

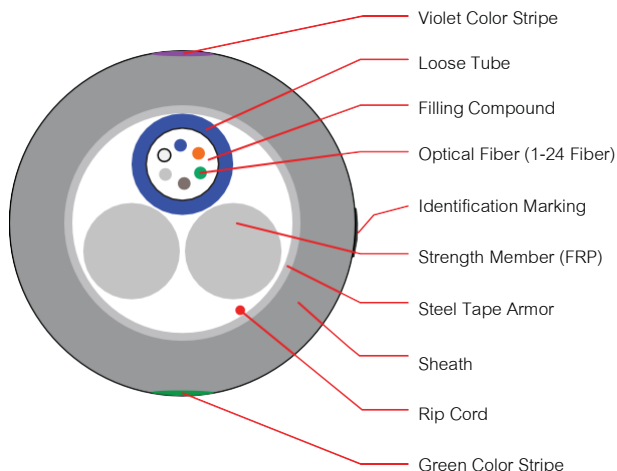
FIBER OPTIC CABLE PRODUCT

MINI ARSS FIBER OPTIC CABLE



GENERAL

- The specification covers the construction and properties of optical fiber cable.
- The cable shall be used for aerial installed-Anti Rodent type.(Span 40 meter).
- The cable generally meets any latest relevant IEC, ITU-T Recommendation or better.
- The single mode fiber shall operate in 1310nm and 1550nm.
- Fiber Optic 6, 12, 24 Core



STANDARD

TIA/EIA-598-C (Rev. TIA/EIA-598-A), EIA-359-A, ANSI/TIA-568.3-D, ANSI/TIA-568-C.3, ANSI/ICEA 640, Telcordia (Bellcore) GR-20-CORE, ITU-T G.652D (Singlemode), ITU-T G.651 (Multimode), ITU-TG 657A2, ISO/IEC 11801:2011, ISO/IEC 11801:2017, IEC 60793, IEC 60794-1-2, EN 50173-1, TIS 2166-2548, RoHS Compliant

OPTICAL FIBER CHARACTERISTICS

Fiber Type	Single Mode 9/125 μm (ITU-T Rec. G.652 D) , Multimode 62.5/125 μm , 50/125 μm (ITU-T G651)	
Fiber Material	Core & Cladding	High Grade Sillica, Compound Silica Glasses or equivalent material.
Nominal Mode Field Diameter	@ 1310 nm @ 1550 nm	9.2 \pm 0.4 μm 10.4 \pm 1.0 μm
Cladding Diameter		125 \pm 1 μm
Core Concentricity Error		\leq 0.5 μm
Cladding Non-Circularity		\leq 0.7 %
Cable Cut Off Wavelength (λ_{cc})		\leq 1260 nm (Refer to TIA/EIA-455-170)
Protective Coating	Material Diameter	UV Curable Material or equivalent material. 242 μm \pm 5 μm (uncolored), 250 μm \pm 5 μm (Colored) (Refer to EIA/TIA-455-173)
Fiber Proof test		\geq 1 % Strain (100 kpsi or 0.69 GPa) (Refer to EIA/TIA-455-31B or IEC 60793-1-30)
Effective group index of reaction	@1310nm @1550nm	1.4676 1.4682

FIBER AND LOOSE TUBE IDENTIFICATION

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

COLOR CODE FOR TUBES.

Tube No.	1
Color	Blue



CABLE CORE / CABLE SHEATHS CONSTRUCTION

Number of Fibers	Number	1-12 Fibers
Optical Fiber	Construction	According to 4.1
Loose Tube	Filling Compound	shall be fully water-blocked with a thixotropic jelly compound or Low density White Jelly or dry loose tube technology.
	Assembly	The required number of optical fibers shall be placed loosely into a filling compound or water blocking thread and placed in the extruded tube.
	Material	Polybutylene Terephthalate (PBT) or Polypropylene (PP) with color coding. The loose tube shall be colored vivid and opaque.
Strength Member (FRP)	Material	shall be made of non-metallic material provide both tensile and anti-buckling strength to the cable.
Stranding	Method	shall be resistant to kinking and stranded around the central strength member using stranding method of Reverse Oscillating Lay (ROL) Technique (SZ direction).
Core Binding	Material	Polyester yarns
Rodent Protection Armor	Material	Corrugated Steel Coated with polymer nominal thickness of steel tape 0.25 mm., polymer 0.05 mm.
Ripcord	Material	Aramid Cord shall be non-hygroscopic, non-wicking, dielectric and shall be continuous throughout the whole cable length.
	Number	1
Cable sheath	Material	The cable sheath shall be made of new UV-Proof black high density polyethylene (HDPE) and containing a suitable antioxidant to offer maximum protection in hostile environment (detail as shown in Table 3 Cable Sheath specification). * Do not use reused material or mixed.
	Thickness	Minimum thickness 1.0 -1.6 mm.
Cable sheath color stripes	Material	shall be added UV protection material, these color stripes shall be discernibly.
	Assembly	The violet color stripe shall be continuously added on one side of the outer sheath. The green color stripe shall be symmetrically on opposite side along with the cable length.
	Width	The width of the color stripes shall be approximately 2.0 mm.
Cable Structure	Construction	According to 4.4 Figure 1

