

All Dielectric Self-supporting Optical Fiber Cable (ADSS-Span 200m)

1. GENERAL

1) SCOPE

This specification covers the general requirements and performance of ADSS which offered including optical characteristics, electrical characteristics, mechanical characteristics, geometrical characteristics.

2) REFERENCES

The ADSS which offered shall be designed, manufactured and tested according to international standards as follows:

ISO 9001	Quality Management Systems
ISO 14001	Environmental Management Systems
IEEE Std P.1222	IEEE Standard construction of composite fiber for use on electric utility power lines
IEC 60793-1	Optical fiber Part 1: Generic specifications
IEC 60793-2	Optical fiber Part 2: Product specifications
IEC 60794-1-2	Optical fiber cables – Part 4: Sectional specification – Aerial optical cables along electrical power lines
EIA/TIA 598	Color code of fiber optic cables
ITU-T G.652	Characteristics of a single-mode optical fiber cable

2. OPTICAL FIBER

G. 652D Type

The optical fiber shall be 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:

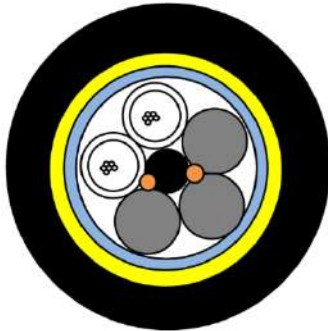
Category	Description	Specifications
Optical Characteristics	Attenuation Coefficient: at 1310 nm Max: at 1550 nm Max:	$\leq 0.35\text{dB/km}$ $\leq 0.21\text{dB/km}$
	Chromatic Dispersion: between 1285 - 1330 nm: at 1550nm	$\leq 3.5 \text{ ps/nm}\cdot\text{km}$ $\leq 18 \text{ ps/nm}\cdot\text{km}$
	Chromatic dispersion coefficient	$\lambda_{\text{omin}}:1300\text{nm}$ $\lambda_{\text{oMax}}:1324\text{nm}$ $S_{\text{omax}}:0.092\text{ps}/(\text{nm}^2\cdot\text{km})$
	Point Discontinuity: at 1310&1550 nm	$\leq 0.1 \text{ dB}$
	Polarization Mode Dispersion (PMD) PMD Q value	$\leq 0.2 \text{ ps}/\sqrt{\text{km}}$ $\leq 0.08 \text{ ps} / \sqrt{\text{km}}$.
	The optical fiber core and sheath shall be of the E9 / 125 type. The protective cover must be in direct contact with the surface of the optical fiber to protect it and avoid cracking of the optical fiber	E9 / 125 type
	Cable Cut off Wavelength (λ_{cc})	$\leq 1260 \text{ nm}$
Geometrical Characteristics	Mode Field Diameter: at 1310 nm at 1550 nm	$9.2 \pm 0.4\mu\text{m}$ $10.4 \pm 0.5\mu\text{m}$
	The uniformity attenuation at any projected wavelength	$\leq 0.1 \text{ dB/km}$
	Cladding Diameter	$125 \pm 1.0\mu\text{m}$
	Mode field (Core/clad) concentricity error	$\leq 0.5 \mu\text{m}$
	Cladding Non-Circularity	$\leq 1\%$
	Coating Diameter	$245 \pm 7\mu\text{m}$
	Core / Cladding Concentricity error	$\leq 0.6\mu\text{m}$

	The increase in attenuation of 100 optical fiber cores wrapped on a 50 mm diameter chuck at 1310 nm: at 1550 nm:	≤0,05 dB; ≤ 0,05 dB
	Coating-Cladding Concentricity error	≤ 12um
	Effective Group Index of Refraction: at 1550 nm	1.4675
	Coating non-circularity The test must be carried out according to IEC/EN 60793-1-21.	≤6%
	Optical fiber shall be able to withstand a strain at minimum 8N for one second. This must correspond to a maximum optical fiber elongation of 1%	minimum 8 N for one second
Environmental Characteristics	Temperature Cycling Induced Attenuation: at 1550nm and 1625 nm (-60°C to +85°C)	0.05dB/km
	Variation of attenuation in the temperature range -40 °C to +65 °C must not exceed: at 1310 nm: at 1550 nm:	0,05 dB/km;
		0,05 dB/km.
	Macro bending Loss: at 1550nm and 1625 nm (100 turns; Φ 60 mm)	≤ 0.1dB

