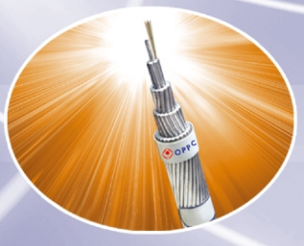
ZTT 中天科技
Your Partner In Cable

AERIAL OPTICAL CABLES ALONG ELECTRICAL POWER LINES

OPGW/OPPC/ADSS/MASS






ZHONGTIAN TECHNOLOGY CO,. LTD.
ZHONGTIAN HITACHI FIBER OPTIC CABLE CO,. LTD.

CATALOGUE

PROFILE OF COMPANY

Zhongtian Hitachi Optic Fiber Cable Co., Ltd. was established in May, 2000 which is a joint venture invested by Jiangsu Zhongtian Technology Co., Ltd.(SSE Code :600522, ZTT hereafter) and Hitachi Cable, Ltd.

ZTT is a modern enterprise group company with 16 subsidiary companies and 500 million capital asserts, specializing in optical fiber communication and electrical power construction products. At present, ZTT has established a special domestic & oversea market pattern by Special Optical Fiber Cable, Common Optical Fiber Cable, Special Conductor, FTTH, Submarine Optical and Power Composite Cable, Fiber Optical Cable Making Equipment and DTS. In recent years, ZTT is titled as "National Key Innovative High-tech Enterprise", "Chinese Name-Brand Products", "Chinese Well-Known Trademark", "National Quality Surveillance Inspection Exemption Enterprise" etc.

Zhongtian Hitachi Optic Fiber Cable Co., Ltd. is a holding subsidiary and key company of ZTT. It specializes in research, development, production of special optical fiber cables for electrical power lines, e.g. OPGW, OPPC, fine steel tube optical fiber cables for sensor and detector in electrical cable and oil well areas. It imports series of production lines and test instruments from Switzerland, America, France, Japan, Britain and Italy. Depending on the advantage between Hitachi and ZTT, Zhongtian Hitachi has made continual technical improvement and roundly innovated OPGW new structure and technology. Compressed layer type lightning resistance OPGW and its new production method win national Invention patent, and the high strength steel tube coating fiber and Al covered steel tube type corrosion resistance OPGW gain utility model patent.

The OPGW, OPPC and other power special optic cables and fine steel tube optical fiber cables for sensor and detector provided by Zhongtian Hitachi Optical Fiber Cable Co.,Ltd, are comprehensively used in optical fiber communication industry of national power grid, telecommunication , mobile, railway, petroleum and chemical. Furthermore, the cables had been sold to Russia, Tajikistan, Spain, Poland, Australia, South Africa, Angora, Nigeria, Jordan, Thailand, Vietnam, Venezuela, Guatemala etc.. The research and application of OPGW, OPPC and other power special optic cables are in an leading position in the world. It has made such many new technical records as large cross-section, big cores, large capacity, long span, firn resistance, ice resistance, sand, lightning resistance and ultra high voltage. Zhongtian Hitachi OPGW kept No.1 rate of market share in China (extra 35%), it formed the market image "No.1 Special Optical Fiber Cable of China and "Special Optical Fiber Cable, Zhongtian". In October 2003, The Chinese and Japanese shareholders celebrated "Zhongtian 10000km OPGW Record "in Zhongnanhai Diaoyutai State Hotel. In 2006 and 2007, ZTT OPGW and fitting & accessories are sole installed and operated at the first 1000kV UHV AC experimental base and ±800kV UHV DC experimental base of SGCC, and it wins the OPGW and fitting & accessories bidding order of the first Jindongnan-Nanyang-Jingmen 1000kV UHV AC Experimental Pilot Project of SGCC.ZTT has supplied over 70,000km ADSS and 68,000km OPGW all over the world so far.

Based on its leading technology, advanced management and perfect pre-sales, during sales, and post-sales services, Zhongtian Hitachi will consistently serve the telecommunication and power grid industry relying on our sales & service network in China and all over the world.

HEADLINE NEWS

May. 2000	Zhongtian Hitachi Fiber Optical Cable Co., Ltd. Establishing
Dec. 2000	Optical Fiber Composite Ground Wire(OPGW) Passing The State-level Product Appraisal Which Is The First in China.
May. 2001	OPGW Passing Domestic & Overseas Authoritative Organization Test.
Nov. 2001	Zhongtian Hitachi Successively Sponsored “The Seminar on New Genery OPGW ”Which Was Presided by State Grid Telecom Center.
May. 2002	OPGW Entering The List of National Torch Project And Obtaining National New Product Certificate.
Oct. 2003	Zhongtian Hitachi Passing The Qualification of ISO9001:2000 Quality Control System And ISO14001:2000 Environment Control System.
Oct. 2003	Zhongtian Hitachi Celebrated “10000 km OPGW Record” in Zhongnanhai Diaoyutai State Hotel.
Dec. 2003	Obtained “Network Access License for Special Telecommunication Equipment in Electric Power System” Issued by State Grid Telecom Center.
Jan. 2004	Obtained “Certificate for Product Exemption From Quality Surveillance Inspection” Issued by AQSIQ of CHINA
Jun. 2004	Zhongtian Hitachi Successively Supported “The Meeting of DL/T 832-2003 Standards ”Which Was Presided by State Grid Telecom Center.
May. 2005	Zhongtian Hitachi Successively Supported the “2005 Seminar on the Special Optical Fiber Cable in Power Line”.
Oct. 2006	Zhongtian Hitachi Sole Sponsored “The 6th Seminar on Telecommunications for Electric Power System”(Held in Kunming)
Nov. 2006	OPGW and Fitting & Accessories manufactured by Zhongtian Hitachi were used in the first 1000kV UHV AC experimental base of SGCC.
Jun. 2007	Zhongtian Hitachi Won the OPGW and Fitting & Accessories Bidding Order of Jindongnan-Nanyang-Jingmen 1000kV UHV AC Experimental Pilot Project of SGCC.
Aug. 2007	OPGW and Fitting & Accessories Manufactured by Zhongtian Hitachi were Used in The First ±800kV UHV DC Experimental Base of SGCC.

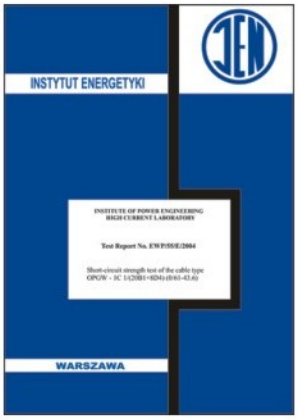
Zhongtian Hitachi Fiber Optic Cable Co.,Ltd.is Established in May 2000

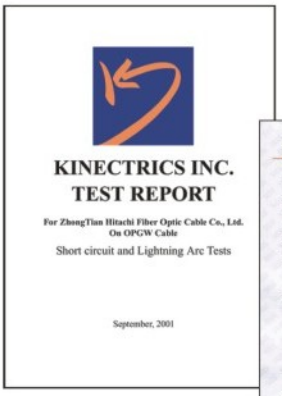
New Generation OPGW Application Seminar

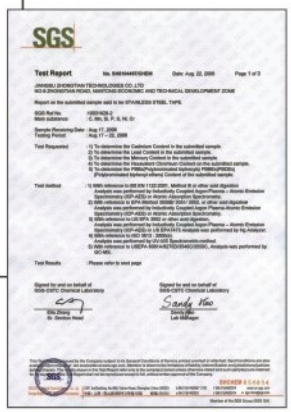
Zhongtian Hitachi Celebrated “10000 km OPGW Record” in Zhongnanhai Diaoyutai State Hotel.

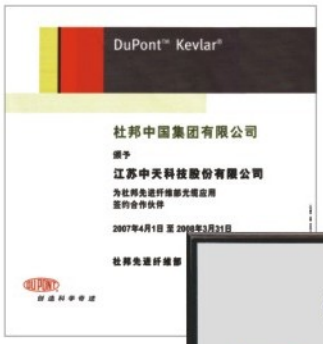
Symposium on Promoting The Sound Development of OPGW Industry

HONOR CERTIFICATES









ADVANCED FACILITIES AND TECHNICAL FLOW

Advanced facilities are the precondition of assuring production quality. The company had three times of extending its annual production capability. Many advanced manufacturing equipments and measurement instrument have been introduced to the company from Switzerland, USA, France, Japan, UK, Italy, etc, and has made continual technical improvement, so as to ensure the leading technology and first-class quality of the products.

Fiber Coloring → Fiber Paying-Off → Manufacturing OP-Unit → Cable Armouring → Cable Packaging & Delivery

Main Production Equipment	Equipment Type	Manufacturer	Quantity
Laser Welding Line for Stainless Steel Tube Fiber Unit	LCF809	SWISSCAB	1
	WT304	Watson, America	1
	APS	APSWISSTECH	3
Planetary Strander	630/8+16	Pourtier, France	2
	800/6+12+24	Hefei Smarter, China	1
	630/8+16 630/6+12+18	Hefei Smarter, China	9
Tubular Strander	500&630	Hefei Smarter, China	2
Optical Fiber Coloring Machine	OFC52 LINX2000	NORKIA, Finland SWISSCAB	5
Continuous Clad & Extruder	CONFORM® 2000	Holton and BWE, England	4

Aramid Yarn Stranding Machine of ADSS Cable

Continuous Clad & Extruder

EXCELLENT TEST FACILITIES

Zhongtian Technology test center is established in 1999 and have more than 100 sets excellent inspection instruments. It includes Optical Fiber Test Lab, Raw Material Lab, Cable Optical and Mechanical Characteristic Lab, Salty Fog Lab, Environment Lab.

