRP				
	Diameter (mm)	2.25	2.25	2.6	3.0	3.5
	PE layer diameter (mm)	/	/	/	4.2	7.2
Water Blocking Material	Material	Water Blocking Tape & Yarn				
Strength member	Material	Aramid yarn				
Armor	Material	Steel tape				
	Steel tape thickness (mm)	Nominal: 0.10				
	Polymer thickness (mm)	Nominal: 0.05				
Sheath	Material	HDPE				
	Color	Black				
	Thickness (mm)	Nominal: 1.6				
Ripcord	Number	2				
	Color	Red				
Cable diameter(mm) Approx.		11.6	11.6	12.6	14.2	17.2
Cable weight(kg/km) Approx.		115	115	125	150	210

3.2.4 Main Mechanical and Environmental Performance of Cable

Tensile performance(N)		Crush(N/100mm)	
Short term	Long term	Short term	Long term
2700	1000	2200	1100

Operation temperature: -40℃ ~ +70℃

3.3 Mechanical, Electrical 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
Tension	<u>IEC 60794-1-21-E1</u> Load: According to 3.2.3 Sample length: Not less than 50m. Duration time: 1min.	Additional attenuation: $\leq 0.1\text{dB}$ after test No damage to outer jacket and inner elements
Crush	<u>IEC 60794-1-21-E3A</u> Load: According to 3.2.3 Duration of load: 1min	Additional attenuation: $\leq 0.1\text{dB}$ after test No damage to outer jacket and inner elements
Impact	<u>IEC 60794-1-21-E4</u> Radius: 300 mm Impact energy: 4.5 J Impact number: 1 Impact points: 3	Additional attenuation: $\leq 0.1\text{dB}$ No damage to outer jacket and inner elements
Bend	<u>IEC 60794-1-21-E11A</u> Mandrel radius: $10 \times D$ Turns: 4 Cycles: 3	Additional attenuation: $\leq 0.1\text{dB}$ No damage to outer jacket and inner elements
Repeated bending	<u>IEC 60794-1-21-E6</u> Bending radius: $20 \times D$ Cycles: 25 Load: 150N	Additional attenuation: $\leq 0.1\text{dB}$ No damage to outer jacket and inner elements
Torsion	<u>IEC 60794-1-21-E7</u> Cycles: 10 Length under test: 1m Turns: $\pm 180^\circ$ Load: 150N	Additional attenuation: $\leq 0.1\text{dB}$ No damage to outer jacket and inner elements
Water Penetration	<u>IEC 60794-1-22-F5B</u> Time : 24 hours Sample length : 3m Water height : 1m	No water leakage.
Temperature cycling	<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 .
Other parameters	According to <u>IEC 60794-1</u>	

4. Packaging and Drum

4.1 Cable Sheath Marking

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

Method: hot foil

- ☐ Color: white
- ☐ Contents: YOFC, the year of manufacture, the type of cable, cable number, length marking
- ☐ Interval: $1\pm1\%$ m

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

4.2 Reel Length

Standard reel length: 4 km/reel, other length is also available.

4.3 Cable Drum

The cables are packed in fumigated wooden drums.

4.4 Cable Packing

Both cable ends are protected against water penetration and firmly secured to the drum, so the cable cannot move and the turns cannot slide when it is moved, handled or laid. The inner end has around 2 meters of accessible length to perform reception tests.