TECHNICAL SPECIFICATION

Duct and Direct Buried Installation Cable

Version	Date	Prepared	Reviewed	Approved	Remark
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1. GENERAL

1.1 SCOPE

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

Cable type	Application
GYFHTY83-12/24G.652D/OM1	Duct and direct buried installation cable

1.2 CABLE DESCRIPTION

ZTT cable possesses high tensile strength and flexibility in compact cable sizes. At the same time, it provides excellent optical transmission and physical performance.

1.3 QUALITY

Excellent quality control is achieved through intense in-house quality check and stringent audit acceptance by ISO 9001.

1.4 RELIABILITY

Initial and periodic product qualification tests for performance and durability are performed rigorously to ensure product reliability.

1.5 REFERENCE

The cable which ZTT offered are designed, manufactured and tested according to international standards as follows:

IEC 60793-1	Optical fiber Part 1: Generic specifications
IEC 60793-2	Optical fiber Part 2: Product specifications
IEC 60794-3-10	Outdoor cables- family specification for duct and directly buried optical telecommunication cable
ITU-T G.650	Definition and test methods for the relevant parameters of single-mode fibers
ITU-T G.652	Characteristics of a single-mode optical fiber and cable
IEC 60793-2-10	Optical fibers. Part 2-10:Product specifications. Sectional specification for category A1 multimode fibers
EIA/TIA 598	Color code of fiber optic cables

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2. OPTICAL FIBER

The optical fiber is made of high pure silica and germanium doped silica. UV curable acrylate material is applied over fiber cladding as optical fiber primary protective coating. The detail data of optical fiber performance are shown in the following table.

G.652D Fiber in Cable

Category	Description	Specifications
Optical Specifications	Attenuation @1310 nm	≤0.36 dB/km
	Attenuation @1550 nm	≤0.22 dB/km
	Zero Dispersion Wavelength	1300~1324 nm
	Zero Dispersion Slope	≤0.092 ps/nm^2·km
	PMD (Polarization Mode Dispersion)	≤0.2 ps/√km
	Cable Cutoff Wavelength (λ_{cc})	≤1260 nm
	Macro bending Loss (100 turns; Φ50 mm) @1550 nm (100 turns; Φ50 mm) @1625 nm	 ≤ 0.05 dB ≤ 0.10 dB
	Mode Field Diameter @1310 nm	9.2±0.4μm
Dimensional Specifications	Cladding Diameter	125 ±1μm
	Core/clad Concentricity Error	≤0.6μm
	Cladding Non-Circularity	≤1.0%
Mechanical Specifications	Proof stress	≥0.69Gpa

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OM1 (62.5/125) in Cable

Category	Description	Specifications
Optical Specifications	Attenuation @ 850 nm	≤ 3.5 dB/km
	@1300 nm	≤ 1.5 dB/km
	Standard bandwidth @ 850 nm	≥160MHz.km
	@1300 nm	≥500MHz.km
	Numerical Aperture (NA)	0.275 ± 0.015μm
Backscatter characteristics	Step(mean of bidirectional measurement)	≤0.10 dB
	Irregularities over fibre length and point discontinuity	≤0.10 dB
Dimensional Specifications	Core Diameter	62.5±2.5μm
	Cladding Diameter	125 ±1.0μm
	Core / Clad Concentricity	≤ 1.5μm
	Cladding Non-Circularity	≤2.0%
Mechanical Specifications	Proof Test	≥ 0.69Gpa
	Peak Coating Strip Force	Typical average force: 1.5N Peak force1.3N~8.9N

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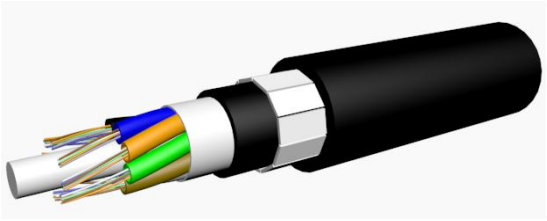
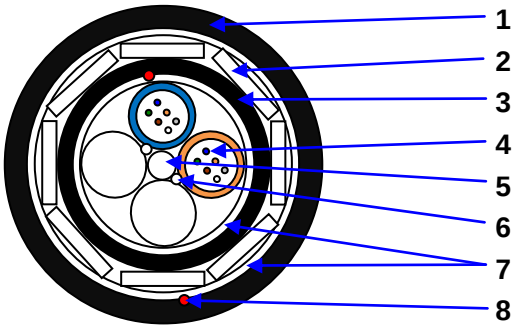
3. CABLE STRUCTURE

3.1 CABLE TYPE: GYFHTY83-12/24G.652D/OM1



Picture is only for reference



Technical Characteristics

- The unique extruding technology provides the fibers in the tube with good flexibility and bending endurance
- The unique fiber excess length control method provides the cable with excellent mechanical and environmental properties
- Multiple water blocking material filling provides dual water blocking function
- Provide good tension performance

Construction：

1. Outer sheath (**PE**)
2. Anti-rodents armor (Flat FRP)
3. Inner sheath (**PE**)
4. Loose tube, fiber and jelly
5. Central strength member (FRP)
6. Water blocking yarns
7. Water blocking tape
8. Rip cord (*2, red)

Dimension and Properties

Physical	Fiber count	12 G.652D	24 G.652D	12 OM1
	No of loose tube / filler	2/2	4/0	2/2
	Fiber No. per tube	6		
	Cable OD	11.6mm± 5%		
	Cable weight	126kg/km±15%		
	Operation temperature range	-40 deg C to + 70 deg C		
	Installation temperature range	-10 deg C to + 60 deg C		
	Transport and storage temperature range	-40 deg C to + 70 deg C		
Mechanical	Max. tensile load	2700N		
	Crush resistance	2200 N/10cm		
	Minimal installation bending radius	20 x OD		
	Minimal operation bending radius	10 x OD		

Color code scheme:

Fiber color	blue	orange	green	brown	gray	white
Tube color	blue	orange	green	brown	/	/

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4. TEST REQUIREMENTS

Approved by various professional optical and communication product institution, ZTT also conduct various in-house testing in its own Laboratory and Test Center. She also conduct test with special arrangement with the Chinese Government Ministry of Quality Supervision & Inspection Center of Optical Communication Products (QSICO). ZTT possess the technology to keep its fiber attenuation loss within Industry Standards.