3. DRAWING AND DATASHEET OF CABLE

Cable type : **ADSS - PE 12B1.3 - 2.9 kN**

Cable structure :



Design Data			
Name	NO	Size	
Center	FRP	1	1.6 mm
Layer	Fibers of Cable	12	2.0/1.4 mm
	Filler	3	
	Water blocking yarns	2	
Water blocking tape thickness			0.25 mm
Aramid yarns			
HDPE outer sheath thickness			1.50 mm

Fiber type: **12 x G.652D**

Tubes / Fibers	2/6
Color coding of fiber	blue/orange/green/brown/grey/white
Color coding of tube	blue/orange

Cable Diameter	9.4 mm
Cable Weight	67 kg/km

Technical Data:	according to IEEE.P1222 and DL/T 788 standards	
Supporting Cross Section (Aramid Yarn: 3.84 . FRP: 3.80)	7.63 mm ²	
Rate Tensile Strength (RTS)	7.2 kN	
Modulus of Elasticity (E-Modulus)	10.0 kN/mm ²	
Thermal Elongation Coefficient	4.81 10 ⁻⁶ /°C	
Maximum Allowable Tension(MAT) (40%RTS)	2.9 kN	
Everyday Stress (EDS) (16% ~ 25%RTS)	1.2	~ 1.8 kN
Strain Margin Strength (60%RTS)	4.3 kN	
Minimum Bending Radius(Installing)	202 mm	
Minimum Bending Radius(Operating)	151 mm	
Installation Tensile Strength (≤20%RTS)	≤ 1.4 kN	
Temperature	Installation	-10°C ~ +60 °C
	Transportation and Operation	-40°C ~ +80 °C

Remarks: All Sizes and Values are Nominal Values

ADSS	-	ADSS Cable
PE	-	Outer Sheeth Material
12	-	Fibers of Cable
2.9kN	-	Maximum Allowable Tension(MAT)(kN)

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Cable type : **ADSS - PE 48B1.3 - 3.7 kN**

Cable structure :



Design Data			
	Name	NO	Size
Center	FRP wire	1	1.90 mm
Layer	Fibers of Cable	48	2.5/1.7 mm
	Filler	1	
	Water blocking yarns	2	
	Water blocking tape thickness		0.25 mm
Aramid yarns			
	HDPE outer sheath thickness		1.50 mm

Fiber type: **48 x G.652D**

Tubes / Fibers	4/12
Color coding of fiber	blue/orange/green/brown/grey/white/red/black/yellow/violet/pink/aqua
Color coding of tube	blue/orange/green/brown

Cable Diameter	10.8 mm
Cable Weight	88 kg/km

Technical Data:	according to IEEE.P1222 and DL/T 788 standards
	Supporting Cross Section (Aramid Yarn: 4.86 , FRP: 5.73) 10.58 mm²
	Rate Tensile Strength (RTS) 9.2 kN
	Modulus of Elasticity (E-Modulus) 10.6 kN/mm²
	Thermal Elongation Coefficient 5.23 10⁻⁶/°C
	Maximum Allowable Tension(MAT) (40%RTS) 3.7 kN
	Everyday Stress (EDS) (16% ~ 25%RTS) 1.5 ~ 2.3 kN
	Strain Margin Strength (60%RTS) 5.5 kN
	Minimum Bending Radius(Installing) 232 mm
	Minimum Bending Radius(Operating) 174 mm
	Installation Tensile Strength (≤20%RTS) ≤ 1.8 kN
Temperature	Installation -10°C ~ +60 °C
	Transportation and Operation -40°C ~ +80 °C

