Aerial Optical Cables Along Electrical Power Lines

Introduction

Aerial optical cables along electrical power lines include: OPGW (optical fiber composite overhead ground wires), OPPC (optical phase conductor), MASS (metallic armoured self supporting cable), ADSS (all dielectric self supporting cable) and OPAC (optical attached cable).

In this introduction, OPGW, OPPC and ADSS, will be mainly introduced.

OPGW cables, installed on the top of power poles or towers, have the dual performance functions of standard ground wires with communication capabilities.

OPPC cables, installed at the positions of power transmission phase conductors, have the dual performance functions of standard phase conductors with communication capabilities.

ADSS cables, installed at proper positions of power poles or towers, are a kind of non-metal optical cables suspended directly between two points without need of other supporting elements.

If you are interesting in or have any request on MASS and OPAC, please contact us without any hesitations, you will get a quick response.

General Design Requirements

TCI’s products are complied with relevant international standards and national and industrial standards of China, including but not limited to following standards:

GB/T: national standard of PRC；

DL/T: electrical power industrial standards of PRC；

YD/T： post and telecom industrial standard of PRC；

JB/T： mechanical industrial standard of PRC (PRC: the People’s Republic of China).

Standards And Specifications

Relevant standards about optical fibers:

ITU-T G.650 Definition and test methods for the relevant parameters of single-mode fibers

ITU-T G.651 Characteristics of a 50/125 um multimode graded index optical fiber cable

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

ITU-T G.653 Characteristics of a dispersion-shifted single mode optical fiber cable

ITU-T G.654 Characteristics of a cut-off shifted single-mode optical fiber and cable

ITU-T G.655 Characteristics of a non-zero dispersion-shifted single-mode optical fiber and cable

ITU-T G.656 Characteristics of a fiber and cable with non-zero dispersion for wideband optical transport

GB/T 9771 Single mode fiber series for communication

GB/T 12357 Multi mode fiber series for communication

GB/T 15972.1 General specification of optical fibers, Part 1: General specification（eq. IEC793-1-1：1995）

GB/T 15972. 2 General specification of optical fibers, Part 2: Test methods of size parameter (eq. IEC793-1-2：1998）

GB/T 15972.3 General specification of optical fibers, Part 3: Test methods of mechanical properties （eq. IEC793-1-3：1995）

GB/T 15972.4 General specification of optical fibers, Part 4: Test methods of transmission and optical characteristics（eq. IEC 793-1-4：1995）

GB/T 15972.5 General specification of optical fibers, Part 5: Test methods of environment characteristics （eq. IEC793-1-5：1995）

Relevant standards about optical cables:

IEC 60794-4 Optical fiber cables -Part 4: Sectional Specification--Aerial optical cables along electrical power lines

IEC 60794-4-1 Optical fiber cables - Part 4-1: Aerial optical cables for high- voltage power lines

IEEE Std P1222 IEEE standard for all-dielectric self-supporting fiber optic cable

IEEE 1138 IEEE standard construction of composite fiber optic overhead ground wire (OPGW) for use on electric utility power lines

GB/T 18899 All dielectric self supporting optical fiber cables

GB/T 7424.4 Optical cables, Part 4： Sectional specification-Optical fiber composite overhead ground wires

DL/T 788 All dielectric self supporting optical fiber cables

DL/T 832 Optical fiber composite overhead ground wires

DL/T 767 Technical specification and test methods for ADSS preforming fittings

DL/T 766 Technical specification and test methods for OPGW preforming fittings

Relevant standards about raw materials:

IEC 60888 Zinc-coated steel wires for stranded conductors

IEC 61232 Aluminum-clad steel wires for electrical purposes

IEC 60104 Aluminum-magnesium-silicon alloy wire for over-head line conductors

IEC 60889 Hard-drawn aluminum wire for overhead line conductors

IEC 61394 Overhead lines - characteristics of greases for aluminum, aluminum alloy and steel bare conductors

DIN 48200 T8 Specification for materials of aluminum clad steel wires

DIN 48200 T6 Specification for materials of aluminum alloy wires.

ASTM B416 Standard specification for concentric-lay-stranded aluminum-clad steel conductors

GB/T 17937 Aluminum-clad steel wires for electrical purposes（idt. IEC 61232，1993）

GB/T 17048 Hard-drawn aluminum wire for overhead line conductors (eqv. IEC 60889，1993）

GB/T 4239 Stainless steel and heat resist cold-rolled steel strip

JB/T 8134 Aluminum-magnesium-silicon alloy wire for over-head line conductors (idt IEC 60104）

YD/T 839.3 Filling and flooding compound for communication cables and optical cables.

General Design Requirements

No.	Design performances	OPGW	OPPC	ADSS
1	Fiber count and type	●	●	●
2	Detail description of optical cables designing	●	●	●
3	Overall diameter（mm）	●	●	●
4	Calculating cross section area for RTS（mm2）	●	●	●
5	Calculated mass（kg/km）	●	●	●
6	RTS—(kN）	●	●	●
7	MAT—Max allowable tensile strength (kN)	●	●	●
8	Average tension in a year(N/mm2)[or average stress in a year (N/mm2)]	●	●	●
9	Yang's modulus(Elastic modulus)(N/mm2)	●	●	●
10	Linear expansion coefficient(1/℃)	●	●	●
11	DC resistance（Ω/km）	●	●	—
12	Short current capacity $I^2t/$（$kA^2 \cdot s$）	●(1)	—	—
13	Safe continual current-carrying capacity（A）	—	●	—
14	Storage and operating temperature range (℃)	●	●	●
15	Strain margin (%)	●	●	●
16	Outer layer stranding direction	●	●	—
17	Tracking resistant sheath（if applicable）	—	—	●
（1） Operation temperature range of optical cable under short-circuit current will be decided by supplier.				

OPGW/OPPC Structure Design

Description

According to position of optical fiber unit, it could be classified into central tube type and eccentric tube type.

-- Optical unit is classified into stainless steel tube with optical fibers, and aluminum clad stainless steel tube.