The cable is in accordance with applicable standard of cable and requirement of customer. The following test items are carried out according to corresponding reference.

Routine tests of G.652D optical fiber

Mode field diameter	IEC 60793-1-45
Mode field Core/clad concentricity	IEC 60793-1-20
Cladding diameter	IEC 60793-1-20
Cladding non-circularity	IEC 60793-1-20
Attenuation coefficient	IEC 60793-1-40
Chromatic dispersion	IEC 60793-1-42
Cable cut-off wavelength	IEC 60793-1-44

Routine tests of OM1 optical fiber

Core/clad concentricity	IEC 60793-1-20
Cladding diameter	IEC 60793-1-20
Cladding non-circularity	IEC 60793-1-20
Attenuation coefficient	IEC 60793-1-40

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TEST LIST

4.1 Tension Loading Test

Test Standard	IEC 60794-1-2 E1
Sample length	No less than 50 meters
Load	Max. tension load
Duration time	1 minute
Test results	Fiber strain:≤0.60%
	Additional attenuation:≤0.1dB for G.652D, ≤0.2dB for OM1
	No damage to outer jacket and inner elements

4.2 Crush/Compression Test

Test Standard	IEC 60794-1-2 E3
Load	Crush load
Duration time	1minute
Test number	3
Test results	After test additional attenuation:≤0.05dB for G.652D, ≤0.2dB for OM1
	No damage to outer jacket and inner elements

4.3 Impact Resistance Test

Test Standard	IEC 60794-1-2 E4
Impact energy	10J
Radius	300mm
Impact points	3
Impact number	1
Test result	After test additional attenuation:≤0.05dB for G.652D, ≤0.2dB for OM1
	No damage to outer jacket and inner elements

4.4 Repeated Bending Test

Test Standard	IEC 60794-1-2 E6
Bending radius	20 X diameter of cable
Cycles	25 cycles
Test result	No damage to outer jacket and inner elements

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4.5 Torsion/Twist Test

Test Standard	IEC 60794-1-2 E7
Sample length	2m
Angles	±180 degree
Cycles	5
Test result	No damage to outer jacket and inner elements

4.6 Bend Test

Test Standard	IEC 60794-1-2 E11
Mandrel diameter	20 X diameter of cable
Turn number	4
Number of cycles	3
Test result	After test additional attenuation:≤0.05dB for G.652D, ≤0.2dB for OM1
	No damage to outer jacket and inner elements

4.7 Temperature cycling Test

Test Standard	IEC 60794-1-2 F1
Temperature step	+20℃ →-40℃ →+70℃ →+20℃
Time per each step	12 hrs
Cycles	2
Test result	Attenuation variation for reference value (the attenuation to be measured before test at +20±3℃) ≤ 0.15 dB/km for G.652D, ≤0.3dB/km for OM1and is reversible during last cycle

4.8 Water penetration Test

Test Standard	IEC 60794-1-2 F5
Height of water column	1m
Sample length	3m
Test time	24 hrs
Test result	No water leakage from the opposite of the cable core

4.9 Drip Test

Test Standard	IEC 60794-1-2 E14
Sample length	0.3m
Temperature	70℃
Duration	24 hrs
Test result	No filling compound shall drip from tubes

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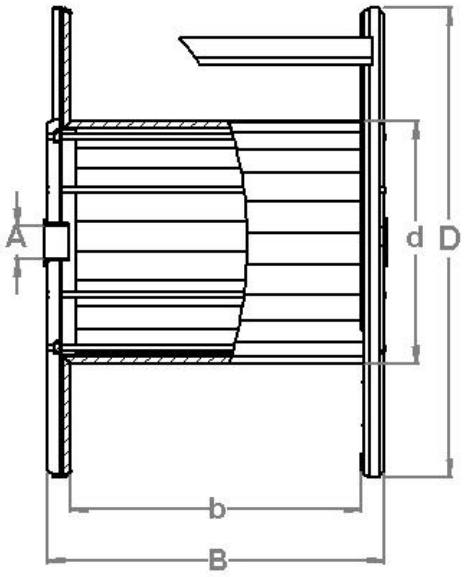
5. PACKING AND DRUM

5.1 ZTT cables are coiled on bakelite, wooden or ironwood drum. During transportation, right tools should be used to avoid damaging the package and to handle with ease. Cables should be protected from moisture; kept away from high temperature and fire sparks; protected from over bending and crushing; protected from mechanical stress and damage.

Wooden Drum



ZTT Cable	D*d*B cm (weights kg) D: including seal plate thickness
Length / Type	4Km/reel
GYFHTY83-12/24G.652D/OM1	Wooden 145*70*75 (623)

Note: The drum size & cable weight as above is estimated and final size & weight shall be confirmed before shipment.

5.2 The color of cable marking is white. (The printing shall be carried out at interval of 1 meter on the outer sheath of cable) The inner end of cable is then sealed with heat shrinkable end cap to prevent ingress of water and is made available for testing. The outer end of cable is equipped with heat shrinkable end cap. Outer sheath marking legend can be changed according to user's requests.

5.3 Outdoor cable packing

Bakelite, wooden or ironwood drum

Strong wooden batten protection

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