OTDR

Electro- tension Meter

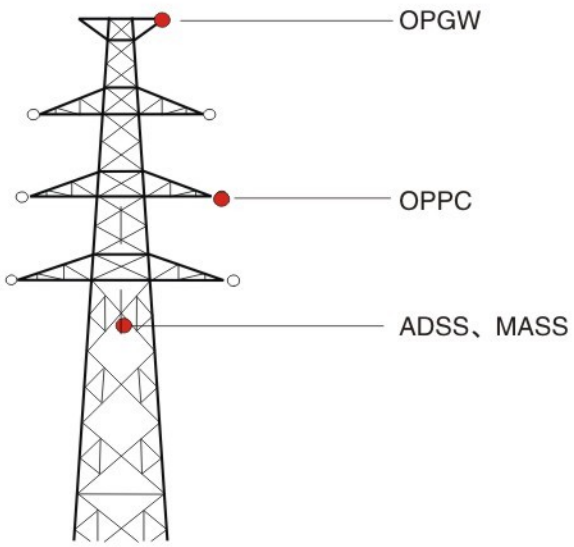
CD400 Optical Fiber Dispersion & Strain Instrument

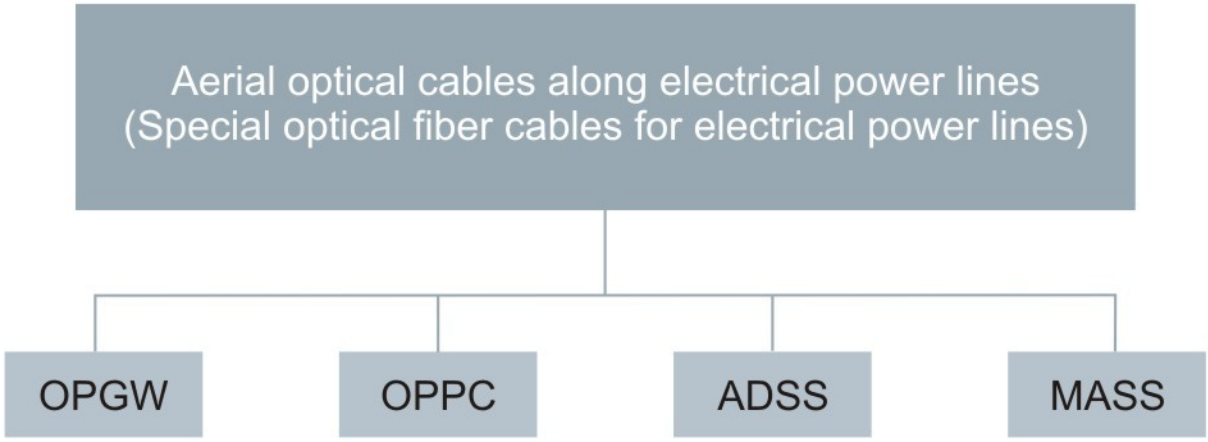
MainTest Instrument	Measurable Items	Quantity	Manufacturer
OTDR	Attenuation,Length, Attenuation Unevenness, Splice Attenuation	20	PK Technology、EXFO、Tektronix、Agilent
Fiber Splice Machine	Fiber Ribbon Splice Fiber Splice	20	Japan Fujikura, Sumitomo
OpticalFiber Dispersion & Strain Inspection Instrument	Fiber Dispersion,Cable's Tension Strain and Mechanical Performance Motoring	2	UK EG & G、Perkin Elme
Temperature Cycling Test Box	Temperature Cycling Test and Seepage of Compound Test	2	Chongqing Test Equipment Factory
Computer-control Fiber Cable Horizontal Tension Machine	Cable Breaking Strength Test, Tension Test,Stress-strain Test,Etc	1	Shanghai Hualong Test Instrument Factory
Sheave Test Machine	Stimulate the Influence to ADSS、OPGW Cable During Installation	1	Shanghai Electric Cable Research Institute
Salty Fog Lab	ADSS Outer Sheath Anti-tracking Test	1	Shanghai Electric Cable Research Institute

TYPE OF SPECIAL OPTICAL FIBER CABLES FOR ELECTRICAL POWER LINES

Special optical fiber cables for electrical power lines is the optical fiber cables which are installed at the towers or poles of the aerial power transmission lines. IEC 60794-4:2003, Optical fibre cables Part 4:sectional Specification-Aerial optical cables along electrical power lines, consists of the following parts.

ZTT can supply following parts according to IEEE Std 1138-2002:IEEE standard Construction of Composite fiber optic overhead Ground wire (OPGW) for use on electric utility power lines and IEEE Std 1222-2004:IEEE standard for all-dielectric self-supporting fiber optic cable.





- OPGW cables have the dual performance functions of ground wires with communication capabilities.
- OPPC cables have the dual performance functions of phase conductors with communication capabilities.
- ADSS cables are a kind of non-metallic self-supporting optical fiber cables directly between two power towers.
- MASS cables are a kind of metallic self-supporting optical fiber cables directly between two power towers.

DESIGN STANDARDS AND SPECIFICATION

COMPANY	
ISO 9001	Quality Management Systems
ISO 14001	Environmental Management Systems
RAW MATERIAL	
ITU-T G.650	Definition and Test Methods for The Relevant Parameters of Single-mode Fibers
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 Cable
IEC 60793-1	Optical Fiber Part 1: Generic Specifications
IEC 60793-2	Optical Fiber Part 2: Product Specifications
IEC 61232	Aluminum Clad Steel Wire for Electrical Purposes
IEC 60104	Aluminum Magnesium-silicon Alloy Wire for Over-head Line Conductors
ASTM 415	Standard Specification for Hard-Drawn Aluminum-Clad Steel Wire
PRODUCT	
IEEE Std 1138	IEEE Standard Construction of Composite Fiber Optic Overhead Ground Wires (OPGW) for Use on Electric Utility Power Lines
IEC Std 1222	IEEE Standard for All-Dielectric Self-Supporting Fiber Optic Cable
IEC 60794-4	Optical Fiber Cables Part 4: Sectional Specification Aerial Optical Cables along Electrical Power Lines
IEC 61395	Overhead Electrical Conductors Creep Test Procedures for Stranded Conductors
EIA/TIA 598	Color Code of Fiber Optic Cables

Design Performances	OPGW	OPPC	MASS	ADSS
Fiber Count and Type	●	●	●	●
Structure of Cable	●	●	●	●
Overall Diameter (mm)	●	●	●	●
Calculated Sectional Area(mm^2)	●	●	●	●
Calculated Mass(kg/km)	●	●	●	●
RTS-rated Tensile Strength(kN)	●	●	●	●
Elastic Modulus(N/mm^2)	●	●	●	●
Linear Expansion Coefficient(1/℃)	●	●	●	●
DC Resistance(Ω/km)	●	●	—	—
Short Current Capacity(kA^2s)	●	—	—	—
Current Carrying Capacity(A)	—	●	—	—
MAT-Max Allowable Tensile Strength(kN)	●	●	●	●
Storage and Operating Temperature (℃)	●	●	●	●
Strain Margin(%)	●	●	●	●
Outer Layer Stranding Direction	●	●	●	—

PERFORMANCE OF MAIN RAW MATERIALS

Fiber Types and Properties

Items	Fiber Type	ITU-T G.652Fiber(B1)	ITU-T G.655Fiber(B4)
Mode Field Diameter	1310nm	9.2±0.4μm	/
	1550nm	10.4±0.8μm	8～11μm±0.7μm
Cladding Diameter		125±1.0μm	125±1.0μm
Cladding Non-circularity		≤1%	≤1%
Proof Test Strength		0.69GPa	0.69GPa
Cut-off Wavelength		≤1260nm	≤1480nm
Attenuation	1310nm	≤0.36dB/km	/
	1550nm	≤0.22dB/km	≤0.22dB/km
Zero-dispersion Wavelength		1300～1324nm	/
Zero-dispersion Slope		≤0.092ps/nm2.km	/
Dispersion	1285～1330nm	≤3.5ps/nm.km	/
	1550nm(1530～1565nm)	≤18ps/nm.km	1～6ps/nm.km
	1550nm(1565～1625nm)	/	4.5～11.2ps/nm.km

Mechanical and Electric Performance of Aluminum Clad Steel Wire(IEC 61232-1993)

Class	Type	Nominal Diameter mm >	Nominal Diameter mm ≤	Min. Tensile Stength MPa	Min. Stress of 1% Elongation MPa	Max. Resistivity at 20℃ nΩ.m
14SA		1.24	3.00	1590	1410	123.15
		3.00	3.50	1520	1350	123.15
		3.50	4.10	1450	1280	123.15
		4.10	4.80	1400	1240	123.15
20SA	A	1.24	3.25	1340	1200	84.80
		3.25	3.45	1310	1180	84.80
		3.45	3.65	1270	1140	84.80
		3.65	3.95	1250	1100	84.80
		3.95	4.10	1210	1100	84.80
		4.10	4.40	1180	1070	84.80
		4.40	4.60	1140	1030	84.80
		4.60	4.75	1100	1000	84.80
		4.75	5.50	1070	1000	84.80
	B	1.24	5.50	1320	1100	84.80
LB23		2.50	5.00	1220	980	74.96
LB27		2.50	5.00	1080	800	63.86
LB30		2.50	5.00	880	650	57.47
LB35		2.50	5.00	810	590	49.26
LB40		2.50	5.00	680	500	43.10

Mechanical and Electrical Performance of High Strength A1-alloy Wire(IEC 60104-1987)

Item		Unit	LHA1	LHA2
Tensile Strength≥	3.50mm≤3.50mm	Mpa	325	295
	3.50mm>3.50mm		315	295
Elongation Rate(250mm)≥		%	3.0	3.5
Resistivity(20℃)≤		nΩ.m	32.840	32.530
Density		kg/dm	2.703	2.703
Linear Expansion Coefficient		1/℃	23×10^{-6}	23×10^{-6}
Resistance Tmperature Coefficient		1/℃	0.0036	0.0036

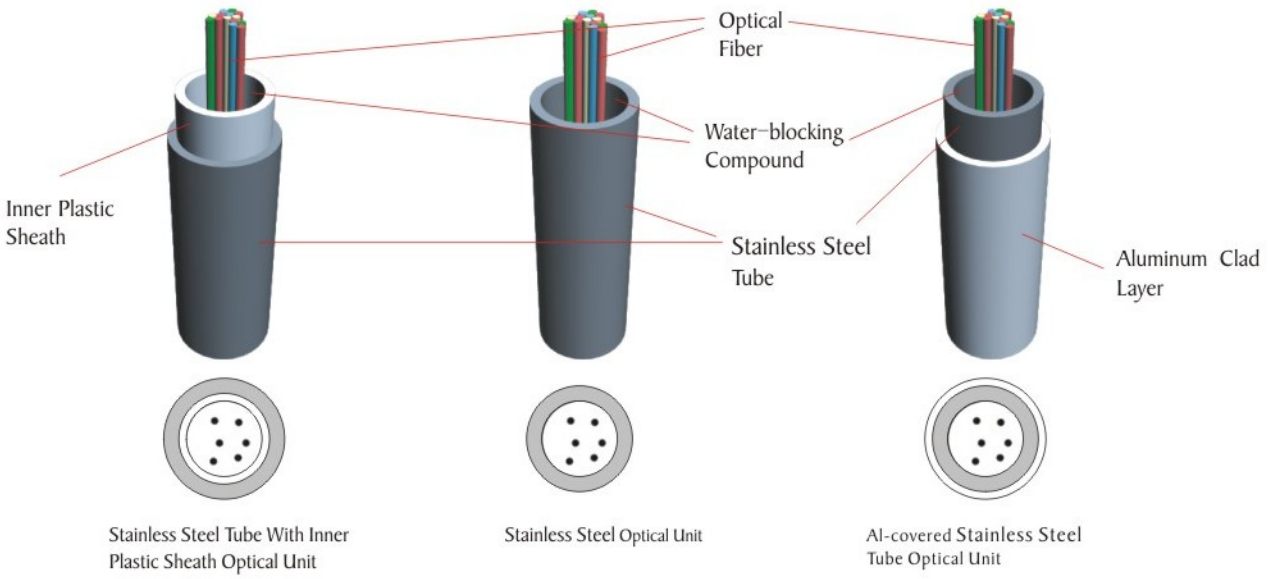
STRUCTURE DESIGN OF OPTICAL UNIT

ZTT can design and manufacture three types optical unit: Stainless steel tube optical unit, stainless steel tube with inner plastic sheath optical unit and Al-covered stainless steel tube optical unit.

