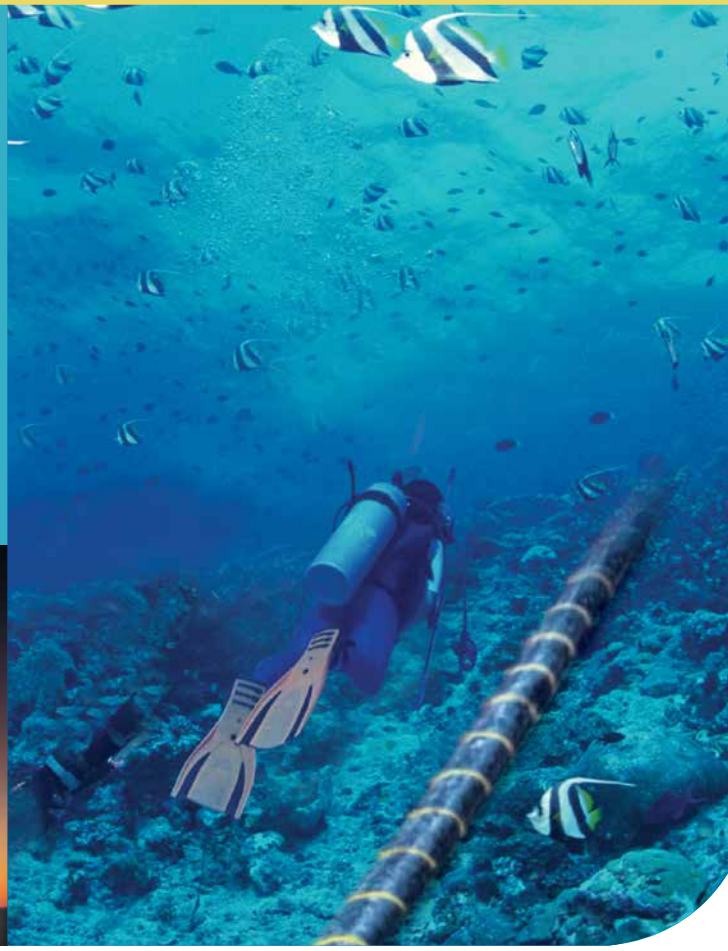
Submarine Cable



www.zttcable.com

About Us

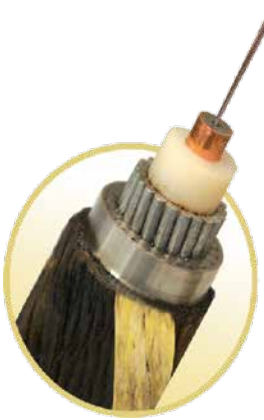
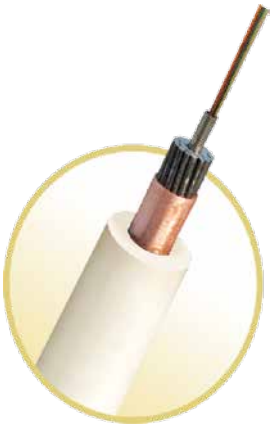
ZTT penetrated the optical fiber cable industry in the year 1992 and grew to a public company in 2002. With constant growth in global market share, ZTT is now the largest cable manufacturer in China for power and telecommunication. Zhongtian Technology Submarine Cable Co., Ltd (ZTTSC) was established in 1999, a 100% arm of Zhongtian Technology Co., Ltd. (ZTT)

ZTT's leadership is clearly marked through its design development, manufacturing, marketing, and distribution program for its "King of Cable" family; submarine optic fiber cable, submarine power cable, submarine composite cable and other hybrid submarine cable for the energy, industrial and communication for the energy and telecommunication markets within China and globally.

ZTT places its top product quality stamp through State-of-the-Art technology, certification and acceptance. According to International Standards and product trends, its R&D department pushes on constantly in search of excellence in oceanic requirement.

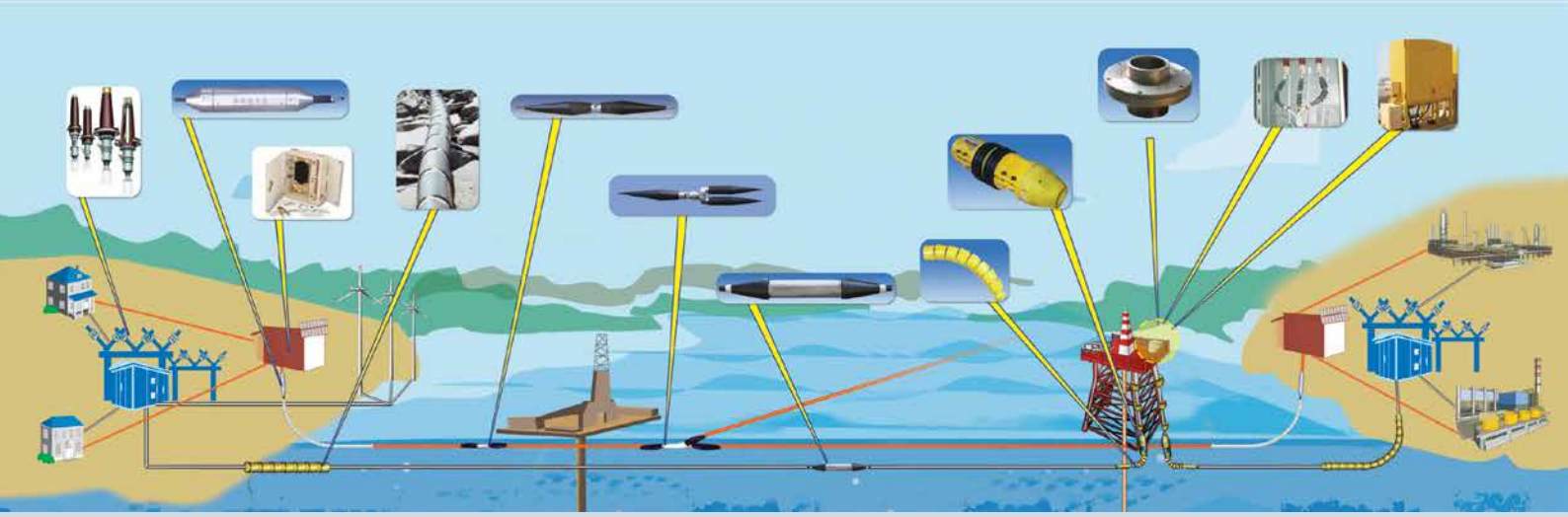
Product Range

- Fiber optic cables
- Control cables
- Instrument cables
- AC submarine power cable
- AC submarine optical fiber composite power cable
- DC submarine power cable
- DC submarine optical fiber composite power cable
- Electric Submersible Pump cable(ESP)
- Hybrid cable
- Related accessories





