

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:

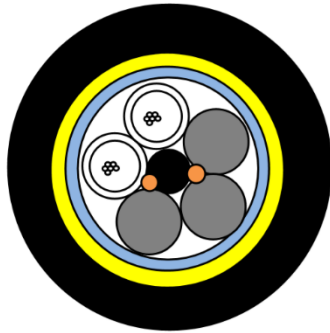
| Category | Description | Specifications |
|-----------------------------|---|---|
| Optical Characteristics | Attenuation Coefficient: at 1310 nm Max: at 1550 nm Max: | ≤ 0.35dB/km ≤ 0.21dB/km |
| | Chromatic Dispersion: between 1285 - 1330 nm: at 1550nm | ≤ 3.5 ps/nm·km ≤ 18 ps/nm·km |
| | Chromatic dispersion coefficient | λ_{omin} :1300nm λ_{oMax} :1324nm S_{oMax} :0.092ps/(nm ² ·km) |
| | Point Discontinuity: at 1310&1550 nm | ≤ 0.1 dB |
| | Polarization Mode Dispersion (PMD) PMD Q value | ≤ 0.2 ps/√km ≤ 0.08 ps / √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}) | ≤ 1260 nm |
| Geometrical Characteristics | Mode Field Diameter: at 1310 nm at 1550 nm | 9.2 ±0.4μm 10.4±0.5μm |
| | The uniformity attenuation at any projected wavelength | ≤ 0.1 dB/km |
| | Cladding Diameter | 125 ±1.0μm |
| | Mode field (Core/clad) concentricity error | ≤ 0.5 μm |
| | Cladding Non-Circularity | ≤1% |
| | Coating Diameter | 245 ± 7μm |
| | Core / Cladding Concentricity error | ≤ 0.6μm |

| | | |
|--------------------------------------|--|----------------------------|
| | 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) |

| | | | | | |
|-----------|--|------|------|--|----|
| 2019/5/14 | | 200m | ADSS | | CL |
|-----------|--|------|------|--|----|

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 mm ² |
| | Rate Tensile Strength (RTS) | 9.2 kN |
| | Modulus of Elasticity (E-Modulus) | 10.6 kN/mm ² |
| | 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 |
| 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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| 2019/5/14 | | 200m | ADSS | | CL |
|-----------|--|------|------|--|----|

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

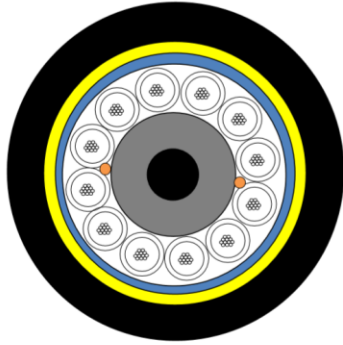
- ADSS - ADSS Cable
- PE - Outer Sheeth Material
- 96 - Fibers of Cable
- 4.6kN - Maximum Allowable Tension(MAT)(kN)

| | | | | | |
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| 2019/11/26 | | Span 200m | ADSS | | BJJ |
|------------|--|------------------|------|--|-----|

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 |
| Temperature | Installation Tensile Strength (≤20%RTS) | ≤ 3.2 kN |
| | 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)

| | | | | |
|----------|--|-------------|------|-----|
| 2019/4/8 | | 200m | ADSS | swq |
|----------|--|-------------|------|-----|

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.

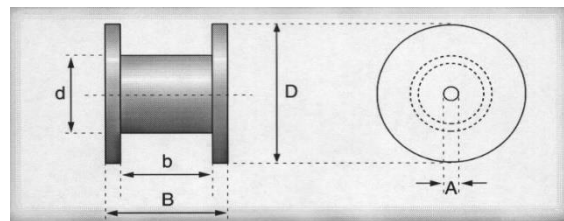
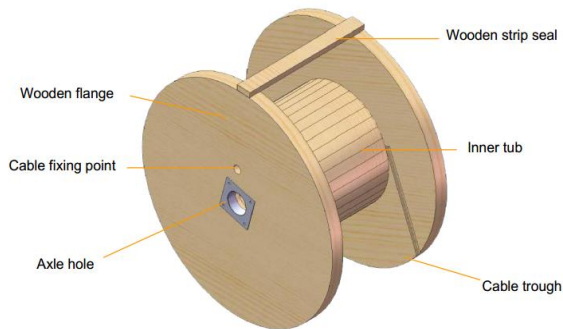
| | | | | | | |
|-------|------|--------|--------|--------|------|-------|
| Fiber | 1 | 2 | 3 | 4 | 5 | 6 |
| Color | Blue | Orange | Green | Brown | Grey | White |
| Code | 7 | 8 | 9 | 10 | 11 | 12 |
| | Red | Black | Yellow | Purple | Pink | Aqua |

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 |