

TECHNICAL PROPOSAL

FOR

SINGLE MODE OPTICAL FIBER CABLE

(MINI-DUCT TYPE)



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1. GENERAL

This specification covers the design requirements and performance standard for the supply of optical fiber cable.

1.1 Cable Description

Loose tube cable is a design that has high tensile strength and flexibility in a compact cable size. TAIHAN's loose tube cable provides excellent optical transmission and physical performance.

1.2 Quality

TAIHAN ensure a continuing level of quality in our cable products through several quality control programs including ISO 9001.

1.3 Reliability

TAIHAN ensure product reliability through rigorous qualification testing of each product family. Both initial and periodic qualification testing are performed to assure the cable's performance and durability in the field environments.

1.4 Reference

IEC 60793, 60794. ITU-T G 650, G 652D

2. OPTICAL FIBER

2.1 Single Mode Fiber

TAIHAN offers single mode fiber manufactured by the vapour axial deposition (VAD) process to produce the highest quality glass with excellent geometry, high strength characteristics, and attenuation that approaches theoretical minimum.

The single mode fiber is fully compatible with other commercially available single mode fibers and has the zero dispersion wavelength around 1310nm.

2.2 General Design

Its optical properties are achieved through a germanium doped silica based core with a pure silica cladding. An acrylate protective coating is applied over glass cladding to provide the necessary maximum fiber lifetime.

2.3 Construction

Mode field diameter at 1310nm	9.2um +/-0.5 um
Mode field concentricity error	≤ 0.6um
Cladding diameter	125um +/- 1um
Cladding non-circularity	≤ 1%
Primary coating material	UV curable acrylate
diameter	245 +/- 10um

2.4 Optical characteristics

Attenuation at 1310nm	≤ 0.35 dB/km.
at 1550nm	≤ 0.25 dB/km.
Dispersion between	
at 1285~1330nm	≤ 3.5 ps/(nm.km)
at 1550nm	≤ 18 ps/(nm.km)
Zero dispersion wavelength	1300nm - 1324nm
Zero dispersion slope	≤ 0.092 ps/(nm ² .km)
Cable cut off wavelength	≤ 1260nm
PMD	≤ 0.1 ps/√km

2.5 Mechanical characteristics

Fiber proof test level	≥ 1% x 1sec
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2.6 Removal of primary coating

For jointing, removal of primary coating is achieved without the use of any chemicals. A simple mechanical operating is sufficient to prepare the fiber for jointing.

3. CABLE

3.1 Cable design

The cable core contains single mode fibers in loose tubes and required number of filler which are stranded (S-Z stranding method) around central strength member consisting of FRP. The loose tubes are filled with jelly compound. And then water blocking yarns and tape shall be applied. Finally, a ripcord and outer sheath apply over the cable core.

3.2 Cable construction

The cable construction shall be in accordance with following table 1, table 2, table 3, and fig 1,2

3.3 Sheath marking

Required marking can be indented on the cable sheath at regular intervals of one meter. Continuously sequential numbering shall be employed starting from zero at the inner end. The color of these markings shall preferably be white

4. CABLE TEST

4.1 Tensile strength

- | | | |
|------------------------|---|--------------------|
| 1) Test method | : | IEC-60794-1-2 E1 |
| 2) Load value | : | 1000 N |
| 3) Test length | : | not less than 100m |
| 4) Applied time | : | 10 min. |
| 5) Acceptable criteria | : | No fiber breakage |

4.2 Crush resistance

- 1) Test method : IEC-60794-1-2 E3
- 2) Applied load : 1000 N/100mm plate
- 3) Duration time : 10 min
- 4) Acceptable criteria : No fiber breakage

4.3 Impact resistance

- 1) Test method : IEC-60794-1-2 E4
- 2) Test load : 2kg x 1m x 3 different point impact
- 3) Acceptable criteria : No fiber breakage