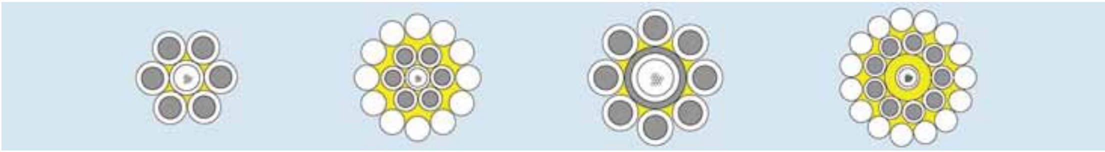
-- According to customer's requirements or requirements of optical transmission system, determine fiber type and count in the optical tube

-- According to customer's detail requirements to optical fiber type and count, determine quantity of optical unit, it could be 1, 2 or 3 (maximum at present).

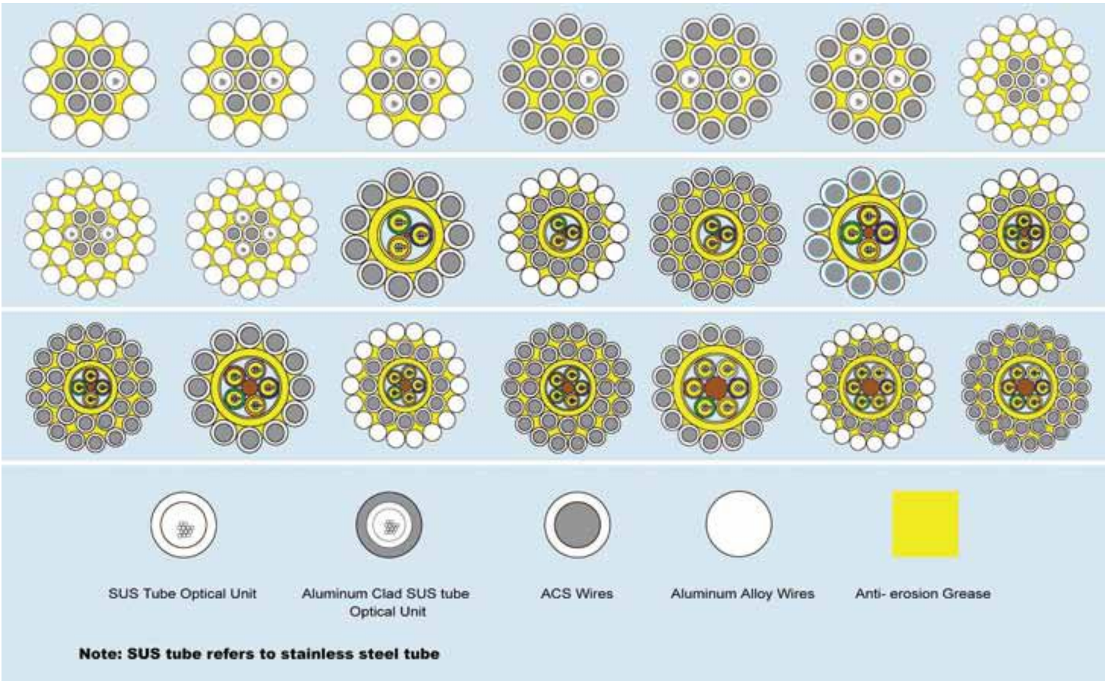
-- According to customer's detail requirements to cable mechanical , electrical performance and span, tensile strength, sag and weather condition, the stranded layer could be one layer or multi layers, stranded wires could be ACS (aluminum clad steel) wires or composition of ACS wires with aluminum or aluminum alloy wires.

-- In order to ensure the operation life, the interstice of stranded wires should be covered with anti-erosion grease(IEC 60394).

Structure Drawing of Central Optical Fiber Unit Type



Structure Drawing of Eccentric (Stranded) Optical Fiber Unit Type



Optical Fiber Unit

Types of optical fiber unit of OPGW/OPPC could be classified into two types, they are SUS tube type and aluminum clad SUS tube type. The SUS tube is manufactured by laser welding-drawing technique, and optical fibers and water-blocking compound are introduced into tube at the same time of welding-drawing in process, forming optical unit.

-- The CO2 gas laser of line is driven by RF, and the output beam has single mode pattern with good energy concentration, makes the best weld seam quality.

-- The welding-drawing process plays a roll of defects screen, passing through an on-line eddy-current detection, defects such as dummy welding, leaky welding etc could be completely gotten rid of.

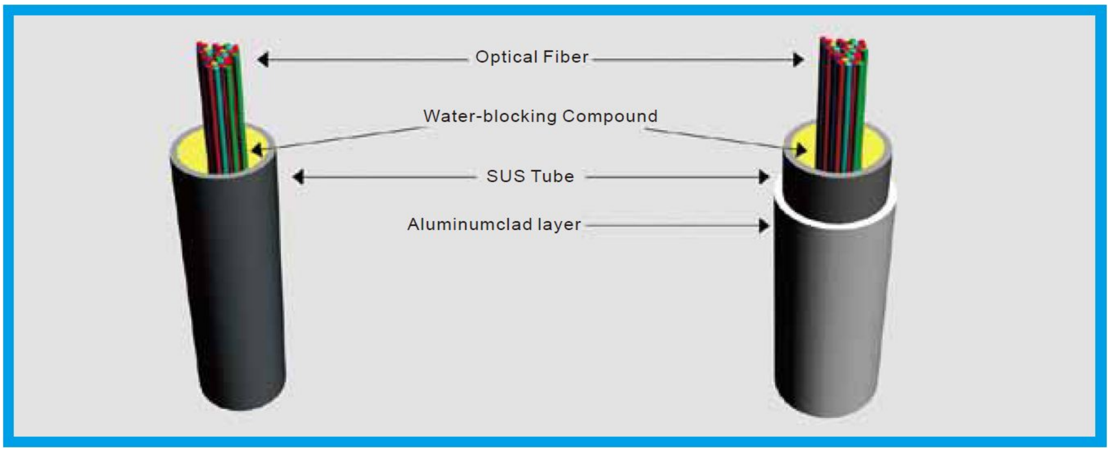
-- Adopt our unique technique, excess length of optical fibers in tube could be controlled precisely, uniformity of excess length is better than ±0.2‰.

