Technical Specifications

For

Optical Fiber Composite Overhead Ground Wires (OPGW)

（OPGW-36B1-105[112;77.0], ITU-T G.652 Fibers)

Spec. No.： CG2018-191

Technical Specifications for Optical Fiber Cable

1. General

1.1 This specification covers the requirements of the Optical Fiber Composite Overhead Ground Wires (OPGW) to be supplied to customer for use outside installation.

1.2 The optical fiber cable shall comply with the requirements of this specification and generally meet or better latest standards:

ITU-T G.650: Definitions and test methods for linear, deterministic attributes of single-mode fiber and cable

ITU-T G.652: Characteristics of a single-mode optical fiber and cable

IEC 60793-2-50 B1.3: Sectional specification for class B single mode fibers

IEEE 1138: Standard Construction of Composite Fiber Optic Overhead Ground Wires (OPGW) for use on Electric Utility Power Lines

ASTM B398: Standard Specification for Aluminum-Alloy 6201-T81 Wire for Electrical Purposes

ASTM B 415: Standard Specification for Hard-Drawn Aluminum-Clad Steel Conductors

ASTM B416: Specification for Concentric-Lay-Stranded Aluminum-Clad Steel Conductors

EIA/TIA-455: Standard Test Procedures for Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices and other Fiber Optic Components

EIA 492A: Generic Specification for Optical Waveguide Fibers

EIA 472A: Sectional Specification for Fiber Optic Communication Cables for Outside Aerial Use

2. Optical Fiber Characteristics

2.1 The optical, geometrical, mechanical and environment characteristics of the ITU-T G.652 optical fiber shall be accordance with below table:

Characteristics			**Specified Values**	**Units**
Optical Characteristics				
Mode field diameter	at 1310nm		9.2±0.4	μm
	at 1550nm		10.4 ± 0.5	μm
Attenuation coefficient	at 1310nm		≤0.35	dB/km
	at 1550nm		≤0.22	dB/km
Attenuation non-uniformity			≤0.05	dB
Zero dispersion wavelength (λ_0)			1300 ～1324	nm
Max zero dispersion slope (S_{0max})			≤0.092	ps/(nm^2·km)
Polarization mode dispersion coefficient(PMD)			≤0.2	$ps/\sqrt{km}$
Cut-off wavelength (λ_{cc})			≤1260	nm
Dispersion coefficient	1288～1340nm		≤3.5	ps/(nm·km)
	1550nm		≤18	ps/(nm·km)
Effective group index of refraction (N_{eff})		at 1310nm	1.466	—

	at 1550nm	1.467	—
Geometric characteristic			
Cladding diameter		125.0±1.0	μm
Cladding non-circularity		≤1.0	%
Coating diameter		245.0±10.0	μm
Coating-cladding concentricity error		≤12.0	μm
Coating non-circularity		≤6.0	%
Core-cladding concentricity error		≤0.8	μm
Mechanical characteristic			
Curling		≥4	m
Proof stress		≥0.69	GPa
Coating strip force	Average value	1.0-5.0	N
	Peak value	1.3-8.9	N
Macro bending loss	Φ60mm, 100 circles, at 1550nm	≤0.05	dB
	Φ32mm, 1 circle**s**, at 1550nm	≤0.05	dB

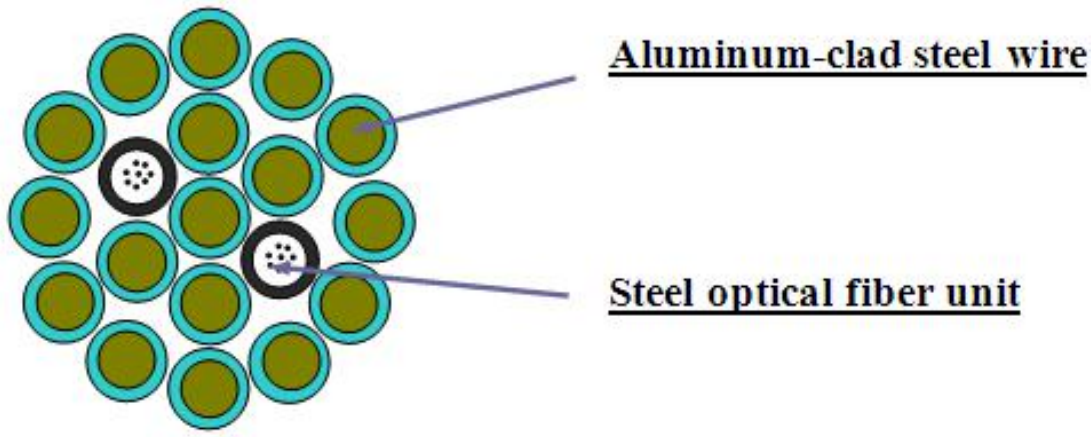
3. Characteristics of Cable

3.1 Cable Construction and Parameter

Overhead ground wire made of aluminum-clad steel wire (AS) and stainless steel tube containing optical fiber.

