ES-23-LTDTTBFD-Rev.0

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Specification

Toneable Flat Drop Optic Cable
(Gel-Free)

1. SCOPE

1.1 Application

Toneable Drop FTTP offers the most flexible solution for fiber to the premise applications. The toneable unit allows for easy location after installation. The small profile reduces cost and increases both ease of use and access to small conduits. This product is the low cost solution to the network's. The durable design incorporates two dielectric rigid rods for tensile and crush protection, bracketing a single enhanced loose tube containing up to 24 optical fibers.

2. OPTICAL FIBER

The optical, geometrical and mechanical performance of the optical fiber shall be in accordance with Table.

2.1 The properties of single mode fiber (ITU-T G. 652.D)

Parameters		Value
Dimensional Specification		
Cladding Diameter		125±1 ㎛
Core-Clad Concentricity Error		≤0.8 ㎛
Cladding Non-Circularity		≤1%
Coating Material		Acrylate
Coating Diameter (Colored)		245±10 ㎛
Optical Specification		
Operational Wavelength		1310 nm and 1550 nm
Mode Field Diameter		9.2±0.4 ㎛@1310nm
Cabled Fiber Cutoff Wavelength		≤1260 nm
Zero Dispersion Wavelength Range		1300nm ~ 1324nm
Zero Dispersion Slope		0.092ps/(nm^2.km)
Polarization Mode Dispersion		0.2 ps/√km
Attenuation(After cabling)		≤ 0.35 dB/km @1310 nm ≤ 0.25 dB/km @1550 nm
Chromatic Dispersion	1285 ~1330 nm	≤ 3.5 ps/nm.km
	1550 nm	≤ 18 ps/nm.km
Proof Stress (100% testing)		0.69 N/m^2 (100 kpsi)

3. CABLE CONSTRUCTION

The construction of the cable shall be in accordance with Table.

Table1 . Construction of the Cable

ITEMS	DESCRIPTION
Number of Fibers	Up to 24
Central Tube	PBT (Polybutylene Terephthalate) Nom. 3.0mm
Water Proof	Gel-Free
Dielectric Strength Member	FRP (Fiberglass Reinforced Plastic) Diameter : 1.5mmx2

Toning Conductor (Copper wire)		24AWG (Conductor according to customer requirements : 12AWG or 16AWG or 20AWG)
Outer Jacket		Polyethylene(PE)
Cable Outer diameter		Nominal 9.8mm x 4.5mm
Cable Weight		Nom. 42.0 kg/km
Tensile Strength		1,350N
Bending Radius	Dynamic	≥200mm
	Static	≥100mm

4. IDENTIFICATION

4.1 The Color Code of the individual fibers

Table 2. Fiber Identification

No	1	2	3	4	5	6	7	8	9	10	11	12
24F	Blue	Orange	Green	Brown	Slate	White	Red	Black	Yellow	Violet	Pink	Aqua
	13	14	15	16	17	18	19	20	21	22	23	24
	Blue	Orange	Green	Brown	Slate	White	Red	Natural	Yellow	Violet	Pink	Aqua

* ▌ : Black dot marking

Table3 . The Loose Tubes Identification

No.	1
Up to 24	Natural

4.2 Outer jacket color

The outer jacket shall be an extruded layer of HDPE.
The color of outer jacket shall be UV stable black.

5. PHYSICAL / MECHANICAL / ENVIRONMENTAL PERFORMANCE AND TESTS

5.1 Temperature Range

For the cables covered by this specification, the following temperature ranges apply:

● Storage & Operation range : -40 to 70℃

● Installation range : -30 to 70℃

5.2 Mechanical Characteristics

The mechanical performance of the cable shall be in accordance with Table below.

ITEMS	TEST METHOD AND ACCEPTANCE CRITERIA	
-	Method Description	Acceptance Criteria
Tensile Performance	**IEC 60794-1-2 Method E1** - Mandrel diameter: min 1m but not less than cable specific bending diameter - Length under tension: 50 m - Applied tensile load: 1350N	Permissible change in attenuation at 1550 nm wavelength less than 0.2dB.
Repeated Bending	**IEC 60794-1-2 Method E6** - Bending radius: 20 x O.D - Applied load: 40N - No. of flexing cycles: 25 cycles - Cycle duration: 2 seconds	Permissible change in attenuation at 1550 nm wavelength less than 0.2 dB.
Impact resistance	**IEC 60794-1-2 Method E4** - Impact Radius: 10mm or 300mm - Impact Energy: 5,0J of 10mm impact - No. of impact: minimum 3 times	No visible damage to the coating. Permissible change in attenuation at 1550 nm wavelength less than 0.2 dB.
Torsion resistance	**IEC 60794-1-2 Method E7** - No. of cycles: 10 cycles - Distance between fixed and rotary handle: 2m - Tensioning force: 50N - Twist angle: ±180°	No visible damage to the coating. Permissible change in attenuation at 1550 nm wavelength less than 0.2 dB.
Crush resistance	**IEC 60794-1-2 Method E3** - Crushing force: 500N - Length of crushing element: 50mm - Duration of loading: 5 minutes	Permissible change of attenuation at 1550 nm wavelength less than 0.2 dB, no visible damage to any element of the cable.
Resistance to temperature changes	**IEC 60794-1-2 Method F1** - Cable length: 500m - T_{A1}: -40℃, T_{B1}: +70℃, T_{A2}:-40℃, T_{B2}:+70℃, - Duration of 1 cycle t_1: 12hours - Speed of temperature changes: 20℃/h	No visible damage to the coating. Permissible change in attenuation at 1550 nm wavelength less than 0.3 dB.
Water Penetration	**IEC 60794-1 Method F5** √1m (Height) x 3m (Length), 24hr	No water leakage

- **Remarks : We can provide cable qualification test report**

6. PACKING AND MARKING

6.1 Cable Marking

The jacket shall be marked with white characters at intervals of one meter with the following information. Other marking is also available if requested by customer.