-- With unique excellent water block performance. For 1m of optical unit, under 3m of water height, after 1 hr., no water will be penetrated at another end of optical unit.

-- Maximum fiber count of a tube is depended on size of SUS tube and structure of OPGW, it could be optimized by careful design

-- According to customer’s requirement, proper thickness of aluminum could be covered to SUS tube optical fiber unit, forming aluminum clad stainless steel tube optical unit.

Structure Drawing of Optical Fiber Unit



Optical Fiber Unit Specification

Size of SUS tube (mm)	Central optical fiber unit type		Stranded optical fiber unit type	
	Max. fiber count	Max. excess length	Max. fiber count	Max. excess length
2.5	12	5.0‰	24	2.6‰
2.7	20	5.0‰	30	2.7‰
3.0	30	5.0‰	36	3.3‰
3.2	36	5.0‰	48	3.0‰
3.3	40	5.0‰	48	3.9‰
3.4	40	6.0‰	48	4.0‰
3.6	48	6.0‰	48	4.7‰
3.8	48	6.5‰	48	5.2‰

Typical Structure and Parameter of OPGW

Some structures and characteristics of typical representative OPGW are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or directly contact the Company.

Central Optical Fiber SUS Tube Structure (Parts)

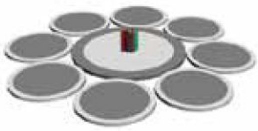
Structure Drawing	Structure：central optical fiber SUS tube structure with single stranded layer		
	Optical Cables Type Model	OPGW-1C1/36 (M48/R60-13)	OPGW-1C1/48 (M68/R85-25)
	Max. fiber count	36	48
	Tube size	Φ3.2 mm	Φ3.8mm
	Cable diameter	Φ9.6 mm	Φ11.4 mm
	Cross-section carry area	48.25 mm^2	68.05 mm^2
	Cable weight	342 kg/km	475kg/km
	Rated Tensile Strength（RTS）	60 kN	85 kN
	DC resistance at 20℃	1.782 Ω/km	1.264 Ω/km
	Short current capacity (40~200℃)	12 kA^2 • s	25 kA^2 • s
	Linear expansion coefficient	13.0×10^{-6}/℃	13.0×10^{-6}/℃
	Young's modulus	162.0 kN/mm^2	162.0 kN/mm^2

Structure Drawing	Structure：central optical fiber SUS tube structure with double stranded layers		
	Optical Cables Type Model	OPGW-2C1/30(M127/R160-80)	OPGW-2C1/40(M163/R205-132)
	Max. fiber count	30	40
	Tube size	Φ3.00 mm	Φ3.40 mm
	Cable diameter	Φ15.00 mm	Φ17.00 mm
	Cross-section carry area	127.23 mm^2	163.43 mm^2
	Cable weight	874 kg/km	1116 kg/km
	Rated Tensile Strength（RTS）	159 kN	205 kN
	DC resistance at 20℃	0.678 Ω/km	0.528 Ω/km
	Short current capacity (40~200℃)	80 kA^2 • s	132 kA^2 • s
	Linear expansion coefficient	13.0×10^{-6}/℃	13.0×10^{-6}/℃
	Young's modulus	162.0 kN/mm^2	162.0 kN/mm^2

Typical Structure and Parameter of OPGW(L)

Some structures and characteristics of typical representative OPGW are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or directly contact the company.

Central Optical Fiber Aluminum Clad SUS Tube Structure (Parts)

Structure Drawing	Structure：central optical fiber aluminum clad SUS tube structure with single stranded layer		
	Optical Cables Type Model	OPGW(AL-Tube)-1 S36(M75/R68-33)	OPGW(AL-Tube)-1 S 36(M88/R83-43)
	Max. fiber count	36	36
	Tube size	Φ 6.20 mm	Φ 6.20 mm
	Cable diameter	Φ 11.40 mm	Φ 12.30 mm
	Cross-section carry area	75.24 mm^2	87.90 mm^2
	Cable weight	430 kg/km	513 kg/km
	Rated Tensile Strength（RTS）	67 kN	83 kN
	DC resistance at 20℃	0.714 Ω/km	0.646 Ω/km
	Short current capacity (40~200℃)	32 kA^2 • s	43 kA^2 • s
	Linear expansion coefficient	14.3×10^{-6}/℃	14.0×10^{-6}/℃
	Young’s modulus	130.8 kN/mm^2	135.3 kN/mm^2

Structure Drawing	Structure：central optical fiber aluminum clad SUS tube structure with double stranded layers		
	Optical Cables Type Model	OPGW(AL-Tube)-2S 36(M160/R170-130)	OPGW(AL-Tube)-2S 36(M171/R183-147)
	Max. fiber count	36	36
	Tube size	Φ 6.20 mm	Φ 6.20 mm
	Cable diameter	Φ 16.60 mm	Φ 17.00 mm
	Cross-section carry area	160.19 mm^2	171.01 mm^2
	Cable weight	990 kg/km	1061 kg/km
	Rated Tensile Strength（RTS）	170 kN	183 kN
	DC resistance at 20℃	0.420 Ω/km	0.399 Ω/km
	Short current capacity (40~200℃)	129 kA^2 • s	146 kA^2 • s
	Linear expansion coefficient	13.5×10^{-6}/℃	13.5×10^{-6}/℃
	Young’s modulus	147.3 kN/mm^2	148.3 kN/mm^2

Typical Structure and Parameter of OPGW

Some structures and characteristics of typical representative OPGW are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or directly contact the Company.

