

Optical Fibre Cable Technical Specification

Duct Cable GYDXW(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
GYDXW(ALL DRY)-nB1.3&B6a1 n represents the fibre count.	Duct installation

1.2 Reference

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

ITU-T G.652	Characteristics of a single-mode optical fibre and cable
ITU-T G.657	Characteristics of a bending-loss insensitive single-mode optical fibre and cable
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
Installation temperature	-30 °C~+70 °C
Storage temperature	-40 °C~+70 °C
Static bending radius	15 times the cable diameter
Dynamic bending radius	25 times the cable diameter

2. Optical Fibre

Optical Fibres supplied in this specification meet the requirements of ITU-T G652D& G657A1.

G.652D			
Category	Description	Specification	
		Before cable	After cable
Geometrical Characteristics	Cladding diameter	125.0 ± 1.0 μm	
	Cladding non-circularity	≤ 1.0 %	
	Core concentricity error	≤ 0.6 μm	
	Coating diameter	235~255 μm (Before Colored)	
		250+/-15 μm (Colored)	
	Coating/cladding concentricity error	≤ 12.0 μm	
Optical Characteristics	Mode field diameter at 1310 nm	8.7 ~ 9.5 μm	
	Attenuation at 1310 nm	≤0.34 dB/km	≤ 0.35 dB/km
	Attenuation at 1383 nm	≤0.34 dB/km	≤ 0.35 dB/km
	Attenuation at 1550 nm	≤0.20 dB/km	≤ 0.25dB/km
	Point discontinuity at 1310nm and 1550nm	≤ 0.05dB	
	Zero dispersion wavelength	1300 ~ 1324 nm	
	Zero dispersion slope	≤0.092 ps/(nm ² ·km)	
	Cable cut-off wavelength (λ _{cc})	≤ 1260 nm	
	Polarization mode dispersion individual fiber	≤ 0.2 ps/ √ km	
	Polarization mode dispersion design link value (M=20, Q=0.01%)	≤ 0.1 ps/ √ km	
Macro-bend loss (100 turns, 30mm radius)	1550&1625nm: ≤ 0.05 dB		
Mechanical Specification	Proof stress level	≥100kpsi (0.69 GPa)	
	Coating strip force (peak value)	1.3~8.9N	
	Dynamic Fatigue Parameter (nd)	≥20	
	Fiber curl (Radius)	≥2 m	

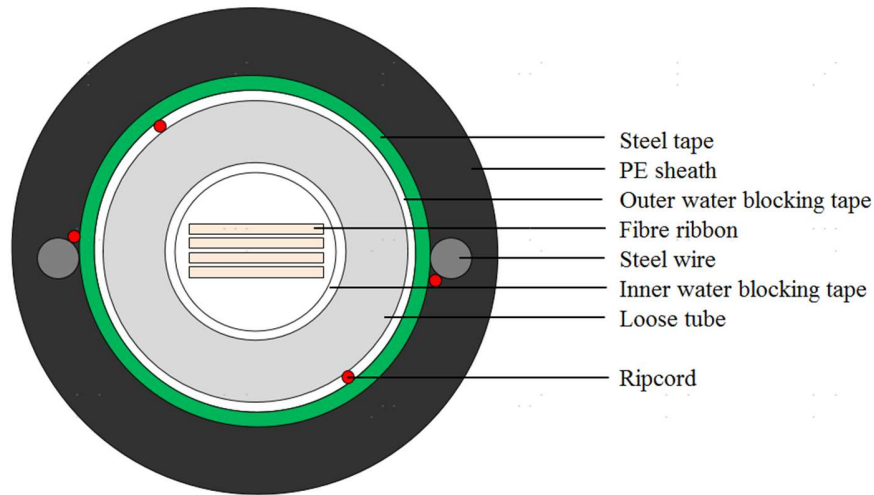
G.657A1			
Category	Description	Specification	
		Before cable	After cable
Geometrical Characteristics	Cladding diameter	125.0 ± 0.7 μm	
	Cladding non-circularity	≤ 0.7 %	
	Core concentricity error	≤ 0.5 μm	
	Coating diameter	235~255 μm (Before Colored)	
		250+/-15 μm (Colored)	
	Coating/cladding concentricity error	≤ 12.0 μm	
Optical Characteristics	Mode field diameter at 1310 nm	8.4 ~ 9.2 μm	
	Attenuation at 1310 nm	≤0.34 dB/km	≤ 0.35 dB/km
	Attenuation at 1383 nm	≤0.34 dB/km	≤ 0.35 dB/km
	Attenuation at 1550 nm	≤0.20 dB/km	≤ 0.25dB/km
	Point discontinuity at 1310nm and 1550nm	≤ 0.05dB	
	Zero dispersion wavelength	1300 ~ 1324 nm	
	Zero dispersion slope	≤0.092 ps/(nm ² ·km)	
	Cable cut-off wavelength (λ _{cc})	≤ 1260 nm	
	Polarization mode dispersion individual fiber	≤ 0.2 ps/√km	
	Polarization mode dispersion design link value (M=20, Q=0.01%)	≤ 0.1 ps/√km	
	Macro-bend loss (10 turns, 15mm radius)	1550nm: ≤ 0.25 dB; 1625nm: ≤ 1.0dB;	
	Macro-bend loss (1 turn, 10mm radius)	1550nm: ≤ 0.75 dB; 1625nm: ≤ 1.5dB;	
Mechanical Specification	Proof stress level	≥100kpsi (0.69 GPa)	
	Coating strip force (peak value)	1.3~8.9N	
	Dynamic Fatigue Parameter (nd)	≥20	
	Fiber curl (Radius)	≥2 m	