1) Length marking
2) Cable type and fiber counts
3) Manufacturer's name
4) Year of manufacture

6.2 Cable Packing

6.2.1 Standard lengths of cable shall be 1km and 4km. Other cable length is also available if required by Customer.(Maximum lengths : 6km)

6.2.2 Each length of the cable shall be wound on a separate wooden reel or plywood reel.

6.2.3 Both ends of the cable shall be sealed with a suitable plastic cap or a suitable plastic tape to prevent the entry of moisture during shipping, handling and storage.

6.2.4 Wood-fiber board or circumference battens shall be laid on cable between flanges and fixed by steel bands.

6.2.5 The cable ends shall be securely fastened to the reel to prevent the cable from becoming loose in transit or during placing operations.

6.3 Cable Reel

6.3.1 The sticker information on the spool

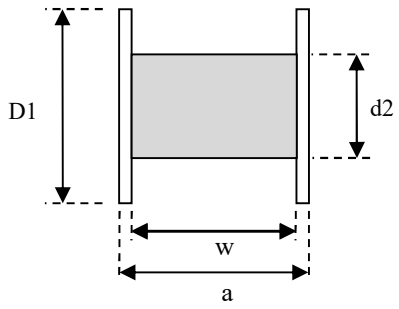
(1) Cable type and fiber counts
(2) Length of cable in meters
(3) Gross weight in kilograms
(4) Reel number
(5) Year of manufacture

6.3.2 The cable shall be wound on the reel designed to prevent damages during shipment and installation.

6.4 Packing Detail

6.4.1 Reel dimension

Items	Dimension				Cable Length	Weight (kg / EA)
	D1	d2	W	a		
1~24F	880mm	300mm	410mm	450mm	4.0km	20kg



6.4.2 Container packing

Items	Length (km/drum)	Weight(drum)		Container (40ft)	
		NET	Gross	Packing	Gross weight
1~24F	4.0km	165.6kg	185.6kg	70 Bobbins (280km)	12,992kg

7. QUALITY CONTROL

7.1 Incoming Inspection

All the raw materials that are used for optical fiber cable shall be inspected by the raw material testing methods that are specified by the manufacturer and that are based on 'Korea Standard' or 'ASTM'.

In some cases, suppliers' test report shall substitute for the raw material manufacturer's test. Any materials that do not meet the manufacturer's raw material specification shall be rejected or scrapped, and the passed materials only shall be used in the process. Some raw material specifications and subsequent raw material test method may be changed without notice, if and only if the new specification and the new test method do not affect the quality of optical fiber cable.

7.2 In-Process Inspection

Semi-final goods shall be inspected in accordance with specified manufacturer's testing method. The testing method may be changed without notice, if it does not affect quality of optical fiber cable.

7.3 Final Cable Inspection

Following quality properties of finished cable shall be tested to assure the field performances.

- Construction/Material
- Mechanical characteristics
- Optical characteristics

7.4 Quality System

International Industrial Certification (IIC) applied ISO 9001 and ISO 14001 to assure the conformance to specified requirements during our production.

8. SAFETY

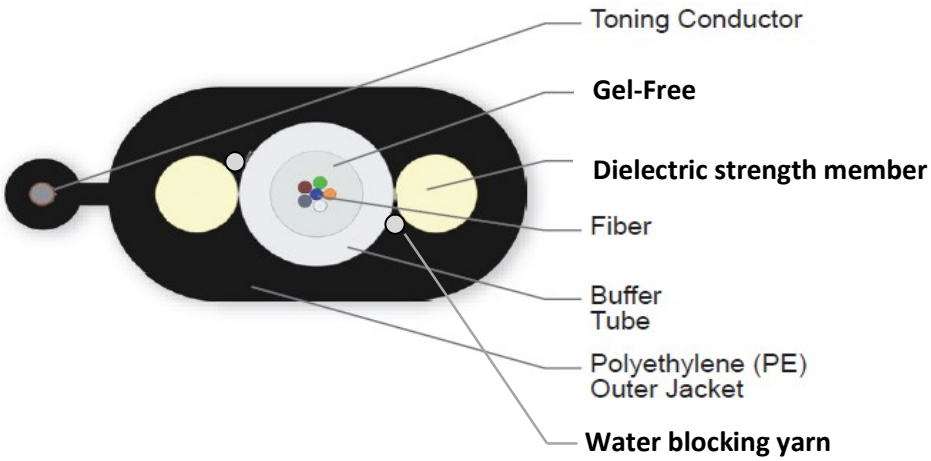
8.1 ROHS Directive

All cables and any associated packing and labeling materials shall meet RoHS (Restriction of the Use of certain Hazardous Substances) regulations as appropriate.

8.2 ISPM 15 Directive

All wooden packing materials shall meet ISPM (International Standards for Phytosanitary Measures) regulations as appropriate.

Cross-Sectional Drawing



- End of Specification -