Stranded Optical Fiber SUS Tube Structure (Parts)

Structure Drawing

Structure：stranded optical fiber SUS tube structure with double stranded layers		
Optical Cables Type Model	OPGW-2S1/24(M89/R111-39)	OPGW-2S1/48(M150/R189-111)
Max. fiber count	24	48
Tube size	Φ2.50 mm	Φ3.40 mm
Cable diameter	Φ12.60 mm	Φ16.40 mm
Cross-section carry area	88.76 mm^2	150.11 mm^2
Cable weight	615 kg/km	1026 kg/km
Rated Tensile Strength（RTS）	111 kN	188 kN
DC resistance at 20℃	0.972 Ω/km	0.575 Ω/km
Short current capacity (40~200℃)	39 $kA^2 \cdot s$	111 $kA^2 \cdot s$
Linear expansion coefficient	13.0×10^{-6}/℃	13.0×10^{-6}/℃
Young's modulus	162.0 kN/mm^2	162.0 kN/mm^2

Structure Drawing

Structure：stranded optical fiber SUS tube structure with double stranded layers		
Optical Cables Type Model	OPGW-2S1/24(M107/R133-57)	OPGW-2S1/48(M150/R92-190)
Max. fiber count	24	48
Tube size	Φ2.50 mm	Φ3.20 mm
Cable diameter	Φ12.60 mm	Φ16.40 mm
Cross-section carry area	88.76 mm^2	150.11 mm^2
Cable weight	381 kg/km	631 kg/km
Rated Tensile Strength（RTS）	54 kN	92 kN
DC resistance at 20℃	0.471 Ω/km	0.279 Ω/km
Short current capacity (40~200℃)	66 $kA^2 \cdot s$	190 $kA^2 \cdot s$
Linear expansion coefficient	17.4×10^{-6}/℃	17.4×10^{-6}/℃
Young's modulus	97.6 kN/mm^2	97.7 kN/mm^2

Typical Structure and Parameter of OPGW

Some structures and characteristics of typical representative OPGW are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or directly contact the company.

Stranded Optical Fiber SUS Tube Structure (Parts)

Structure Drawing	Structure： stranded optical fiber SUS tube structure with three stranded layers	
	Optical Cables Type Model	OPGW-3S1/36(M281/R128-714)
	Max. fiber count	36
	Tube size	Φ3.00 mm
	Cable diameter	Φ22.10 mm
	Cross-section carry area	280.80 mm^2
	Cable weight	980 kg/km
	Rated Tensile Strength（RTS）	128 kN
	DC resistance at 20℃	0.132 Ω/km
	Short current capacity (40~200℃)	714 kA^2 • s
	Linear expansion coefficient	19.7×10^{-6}/℃
	Young's modulus	81.2 kN/mm

Structure Drawing	Structure： stranded optical fiber SUS tube structure with three stranded layers	
	Optical Cables Type Model	OPGW-3S1/24(M214/R269-227)
	Max. fiber count	24
	Tube size	Φ2.70 mm
	Cable diameter	Φ19.35 mm
	Cross-section carry area	214.26 mm^2
	Cable weight	1462 kg/km
	Rated Tensile Strength（RTS）	269 kN
	DC resistance at 20℃	0.404 Ω/km
	Short current capacity (40~200℃)	227 kA^2 • s
	Linear expansion coefficient	13.0×10^{-6}/℃
	Young's modulus	162.0 kN/mm^2

Typical Structure and Parameter of OPGW

Some structures and characteristics of typical representative OPGW are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or directly contact the Company.

Stranded loose tube aluminum optical unit structure (part)

Structure Drawing

Structure：double layer stranded loose tube aluminum optical unit structure		
Optical Cables Type Model	OPGW(L-AL_Tube) – 2S 48(M107/R95-85)	OPGW(L-AL_Tube) – 2S 48(M125/R117-111)
Max. fiber count	48	48
Tube size	Φ 10.0 mm	Φ 10.0 mm
Cable diameter	Φ 15.10 mm	Φ 16.1 mm
Cross-section carry area	107.18 mm^2	125.44 mm^2
Cable weight	605 kg/km	726 kg/km
Rated Tensile Strength（RTS）	94.5 kN	116.5 kN
DC resistance at 20℃	0.489 Ω /km	0.443 Ω /km
Short current capacity (40~200℃)	84 kA^2 • s	111 kA^2 • s
Linear expansion coefficient	14.4×10^{-6}/℃	14.1×10^{-6}/℃
Young's modulus	128.8 kN/mm^2	133.6 kN/mm^2

Structure Drawing

Structure：double layer stranded loose tube aluminum optical unit structure		
Optical Cables Type Model	OPGW(L-AL_Tube) – 2S 48(M210/R219-277)	OPGW(L-AL_Tube) – 2S 48(M260/R278-407)
Max. fiber count	48	48
Tube size	Φ 10.0 mm	Φ 10.0 mm
Cable diameter	Φ 20.10 mm	Φ 22.1 mm
Cross-section carry area	210.27 mm^2	259.75 mm^2
Cable weight	1285 kg/km	1611 kg/km
Rated Tensile Strength（RTS）	218.8 kN	278.5 kN
DC resistance at 20℃	0.309 Ω /km	0.263 Ω /km
Short current capacity (40~200℃)	277 kA^2 • s	406 kA^2 • s
Linear expansion coefficient	13.6×10^{-6}/℃	13.5×10^{-6}/℃
Young's modulus	145.0 kN/mm^2	148.3 kN/mm^2

