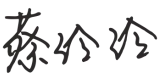


TECHNICAL SPECIFICATION

ZTT® Skygrid™ OPGW



A	February 8, 2025	 Ezra	 Linda	 Lemon	
Version	Date	Prepared	Reviewed	Approved	Accepted

1. General

1.1 SCOPE

This specification covers ZTT® Skygrid™ OPGW for the installation on high voltage overhead power lines. The cable contains optical fibers for data transmission and telecom purposes and is installed instead of a ground wire.

The specification describes the basic design of ZTT® Skygrid™ OPGW with its main components: the fibers, the optical fiber unit and the cable armoring. Furthermore, this specification contains information concerning the quality assurance during manufacturing, the final acceptance tests, the type tests and the packaging.

1.2 Cable Description

Cable which has the dual performance functions of a conventional ground wire with telecommunication capabilities.

1.3 Quality

ZTT ensures a continuing level of quality in our cable products through several quality control programs including ISO 9001.

1.4 Reliability

ZTT ensures product reliability through rigorous qualification testing of each product family. Both initial and periodic qualification testing are performed to assure the cable's performance and durability in the field environments.

1.5 Reference

The cable which ZTT 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
ITU-T G.652	Characteristics of a single-mode optical fiber cable
ITU-T G.655	Characteristics of a non-zero dispersion-shifted single-mode optical fiber and cable
EIA/TIA 598	Color code of fiber optic cables
IEC 60794-4-10	Aerial optical cables along electrical power lines – Family specification for OPGW
IEC 60794-1-2	Optical fiber cables-Part 1-2: Generic specification-Basic optical cable test procedures
IEEE1138-2021	IEEE Standard for testing and performance for optical ground wire (OPGW) for use on electric utility power lines
IEC 63248	Conductors for overhead lines-Coated or clad metallic wire for concentric lay stranded conductors
IEC 62641	Conductors for overhead lines-Aluminum and aluminum alloy wires for concentric lay stranded conductors
IEC 61089	Round wire concentric lay overhead electrical stranded conductors

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.

Optical fiber uses special spun device successfully controlled the value of PMD, and makes sure that it can keep stable in cabling.

ZTT-ALF® G652D Optical Fiber

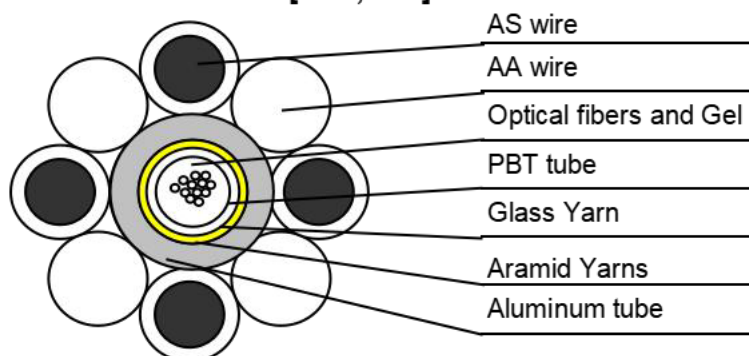
Category	Description	Specifications
		After cabling
Optical Specifications	Attenuation @1310 nm	≤ 0.36 dB/km
	Attenuation @1550 nm	≤ 0.22 dB/km
	Zero Dispersion Wavelength	1300~1324 nm
	Zero Dispersion Slope	≤ 0.092 ps/nm ² ·km
	PMD Link value	≤ 0.2 ps/√km
	Cable Cutoff Wavelength (λ_{cc})	≤ 1260 nm
	Macro bending Loss (100 turns; $\Phi 50$ mm) @1550 nm (100 turns; $\Phi 50$ mm) @1625 nm	≤ 0.05 dB ≤ 0.10 dB
	Mode Field Diameter @1310 nm	$9.2 \pm 0.4 \mu\text{m}$
Dimensional Specifications	Cladding Diameter	$125 \pm 0.7 \mu\text{m}$
	Core/clad concentricity error	$\leq 0.6 \mu\text{m}$
	Cladding Non-Circularity	$\leq 1\%$
Mechanical Specifications	Proof stress	≥ 0.69 Gpa
Installation	Splice loss	≤ 0.1 dB average