3.2Cable type: **OPGW**-36B1-105[112;77.0]

3.2.1 Cross section of OPGW



Structure		Material	No.	Material Diameter	
	Fiber	G.652	36	-	
	Center	20%AS wire	1	Diameter	2.8mm
	Layer 1	SUS Tube	2	Diameter	2.8mm

	Layer 1	20%AS wire	4	Diameter	2.8mm
	Layer 2	20%AS wire	8	Diameter	2.8mm
	Layer 2	40%AS wire	4	Diameter	2.8mm

3.2.1 Specification of OPGW

Items		Technical Data
Stranded		Core, layer 1 layer 2
Stranding direction		Outer layer is **Right** hand
Cable diameter (Nominal)		14.0mm
Cable Weight (Approx.)		688.3kg/km
Supporting Cross Section	AS Wire	104.7mm^2
Rated Tensile Strength (RTS)		111.6kN
Modulus of Elasticity (E-Modulus)		149.5N /mm^2
Thermal Elongation Coefficient		13.4×10^{-6}/K
Maximum Working Stress (40%RTS)		44.64kN
Everyday Stress(EDS)(16~25%RTS)		17.86~27.9kN
DC Resistance at 20℃		0.667ohm/km
Short time current (1s,20℃～200℃)		8.77kA
Short time current Capacity (I^{2}t)		77.0kA^{2}s
Minimum bending radius	Installation	30 times of cable diameter
	Operation	15 times of cable diameter
Temperature Range	Installation	-20℃～+60℃
	Storage & shipping	-40℃～+70℃
	Operation	-40℃～+70℃

4. Fiber and Loose Tube Color Identification

The individual fiber and loose tubes shall accordance with standard TIA/EIA-598-A and the color code as below.

Fiber Colors

Steel tube 1 (No.1-24fibers)

Fiber Colors

NO.	1	2	3	4	5	6	7	8	9	10	11	12
Color	Blue	Orange	Green	Brown	Grey	White	Red	Nature	Yellow	Violet	Pink	Aqua

One black tracer (100mm pitch)

NO.	13	14	15	16	17	18	19	20	21	22	23	24
Color	Blue	Orange	Green	Brown	Grey	White	Red	Nature	Yellow	Violet	Pink	Aqua

Steel tube 2 (No.25-36fibers)

NO.	25	26	27	28	29	30	31	32	33	34	35	36
Color	Blue	Orange	Green	Brown	Grey	White	Red	Nature	Yellow	Violet	Pink	Aqua

5. Mechanical and Environmental Test.

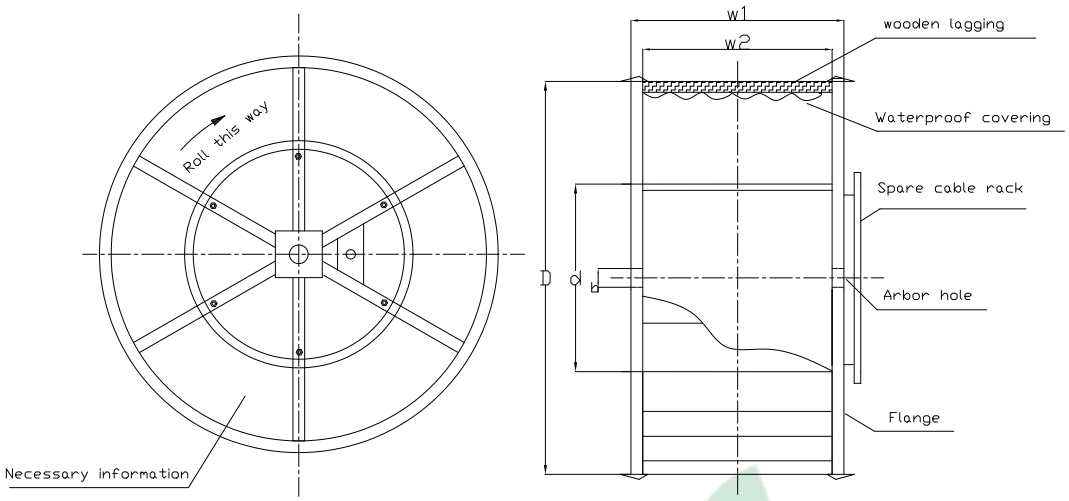
The OPGW cable shall successfully pass the following tests which don't must been chosen all. The following test items shall be carried out in according to corresponding reference.

No	Item	Reference
OPGW tests		
1	Cutoff wavelength	IEEE Std 1138
2	Water ingress test	IEEE Std 1138
3	Seepage of flooding compound	IEEE Std 1138
4	Short circuit test	IEEE Std 1138
5	Aeolian vibration test	IEEE Std 1138
6	Sheave test	IEEE Std 1138
7	Crush test	IEEE Std 1138
8	impact test	IEEE Std 1138
9	Creep test	IEEE Std 1138
10	Stress-strain test	IEEE Std 1138
11	Temperature cycling	IEEE Std 1138
12	Strain margin test	IEEE Std 1138
13	Galloping test	IEEE Std 1138
14	Lightning test	IEEE Std 1138
Fiber tests		
1	Attenuation variation with wavelength	IEEE Std 1138
2	Attenuation with bending	IEEE Std 1138
3	Temperature cycling	IEEE Std 1138
4	Attenuation at the water peak	IEEE Std 1138
Field acceptance tests		
1	Fiber continuity	IEEE Std 1138
2	Attenuation	IEEE Std 1138
3	Fiber length	IEEE Std 1138

6. Packing and Shipping

The OPGW shall be tightly and uniformly wound on a strong wood-iron reel which conforms to ANSI/AA 53-1981 or equal. The reel shall be lagged with stout wood-iron battens so as to prevent the OPGW from damage in ordinary shipping, handling, storage and stringing operations.

Drawing of Reel



According to length of cable, we choose different type reel (D,d,b,w1,w2) for loading cable.

7. Environmentally

Full comply with ISO14001, RoHS and OHSAS18001 system

8. Installation Recommendations

Installation procedure:

It is recommended that IEEE Std 524-1992 and our company recommended procedures be used for the installation of OPGW.

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