The stainless steel tube optical unit is manufactured by laser welding-drawing at gas protecting technique, the line possesses of drawing process and on-line eddy-current detection which play an importance of defects screen to get rid of dummy wedding, leak welding etc.

The stainless steel tube with inner plastic sheath optical unit is manufactured by ideally combining the well-rounded optical fiber second coating craftwork with the advanced laser welding steel tube technique. It could effectively protect fibers from burr and sawtooth etc. and precisely control the fibers excess length, and increase the horizontal fluid penetration characteristic of stainless steel tube.

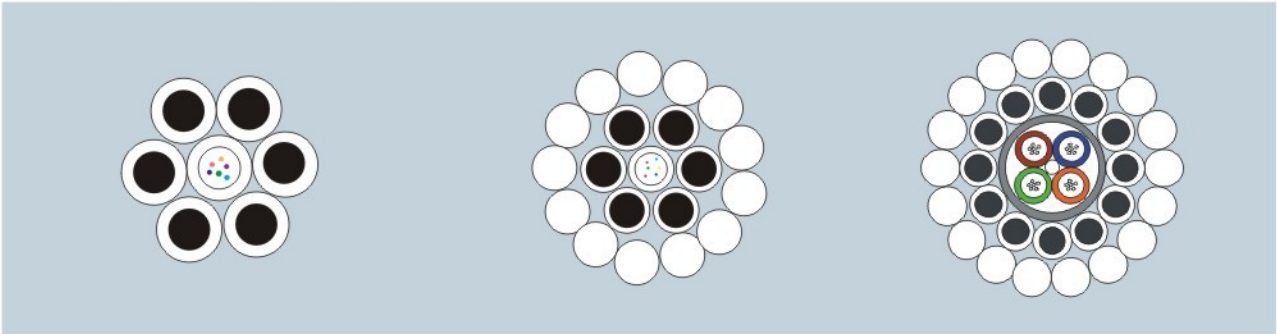
The Al–covered stainless steel tube optical unit is manufactured by ideally combining the advanced laser welding steel tube technique with continual extrusion & cladding Al tube technology. It could effectively increase the electric characteristics such as short-circuit current and lightning, and evidently increase corrosion and crush resistance.



Diameter of Steel Tube	Central Type (Max. Cores)	Stranded Type (Max. Cores)
Φ2.4	--	24
Φ2.5	--	24
Φ2.7	18	28
Φ3.0	24	36
Φ3.2	30	48
Φ3.3	30	48
Φ3.4	36	48
Φ3.5	40	48
Φ3.6	48	48
Φ3.7	50	--
Φ3.8	54	--
Φ4.0	60	--

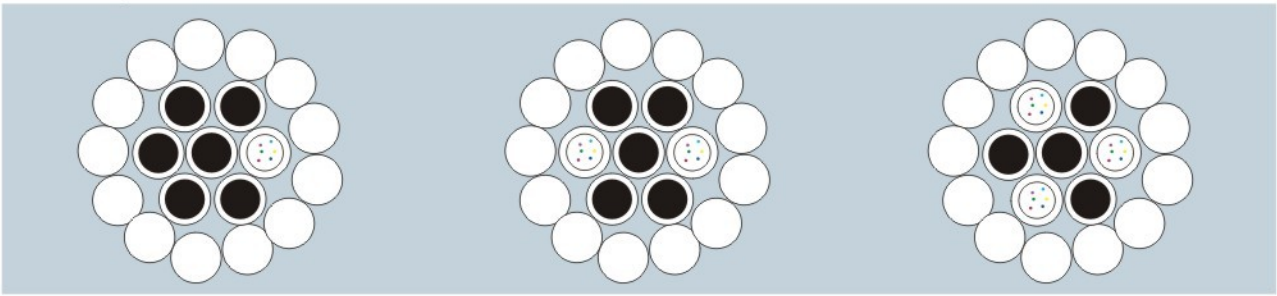
STRUCTURE TYPE & DRAWING OF OPGW / OPPC / MASS

Central Optical Unit Type (Optical Unit in the Center of Cable)

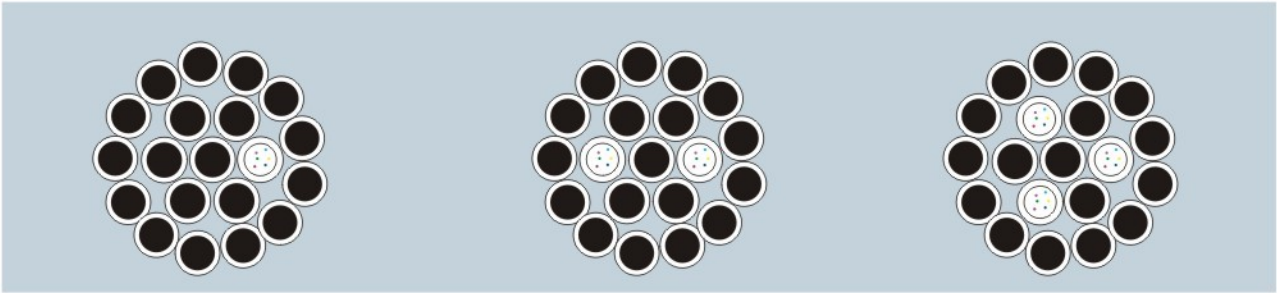


Stranded Optical Unit Type (Optical Unit in the Eccentric Inner Layer of Cable)

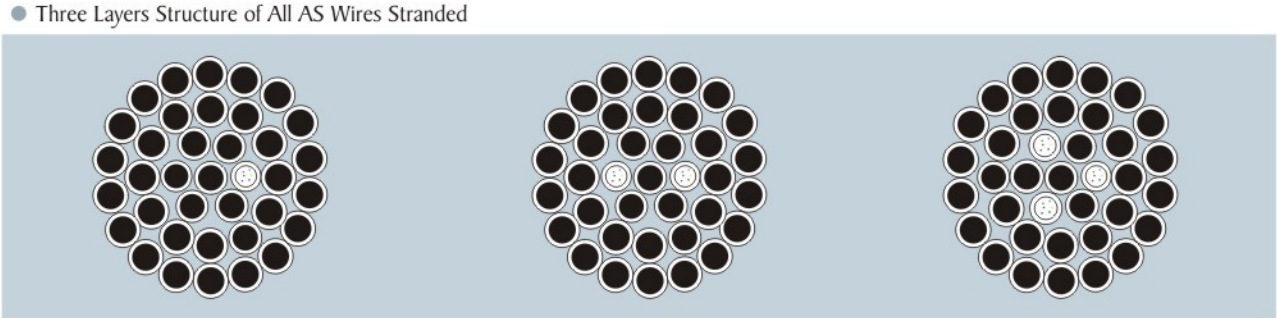
- Double Layers Structure of AS Wires and AA Wires Mixed Stranded



- Double Layers Structure of All AS Wires Stranded

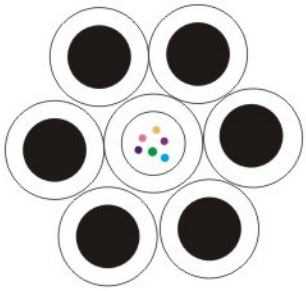


- Three Layers Structure of All AS Wires Stranded



TYPICAL LIST OF CENTRAL STEEL TUBE OPGW WITH SINGLE STRANDED LAYER

Structure Drawing



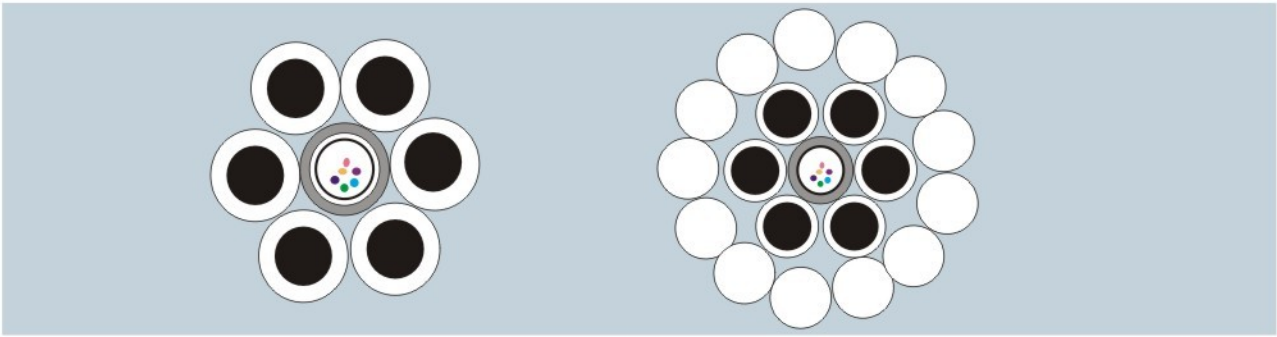
Structure Characteristic and Application

- Small cable diameter and light weight
- Obtaining appropriate primary fiber excess length within stainless steel tube
- The OPGW has good tensile, impact and crush resistance performance
- Matching with the diffluent ground wire