3. Cable Structural Drawing

 ZTT Group	ZTT® Skygrid™ OPGW	Serial No:	ZTT 2025
	Specification	Bid No:	XM2502050055-1

Cable Type: OPGW - 16G652-ALT-96 [63.2;80.2]

Cross Section:



OPGW Structure	Fiber	Material	No	Material	No.	Material Dia.	
		G.652	16				
	AL tube			Inner-Dia.	4.20	Outer-Dia	6.00 mm
	Layer1:20.3%AS wire		4	AA wire	4	Diameter	3.60 mm

Technical Data	according to IEC 60794-4-10, IEEE 1138, DL/T 832 standards		
	Stranding direction of outer layer is right hand(Z-Stranding)		
	Cable Diameter		13.20 mm
	Cable Weight		435 kg/km
	Supporting Cross Section		96 mm ²
	Section of AS Wire	41 mm ²	
	Section of AA Wire	41 mm ²	
	Section of AL Tube	14 mm ²	
	Rated Tensile Strength (RTS)		63.2 kN
	Modulus of Elasticity (E-Modulus)		104.8 kN/mm ²
	Thermal Elongation Coefficient		16.4 × 10 ⁻⁶ /°C
	Permissible Maximum Working Stress (40% RTS)		263.7 N/mm ²
	Everyday Stress (EDS) (16%~25% RTS)	105.5 ~164.8	N/mm ²
	DC Resistance		0.451 Ω/km
	Short Time Current (1s)		9.0 kA
Temperature Range:	Short Time Current Capacity (20°C~200°C)		80.2 kA ² S
	Minimum Bending Radius: Installation:		264 mm
	Operating:		198 mm
	Ratio of RTS to Weight		14.6 km
Temperature Range:	Installation		-30°C ~ +50 °C
	Transportation and Operation		-60°C ~ +80 °C

Remarks: All Sizes and Values are Nominal Values

Diameter Tolerance: ±1%; Weight Tolerance: ±2%;

Rev. ZECT-TD 120-2009	Designer	Ezra Zhang	Authorized	Lemon Lu	2025/2/7
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4. Color Identification of Fiber in ZTT® Skygrid™ OPGW