BUFFER TUBE STRANDING, CABLE SIZE

Cable Capacity	Number of elements	Buffer tubes X Fibers per tube	Cable Diameter (Approx. mm.)
1	3(1T+2FRP)	1×1	8.5
2	3(1T+2FRP)	1×2	8.5
4	3(1T+2FRP)	1×4	8.5
6	3(1T+2FRP)	1×6	8.5
8	3(1T+2FRP)	1×8	8.5
10	3(1T+2FRP)	1×10	8.5
12	3(1T+2FRP)	1×12	8.5

CABLE FIBER ATTRIBUTES

Attenuation coefficient	@ 1310 nm.	$\leq 0.35/\leq 0.33\text{dB/km}$
	@ 1383 nm.*	$\leq 0.35/\leq 0.31\text{dB/km}$
	@ 1490 nm.	$\leq 0.24\text{dB/km}$
	@ 1550 nm.	$\leq 0.21\text{dB/km}/\leq 0.19\text{dB/km}$
	@ 1625 nm.	$\leq 0.23\text{ dB/km}/\leq 0.20\text{dB/km}$
*at this wavelength represents post hydrogen aging performance according to IEC 60793-2-50 regarding the B1.3 fiber category.		
Attenuation coefficient for the wavelength range from	1285 nm. - 1330 nm.	@ 1310 nm. $\leq 0.03\text{ dB/km}$
	1525 nm. - 1575 nm.	@ 1550 nm. $\leq 0.02\text{ dB/km}$
Chromatic Dispersion Coefficient	@ 1310 nm.	$\leq 3.5\text{ ps}/(\text{nm.km})$
	@ 1550 nm.	$\leq 18\text{ ps}/(\text{nm.km})$
	@ 1625 nm.	$\leq 22\text{ ps}/(\text{nm.km})$
Zero-dispersion wavelength	λ_{omin} to λ_{omax}	1300 nm. to 1324 nm.
Zero-dispersion Slope	λ_0	$\leq 0.093\text{ ps}/(\text{nm}^2.\text{km})$
PMD Coefficient	@ 1550 nm.	$\leq 0.2\text{ ps}/\text{km}^{1/2}$
Maximum attenuation with macrobending of fiber 100 turns 30 mm. radius	@ 1550 nm.	$\leq 0.10\text{ dB}$
Coating/Cladding concentricity error		$\leq 12\text{ }\mu\text{m}$

CABLE SHEATH SPECIFICATION

Parameters	Specification
Carbon Black (%)	2.6 +/- 0.25
Minimum Tensile Strength (kg/cm ²)	168
Minimum Elongation (%)	300
Environment Stress Cracking: Max. Failure from 10 Specimens	2
Maximum Shrink back (%)	5
Thermal oxidative stability (OIT-Test)	OIT at 200°C > 40 min

INSTALLATION CONDITIONS

Parameters	Specification
Maximum pole span length	40 - 80 Meters
Temperature	Installation: -40°C to 70°C
	Operation: Tropical, -10 to 75°C
Worst case loading condition (Short-term)	Wind Velocity: Maximum 126 km/hr
	Temperature: 25°C
Initial Sag	1% of span length 40 m
Relative humidity	Up to 90%, no frost

OPTICAL FIBER CABLE CHARACTERISTICS

Tensile Loading	IEC 60794-1-2-E1A ,TIA/EIA-455-33A Load : $\geq 4,000$ N Installation/Operation Mandrel diameter: ≤ 30 x cable diameter Hold time : 1hour	Attenuation change < 0.05 dB Fiber strain $\leq 0.33\%$ No fiber break and no sheath damage
Impact	IEC 60794-1-2-E4,TIA/EIA-455-25B Impact energy : 2.94N.m Radius of hammer head:12.5 \pm 0.1mm No. of impacts : 20 cycles Impact rate: ≤ 2 sec/cycle	Attenuation change < 0.1 dB No fiber break and no cable damage
Crush	IEC 60794-1-2-E3,TIA/EIA-455-41A Load : $\geq 1,000$ N/100mm Loading time: ≥ 10 minute (one point and one time)	Attenuation change < 0.1 dB No fiber break and no cable damage
Repeat Bending	IEC 60794-1-2-E6,TIA/EIA-455-104A, IEC 60794-1-2-E11B Load : 44.13N Flexing rate: ≤ 2 sec/cycle No. of cycles : ≥ 25 Mandrel diameter: 20 \times Dia. of cable.	Attenuation change < 0.1 dB No fiber break and no cable damage
Water Penetration	IEC 60794-1-2-F5,TIA/EIA-455-82B (For Loose Tube) Head of water : 1 m Test time : 1 hour Sample length: 1 m	No water leakage at end of cable
Twist	IEC 60794-1-2-E7,TIA/EIA-455-85A Length : 1 m Twist angle : $\pm 180^\circ$ No. of cycles : 10 cycles	Attenuation change < 0.1 dB No fiber break and no cable damage
Cable Bending	IEC 60794-1-2-E11B Mandrel Dia. : 20 \times cable Installation, 10 \times cable Operation No. of cycle : 1	Attenuation change < 0.1 dB No fiber break and no cable damage
Temperature Cycling	IEC 60794-1-2-F1,TIA/EIA-455-3A No. of cycles : 2 Temperature: -10 to +70 $^\circ$ C	Attenuation change < 0.1 dB/km No fiber break and no cable damage