4.4 Water penetration

- 1) Test method : IEC-60794-1-2 F5
- 2) Test length : 3m
- 3) Applied time : min.24 hr x 1m height
- 4) Acceptable criteria : No water drip

4.5 Torsion

- 1) Test method : IEC-60794-1-2 E7
- 2) Load value : 100N
- 3) Twist angle : $\pm 180^\circ$
- 4) Twist cycle : 10times
- 5) Acceptable criteria : No fiber breakage

5. PACKING AND MARKING

5.1 Packing-Cable drum

Each length of cable shall have both ends effective sealed. Each cable drum shall be marked to indicate the direction of rotating for reeling of the cable. On both side of the cable drum, required marking shall be printed. The minimum barrel diameter of the drums shall be 40times the nominal diameter of the cable.

5.2 Marking

Required letters shall be distinctly marked on a weather proof material on both outer sides of the drum flange. The marking plates shall be made of a non-corrodible material.

Table 1. Color Coding of Optical Fiber in Tube

Number of fiber per tube	1	2	3	4	5	6	7	8	9	10	11	12
12 cores	Blue	Orange	Green	Brown	Slate	White	Red	Black	Yellow	Violet	Pink	Aqua

Table 2. Color Coding of Loose Tube

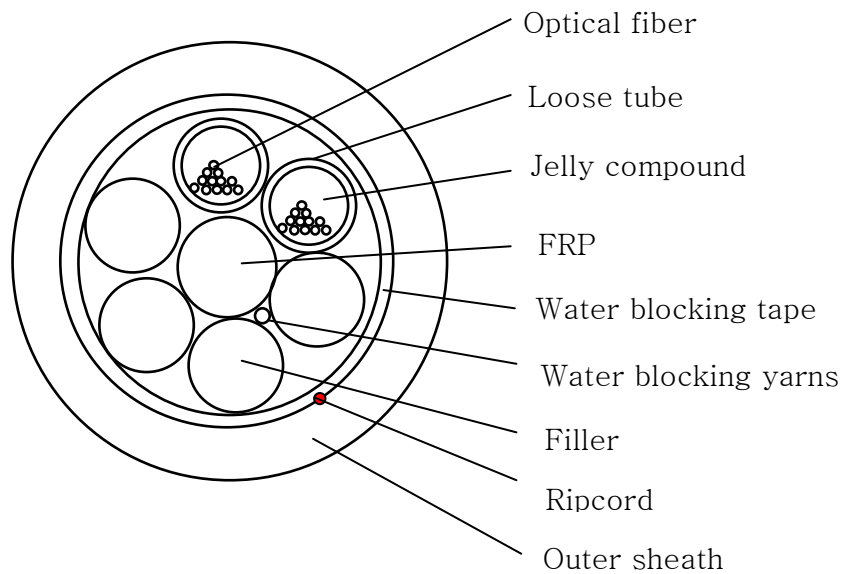
Tube	1	2	3	4	5	6
24 cores	Blue (12)	Orange (12)	Filler	Filler	Filler	Filler

() : Number of fibers

Table 3. Construction of Optical Fiber Cable

Item		Construction
Total fiber number (core)		24
Number of loose tube (ea)		2
Number of filler (ea)		4
Number of fiber per tube (core)		12
Tube material & Size		PBT (Polybutylene Terephthalate) & Nom 1.5mm
Filler material & Size		PE string & Nom 1.5mm
Central strength member & Size		FRP (Fiber reinforced plastic) & Nom 1.5mm
Water blocking material		Water blocking yarns and tape
Ripcords (ea)		1
Outer sheath material & thickness		Black color HDPE& Nom 0.6mm
Storage/Operating/Installation temperature range		-10 °C to +70 °C
Bending radius	With load	Cable diameter X 15times
	Without load	Cable diameter X 10times
Nominal cable diameter (Nom.mm)		6.1
Nominal cable weight (Nom.kg/km)		27
Nominal shipping length (Nom.m)		6000m

-24C cable



Not to scale