Cable Type	Structure (no. ×D/ Conductivity)		Sectional Area (mm^2)			Diameter	Weight	RTS	R(20℃)	I^2T(40-200℃)	E-Modulus	Ther-expansion Coefficient	Ratio of RTS/W
	Central Unit (Max. Cores)	Outer Layer	AA	AS	total	mm	kg/km	kN	Ω/km	kA^2S	Gpa	$\times10^{-6}$/℃	km
OPGW-1C 1/24B1(0/42-8.4)	1×3.0/24B1	6×3.0/20AS	0.00	42.41	42	9.00	313	54.0	2.03	8.4	162	13	17.6
OPGW-1C 1/24B1(0/42-10.6)		6×3.0/27AS	0.00	42.41	42	9.00	284	43.5	1.53	10.6	140	13.4	15.6
OPGW-1C 1/24B1(0/42-11.5)		6×3.0/30AS	0.00	42.41	42	9.00	271	35.5	1.37	11.5	132	13.8	13.3
OPGW-1C 1/30B1(0/48-10.9)	1×3.2/30B1	6×3.2/20AS	0.00	48.25	48	9.60	352	61.4	1.78	10.9	162	13	17.8
OPGW-1C 1/30B1(0/48-13.7)		6×3.2/27AS	0.00	48.25	48	9.60	319	49.5	1.34	13.7	140	13.4	15.8
OPGW-1C 1/30B1(0/48-14.9)		6×3.2/30AS	0.00	48.25	48	9.60	304	40.3	1.21	14.9	132	13.8	13.5
OPGW-1C 1/30B1(0/51-12.3)	1×3.3/30B1	6×3.3/20AS	0.00	51.32	51	9.90	373	63.9	1.68	12.3	162	13	17.5
OPGW-1C 1/30B1(0/51-15.5)		6×3.3/27AS	0.00	51.32	51	9.90	338	52.7	1.26	15.5	140	13.4	15.9
OPGW-1C 1/30B1(0/51-16.8)		6×3.3/30AS	0.00	51.32	51	9.90	322	42.9	1.14	16.8	132	13.8	13.6
OPGW-1C 1/30B1(0/51-20.8)		6×3.3/40AS	0.00	51.32	51	9.90	271	33.2	0.85	20.8	109	15.5	12.5
OPGW-1C 1/36B1(0/54-13.9)	1×3.4/36B1	6×3.4/20AS	0.00	54.48	54	10.20	394	67.8	1.58	13.9	162	13	17.6
OPGW-1C 1/36B1(0/54-17.5)		6×3.4/27AS	0.00	54.48	54	10.20	356	55.9	1.19	17.5	140	13.4	16.0
OPGW-1C 1/36B1(0/54-19.0)		6×3.4/30AS	0.00	54.48	54	10.20	340	45.5	1.07	19.0	132	13.8	13.7
OPGW-1C 1/36B1(0/54-23.4)		6×3.4/40AS	0.00	54.48	54	10.20	286	35.2	0.80	23.4	109	15.5	12.5
OPGW-1C 1/40B1(0/58-15.6)	1×3.5/40B1	6×3.5/20AS	0.00	57.73	58	10.50	416	69.6	1.49	15.6	162	13	17.1
OPGW-1C 1/40B1(0/58-19.6)		6×3.5/27AS	0.00	57.73	58	10.50	376	59.2	1.12	19.6	140	13.4	16.1
OPGW-1C 1/40B1(0/58-21.3)		6×3.5/30AS	0.00	57.73	58	10.50	358	48.3	1.01	21.3	132	13.8	13.7
OPGW-1C 1/40B1(0/58-26.3)		6×3.5/40AS	0.00	57.73	58	10.50	302	37.3	0.76	26.3	109	15.5	12.6
OPGW-1C 1/48B1(0/61-17.5)	1×3.6/48B1	6×3.6/20AS	0.00	61.07	61	10.80	438	73.7	1.41	17.5	162	13	17.2
OPGW-1C 1/48B1(0/61-22.0)		6×3.6/27AS	0.00	61.07	61	10.80	396	62.7	1.06	22.0	140	13.4	16.1
OPGW-1C 1/48B1(0/61-23.8)		6×3.6/30AS	0.00	61.07	61	10.80	377	51.1	0.95	23.8	132	13.8	13.8
OPGW-1C 1/48B1(0/61-29.5)		6×3.6/40AS	0.00	61.07	61	10.80	317	39.5	0.72	29.5	109	15.5	12.7
OPGW-1C 1/50B1(0/65-19.5)	1×3.7/50B1	6×3.7/20AS	0.00	64.51	65	11.10	461	76.6	1.33	19.5	162	13	17.0
OPGW-1C 1/50B1(0/65-24.5)		6×3.7/27AS	0.00	64.51	65	11.10	417	66.2	1.00	24.5	140	13.4	16.2
OPGW-1C 1/50B1(0/65-26.6)		6×3.7/30AS	0.00	64.51	65	11.10	397	53.9	0.90	26.6	132	13.8	13.9
OPGW-1C 1/50B1(0/65-32.9)		6×3.7/40AS	0.00	64.51	65	11.10	334	41.7	0.68	32.9	109	15.5	12.8
OPGW-1C 1/54B1(0/68-21.7)	1×3.8/54B1	6×3.8/20AS	0.00	68.05	68	11.40	485	80.8	1.26	21.7	162	13	17.0
OPGW-1C 1/54B1(0/68-27.3)		6×3.8/27AS	0.00	68.05	68	11.40	438	69.8	0.95	27.3	140	13.4	16.3
OPGW-1C 1/54B1(0/68-29.6)		6×3.8/30AS	0.00	68.05	68	11.40	417	56.9	0.86	29.6	132	13.8	13.9
OPGW-1C 1/54B1(0/68-36.6)		6×3.8/40AS	0.00	68.05	68	11.40	350	44.0	0.64	36.6	109	15.5	12.8
OPGW-1C 1/60B1(0/75-26.6)	1×4.0/60B1	6×4.0/20AS	0.00	75.40	75	12.00	534	86.7	1.14	26.6	162	13	16.6
OPGW-1C 1/60B1(0/75-33.5)		6×4.0/27AS	0.00	75.40	75	12.00	482	77.4	0.86	33.5	140	13.4	16.4
OPGW-1C 1/60B1(0/75-36.3)		6×4.0/30AS	0.00	75.40	75	12.00	459	63.0	0.77	36.3	132	13.8	14.0
OPGW-1C 1/60B1(0/75-44.9)		6×4.0/40AS	0.00	75.40	75	12.00	385	48.7	0.58	44.9	109	15.5	12.9

TYPICAL LIST OF CENTRAL AL-COVERED STEEL TUBE OPGW

Structure Drawing



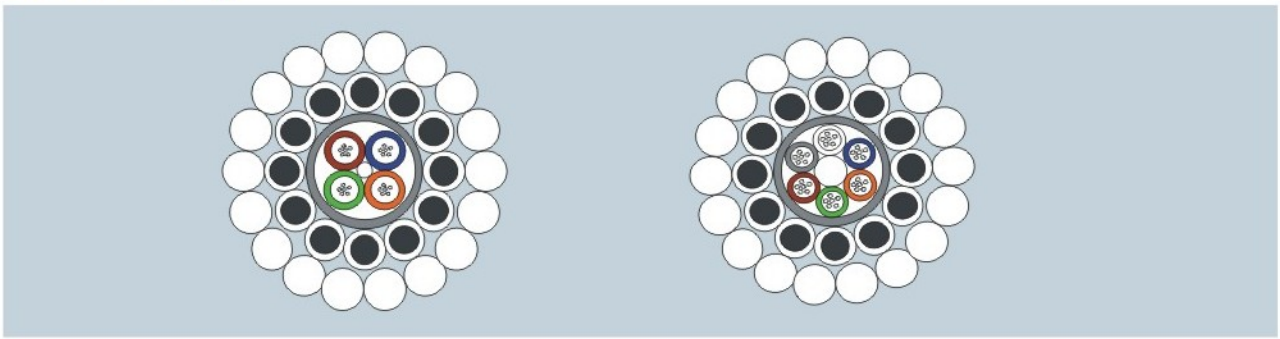
Structure Characteristic and Application

- AL-covered steel tube design increasing Al sectional area, the better fault current and lightning resistance performance
- Extremely good corrosion resistance
- Used in the transmission line which specifies the small cable diameter and bigger fault current.
- Extremely corrosion condition, such as littoral, chemical areas

Cable Type	Structure (no. ×D/Conductivity)		Sectional Area(mm^2)			Diameter	Weight	RTS	R(20℃)	I^2T(40-200℃)	E-Modulus	Ther-expansion Coefficient	Ratio of RTS/W
	Central Al-SUS Unit (Max. Cores)	Outer Layer	AA	AS	Total	mm	kg/km	kN	Ω/km	kA^2S	Gpa	$\times10^{-6}$/℃	km
OPGW-L-30B1-69[70.2;28.0]	1×3.2/5.0（30B1）	8×3.0/20AS	11.59	56.55	68	11.00	439	70.2	0.935	28.0	144	13.7	16.3
OPGW-L-30B1-73[75.1;33.0]	1×3.2/5.2（30B1）	8×3.1/20AS	13.19	60.38	74	11.40	469	75.1	0.854	33.0	143	13.7	16.3
OPGW-L-30B1-81[83.1;37.5]	1×3.2/4.8（30B1）	7×3.6/20AS	10.05	71.25	81	12.00	533	83.1	0.843	37.5	149	13.5	15.9
OPGW-L-30B1-97[96.3;54.1]	1×3.2/5.2（30B1）	7×3.9/20AS	13.19	83.62	97	13.00	624	96.3	0.694	54.1	148	13.5	15.7
OPGW-L-48B1-71[74.7;30.2]	1×3.6/5.2（48B1）	8×3.1/20AS	11.06	60.38	71	11.40	463	74.7	0.913	30.2	146	13.6	16.4
OPGW-L-48B1-85[85.6;43.5]	1×3.6/5.6（48B1）	8×3.35/20AS	14.45	70.51	85	12.30	540	85.6	0.750	43.5	144	13.7	16.2
OPGW-L-48B1-95[96.0;50.4]	1×3.6/5.2（48B1）	7×3.9/20AS	11.06	83.62	95	13.00	619	96.0	0.732	50.4	150	13.4	15.8
OPGW-L-60B1-80[79.4;39.2]	1×4.0/6.0（60B1）	9×3.0/20AS	15.71	63.62	79	12.00	498	79.4	0.771	39.2	141	13.8	16.3
OPGW-L-60B1-83[85.2;39.8]	1×4.0/5.6（60B1）	8×3.35/20AS	12.06	70.51	83	12.30	534	85.2	0.801	39.8	147	13.6	16.3

TYPICAL LIST OF AL TUBE STRUCTURE OPGW

Structure Drawing



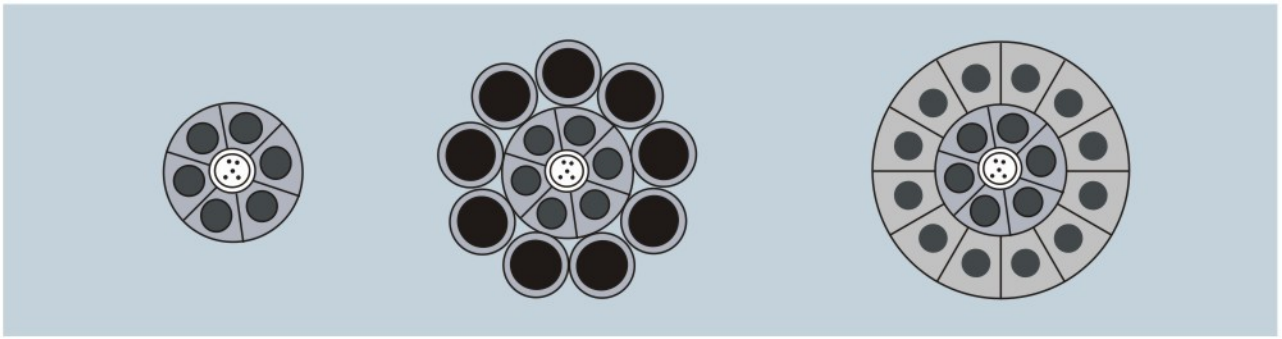
Structure Characteristic and Application

- Small outer diameter and light weight, no additional load for tower or pole.
- High Breaking load, applicable in coastal area and other terrible
- environment.Different coloring loose tube, easy to distinguish multi-core OPGW and splice optical fiber .
- Reasonable structure and secondary fiber excess length ensures there is no fiber strain under maximum allowable load.