Typical Structure and Parameter of OPPC

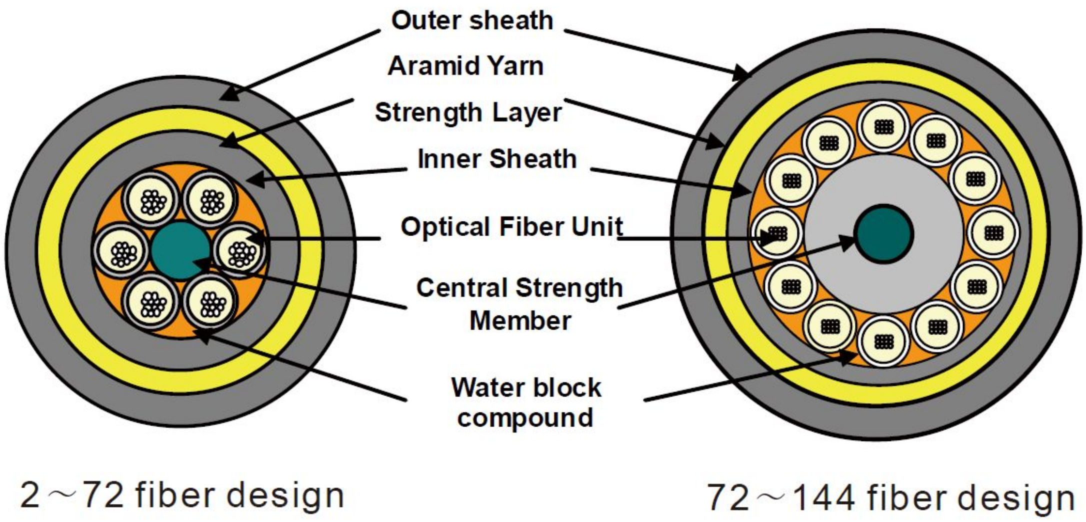
Some structures and characteristics of typical representative OPGW are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or directly contact the company.

Stranded Optical Fiber SUS Tube Structure (Parts)

Structure Drawing	Structure： stranded optical fiber SUS tube structure with double stranded layers		
	Optical Cables Type Model	OPPC-2S 1/24(M88/R47-257)	OPPC-2S 1/48(M155/R82-362)
	Max. fiber count	24	48
	Tube size	Φ 2.50 mm	Φ 3.20 mm
	Cable diameter	Φ 12.60 mm	Φ 16.70 mm
	Cross-section carry area	29.85	52.39
	Section area of electrical Aluminum	58.90	102.64
	Total cross section area	88.76 mm^2	155.02 mm^2
	Cable weight	381 kg/km	652 kg/km
	Rated Tensile Strength（RTS）	47 kN	82 kN
	DC resistance at 20℃	0.418 Ω/km	0.240 Ω/km
	Safe current-carrying capacity	257 A	362 A
	Linear expansion coefficient	17.1×10^{-6}/℃	17.0×10^{-6}/℃
	Young's modulus	91.7 kN/mm^2	91.8 kN/mm^2
	Corresponding wires model	LGJ-50/30	LGJ-95/55

Structure Drawing	Structure： stranded optical fiber SUS tube structure with three stranded layers		
	Optical Cables Type Model	OPPC-3S 1/30(M238/R83-502)	OPPC-3S 1/30(M287/R87-363)
	Max. fiber count	30	30
	Tube size	Φ 2.80 mm	Φ 2.70 mm
	Cable diameter	Φ 20.40 mm	Φ 22.45 mm
	Cross-section carry area	40.09	37.17
	Section area of electrical Aluminum	198.16	250.15
	Total cross section area	238.25 mm^2	287.32 mm^2
	Cable weight	835 kg/km	960 kg/km
	Rated Tensile Strength（RTS）	83 kN	87 kN
	DC resistance at 20℃	0.137 Ω/km	0.110 Ω/km
	Safe current-carrying capacity	502 A	572 A
	Linear expansion coefficient	19.3×10^{-6}/℃	20.0×10^{-6}/℃
	Young's modulus	73.8 kN/mm^2	69.7 kN/mm^2
	Corresponding wires model	LGJ-185/35	LGJ-240/40

ADSS Cable Structure Design



Description

Our ADSS design is a kind of typical stranded loose tube design, which including two typical structures with maximum (but not limited to) fiber count of 72 and 144. We could make special design according to customer's requirement.

-- Central strength member, normally adopt FRP（YD/T 1181.1）, also plays the role of anti bend break member. For maximum 144 fiber design, proper materials could be covered on outside of the FRP.

-Adopting loose tube design as fiber unit, normally, PBT（GB/T118.12001） is used as tube materials. Optical fibers with proper excess length and filling compound with excellent water-block performance are put or filled into the tubes.

-- Black PE（GB/T 15065）is placed outside of stranded optical units, forms cable core, water-block compound（YD/T 839.9）is placed in the interstice of the cable core.

-- Maximum operation tensile strength could be calculated according to customer's requirement to cable strength or according to weather condition and span-sag requirement, thus the quantity of aramid yarn should be used could be determined. The yarn is applied with balanced- torque, could also play the role of bullet-proof.

-- According to international and national standards, the outer sheath of ADSS could be classified into class-A and class-B, which is suited for spatial potential environments of below and above 12kV respectively.

ADSS Cable Application Design

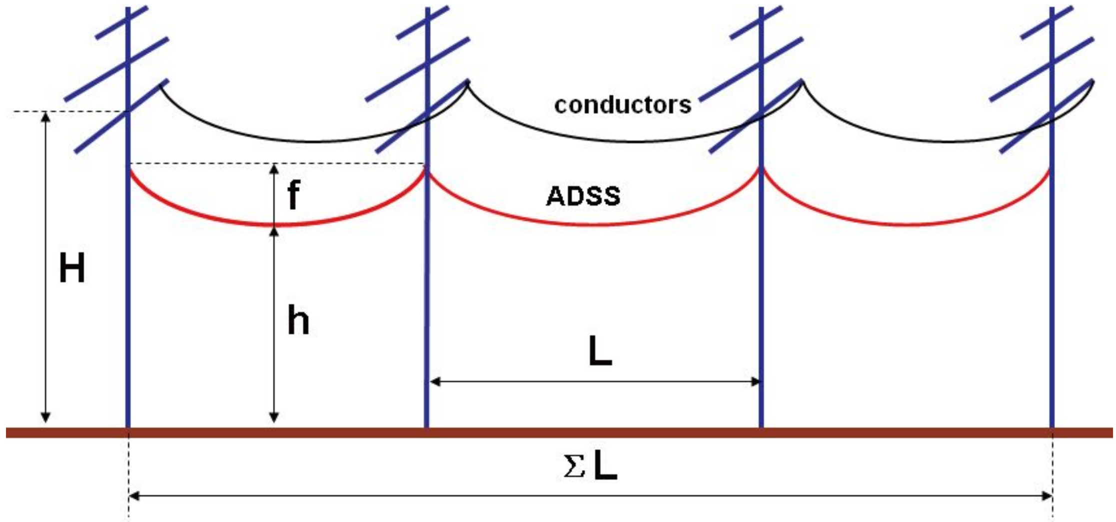
Description

In most instances, ADSS cables are installed at existing power lines. The only way for ADSS installation is to suit existing poles/tower condition to find limited available space for installation.