Remarks: All Sizes and Values are Nominal Values

ADSS	-	ADSS Cable
PE	-	Outer Sheeth Material
48	-	Fibers of Cable
3.7kN	-	Maximum Allowable Tension(MAT)(kN)

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Cable type:

ADSS - PE 96B1.3 - 4.6kN

Cable structure:



Design Data			
	Name	NO	Size
Center	PE/FRP	1	4.3/2.5:mm
Layer	Fibers of Cable	96	2.5/1.7:mm
	Filler	0	
	Water blocking yarns	2	
	Water blocking tape thickness		0.25 mm
Aramid yarns			
	HDPE outer sheath thickness		1.60 mm

Fiber type: **96 x G.652D**

Tubes / Fibers	8/12
Color coding of fiber	blue/orange/green/brown/grey/white/red/black/yellow/violet/pink/aqua
Color coding of tube	blue/orange/green/brown/grey/white/red/black

Cable Diameter	13.4 mm
Cable Weight	136 kg/km

Technical Data:	according to IEEE.P1222 and DL/T 788 standards		
	Supporting Cross Section (Aramid Yarn: 5.92 、 FRP: 14.52)	20.44 mm ²	
	Rate Tensile Strength (RTS)	11.5 kN	
	Modulus of Elasticity (E-Modulus)	12.9 kN/mm ²	
	Thermal Elongation Coefficient	6.19 10 ⁻⁶ /°C	
	Maximum Allowable Tension(MAT) (40%RTS)	4.6 kN	
	Everyday Stress (EDS) (16% ~ 25%RTS)	1.8 ~ 2.9 kN	
	Strain Margin Strength (60%RTS)	6.9 kN	
	Minimum Bending Radius(Installing)	20 D	
	Minimum Bending Radius(Operating)	15 D	
	Installation Tensile Strength (≤20%RTS)	≤ 2.3 kN	
	Temperature	Installation	-10°C ~ +60 °C
		Transportation and Operation	-40°C ~ +80 °C

Remarks: All Sizes and Values are Nominal Values

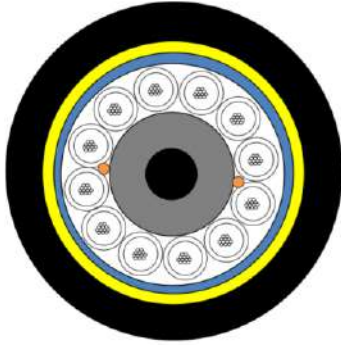
- ADSS - ADSS Cable
- PE - Outer Sheeth Material
- 96 - Fibers of Cable
- 4.6kN - Maximum Allowable Tension(MAT)(kN)

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Cable type:

ADSS - PE 144B1.3 - 6.5 kN

Cable structure:



Design Data

	Name	NO	Size
Center	PE/FRP	1	7.6/2.5 mm
Layer	Fibers of Cable	144	2.5/1.7 mm
	Filler	0	
	Water blocking yarns	2	
	Water blocking tape thickness		0.25 mm
Aramid yarns			
	HDPE outer sheath thickness		1.70 mm

Fiber type: **144 x G.652D**

Tubes / Fibers	12/12
Color coding of fiber	blue/orange/green/brown/grey/white/red/black/yellow/violet/pink/aqua
Color coding of tube	blue/orange/green/brown/grey/white/red/black/yellow/violet/pink/aqua

Cable Diameter	17.1 mm
Cable Weight	215 kg/km

Technical Data:	according to IEEE.P1222 and DL/T 788 standards	
	Supporting Cross Section (Aramid Yarn: 8.41 、 FRP: 14.52)	22.93 mm ²
	Rate Tensile Strength (RTS)	16.1 kN
	Modulus of Elasticity (E-Modulus)	9.2 kN/mm ²
	Thermal Elongation Coefficient	7.15 10 ⁻⁶ /°C
	Maximum Allowable Tension(MAT) (40%RTS)	6.5 kN
	Everyday Stress (EDS) (16% ~ 25%RTS)	2.6 ~ 4.0 kN
	Strain Margin Strength (60%RTS)	9.7 kN
	Minimum Bending Radius(Installing)	338 mm
	Minimum Bending Radius(Operating)	253 mm
	Installation Tensile Strength (≤20%RTS)	≤ 3.2 kN
Temperature	Installation	-10°C ~ +60 °C
	Transportation and Operation	-40°C ~ +80 °C