Cable Type	Structure (no. ×D/Conductivity)		Sectional Area(mm²)			Diameter	Weight	RTS	R(20℃)	I²T(40-200℃)	E-Modulus	Ther-expansion Coefficient	Ratio of RTS/W
	Al Tube	Layer	AL	AS	Total	mm	kg/km	kN	Ω/km	kA²S	Gpa	×10⁻⁶/℃	km
OPGW-24B1/65[62;34.8]	1×7.2	13×2.16	29.72	35.7	65.5	11.4	389	62.2	0.847	40.2	133.1	14.3	16.3
OPGW-24B1/70[71;41.0]	1×7.2	12×2.40	31.38	40.7	72.1	12.0	429	70.7	0.79	47.6	135.5	14.2	16.8
OPGW-24B1/70[57;46.0]	1×7.2	12×2.40	37.9	34.2	72.1	12.0	392	57.3	0.68	53.6	119.3	14.7	14.9
OPGW-24B1/80[82;50.1]	1×7.2	11×2.70	33.56	47.2	80.8	12.4	492	81.8	0.736	58.0	138.0	14.0	17.0
OPGW-24B1/80[66;56.9]	1×7.2	11×2.70	41.12	39.7	80.8	12.4	448	66.2	0.626	66.0	121.2	14.5	15.1

TYPICAL LIST OF LIGHTNING RESISTANT CENTRAL STEEL TUBE OPGW WITH COMPRESSED WIRES

Structure Drawing



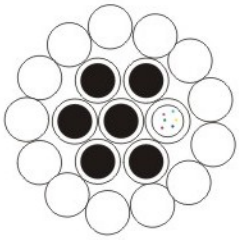
Structure Characteristic and Application

- Compressing round AS wires as sector AS wires during stranding
- Increasing cable cross sectional area and fault current capacity at the same cable diameter
- Extremely increasing lightning resistant performance for increasing the outer wires diameter at the same cable diameter
- Decreasing cable diameter at the same cable cross sectional area
- Used in the transmission line which specifies the small cable diameter and bigger fault current.
- Used in high lightning storm areas

Cable Type	Structure (no. ×D/conductivity)			Sectional Area(mm²)			Diameter	Weight	RTS	R(20℃)	I^2T(40-200℃)	Modulus	Ther-expansion Coefficient	Ratio of RTS/W
	Central Unit (Max. Corees)	Inner Layer	Outer Layer	AA	AS	Total	mm	kg/km	kN	Ω/km	kA²S	Gpa	$\times 10^{-6}$/℃	km
OPGW-YS-2C 1/30B1(D/138-147.9)	1×3.2/30B1	6×3.0SB/40AS	12×3.0/40AS	0.0	137.71	138	15.20	680	89.0	0.319	147.9	109	15.5	13.3
OPGW-YS-2C 1/30B1(D/159-196.3)		6×3.0SB/40AS	11×3.5/40AS	0.0	158.72	159	16.20	780	102.5	0.276	196.3	109	15.5	13.4
OPGW-YS-2C 1/36B1(D/115-97.1)	1×3.4/36B1	6×2.3SB/30AS	11×3.0/40AS	0.0	114.96	115	14.00	610	81.3	0.415	97.1	116.4	14.9	13.6
OPGW-YS-2C 1/36B1(D/128-121.0)		6×2.3SB/30AS	10×3.4/40AS	0.0	128.00	128	14.80	671	89.8	0.370	121.0	115.7	14.9	13.6
OPGW-YS-2C 1/36B1(D/150-168.1)		6×2.3SB/30AS	9×4.0/40AS	0.0	150.31	150	16.00	777	104.2	0.311	168.1	114.7	15.0	13.7
OPGW-YS-2C 1/48B1(D/132-135.2)	1×3.6/48B1	6×2.5SB/40AS	11×3.2/40AS	0.0	131.73	132	15.00	652	85.1	0.333	135.2	109	15.5	13.3
OPGW-YS-2C 1/48B1(D/151-177.0)		6×2.5SB/40AS	10×3.7/40AS	0.0	150.78	151	16.00	742	97.4	0.291	177.0	109	15.5	13.4
OPGW-YS-2C 1/48B1(D/133-138.1)		6×2.7SB/40AS	12×3.0/40AS	0.0	133.08	133	15.00	658	86.0	0.330	138.1	109	15.5	13.3
OPGW-YS-2C 1/48B1(D/145-164.3)		6×2.7SB/40AS	11×3.35/40AS	0.0	145.21	145	15.70	716	93.8	0.302	164.3	109	15.5	13.4

TYPICAL LIST OF STANDED STEEL TUBE STRUCTURE OPGW WITH DOUBLE STRANDED LAYERS

Structure Drawing



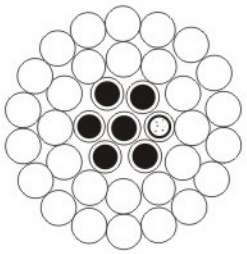
Structure Characteristic and Application

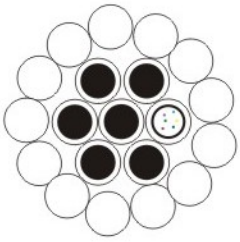
- Bigger cable diameter and higher fiber count
- The best balance of electric and mechanic performance for the bigger RTS and fault current capacity
- Quantity of steel tube OP-Unit could be 1,2 or 3(max. at present)
- Optimum stranding design, making primary and secondary fiber excess length
- The stranded layer could be single, double layers or three layers, the stranded wire could be AS wires with/or AA and Al wires.

Cable Type	Structure (no. ×D/Conductivity)				Sectional Area(mm²)			Diameter	Weight	RTS	R(20℃)	I²T(40-200℃)	Modulus	Therm. Coeff.	Ratio of RTS/W
	Central	Inner Layer	Steel Unit	Outer Layer	AA	AS	Total	mm	kg/km	kN	Ω/km	kA²S	Gpa	×10⁻⁶/℃	km
OPGW-2S 1/24B1(0/103-62.5)	1×2.5/27AS	5×2.4/27AS	1×2.4/24B1*	10×3.1/27AS	0.0	103.0	103	13.50	640	105.7	0.63	62.5	140	13.4	16.9
OPGW-2S 1/24B1(0/103-75.9)	1×2.5/20AS	5×2.4/20AS		10×3.1/40AS	0.0	103.0	103	13.50	561	83.8	0.49	75.9	123	14.6	15.3
OPGW-2S 1/24B1(75/28-87.4)	1×2.5/20AS	5×2.4/20AS		10×3.1/AA	75.5	27.5	103	13.50	412	57.3	0.39	87.4	91	18.2	14.2
OPGW-2S 1/24B1(0/89-46.4)	1×2.6/27AS	5×2.5/27AS	1×2.5/24B1	12×2.5/27AS	0.0	88.8	89	12.60	554	91.1	0.73	46.4	140	13.4	16.8
OPGW-2S 1/24B1(0/89-50.3)	1×2.6/30AS	5×2.5/30AS		12×2.5/30AS	0.0	88.8	89	12.60	526	74.2	0.66	50.3	132	13.8	14.4
OPGW-2S 1/24B1(59/30-62.9)	1×2.6/20AS	5×2.5/20AS		12×2.5/AA	58.9	29.9	89	12.60	381	55.4	0.47	62.9	98	17.4	14.8
OPGW-2S 1/24B1(0/98-60.9)	1×2.6/30AS	5×2.5/30AS	1×2.5/24B1	11×2.8/30AS	0.0	97.6	98	13.20	577	81.6	0.60	60.9	132	13.8	14.4
OPGW-2S 1/24B1(68/30-77.1)	1×2.6/20AS	5×2.5/20AS		11×2.8/AA	67.7	29.9	98	13.20	406	58.0	0.42	77.1	95	17.8	14.6
OPGW-2S 1/24B1(0/110-71.7)	1×2.6/27AS	5×2.5/27AS	1×2.5/24B1	10×3.2/27AS	0.0	110.3	110	14.00	683	113.1	0.59	71.7	140	13.4	16.9
OPGW-2S 1/24B1(0/110-77.7)	1×2.6/30AS	5×2.5/30AS		10×3.2/30AS	0.0	110.3	110	14.00	650	92.2	0.53	77.7	132	13.8	14.5
OPGW-2S 1/24B1(0/110-86.9)	1×2.6/20AS	5×2.5/20AS		10×3.2/40AS	0.0	110.3	110	14.00	600	90.0	0.46	86.9	123	14.6	15.3
OPGW-2S 1/24B1(80/30-100.0)	1×2.6/20AS	5×2.5/20AS		10×3.2/AA	80.4	29.9	110	14.00	441	61.7	0.36	100.0	91	18.2	14.3
OPGW-2S 1/28B1(0/112-80.6)	1×2.75/30AS	5×2.7/30AS	1×2.7/28B1	11×3.0/30AS	0.0	112.3	112	14.15	661	93.9	0.52	80.6	132	13.8	14.5
OPGW-2S 1/28B1(0/112-88.7)	1×2.75/20AS	5×2.7/20AS		11×3.0/40AS	0.0	112.3	112	14.15	618	94.2	0.46	88.7	125	14.5	15.5
OPGW-2S 1/28B1(78/35-102.1)	1×2.75/20AS	5×2.7/20AS		11×3.0/AA	77.8	34.6	112	14.15	465	66.9	0.36	102.1	95	17.7	14.7
OPGW-2S 1/28B1(0/103-68.4)	1×2.8/30AS	5×2.7/30AS	1×2.7/28B1	12×2.7/30AS	0.0	103.5	103	13.60	611	86.5	0.56	68.4	132	13.8	14.5
OPGW-2S 1/28B1(69/35-85.6)	1×2.8/20AS	5×2.7/20AS		12×2.7/AA	68.7	34.8	103	13.60	441	64.6	0.40	85.6	98	17.4	14.9
OPGW-2S 1/28B1(0/131-110.0)	1×2.85/30AS	5×2.7/30AS	1×2.7/28B1	10×3.5/30AS	0.0	131.2	131	15.25	769	109.7	0.45	110.0	132	13.8	14.6
OPGW-2S 1/28B1(0/131-123.2)	1×2.85/20AS	5×2.7/20AS		10×3.5/40AS	0.0	131.2	131	15.25	709	106.7	0.39	123.2	123	14.6	15.4
OPGW-2S 1/28B1(96/35-141.8)	1×2.85/20AS	5×2.7/20AS		10×3.5/AA	96.2	35.0	131	15.25	519	72.9	0.30	141.8	91	18.2	14.4
OPGW-2S 1/28B1(0/120-92.3)	1×2.85/30AS	5×2.8/30AS	1×2.7/28B1	11×3.1/30AS	0.0	120.2	120	14.65	706	100.5	0.49	92.3	132	13.8	14.5
OPGW-2S 1/28B1(0/120-114.1)	1×2.85/40AS	5×2.8/40AS		11×3.1/40AS	0.0	120.2	120	14.65	587	77.6	0.36	114.1	109	15.5	13.5
OPGW-2S 1/28B1(83/37-116.8)	1×2.85/20AS	5×2.8/20AS		11×3.1/AA	83.0	37.2	120	14.65	497	71.8	0.34	116.8	95	17.7	14.8
OPGW-2S 1/28B1(0/126-102.0)	1×3.0/30AS	5×2.8/30AS	1×2.7/28B1	11×3.2/30AS	0.0	126.3	126	15.00	741	105.6	0.46	102.0	132	13.8	14.5
OPGW-2S 1/28B1(0/126-126.0)	1×3.0/40AS	5×2.8/40AS		11×3.2/40AS	0.0	126.3	126	15.00	616	81.6	0.35	126.0	109	15.5	13.5
OPGW-2S 1/28B1(88/38-129.6)	1×3.0/20AS	5×2.8/20AS		11×3.2/AA	88.5	37.9	126	15.00	516	74.3	0.32	129.6	94	17.8	14.7
OPGW-2S 1/36B1(0/128-105.0)	1×3.2/30AS	5×3.0/30AS	1×3.0/36B1	12×3.0/30AS	0.0	128.2	128	15.20	752	107.2	0.46	105.0	132	13.8	14.6
OPGW-2S 1/36B1(0/128-129.8)	1×3.2/40AS	5×3.0/40AS		12×3.0/40AS	0.0	128.2	128	15.20	625	82.8	0.34	129.8	109	15.5	13.5
OPGW-2S 1/36B1(85/43-131.2)	1×3.2/20AS	5×3.0/20AS		12×3.0/AA	84.8	43.4	128	15.20	543	80.3	0.33	131.2	98	17.4	15.1
OPGW-2S 1/36B1(0/143-162.1)	1×3.2/40AS	5×3.0/40AS	1×3.0/36B1	11×3.4/40AS	0.0	143.3	143	16.00	696	92.5	0.31	162.1	109	15.5	13.6
OPGW-2S 1/36B1(100/43-166.4)	1×3.2/20AS	5×3.0/20AS		11×3.4/AA	99.9	43.4	143	16.00	585	84.7	0.28	166.4	94	17.8	14.8
OPGW-2S 1/36B1(0/136-118.8)	1×3.2/30AS	5×3.1/30AS	1×3.0/36B1	12×3.1/30AS	0.0	136.4	136	15.60	798	114.0	0.43	118.8	132	13.8	14.6
OPGW-2S 1/36B1(0/136-146.8)	1×3.2/40AS	5×3.1/40AS		12×3.1/40AS	0.0	136.4	136	15.60	664	88.1	0.32	146.8	109	15.5	13.5
OPGW-2S 1/48B1(0/145-134.9)	1×3.3/30AS	5×3.2/30AS	1×3.2/48B1*	12×3.2/30AS	0.0	145.3	145	16.10	849	121.4	0.40	134.9	132	13.8	14.6
OPGW-2S 1/48B1(0/145-166.6)	1×3.3/40AS	5×3.2/40AS		12×3.2/40AS	0.0	145.3	145	16.10	706	93.8	0.30	166.6	109	15.5	13.6
OPGW-2S 1/48B1(0/155-189.8)	1×3.5/40AS	5×3.3/40AS	1×3.2/48B1*	12×3.3/40AS	0.0	155.0	155	16.70	752	100.1	0.28	189.8	109	15.5	13.6
OPGW-2S 1/48B1(103/52-191.8)	1×3.5/20AS	5×3.3/20AS		12×3.3/AA	102.6	52.4	155	16.70	652	95.1	0.27	191.8	98	17.4	14.9
OPGW-2S 1/48B1(0/165-173.0)	1×3.6/30AS	5×3.4/30AS	1×3.4/48B1	12×3.4/30AS	0.0	164.5	165	17.20	959	137.5	0.36	173.0	132	13.8	14.6
OPGW-2S 1/48B1(0/165-213.7)	1×3.6/40AS	5×3.4/40AS		12×3.4/40AS	0.0	164.5	165	17.20	796	106.3	0.27	213.7	109	15.5	13.6
OPGW-2S 1/48B1(0/174-194.2)	1×3.7/30AS	5×3.5/30AS	1×3.4/48B1	12×3.5/30AS	0.0	174.3	174	17.70	1015	145.7	0.34	194.2	132	13.8	14.7
OPGW-2S 1/48B1(0/174-239.9)	1×3.7/40AS	5×3.5/40AS		12×3.5/40AS	0.0	174.3	174	17.70	843	112.6	0.25	239.9	109	15.5	13.6
OPGW-2S 1/48B1(115/59-242.5)	1×3.7/20AS	5×3.5/20AS		12×3.5/AA	115.5	58.9	174	17.70	731	104.9	0.24	242.5	98	17.4	14.6