Besides optical transmission performance design, two aspects of ADSS application design are:

-- Span-tension-sag design of ADSS

-- Installation position consideration of ADSS



H：The name height of pole or tower，namely the distance between lowest horizontal structure to the foundation of the pole or tower.；

h： Required minimum distance of ADSS cable to ground；

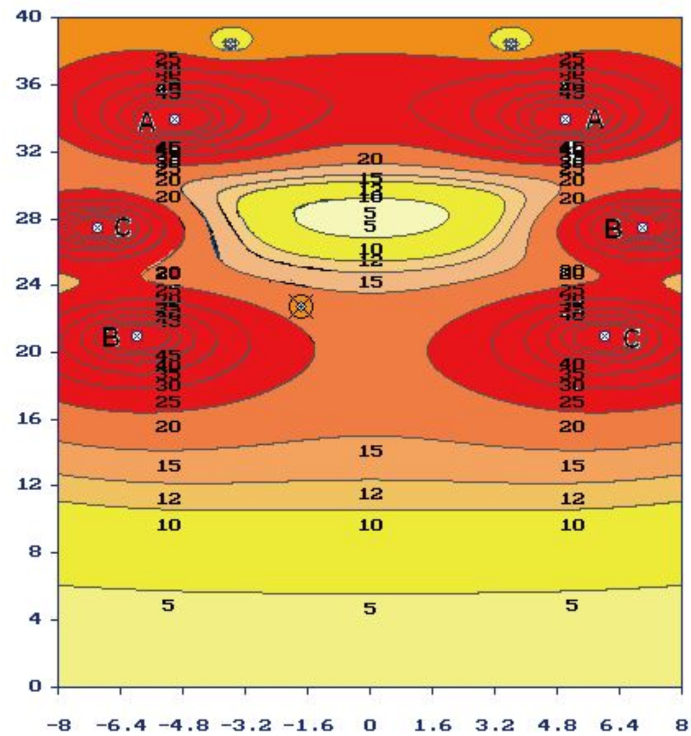
f： Maximum vertical sag of ADSS cable；

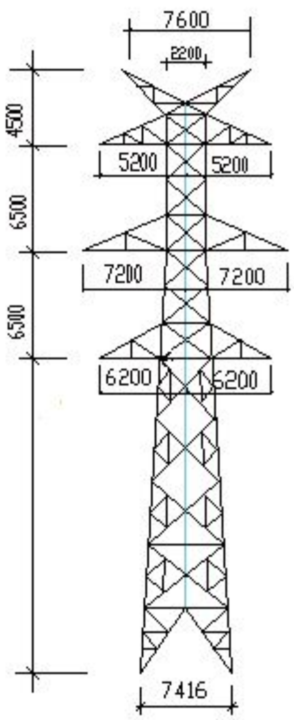
L：Span；

ΣL：Total length between two tension fittings

ADSS Cable Application Design

ADSS Installation Position Design





Description

To one individual pole or tower, the detail installation position design of ADSS cable is of great importance. An installation position not rightly suitable will influence cable operation life at least, or even leads a quick electric erode to cable.

We could provide spatial potentials distribution around the poles and towers, if it is required by customers.

In such case, following information should be available at least:

-- Voltage of the system and its possible maximum value;

-- Main structure size drawing of the pole or tower;

-- Diameter or type model of conductors and overhead ground wires;

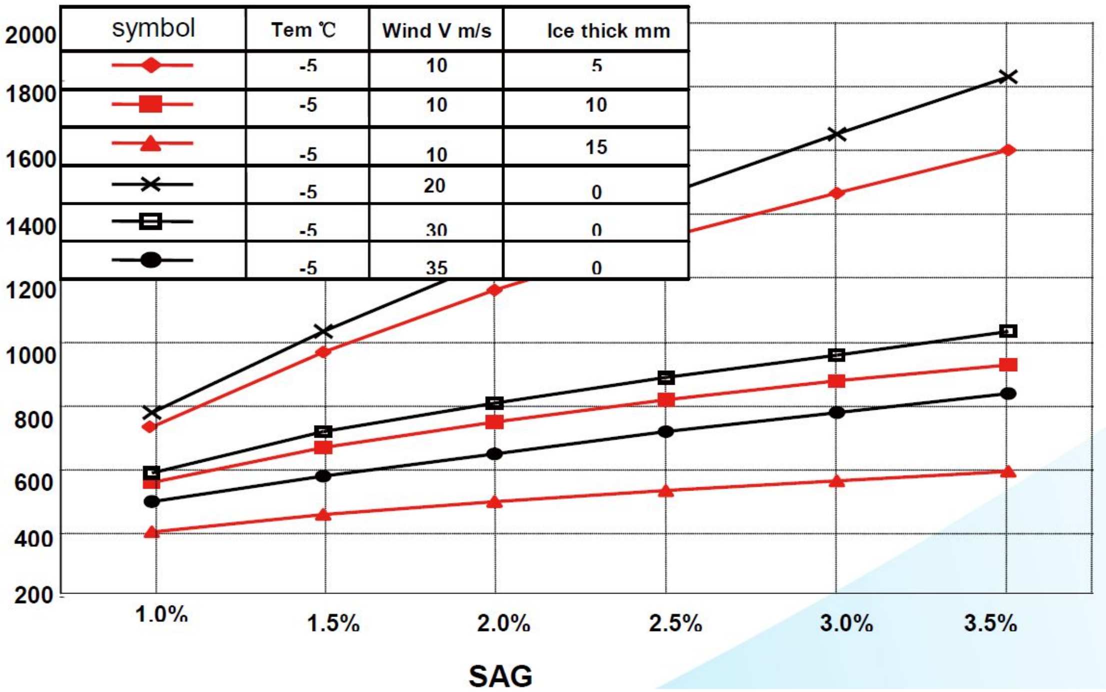
-- Phase arrangement of conductors on the pole or tower;

-- The spacing size of split conductors (if it is the case);

-- The length of Insulator string

ADSS Cable Application Design

Span-tension-sag design for ADSS cables



ADSS cables have so-called "variable span" characteristics.