Power cable Optical cable

Application

- Offshore windfarms
- Tidal & wave energy farms
- Offshore oil and gas industry
- Islands connection
- Lake or river crossings

Service

ZTT has a team of highly trained product specialist for offshore jobs. Performing feasibility research, cable laying supervision, cable splicing, establishing terminal to its final project commissioning to complete the entire submarine cable system.

Submarine Optic Fiber Cable

Submarine optic fiber cable is laid for data transmission between states,with the performance of huge transmission capacity, long distance and compatibility to sever ambience.

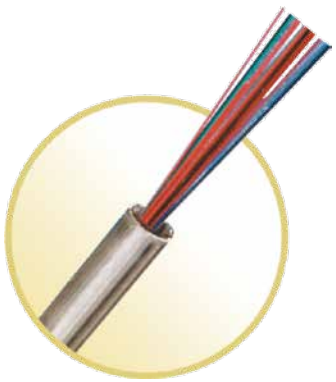
ZTT develop its own technic for manufacturing submarine optic fiber cable and has proprietary wharf and scored many first in invention.

The first to receive National Certification for deep sea SOFC.
The first to be certified by UJ consortium in China.
The largest manufacturing factory of submarine optic fiber cable in China.

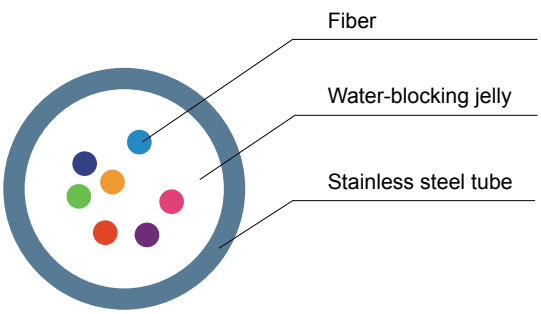
Applicable standards

ZTT's SOFC are designed, manufactured and tested according to the latest edition of the following codes and standards:
National Standard GB/ T18480-2001
National Military Standard GJB4489-2002
ITU Recommendation for optical fiber submarine cable systems, ITU-T G971~978

Fiber unit design



Drawing of Fiber unit



Characteristics

- High strength fiber — ensure stable signal transmission and effective operation life.
- Special water blocking jelly — prevent the ingress of water or hydrogen gas.
- On-line fiber excess control — exact fiber excess in finished cable
- Stainless steel tube — avoid external damages to optic fiber.

Cable protection

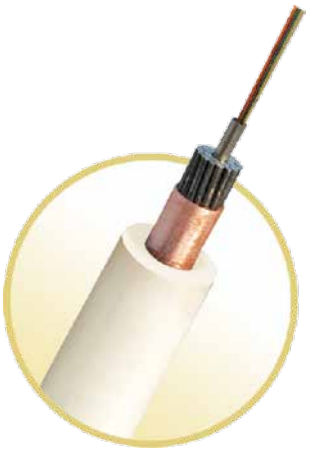
The optical fiber submarine cable should provide protection against the environmental hazards at its depth of utilization: protection against marine life, fish-bite and abrasion, and armouring against aggression and ship activities. Different types of protected cable are defined in [G.972], in particular:

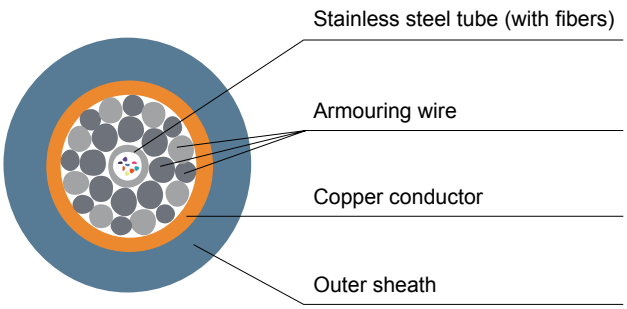
- The lightweight cable (LW cable);
  Cable suitable for laying, recovery and operation, where no special protection is required.
- The lightweight protected cable (LWP cable).
  Cable suitable for laying, recovery and operation, where special protection is required.
- The single armoured cable (SA cable).
  Cable suitable for laying, burial, recovery and operation, and suitably protected for specific area in shallow water.
- The double armoured cable (DA cable).
  Cable suitable for laying, burial, recovery and operation, and suitably protected for specific area in shallow water.
- The rock armoured cable (RA cable).
  Cable suitable for laying, recovery and operation, and suitably protected for specific area in shallow water.

Typical structure of SOFC(S17-for Repeater System)