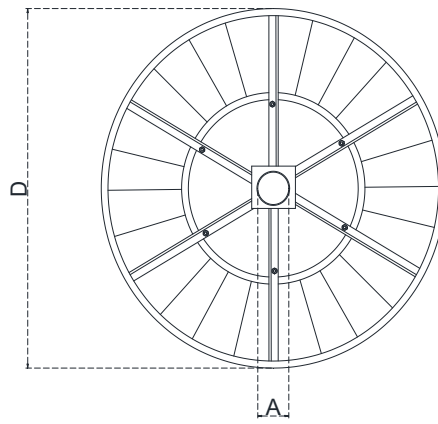
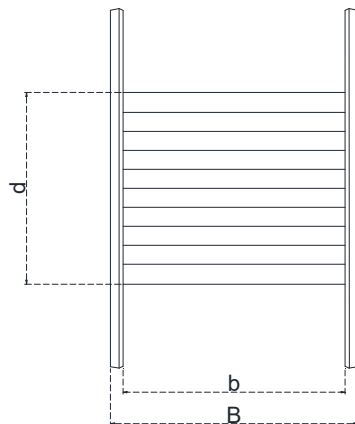
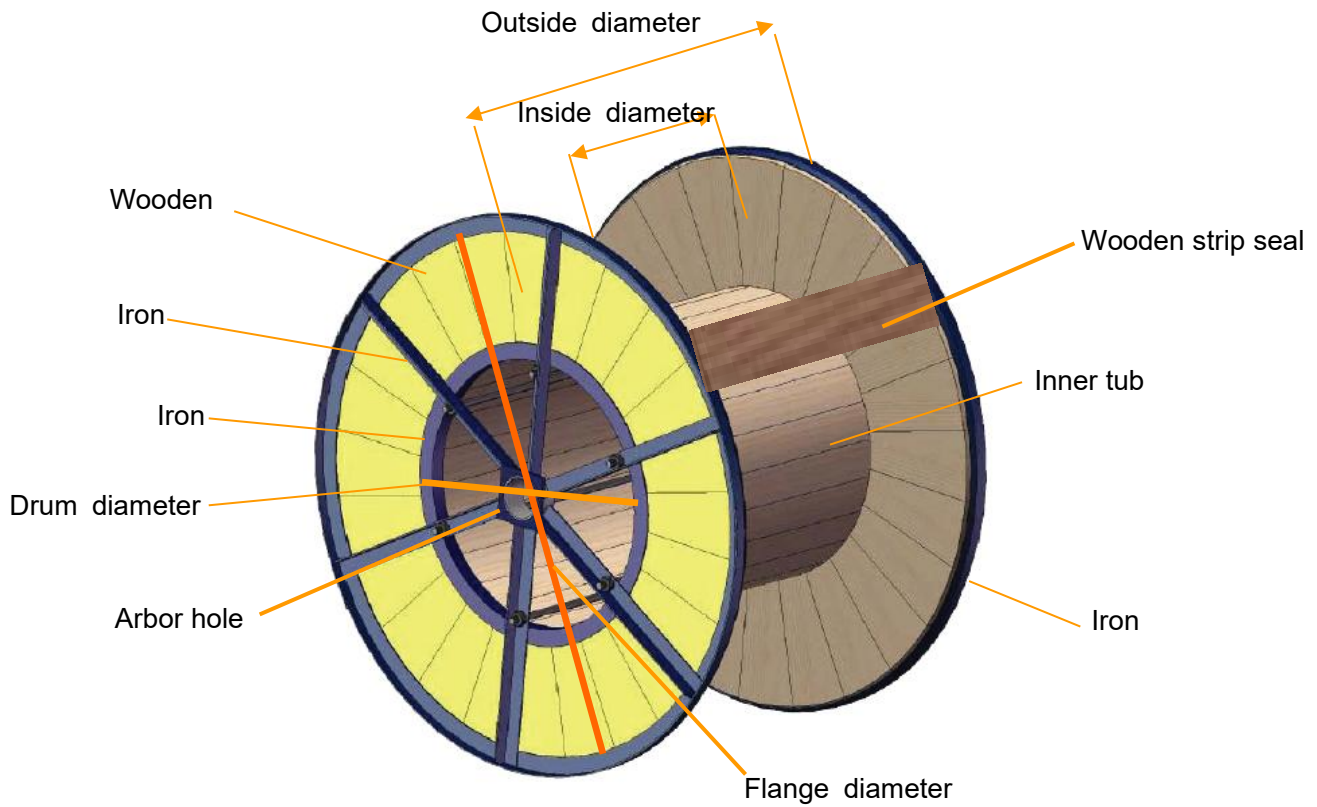
Color code of fiber in OPGW shall be identified referring to the following table:

Typical number of fiber: 16

Remark	Fiber No. & Color					
Without Color Ring	1	2	3	4	5	6
	Blue	Orange	Green	Brown	Gray	White
	7	8	9	10	11	12
	Red	Nature	Yellow	Violet	Pink	Aqua
With S150 Color Ring	13	14	15	16		
	Blue	Orange	Green	Brown		

5. Packing and Drum

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



Cable Diameter (mm)	Drum Length (m)	Drum Dimensions & Weights					
		D	b	B	d	A	weight
		cm	cm	cm	cm	cm	kg
13.2	2000	130	90	110	80	10.5 ± 0.5	160
	3000	140	90	110	80	10.5 ± 0.5	170
	4000	150	90	110	80	10.5 ± 0.5	200
	5000	160	90	110	80	10.5 ± 0.5	240