-- In case of fixed operational tension at two cable ends is required, allowable span for ADSS cables will increase along with increasing of allowable sag;

-- Under different weather conditions, the allowable span of same ADSS cable will reduce along with increasing of weather load to the cable.

On request, we could provide span-tension-sag characteristics of ADSS cable for customers.

Typical Structure and Parameter of ADSS

Some structures and characteristics of typical representative ADSS are shown in the below list, however, they do not represent the whole products of the company. If you have any requests, please contact local representative office or contact the company directly.

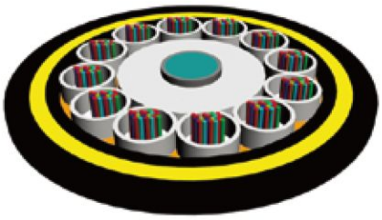
ADSS with grade A sheath (Parts)

Structure drawing	Order Type Model	ADSS- PE 24 M15.5/ A	ADSS- PE48 M17.7 / C	ADSS- PE72 M21.2 / D
	Fiber count	24	48	72
	Size of tube	Φ 2.1mm	Φ 2.6mm	Φ 3.0mm
	Cable diameter	Φ 13.4mm	Φ 14.9mm	Φ 16.4mm
	Cable weight	139kg/km	172kg/km	209kg/km
	RTS	38.8kN	44.3kN	56.6kN
	Linear expansion coefficient	2.2×10^{-6}/℃	2.0×10^{-6}/℃	1.8×10^{-6}/℃
	Young's modulus	16.5kN/mm^2	17.5kN/mm^2	18.6kN/mm^2

ADSS with grade B sheath (parts)

Structure drawing	Order Type Model	ADSS- AT 24 M14 / A	ADSS- AT48M15.2 / C	ADSS- AT72 M21.2 / D
	Fiber count	24	48	72
	Size of tube	Φ 2.1mm	Φ 2.6mm	Φ 3.0mm
	Cable diameter	Φ 13.2mm	Φ 14.3mm	Φ 16.3mm
	Cable weight	146kg/km	169kg/km	220kg/km
	RTS	35kN	37.9kN	52.9kN
	Linear expansion coefficient	4.5×10^{-6}/℃	4.8×10^{-6}/℃	3.6×10^{-6}/℃
	Young's modulus	15.5kN/mm^2	14.9kN/mm^2	17.9kN/mm^2

ADSS with grade B sheath (parts)

Structure Drawing	Order Type Model	ADSS-AT144 M12.3 / D
	Fiber count	144
	Size of tube	Φ 3.0mm
	Cable diameter	Φ 20.7mm
	Cable weight	344kg/km
	RTS	30.8kN
	Linear expansion coefficient	3.5×10-6/℃
	Young's modulus	6.22kN/mm^2

Ordering Information

Type model explaining:

ADSS — XX XX MXXX / X

- **X**: Fiber count in optical unit
  A: 4；B:6；C:8；D:12
- **MXXX**: Max operational tension (kN）
- **XX**: Cable fiber count of
- **XX**: Sheath grade:
  PE：grade A；AT：grade B
- **ADSS**: Product name

We could provide user structure design and type selection,if information is provided as below:

Weather condition			
	Temperature （℃）	Wind speed（m/s）	Ice thick （mm）
Lowest temperature			
Average temperature of year			
Max. wind speed			
Ice thickness			
Highest temperature			
Installation			

Electric line condition			
System voltage*	kV	Type model/diameter* of ground wire	mm
Length of insulator string*	mm	Type model/diameter* of conductor	mm
Name height of pole/tower	m	Split conductor/split spacer(y/no)	mm
Representative span*	m	Initial sag of wires*	%
Max span*	m	Max sag of wire*	%

Main installation operation requirement to ADSS cable					
Installation sag*	%	Max sag	%	Min distance above ground*	m

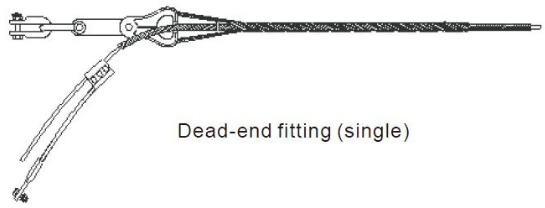
Main transmission requirement to ADSS cable			
Fiber count*		Fiber type*	
attenuation*	dB/km(@1310nm);	dB/km(@1550nm);	
Chromatic dispersion	ps/nm.km(@1310nm);	ps/nm.km(@1550nm);	

Note 1：In some case, detail information of poles and towers and cross section drawing of line is needed.

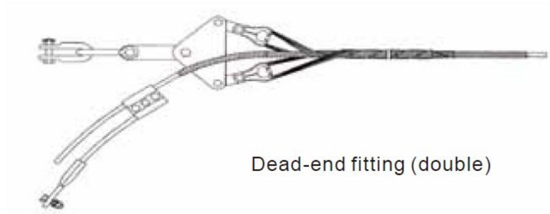
Note 2：“*” represents information must be provided.

Hardware and Fittings for OPGW

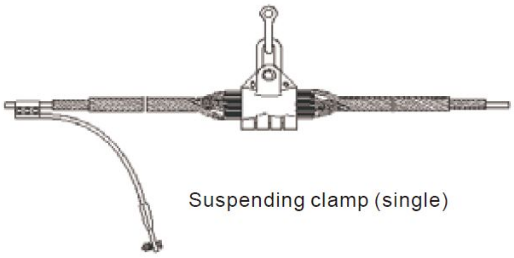
The drawings below are shown with no detail size. If you have any requests, please contact local representative office or contact the company directly.