Light weight

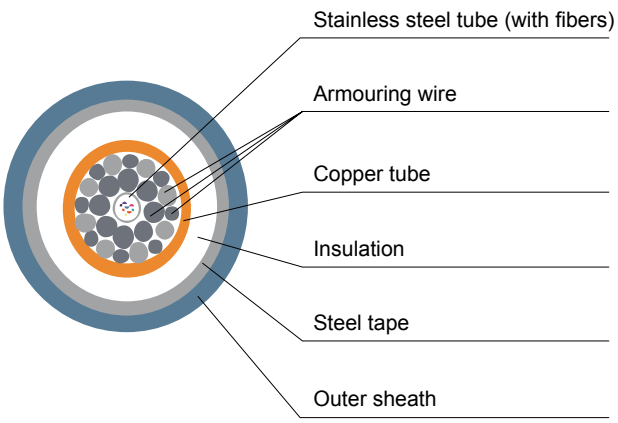
Model : SOFC-S17-LW





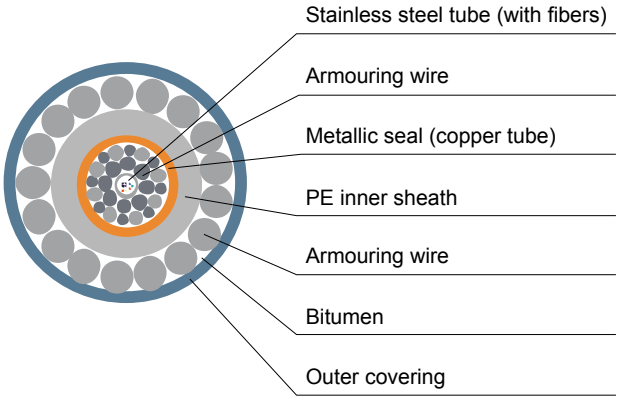
Light weight protection

Model : SOFC-S17-LWP



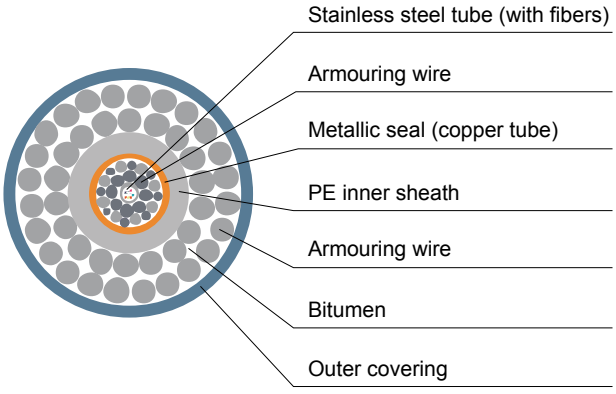
Single armor

Model : SOFC-S17-SA



Double armor

Model: SOFC-S17-DA

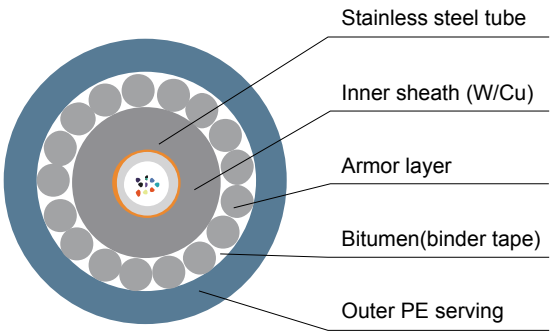


Technical parameter for SOFC (S17 Repeater system)

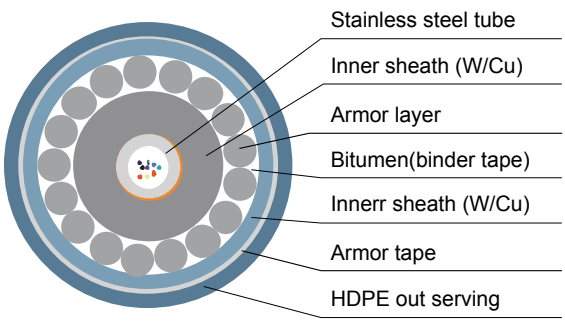
Type	CBL (kN)	NTTS (kN)	NOTS (kN)	NPTS (kN)	Unloaded min.bending radius(m)	Operational temp(˚C)	Storage temp(˚C)
SOFC-S17-LW	80	55	32	20	0.5	-20～+50	-30～+60
SOFC-S17-LWP	80	55	32	20	0.5	-20～+50	-30～+60
SOFC-S17-SA	265	172	105	80	1.0	-20～+50	-30～+60
SOFC-S17-DA	540	350	220	135	1.2	-20～+50	-30～+60

Typical structure of SOFC (Q10-for Unrepeater System)

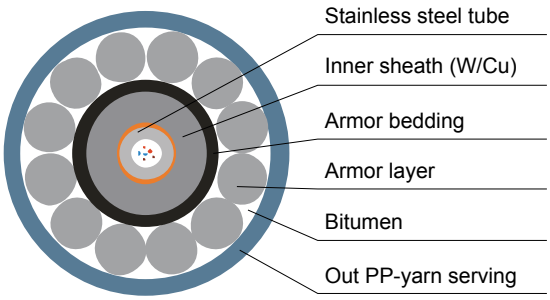
Light weight
Model : SOFC-Q10-LW



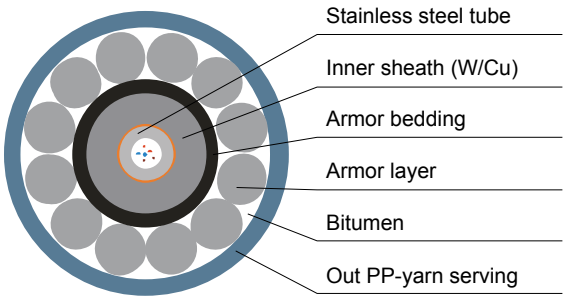
Light weight protection
Model : SOFC-Q10-LWP