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



GYDXW(ALL DRY)
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.

Color Code	12F Ribbon	1	2	3	4	5	6
		Blue	Orange	Green	Brown	Grey	White
		7	8	9	10	11	12
		Red	Black	Yellow	Purple	Pink	Aqua
		1	2	3	4	5	6
		Blue	Orange	Green	Brown	Grey	White
	24F Ribbon	7	8	9	10	11	12
		Red	Black	Yellow	Purple	Pink	Aqua
		13	14	15	16	17	18
		Blue	Orange	Green	Brown	Grey	White
		19	20	21	22	23	24
		Red	Black	Yellow	Purple	Pink	Aqua

The marking on the surface of fibre ribbon: #1, #2, #3, #4, #5,

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	12-24	48-72	96-144	192-216	288-432
Ribbons	Size: nominal (mm)	3.2*0.32				6.4*0.38
Fibers per ribbon		12				24
Loose tube	Color	WHITE				
	Outer diameter (±0.5mm)	6.6	8	9.2	11.8	14.5
Water Blocking Material	Material	Water Blocking Yarns and Tape				
Strength member	Material	Steel tape				
Messenger	Material	Steel wire				
	diameter(mm)	1.4*1.5				
	Number	2				
Ripcord	Number	2+2				
	Color	Red				
Sheath	Material	PE, with UV protection				
	Color	Black				
	Thickness (mm)	Nominal:2.5				
Cable diameter(±0.5mm)		13.9	14.8	16.5	19.4	21.7
Cable weight(kg/km) Approx.		145	196	225	280	330

3.5 Main Mechanical and Environmental Performance

Main mechanical performance

Tensile performance(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
Tension	<u>IEC 60794-1-21-E1</u> Load: According to 3.5 Sample length: Not less than 50m. Duration time: 1min.	Additional attenuation: ≤ 0.1 dB after test No damage to outer jacket and inner elements
Crush	<u>IEC 60794-1-21-E3</u> Load: According to 3.5 Duration of load: 1min	Additional attenuation: ≤ 0.1 dB after test No damage to outer jacket and inner elements
Impact	<u>IEC 60794-1-21-E4</u> Radius: 300 mm Impact energy: 4.5J Impact number: 1 Impact points: 10	Additional attenuation: ≤ 0.1 dB No damage to outer jacket and inner elements
Repeated bending	<u>IEC 60794-1-21-E6</u> Bending radius: $25 \times D$ Cycles: 25 Load: 150N	Additional attenuation: ≤ 0.1 dB No damage to outer jacket and inner elements
Torsion	<u>IEC 60794-1-21-E7</u> Cycles: 10 Length under test: 1m Turns: $\pm 90^\circ$ Load: 150N	Additional attenuation: ≤ 0.1 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, except the part of stranded wire
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 0.05 dB/km.
Other parameters	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.