Duct installation cable

1. OptoWire-U-TIC-L

Fiber count	KN
2 – 24 FO	**2.7 KN**

Description

Underground steel tape cable, suitable for duct installation.

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 Optowire premium designed cable with optical, mechanical and geometrical characteristics

1.2 Cable name

OptoWire **U-TIC-L** (1-24)FO-2.7KN

1.3 Cable description

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

1.4 Quality

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

1.5 Reliability

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

1.6 Reference

The cable, which OptoWire 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 60794-4	Optical fiber cables- Part5-Sectional specification- Micro duct cabling for installation by blowing
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
EIA/TIA 598	Color code of fiber optic cables

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.

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Category	Description	Specifications
		After cabling
Optical Specifications	Attenuation @1310 nm	≤0.36 dB/km
	Attenuation @1550 nm	≤0.22 dB/km
	Dispersion @1310nm	≤3.5 ps/nm·km
	Dispersion @1550nm	≤18.0 ps/nm·km
	Zero Dispersion Wavelength	1300~1324 nm
	Zero Dispersion Slope	≤0.092 ps/nm2·km
	Macro bending Loss (100 turns; Φ 60 mm) @1550 nm (100 turns; Φ 60 mm) @1625 nm	≤ 0.05 dB ≤ 0.1 dB
	Cable cutoff wavelength λ cc(nm)	≤1260 nm
	Mode Field Diameter @1310 nm	9.2±0.4μm
Dimensional Specifications	Cladding Diameter	125±1μm
	Coating diameter	245±10μm
	Core/cladding concentricity error	≤0.6 μm
	Cladding Non-Circularity	≤1.0 %
Mechanical Specifications	Proof stress	≥0.69Gpa

3. Cable structure

OptoWire U-TIC-L (1-24)FO-

Dimension and Properties:

Physical	Fiber count	2	4	8	12	16	24
	Central tube diameter	2.2			2.5	2.8	3.2
	Strength member diameter	2*1.2(±0.1mm)					
	Outer sheath thickness (mm)	Nom. 2.3mm					
	Cable OD (mm)	7.9±0.5mm			8.2±0.5mm		8.7±0.5mm
	Cable weight (kg±15%)	83			88	88	95
	Operation temperature range	-30 deg C to + 70 deg C					
	Installation temperature range	-20 deg C to + 60 deg C					
	Transport and storage temperature range	-30 deg C to + 70 deg C					
Mechanical	Max. tensile load	2700N					
	Crush resistance	2000N/10cm					
	Minimal installation bending radius	25 x OD					
	Minimal operation bending radius	20 x OD					

Color code scheme:

No.	1	2	3	4	5	6	7	8	9	10	11	12
Fiber color	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Aqua
Tube color	Natural											

Note: 13~24 fiber colors same as 1~12 fiber with black tracer, instead of 20 fiber is with white tracer

4. Test Requirements

Approved by various professional optical and communication product institution, OptoWire also conduct various in-house testing in its own Laboratory and Test Center. OptoWire also conduct test with special arrangement with the Chinese Government Ministry of Quality Supervision & Inspection Center of Optical Communication Products (QSICO). OptoWire 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 optical fiber	
Mode field diameter	IEC 60793-1-45
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

4.1 Tension Loading test	
Test Standard	IEC 60794-1-21 E1
Sample length	No less than 50 meters
Load	Breaking tensile force
Duration time	1 minute
Test results	Additional attenuation: ≤0.1dB/km after test
	No damage to outer jacket and inner elements

4.2 Crush/Compression Test	
Test Standard	IEC 60794-1-22 E3
Load	Crush load
Duration time	1 minute
Test number	3
Test results	Additional attenuation: ≤0.1dB/km after test
	No damage to outer jacket and inner elements

4.3 Impact Resistance Test	
Test Standard	IEC 60794-1-22 E4
Impact energy	3J
Radius	300mm
Impact points	3
Impact number	1
Test result	Additional attenuation: ≤0.1dB/km after test
	No damage to outer jacket and inner elements

4.4 Repeated Bending Test	
Test Standard	IEC 60794-1-21 E6
Bending radius	25 X diameter of cable
Cycles	30 cycles
Test result	After test, change of attenuation: ≤0.1dB/km
	No damage to outer jacket and inner elements

4.5 Torsion/Twist Test	
Test Standard	IEC 60794-1-21 E7
Sample length	2m
Angles	±180 degree
cycles	5
Test result	After test, change of attenuation: ≤0.1dB/km
	No damage to outer jacket and inner elements

4.6 Bend Test	
Test Standard	IEC 60794-1-21 E11A
Mandrel radius	25 X diameter of cable
Turn number	4
Number of cycles	3
Test result	After test, change of attenuation: ≤0.1dB/km
	No damage to outer jacket and inner elements

4.7 Temperature cycling Test	
Test Standard	IEC 60794-1-22 F1
Temperature step	-30℃→+70℃
Time per each step	12 hrs
Test result	Attenuation variation for reference value (the attenuation to be measured before test at +20±3℃) ≤ 0.15 dB/km

4.8 Water penetration Test	
Test Standard	IEC 60794-1-22 F5
Height of water column	1m
Sample length	3m
Test time	24 hrs
Test result	No water leakage from the opposite of the sample

5. Packing and Drum

5.1 OptoWire 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 overbending and crushing; protected from mechanical stress and damage.

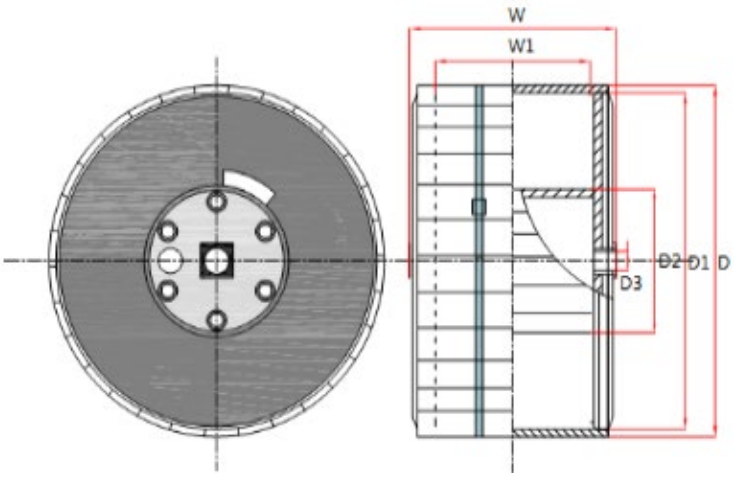
Wood

OptoWire Cable	D*d*B cm D: including seal plate thickness Dimensions±5cm,Weight (kg)±15%	
LengthType	Wooden Drum	
OptoWire AS-L (2,4,8,12,16)FO-2.7KN	4Km/reel	105*50*71
OptoWire AS-L (24)FO-2.7KN	4Km/reel	120*60*71

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

The plywood drum should be stored in a dry condition and no raining area

Description	Value
Flange diameter (mm) D1	1000（0~+10）
Barrel diameter (mm) D2	500 (±10)
Outer diameter width (mm) W	710（-10~0）
Inner diameter width (mm) W1	640 (±10)
Shaft hole diameter (mm) D3	80（0~+3）



5.2 The color of cable marking is black or other colors. (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