Single armor 1
Model : SOFC-Q10-SA1

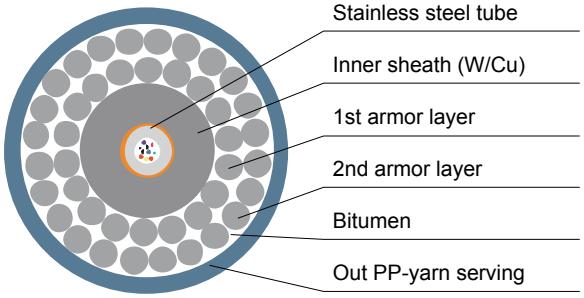


Single armor 2
Model : SOFC-Q10-SA2



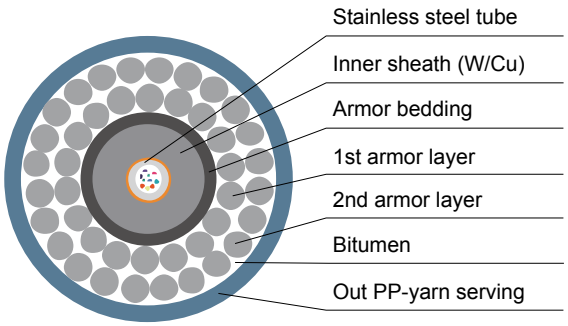
Double armor 1

Model : SOFC-Q10-DA1



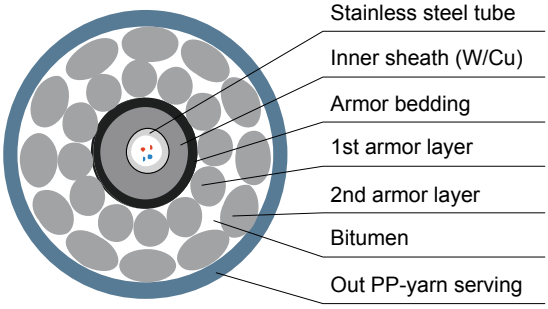
Double armor 2

Model : SOFC-Q10-DA2



Rock armor

Model : SOFC-Q10-RA



Technical parameter for SOFC (Q10 Unrepeater system)

Type	CBL (kN)	NTTS (kN)	NOTS (kN)	NPTS (kN)	Unloaded min.bending radius(m)	Operational temp(℃)	Storage temp(℃)
SOFC-Q10-LW	80	60	40	25	0.50	-20～+45	-30～+60
SOFC-Q10-LWP	80	60	40	25	0.70	-20～+45	-30～+60
SOFC-Q10-SA1	200	160	110	70	0.65	-20～+45	-30～+60
SOFC-Q10-SA2	280	200	150	120	0.85	-20～+45	-30～+60
SOFC-Q10-DA1	420	300	210	150	0.80	-20～+45	-30～+60
SOFC-Q10-DA2	650	400	280	200	1.00	-20～+45	-30～+60
SOFC-Q10-RA	400	200	120	100	1.00	-20～+45	-30～+60

Submarine Optic Fiber Composite Power Cable

Submarine power cable or submarine optic fiber composite power cable are widely used in offshore wind generation farm, tide generation farm,or offshore oil & gas platforms.ZTT owns complete production chain for producing submarine cable, together with own test center and has established itself as a professional solution provider for submarine cable system in the region.

Applicable standards

Submarine cable (<35KV) meets the requirements of ZTT enterprise standard Q/320623AP 27-2006 “rated voltage 1KV~35KV XLPE insulated submarine power cable”.

The rated voltage 110KV submarine cable complies with the enterprise standard Q/320691AAG 01-2008 “rated voltage 110KV XLPE insulated submarine cable”.

Comparing with land power cable, except the mechanical performance, ZTT submarine cable has the same electrical performance, which complies with IEC or ICEA. Optical performance of submarine composite cable is same with that of submarine optic fiber cable.

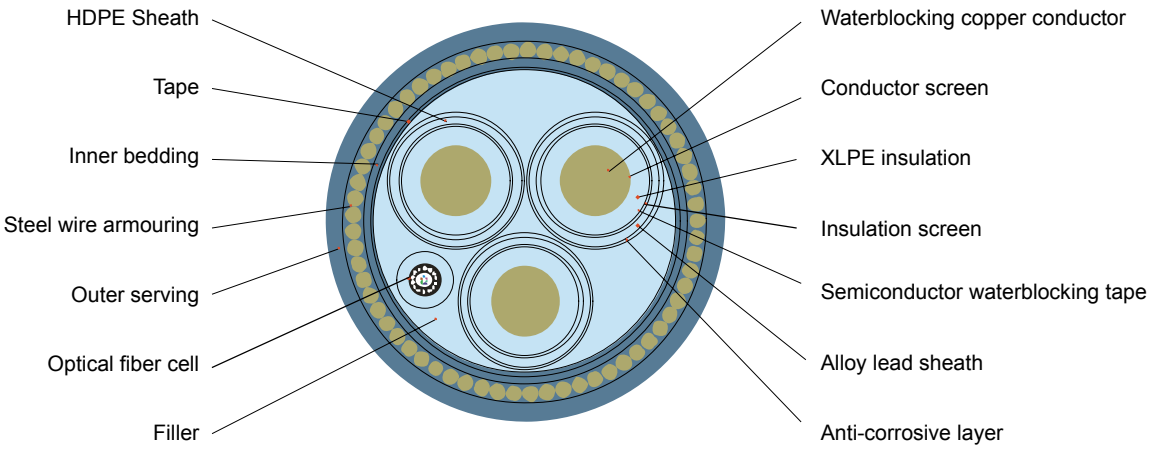
Model and Descriptions

Model	Description
S-YJA41 ZS-YJAF41	submarine power cable: copper conductor with water-blocking tape, XLPE insulation system, LAP* sheath or separately LAP sheath, PE sheath, armor bedding, steel wire armor, out yarns serving.
ZS-YJQ41 ZS-YJQF41	Submarine power cable: copper conductor with water-blocking tape, XLPE insulation system, lead sheath or separately lead sheath, PE sheath, armor bedding, steel wire armor, out yarns serving.
ZS-YJA41+OFC ZS-YJAF41+OFC	Submarine composite cable: copper conductor with water-blocking tape, XLPE insulation system, LAP* sheath or separately LAP sheath, PE sheath, inserted optic fiber cable, armor bedding, steel wire armor, out yarns serving.
ZS-YJQ41+OFC ZS-YJQF41+OFC	Submarine composite cable: copper conductor with water-blocking tape, XLPE insulation system, lead sheath or separately lead sheath, PE sheath, inserted optic fiber cable, armor bedding, steel wire armor, out yarns serving.

Remark: LAP* : laminated aluminium plastic tape

Model: ZS-YJQF41 + OFC

3 cores (copper) XLPE insulation,
Lead sheath,
Steel wire armor,
Yarns serving submarine cable.