Remarks: All Sizes and Values are Nominal Values

- ADSS - ADSS Cable
- PE - Outer Sheeth Material
- 144 - Fibers of Cable
- 6.5kN - Maximum Allowable Tension(MAT)(kN)

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4. COLOR IDENTIFICATION OF FIBER IN CABLE

4.1 Fiber color code

Each fiber will be identifiable throughout the length of the cable in accordance with the following color sequence. Fiber color in each tube starts from No. 1 Blue.

Fiber	1	2	3	4	5	6
Color	Blue	Orange	Green	Brown	Grey	White
Code	7	8	9	10	11	12
	Red	Black	Yellow	Purple	Pink	Aqua

4.2 Color Codes for Loose Tube

The loose tubes will be identifiable in accordance with the following color sequence. If there are fillers, the color is Black.

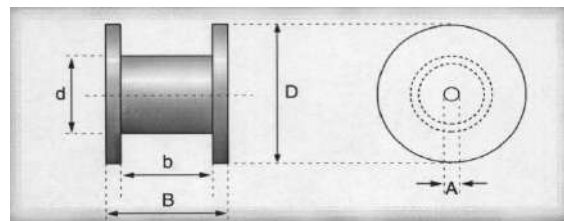
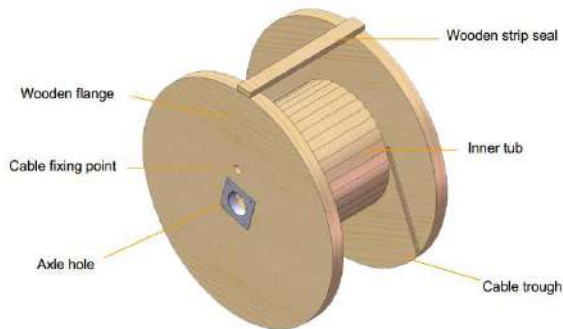
Fiber	1	2	3	4	5	6
Color	Blue	Orange	Green	Brown	Grey	White
Code	7	8	9	10	11	12
	Red	Black	Yellow	Purple	Pink	Aqua

5. CHARACTERISTIC OF OPTICAL CABLE

Mechanical characteristic and test method	
Tensile strength	: Under load of 7000N
Crush	: 2000N/100mm, conform to IEC 794-1-E3
Impact	: conform to IEC 794-1-E4
Repeated bending	: conform to IEC 794-1-E6
Torsion	: conform to IEC 794-1-E7
Flexing	: conform to IEC 794-1-E8
Cable bend	: conform to IEC 794-1-E11
Vibration	: conform to IEC 794-1
Water penetration	: conform to IEC 794-1-F5B
Temperature cycling test	: conform to IEC 794-1-F1
Bending Radius	: unloaded 10 times of outer diameter
	: loaded 20 times of outer diameter

6. PACKING AND DRUM FOR CABLE

CABLE shall be wound on a non-returnable wooden drum or metal drum. Both ends of CABLE shall be securely fastened to drum and sealed with a shrinkable cap. The required marking shall be printed with a weather-proof material on the outsides of drum according to customer's requirement.



Cable Diameter (mm)	Drum Length (km)	Drum Dimensions & Weights					
		D	b	B	d	A	weight
		m	m	m	m	m	t
9.4	4	1.2	0.6	0.7	0.55	0.08	0.11
10.8	4	1.4	0.6	0.7	0.6	0.08	0.146
13.4	4	1.6	0.6	0.7	0.7	0.08	0.197
17.1	4	1.7	0.93	1.05	0.8	0.08	0.24