TYPICAL LIST OF STRANDED STEEL TUBE STRUCTURE OPPC

Structure Drawing



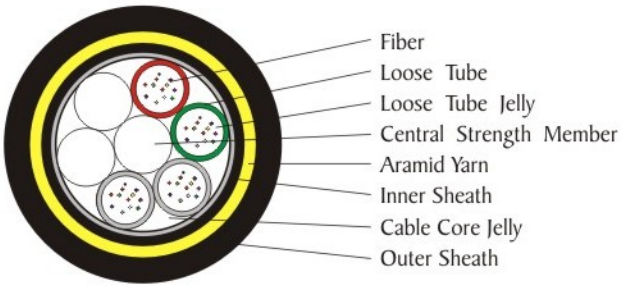


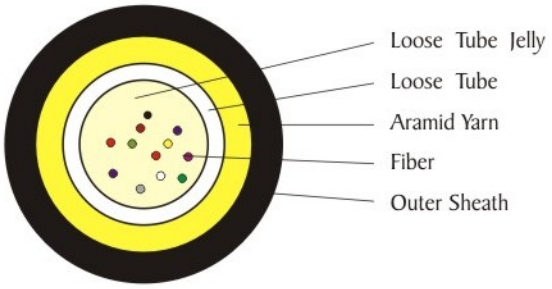
Structure Characteristic and Application

- Replacing one or several steel wires of conventional conductor with stainless steel tube OP-Units, stranding OP-Units and AS/steel wires and Al/AA wires
- Replacing one of three phase conductors with OPPC,the three-phase transmission line system consists of one OPPC and two conductors
- Performance matching: mechanical characteristic,electric characteristic matching with border upon two phase conductors.
- Durative constant temperature: temperature cycling and current test demonstrate that OPPC can meet with durative constant temperature.
- Middle & high voltage power lines without ground wire such as 10kV, 35kV,66kV.
- Don't be suit to install OPGW & ADSS in the power lines.
- Rebuilding telecommunications for middle & high voltage power lines in town and rural areas. Providing optical cable for building distribution station automatization.

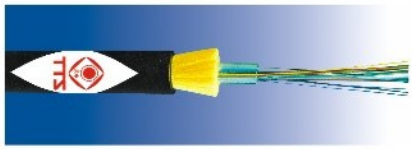
Cable Type	Matching Conductors	Structure					Sectional Area(mm²)			Diameter	Weight	RTS	R(20℃)	Current Carrying Capacity		
		Center	Layer 1	Steel unit	Layer 2	Layer 3	AL	AS	Total	mm	kg/km	kN	Ω/km	40–70℃	40–80℃	40–90℃
OPPC-12B1-85/20	LGJ-95 / 15	1×2.5/20AS	3×2.4/20AS +2×2.4/AL	1×2.4/12B1	10×3.1/AL	/	84.52	18.48	103.0	13.50	376	34.4	0.32	254	308	353
OPPC-12B1-90/50	LGJ-95 / 55	1×3.5/14AS	5×3.3/14AS	1×3.2/12B1	13×3.0/AL	/	91.89	52.39	144.3	16.10	651	82.0	0.28	281	344	395
OPPC-12B1-110/25	LGJ-120 / 20	1×2.4/20AS	5×2.3/20AS	1×2.2/12B1	8×4.2/AL	/	110.84	25.30	136.1	15.40	494	45.7	0.24	299	364	418
OPPC-12B1-120/25	LGJ-120 / 25	1×2.5/20AS	5×2.4/20AS	1×2.4/12B1	8×4.35/AL	/	118.89	27.53	146.4	16.00	531	49.5	0.22	312	381	438
OPPC-12B1-150/25	LGJ-150 / 25	1×2.4/20AS	5×2.3/20AS	1×2.2/12B1	11×2.6/AL	17×2.6/AL	148.66	25.30	174.0	17.40	598	52.8	0.18	351	430	495
OPPC-12B1-150/30	LGJ-150 / 35	1×2.6/14AS	5×2.5/14AS	1×2.5/12B1	12×2.5/AL	18×2.5/AL	147.26	29.85	177.1	17.60	641	64.5	0.19	348	427	492
OPPC-12B1-185/25	LGJ-185 / 25	1×2.4/20AS	5×2.3/20AS	1×2.2/12B1	10×3.0/AL	16×3.0/AL	183.78	25.30	209.1	19.00	695	58.5	0.15	395	486	561
OPPC-12B1-185/40	LGJ-185 / 45	1×2.85/14AS	5×2.8/14AS	1×2.7/12B1	12×2.8/AL	18×2.8/AL	184.73	37.17	221.9	19.65	797	79.6	0.15	398	491	567
OPPC-12B1-210/30	LGJ-210 / 35	1×2.6/14AS	5×2.5/14AS	1×2.5/12B1	10×3.2/AL	16×3.2/AL	209.10	29.85	239.0	20.40	812	74.3	0.13	424	524	605
OPPC-12B1-230/45	LGJ-240 / 30	1×3.2/20AS	5×3.1/20AS	1×3.0/12B1	12×3.1/AL	18×3.1/AL	226.43	45.78	272.2	21.80	949	87.7	0.12	455	563	652
OPPC-12B1-240/50	LGJ-240 / 55	1×3.3/14AS	5×3.2/14AS	1×3.2/12B1	12×3.2/AL	18×3.2/AL	241.27	48.77	290.0	22.50	1037	102.5	0.11	467	580	672

ADSS STRUCTURE & APPLICATION DESIGN DESCRIPTION





Stranded Layer Type



Central Tube Type

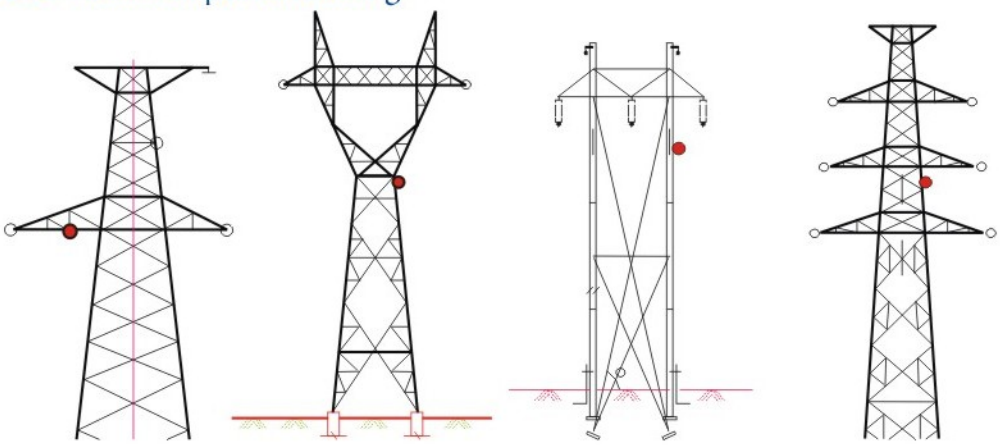
Structure Characteristic and Application