Note: Below value is based on following condition:lead sheath, single circuit, conductor operating temp. =90℃, ground temp. =25℃, ground thermal resistance =1.0km/w, burying depth 1.5m, air temp. =45℃

Rated voltage: 8.7/10kV, 8.7/15kV (ZS-YJQF41, ZS-YJQF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	4.5	1.3	2.0	2.0	5.0	3.0	82	16.1
70	10.0	4.5	1.3	2.0	2.0	5.0	3.0	86	18.0
95	11.6	4.5	1.4	2.0	2.0	5.0	3.0	90	19.8
120	13.0	4.5	1.4	2.0	2.0	5.0	3.0	93	21.5
150	14.4	4.5	1.5	2.0	2.0	5.0	3.0	96	23.3
185	16.2	4.5	1.5	2.0	2.0	5.0	3.0	100	25.6
240	18.4	4.5	1.6	2.1	2.0	5.0	3.0	105	28.9
300	20.6	4.5	1.6	2.1	2.0	5.0	3.0	111	32.4
400	23.5	4.5	1.7	2.2	2.0	5.0	3.0	120	38.2

Nominal cross section	Screen Cross section	DC@20℃ conductor resistance	AC@90℃ conductor resistance	DC@20℃ Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	94.3	0.387	0.494	2.27	0.213	0.438	194	193	7.2	2.3
70	101.7	0.268	0.342	2.10	0.242	0.412	840	235	10.0	2.5
95	117.0	0.193	0.246	1.83	0.267	0.393	288	278	13.6	2.9
120	123.2	0.153	0.196	1.74	0.289	0.379	328	314	17.2	3.0
150	139.0	0.124	0.159	1.54	0.311	0.367	369	348	21.5	3.4
185	147.5	0.0991	0.127	1.45	0.339	0.354	418	389	26.5	3.6
240	168.9	0.0754	0.0976	1.27	0.374	0.341	481	441	34.3	4.1
300	180.0	0.0601	0.0778	1.19	0.408	0.331	542	489	42.9	4.4
400	213.6	0.0470	0.0614	1.00	0.466	0.324	614	541	57.2	5.2

Rated voltage: 12/20kV (ZS-YJQF41, ZS-YJQF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	5.5	1.4	2.0	2.0	5.0	3.0	87	17.6
70	10.0	5.5	1.4	2.0	2.0	5.0	3.0	91	19.4
95	11.6	5.5	1.5	2.0	2.0	5.0	3.0	94	21.4
120	13.0	5.5	1.5	2.0	2.0	5.0	3.0	97	23.1
150	14.4	5.5	1.5	2.0	2.0	5.0	3.0	101	25.0
185	16.2	5.5	1.6	2.0	2.0	5.0	3.0	105	27.4
240	18.4	5.5	1.6	2.1	2.0	5.0	3.0	110	30.8
300	20.6	5.5	1.7	2.1	2.0	5.0	3.0	110	34.3
400	23.5	5.5	1.8	2.2	2.0	5.0	3.0	125	40.2

Nominal cross section	Screen Cross section	DC@20˚C conductor resistance	AC@90˚C conductor resistance	DC@20˚C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	110.8	0.387	0.494	1.93	0.185	0.453	196	193	7.2	2.7
70	118.8	0.268	0.342	1.80	0.268	0.425	242	235	10.0	2.9
95	135.2	0.193	0.246	1.58	0.229	0.405	290	279	13.6	3.3
120	141.8	0.153	0.196	1.51	0.247	0.391	331	314	17.2	3.5
150	148.4	0.124	0.159	1.44	0.265	0.379	372	349	21.5	3.6
185	167.9	0.0991	0.127	1.27	0.289	0.367	421	389	26.5	4.1
240	178.9	0.0754	0.0976	1.20	0.317	0.352	485	441	34.3	4.4
300	202.4	0.0601	0.0778	1.06	0.345	0.341	545	488	42.9	4.9
400	238.1	0.0470	0.0614	0.90	0.392	0.333	616	540	57.2	5.8

Rated voltage: 18/30kV (ZS-YJQF41, ZS-YJQF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	8.0	1.5	2.0	2.0	5.0	3.0	98	21.6
70	10.0	8.0	1.6	2.0	2.0	5.0	3.0	102	23.5
95	11.6	8.0	1.6	2.1	2.0	5.0	3.0	106	25.7
120	13.0	8.0	1.6	2.1	2.0	5.0	3.0	109	27.6
150	14.4	8.0	1.7	2.1	2.0	5.0	3.0	113	29.6
185	16.2	8.0	1.7	2.2	2.0	5.0	3.0	117	32.0
240	18.4	8.0	1.8	2.2	2.0	5.0	3.0	122	35.6
300	20.6	8.0	1.9	2.2	2.0	5.0	3.0	127	39.4
400	23.5	8.0	1.9	2.3	2.0	5.0	3.0	137	45.6

Nominal cross section	Screen Cross section	DC@20˚C conductor resistance	AC@90˚C conductor resistance	DC@20˚C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	142.8	0.387	0.494	1.50	0.143	0.485	200	196	7.2	3.5
70	161.9	0.268	0.342	1.33	0.160	0.456	246	238	10.0	3.9
95	170.0	0.193	0.246	1.26	0.175	0.435	294	281	13.6	4.1
120	176.9	0.154	0.196	1.21	0.188	0.420	335	316	17.2	4.3
150	196.0	0.124	0.159	1.09	0.200	0.406	376	348	21.5	4.8
185	205.6	0.0991	0.127	1.04	0.217	0.392	423	388	26.5	5.0
240	230.7	0.0754	0.0976	0.93	0.236	0.377	488	439	34.3	5.6
300	257.3	0.0601	0.0778	0.83	0.256	0.363	547	485	42.9	6.3
400	281.7	0.0470	0.0614	0.76	0.289	0.355	619	537	57.2	6.9

Rated voltage: 26/35kV (ZS-YJQF41, ZS-YJQF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	10.5	1.7	2.1	2.0	5.0	3.0	110	226.1
70	10.0	10.5	1.7	2.1	2.0	5.0	3.0	114	28.3
95	11.6	10.5	1.8	2.2	2.0	5.0	3.0	118	30.4
120	13.0	10.5	1.8	2.2	2.0	5.0	3.0	121	32.4
150	14.4	10.5	1.8	2.2	2.0	5.0	3.0	124	34.5
185	16.2	10.5	1.9	2.3	2.0	5.0	3.0	129	37.1
240	18.4	10.5	1.9	2.3	2.0	5.0	3.0	134	41.0
300	20.6	10.5	2.0	2.4	2.0	5.0	3.0	139	44.9
400	23.5	10.5	2.1	2.4	2.0	5.0	3.0	149	51.5