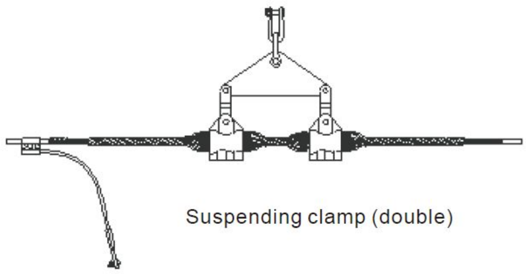
Dead-end fitting (single)



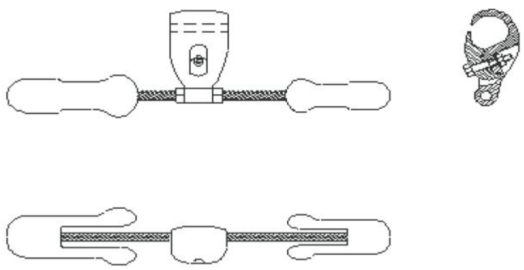
Dead-end fitting (double)



Suspending clamp (single)



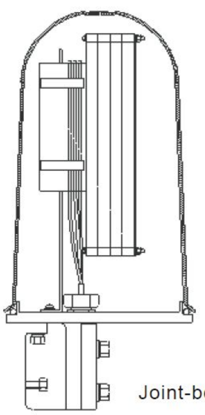
Suspending clamp (double)



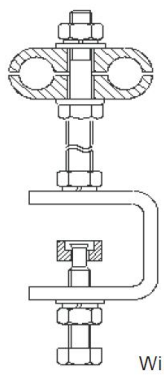
Vibration damper

Protection wires

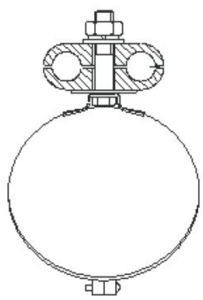
Earth wires



Joint-box



Wire clamp for tower



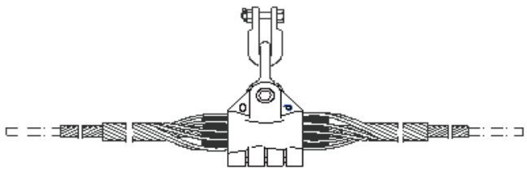
Wire clamp for pole

Hardware and Fittings for ADSS

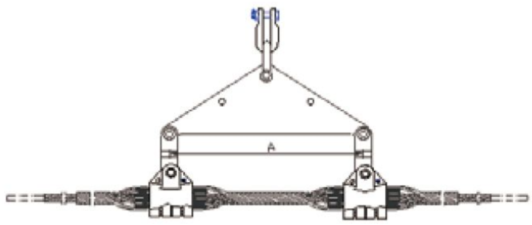
The drawings below are shown with no detail size. If you have any requests, please contact local representative office or contact the company directly.

Dead end clamp with double stranded

Dead end clamp with single stranded

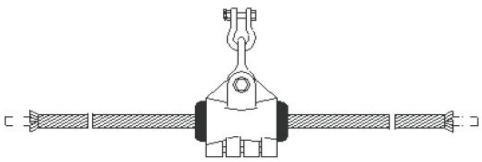


Suspending clamp (single)



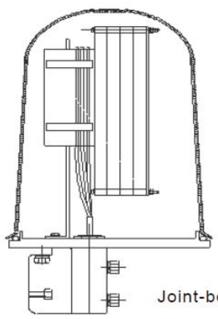
Suspending clamp (double)

Spiral vibration reducer

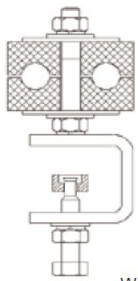


Tangent clamp

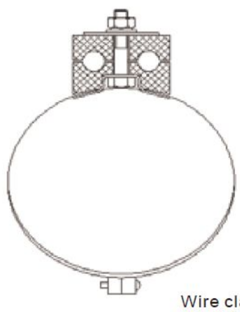
corona-resist ring



Joint-box



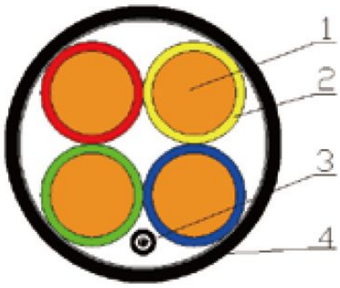
Wire clamp for tower



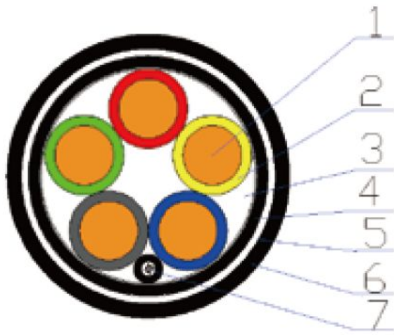
Wire clamp for pole

Optical Composite Low-voltage Cable

Cross Section Drawing:



OPLC without armor



Armored OPLC

Figure 1 1—conductor 2—insulation 3—optical unit 4— sheath

Figure 2 1—conductor 2—insulation 3—filling material 4—inner bedding

5—steel armored layer 6—sheath 7—optical unit

Features of OPLC (optical fiber composite low voltage cable)：

① Integration of optical fiber and power cable, avoid twice cabling, decrease construction cost for network;

② Providing multi-kinds transmission means, high-flexibility, high-expandability, and wide applicability

③ Broadband accessible

④ Excellent shock resistance and crush resistance performance.

⑤ Without electric-magnetic interference between optical unit and power cable, has long term compatibility under operating temperature.

Used for construction of electricity and fiber to the home (FTTH) for intelligent community and intelligent building, realize synchronous transmission of power and communication.