- Precise fiber excess length control ensuring the fibers free from stress when the cable is subject to the maximum design load
- Precise control of pay-off tension and the stranding lay of aramid yarn enhancing the tensile strength of the cable
- Employing the material with excellent tracking resistance, offering more safety in high inductive potential environment
- Special ADSS cables can be designed on customers' request

Installation mode

- Loose tube fiber
- Non-metallic central strength member
- Jelly filling in the tube and core
- PE inner sheath
- Well-distributed stranding aramid yarn and anti-track outer sheath
- Installed on the same poles/towers of the electric power transmission line
- Also can be lashed to the ground wire or wrapped around it

Typical pole & tower installation position drawing



TECHNICAL SPECIFICATION FOR ADSS

Items		Unit	F3	F6	F8	F10	F12	F16
Span		m	100	200	300	400	500	600
Outer Dia.		mm	11.6	12.0	12.3	12.5	12.8	13.8
Weight	PE Sheath	kg/km	124.2	131.1	136.3	141.4	146.5	165.9
	AT Sheath		132.6	139.9	145.3	150.7	156.0	176.3
Cross Area		mm^2	105.68	112.70	117.90	123.07	128.19	150.21
Area of Strength Member		mm^2	5.67	10.20	13.62	17.02	20.43	26.10
RTS		kN	8.50	15.30	20.40	25.50	30.60	39.10
MOTS		kN	3.40	6.12	8.16	10.20	12.24	15.64
EDS		kN	2.13	3.83	5.10	6.38	7.65	9.78
Ultimate Exceptional Stress		kN	5.10	9.18	12.24	15.30	18.36	23.46
Modulus		KN/mm^2	8.44	12.52	15.27	17.79	20.11	21.71
Thermal Expansion Coefficient		$10^{-6}/℃$	9.32	5.28	3.78	2.80	2.12	1.42
Crush Strength	Operation	N/10cm	1000	1000	1000	1000	1000	1000
	Installation	N/10cm	2200	2200	2200	2200	2200	2200
Safety Factor			2.5	2.5	2.5	2.5	2.5	2.5
Min Bending Radius	Operation	mm	174	180	185	188	192	207
	Installation	mm	290	300	308	313	320	345
Temperature	Installation	℃	-10～+60	-10～+60	-10～+60	-10～+60	-10～+60	-10～+60
	Transport	℃	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70
	Operation	℃	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70
Sag(5mm Lce Load, Average 20℃)	PE	%	0.72	0.84	1.06	1.28	1.47	1.57
	AT		0.76	0.90	1.12	1.35	1.54	1.63

Items		Unit	F18	F21	F24	F24	F27	F31
Span		m	700	800	900	1000	1100	1200
Outer Dia		mm	14.2	14.5	14.8	15.1	15.3	15.5
Weight	PE Sheath	kg/km	172.6	179.2	185.8	192.3	197.3	202.1
	AT Sheath		183.2	190.1	197.0	203.8	208.9	214.0
Cross Area		mm^2	157.40	164.55	171.65	178.70	183.96	189.20
Area of Strength member		mm^2	30.64	35.18	39.72	44.26	47.67	51.07
RTS		kN	45.90	52.70	59.50	66.30	71.40	76.50
MOTS		kN	18.36	21.08	23.80	26.52	28.56	30.60
EDS		kN	11.48	13.18	14.88	16.58	17.85	19.13
Ultimate Exceptional Stress		kN	27.54	31.62	35.70	39.78	42.84	45.90
Modulus		KN/mm^2	24.02	26.13	28.07	29.86	31.12	32.31
Termal Expansion Coefficient		$10^{-6}/℃$	0.99	0.67	0.41	0.20	0.07	-0.05
Crush Strength	Operation	N/10cm	1000	1000	1000	1000	1000	1000
	Installation	N/10cm	2200	2200	2200	2200	2200	2200
Safety Factor			2.5	2.5	2.5	2.5	2.5	2.5
Min Bending Radius	Operation	mm	213	218	222	227	230	233
	Installation	mm	355	363	370	378	283	388
Temperature	Installation	℃	-10～+60	-10～+60	-10～+60	-10～+60	-10～+60	-10～+60
	Transport	℃	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70
	Operation	℃	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70	-40～+70
Sag(5mm Ice Load, Average 20℃)	PE	%	1.63	1.71	1.78	1.87	2.03	2.18
	AT		1.70	1.78	1.85	1.94	2.10	2.26

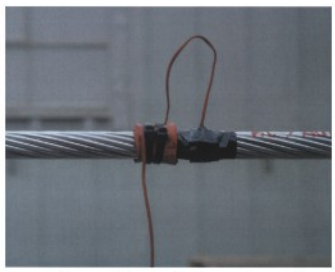
Other Parameters Meet or Exceed the Requirement of IEC 60794-4

AUTHORITATIVE QUALIFICATION TEST

Test Item	Cable Type			Test Standard	Test Laboratory
	OPG	OPPC	ADSS		
Appearance and Structure	●	●	●		
Color of Fiber	●	●	●		
Optical Fiber Characteristics	●	●	●		
Stranding wire	●	●	/		
					Beijing Electric Power Construction
Tensile Performance	●	●	●	ITU–T G652	Research Institute
Stress–strain	●	●	●	ITU–T G655	
Sheave Test	●	●	●	IEC 60793	China Electric Power Research Institute
Repeated Bending	●	●	●		Shanghai Electric Cable Research Institute
Impact Test	●	●	●	IEC 61232	Wuhan High Voltage Research Institute
Crush Test	●	●	●	IEC 60104	
Aeolian Vibration	●	●	●		
Galloping Test	●	●	●	IEC 60794–1	Canada KINECTRICS Lab.
Creep Test	●	●	●	IEC 60794–4	America PLP Lab.
Temperature Cycling	●	●	●	IEEE 1138	Holland KEMA Lab.
Seepage of Compound	●	●	●	IEEE 1222	
Water Penetration Test	●	●	●		Japan Hitachi Cables Lab.
Salty Spray Corrosion	●	●	/		Poland JEN Lab.
Heat Ageing	/	/	●		
DC Resistance	●	●	/		
Short Circuit	●	/	/		
Carrying Capacity	/	●	/		
Lightning	●	/	/		
Anti–tracking Resistance	/	/	●		
UV Resistance	/	/	●		
Shotgun Resistance	/	/	●		