Nominal cross section	Screen Cross section	DC@20°C conductor resistance	AC@90°C conductor resistance	DC@20°C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	189.6	0.387	0.494	1.13	0.121	0.514	203	197	7.2	4.6
70	199.2	0.268	0.342	1.07	0.134	0.483	250	239	10.0	4.9
95	220.5	0.193	0.246	0.97	0.146	0.461	298	281	13.6	5.4
120	228.5	0.154	0.196	0.94	0.156	0.445	339	315	17.2	5.6
150	236.4	0.124	0.159	0.91	0.166	0.431	380	350	21.5	5.8
185	260.8	0.0991	0.127	0.82	0.178	0.415	428	388	26.5	6.4
240	274.0	0.0754	0.0976	0.78	0.193	0.399	493	440	34.3	6.7
300	302.8	0.0601	0.0778	0.71	0.209	0.385	551	484	42.9	7.4
400	345.7	0.0470	0.0614	0.62	0.234	0.374	623	537	57.2	8.4

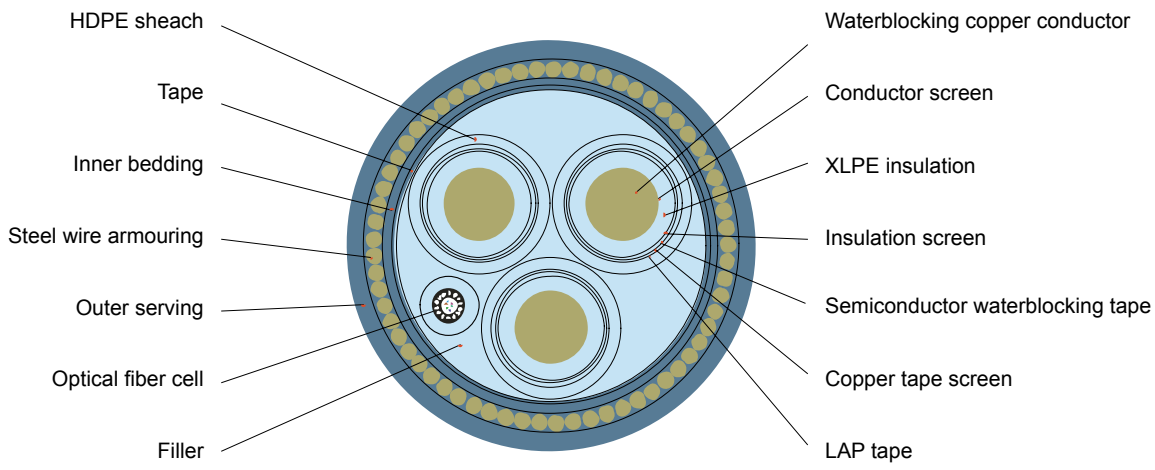
Rated voltage: 48/66kV (ZS-YJQF41, ZS-YJQF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
70	10.0	13.0	2.0	2.2	2.0	6.0	3.0	130	34.4
95	11.6	13.0	2.0	2.2	2.0	6.0	3.0	134	36.3
120	13.0	13.0	2.1	2.2	2.0	6.0	3.0	137	38.7
150	14.4	13.0	2.1	2.3	2.0	6.0	3.0	140	40.9
185	16.2	13.0	2.1	2.3	2.0	6.0	3.0	145	43.9
240	18.4	13.0	2.2	2.3	2.0	6.0	3.0	150	47.1
300	20.6	13.0	2.3	2.4	2.0	6.0	3.0	155	51.4

Nominal cross section	Screen Cross section	DC@20°C conductor resistance	AC@90°C conductor resistance	DC@20°C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
70	270.2	0.268	0.342	0.79	0.111	0.509	272	225	10.0	6.6
95	280.2	0.193	0.246	0.76	0.120	0.486	318	261	13.6	6.9
120	304.1	0.153	0.196	0.70	0.127	0.469	354	289	17.2	7.5
150	313.4	0.124	0.159	0.68	0.135	0.455	389	316	21.5	7.7
185	341.4	0.0991	0.127	0.63	0.144	0.438	429	346	26.5	8.4
240	356.9	0.0754	0.0976	0.60	0.156	0.420	481	386	34.3	8.8
300	389.5	0.0601	0.0778	0.55	0.167	0.406	525	419	42.9	9.6

Model: ZS-YJAF41 + OFC

3 cores (copper) XLPE insulation,
Laminated aluminium plastic tape,
Steel wire armor,
Yarns serving submarine cable.



Note: below value is based on following condition: copper tape screen, single circuit, conductor operating temp. =90℃, ground temp. =25℃, ground thermal resistance =1.0K.m/w, burying depth 1.5m, air temp. =45℃.

Rated voltage: 8.7/10kV, 8.7/15kV (ZS-YJAF41, ZS-YJAF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	4.5	0.3	2.3	2.0	5.0	3.0	80	12.9
70	10.0	4.5	0.3	2.3	2.0	5.0	3.0	84	14.4
95	11.6	4.5	0.3	2.4	2.0	5.0	3.0	88	15.9
120	13.0	4.5	0.3	2.4	2.0	5.0	3.0	91	17.3
150	14.4	4.5	0.3	2.4	2.0	5.0	3.0	94	18.7
185	16.2	4.5	0.3	2.5	2.0	5.0	3.0	98	20.6
240	18.4	4.5	0.3	2.5	2.0	5.0	3.0	103	23.3
300	20.6	4.5	0.3	2.5	2.0	5.0	3.0	108	26.1
400	23.5	4.5	0.3	2.6	2.0	5.0	3.0	117	30.7