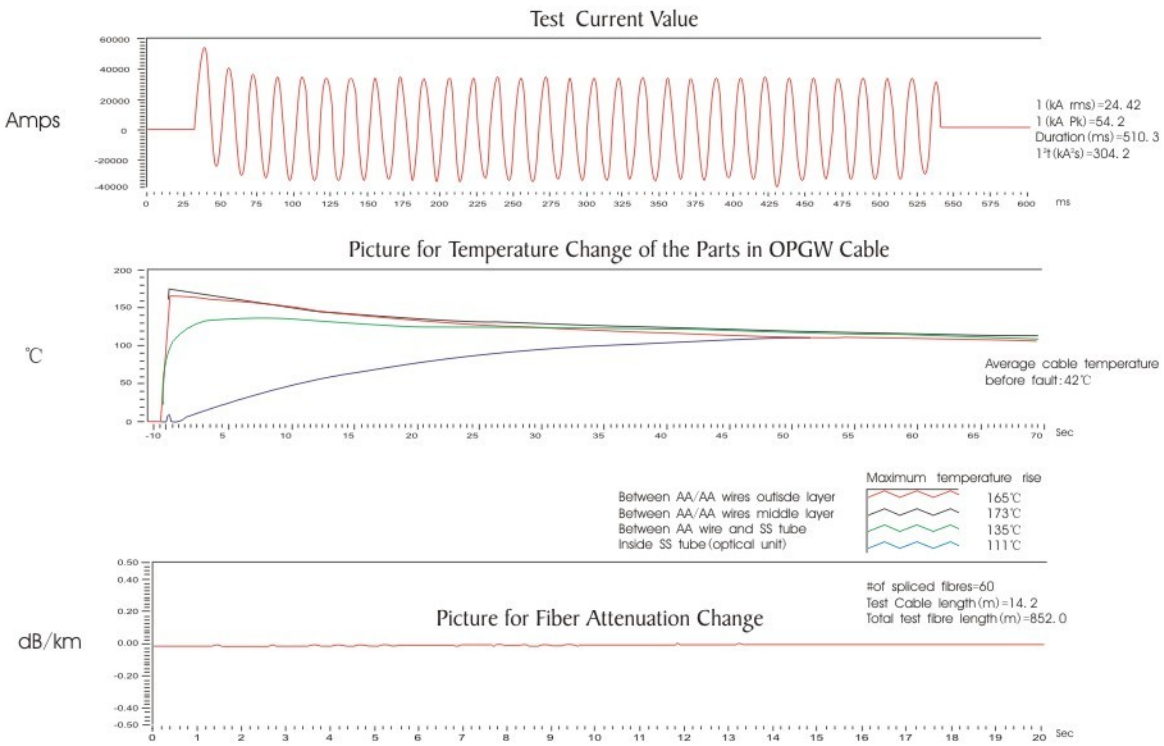
OPGW SHORT CURRENT TEST

Typical Set-up for Short Circuit Test
In High Yard

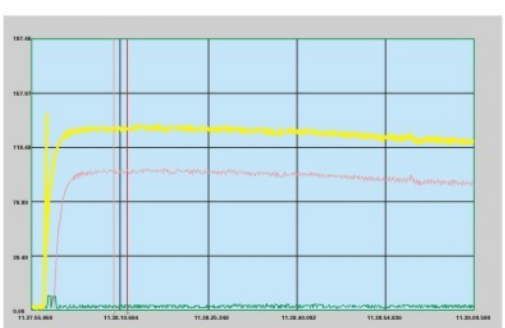


Typical Installtion of Thermocouple
on Temperature Sample

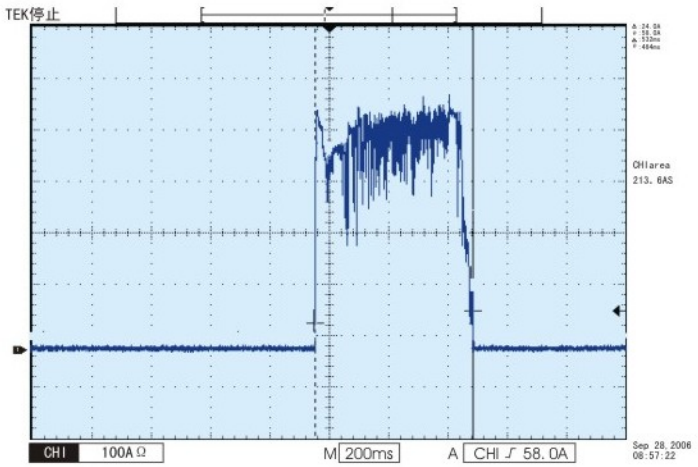
Canada Kinectrics

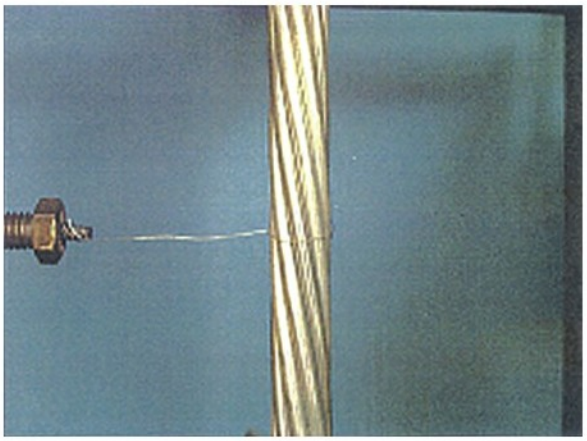


CEPRI



OPGW LIGHTNING ARC TEST





Summany of Results of Lightning Arc Test

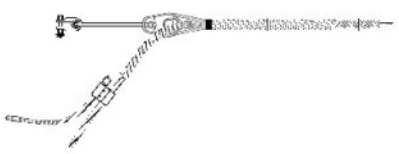
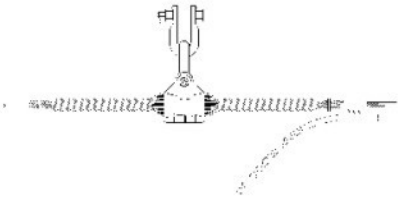
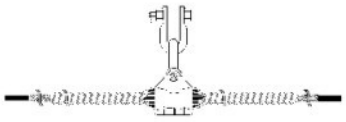
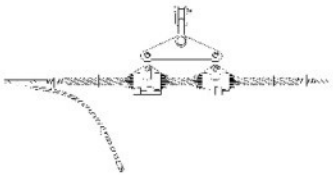
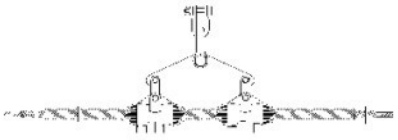
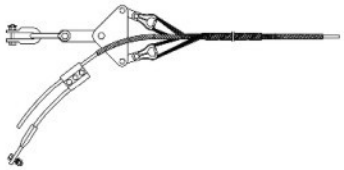
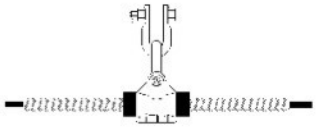
Canada Kinectrics

Test No	Initial Tamp (℃)	Initial Tension (kgf)	Mean Current of Component "B" (KA)	Charge (C)	Change of Attn (dB)	Remaining RTS
N1	44	801	2. 28	-197	0. 0	93%
N2	39	801	2. 26	-146	0. 0	98%
N3	40	816	2. 12	-165	0. 0	86%
N4	44	811	2. 14	-142	0. 0	97%
N5	37. 5	812	2. 10	-136	0. 0	85%

CEPRI

No.	Continual Current	Duration	Charge Transfer	Amount of Outer Layer Broken Wire	Additional Attenuation	Remaining Strength
1	400A	532ms	213.6As	0	0.00dB	100%RTS
2	400A	576ms	210.8As	0	0.00dB	100%RTS
3	400A	532ms	208.8As	0	0.00dB	100%RTS
4	400A	528ms	211.5As	0	0.00dB	100%RTS
5	400A	528ms	206.5As	0	0.00dB	100%RTS

PREFORMING FITTINGS

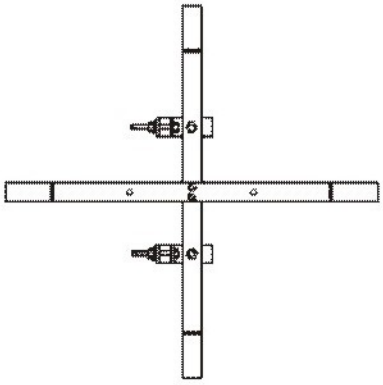
OPGW Fittings	ADSS Fittings	OPPC Fittings
 Dead-end fitting(single)	 Dead-end fitting	 Dead-end fitting(single)
 Suspending clamp(single)	 Suspending clamp(single)	 Suspending clamp(single)
 Suspending clamp(double)	 Suspending clamp(double)	 Suspending clamp(double)
 Dead-end fitting(double)	 Tangent clamp	

ACCESSORIES AND TOOLS

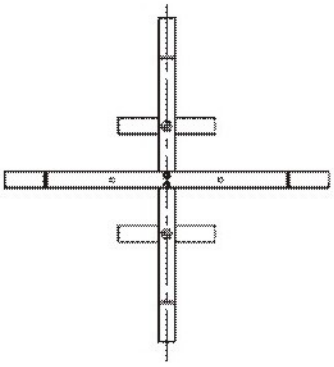
Joint Box for ADSS、OPGW Cable

Joint Box for OPPC Cable

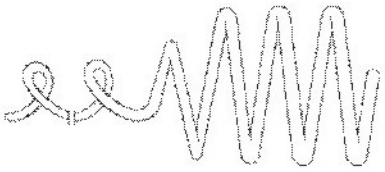
Seperator for OPPC Cable



Cable Tray for Tower

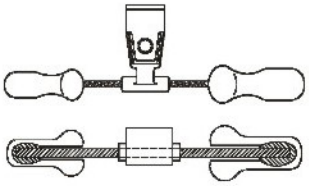


Cable Tray for Pole

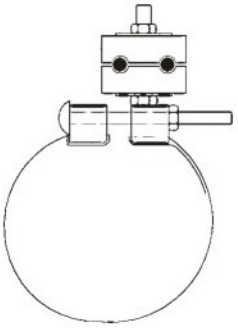


Corona-resist Ring

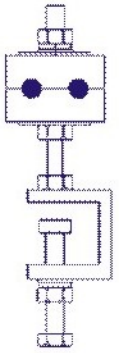
Spiral Vibration Reducer



Vibration Damper



Downlead Clamp for Pole



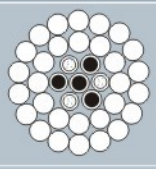
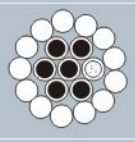
Downlead Clamp for Tower

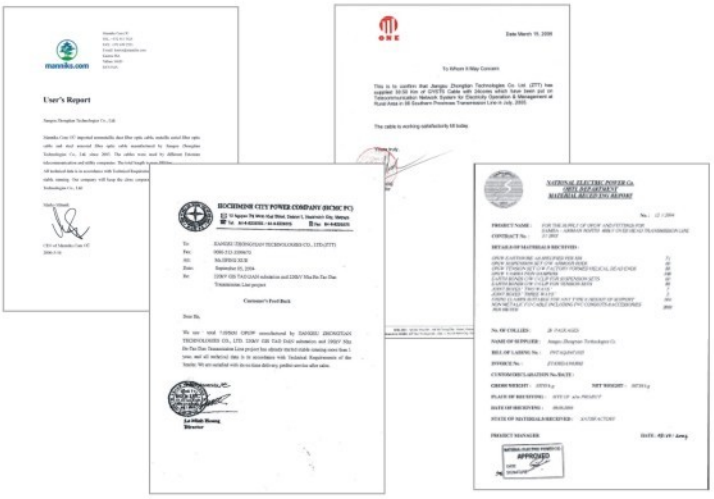
Torsion Releaser

Steel Tube Cuter

Pull-off Net

TYPICAL REFERRENCE LIST FOR RECORD PROJECTS

Record Item	Name of Transmission Line	Record Parameter	Structure Drawing
Big Cores, Big Area, Big Capacity	Zhejiang Hangdong–qiantang Substation Transmission Line	60 G.652+12 G.655 181 mm^2 304 $kA^2.s$	
Long Span	Shanghai Changxinlsland–hengsha Island Project (Crossing Yangtse River) Sichuan 220kV Shuiniujia–ziyili–shuanghe Project (Crossing Fu River)	1519m Span 1644m Span 1425m Span	
High Difference Temp.	Sinkiang Tuodexun–korle 220kV Power Transmission Line	–50℃–– +40℃	
Resistance Firn and Ice	Central China Grid Sanbanxi Water Power Station 500kV Trans Line Chongqing 220kV Wupengqianxiu I,II Transmission Line	50mm Ice Thickness 40mm Ice Thickness	
Resistance Lightning Strike	Hainan 220kV Guantang–yazitang Transmission Line	120 Thunderstorm Days	
750kV	SGCC 750kV Laxiwa–xining, Laxiwa–	20mm Ice Thickness	



Delivery Ceremony of ZTT OPGW & Fittings Using at 1000kV UHV AC and ±800kV UHV DC Experimental Base

PERFECT SERVICES

Cable structure design and type choice services

ZTT can provide you cable structure design, type choice and primary price services, if you at least provide the following information.

Required Information	OPGW	OPPC	ADSS/MASS
Length(km)			
System Voltage(kV)			
Type of Ground Wire			
Type of Conductors			
Fiber Count & Type			
Cable Diameter(mm)			
Cable Mass(kg/km)			
RTS(kN)			
Short Circuit Current(kA)			
Short Circuit Time(s)			
Representative Span			
Max. Span(m)			
Installation Sag(m)			
Sheath Grade			

Customer information

Company: Name:

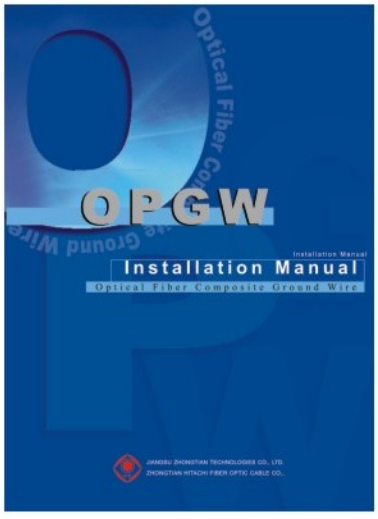
Tel: Fax:

Totally Mid-salas Services

- Tension-sag calculation
- Designed drum
- Fitting and anti-vibration design
- Technical specification
- Contacting meeting of design and factory test
- Technical training and seminar

Perfect Post-sales Services

- Optical fiber and cable performance testing in site
- Acceptance of the fitting & accessories
- Optical fiber splicing
- Final acceptance of completed project
- Tracking and visiting the client



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