Nominal cross section	Screen Cross section	DC@20℃ conductor resistance	AC@90℃ conductor resistance	DC@20℃ Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	8.1	0.387	0.494	2.13	0.213	0.433	184	187	7.2	1.1
70	8.8	0.268	0.342	1.96	0.242	0.406	229	229	10.0	1.2
95	9.4	0.193	0.246	1.84	0.267	0.387	275	272	13.6	1.3
120	9.9	0.153	0.196	1.74	0.289	0.374	315	307	17.2	1.3
150	10.5	0.124	0.159	1.65	0.311	0.362	355	343	21.5	1.4
185	11.1	0.0991	0.127	1.55	0.339	0.349	395	376	26.5	1.5
240	12.0	0.0754	0.0976	1.44	0.374	0.336	459	431	34.3	1.6
300	12.8	0.0601	0.0778	1.35	0.408	0.325	518	482	42.9	1.7
400	14.3	0.0470	0.0614	1.20	0.466	0.318	623	554	57.2	1.9

Rated voltage: 12/20kV (ZS-YJAF41, ZS-YJAF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	5.5	0.3	2.3	2.0	5.0	3.0	85	14.0
70	10.0	5.5	0.3	2.4	2.0	5.0	3.0	89	15.4
95	11.6	5.5	0.3	2.4	2.0	5.0	3.0	92	17.1
120	13.0	5.5	0.3	2.4	2.0	5.0	3.0	95	18.3
150	14.4	5.5	0.3	2.5	2.0	5.0	3.0	99	19.8
185	16.2	5.5	0.3	2.5	2.0	5.0	3.0	103	21.8
240	18.4	5.5	0.3	2.5	2.0	5.0	3.0	108	24.6
300	20.6	5.5	0.3	2.6	2.0	5.0	3.0	112	27.4
400	23.5	5.5	0.3	2.6	2.0	5.0	3.0	122	32.0

Nominal cross section	Screen Cross section	DC@20°C conductor resistance	AC@90°C conductor resistance	DC@20°C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	8.9	0.387	0.494	1.94	0.185	0.447	187	188	7.2	1.2
70	9.5	0.268	0.342	1.81	0.208	0.416	231	229	10.0	1.3
95	10.1	0.193	0.246	1.70	0.229	0.400	878	273	13.6	1.4
120	10.7	0.153	0.196	1.61	0.247	0.386	318	309	17.2	1.4
150	11.2	0.124	0.159	1.54	0.265	0.373	357	344	21.5	1.5
185	11.9	0.0991	0.127	1.45	0.289	0.360	399	378	26.5	1.6
240	12.7	0.0754	0.0976	1.36	0.317	0.346	463	431	34.3	1.7
300	13.5	0.0601	0.0778	1.27	0.345	0.334	520	482	42.9	1.8
400	15.1	0.0470	0.0614	1.14	0.392	0.327	617	554	57.2	2.0

Rated voltage: 18/30kV (ZS-YJAF41, ZS-YJAF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	8.0	0.3	2.4	2.0	5.0	3.0	96	16.8
70	10.0	8.0	0.3	2.5	2.0	5.0	3.0	100	18.3
95	11.6	8.0	0.3	2.5	2.0	5.0	3.0	104	19.9
120	13.0	8.0	0.3	2.5	2.0	5.0	3.0	107	21.3
150	14.4	8.0	0.3	2.6	2.0	5.0	3.0	110	22.9
185	16.2	8.0	0.3	2.6	2.0	5.0	3.0	114	25.0
240	18.4	8.0	0.3	2.6	2.0	5.0	3.0	119	27.7
300	20.6	8.0	0.3	2.7	2.0	5.0	3.0	124	30.6
400	23.5	8.0	0.3	2.7	2.0	5.0	3.0	133	35.6

Nominal cross section	Screen Cross section	DC@20°C conductor resistance	AC@90°C conductor resistance	DC@20°C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	10.8	0.387	0.494	1.60	0.143	0.479	191	190	7.2	1.4
70	11.4	0.268	0.342	1.51	0.160	0.450	236	231	10.0	1.5
95	12.0	0.193	0.246	1.43	0.175	0.429	275	275	13.6	1.6
120	12.6	0.153	0.196	1.37	0.188	0.414	310	310	17.2	1.7
150	13.1	0.124	0.159	1.32	0.200	0.400	345	345	21.5	1.8
185	13.8	0.0991	0.127	1.25	0.217	0.386	379	379	26.5	1.9
240	14.6	0.0754	0.0976	1.18	0.236	0.371	432	432	34.3	2.0
300	15.4	0.0601	0.0778	1.12	0.256	0.351	482	482	42.9	2.1
400	17.0	0.0470	0.0614	1.02	0.289	0.348	556	572	57.2	2.3

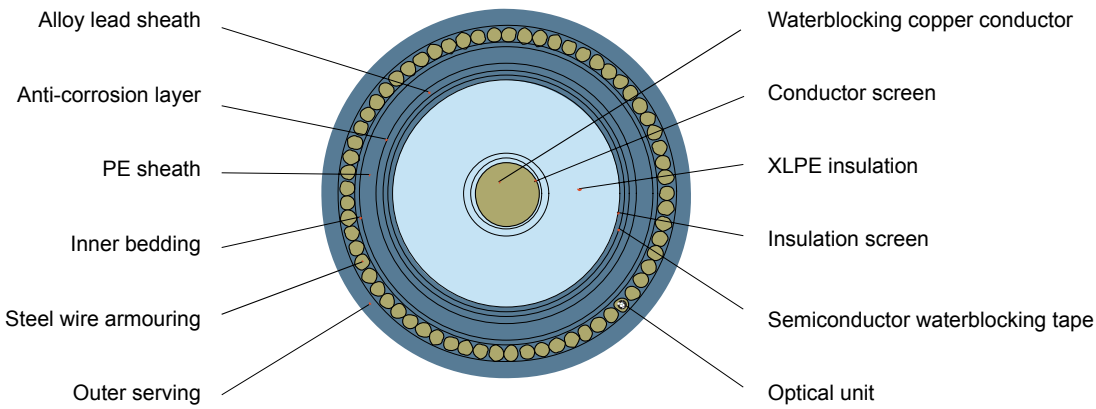
Rated voltage: 26/35kV (ZS-YJAF41, ZS-YJAF41+OFC)

Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
50	8.2	10.5	0.3	2.5	2.0	5.0	3.0	107	19.7
70	10.0	10.5	0.3	2.6	2.0	5.0	3.0	111	21.4
95	11.6	10.5	0.3	2.6	2.0	5.0	3.0	115	23.0
120	13.0	10.5	0.3	2.6	2.0	5.0	3.0	118	24.6
150	14.4	10.5	0.3	2.7	2.0	5.0	3.0	121	26.2
185	16.2	10.5	0.3	2.7	2.0	5.0	3.0	125	28.2
240	18.4	10.5	0.3	2.7	2.0	5.0	3.0	130	31.1
300	20.6	10.5	0.3	2.8	2.0	5.0	3.0	135	34.2
400	23.5	10.5	0.3	2.8	2.0	5.0	3.0	144	39.3

Nominal cross section	Screen Cross section	DC@20°C conductor resistance	AC@90°C conductor resistance	DC@20°C Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
50	12.6	0.387	0.494	1.36	0.121	0.507	195	192	7.2	1.7
70	13.3	0.268	0.342	1.29	0.134	0.476	240	233	10.0	1.8
95	13.9	0.193	0.246	1.24	0.146	0.454	289	277	13.6	1.9
120	14.4	0.153	0.196	1.19	0.156	0.438	330	313	17.2	1.9
150	15.0	0.124	0.159	1.15	0.166	0.424	370	349	21.5	2.0
185	15.7	0.0991	0.127	1.10	0.178	0.408	413	383	26.5	2.1
240	16.5	0.0754	0.0976	1.05	0.193	0.392	477	436	34.3	2.2
300	17.3	0.0601	0.0778	1.00	0.209	0.378	536	482	42.9	2.3
400	18.9	0.0470	0.0614	0.91	0.234	0.367	635	561	57.2	2.5

Model: ZS-YJQ41 + OFC

Single core (copper) XLPE insulation,
Lead sheath,
Steel wire armor,
Yarn serving submarine cable.



Note: below value is based on following condition: copper tape screen, single circuit, conductor operating temp. =90℃, ground temp. =25℃, ground thermal resistance =1.0K.m/w, burying depth 1.5m, air temp. =45℃.

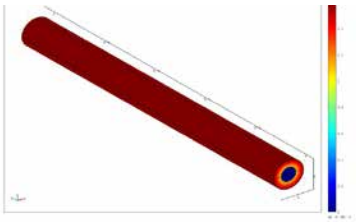
Rated voltage: 64/110kV (ZS-YJQ41, ZS-YJQ41+OFC)

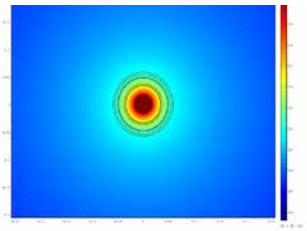
Cross section	Conductor diameter	Insulation diamerter	Lead sheath thickness	HDPE thickness	Bedding thickness	Armoring steel wire dia.	Outer serving thickness	Approx.Cable dia.	Approx.Cable weight.
mm^2	mm	mm	mm	mm	mm	mm	mm	mm	kg/m
240	18.4	19.0	4.0	4.0	2.0	5.0	3.0	106	27.4
300	20.6	18.5	4.0	4.0	2.0	5.0	3.0	107	28.3
400	23.5	17.5	4.0	4.0	2.0	5.0	3.0	108	29.4
500	26.6	17.0	4.0	4.0	2.0	5.0	3.0	110	30.9
630	30.0	16.5	4.0	4.5	2.0	5.0	3.0	114	33.3
800	34.0	16.0	4.0	4.5	2.0	5.0	3.0	117	36.1
1000	38.2	16.0	4.0	4.5	2.0	5.0	3.0	122	39.0

Nominal cross section	Screen Cross section	DC@20℃ conductor resistance	AC@90℃ conductor resistance	DC@20℃ Screen resistance	Capacitance	Inductance	Ampacity		Short circuit Current,1s	
							Air	Ground	Cinductor	Screen
mm^2	mm^2	Ω/km	Ω/km	Ω/km	μF/km	mH/km	A	A	kA	kA
240	847.2	0.0754	0.0976	0.31	0.125	1.768	573	587	34.8	22.4
300	860.1	0.0601	0.0777	0.30	0.135	1.748	635	641	43.4	22.5
400	875.3	0.0470	0.0613	0.30	0.152	1.719	707	698	57.8	22.5
500	898.2	0.0366	0.0484	0.29	0.167	1.696	778	752	72.2	22.8
630	930.4	0.0283	0.0382	0.28	0.184	1.672	853	807	90.9	23.3
800	975.3	0.0221	0.0309	0.27	0.207	1.647	921	852	115.3	24.2
1000	1026.1	0.0176	0.0224	0.25	0.224	1.624	981	888	144.0	25.3

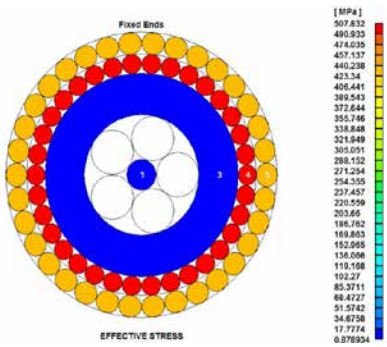
Submarine cable Design software

Electrical finite element method software: Based on the. Static current field, as well as Poisson electric field coupling with thermal field should be analyzed by a decoupling method. Analysis and calculation insulation electric stress distribution and current rating, Design insulation structure.

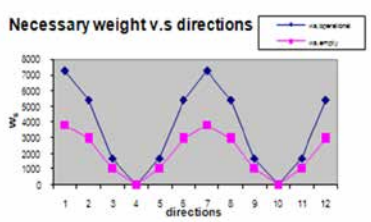


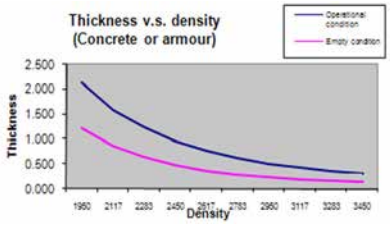


Cable structure and mechanical design software: It can be used for submarine cable structure analysis and mechanical properties calculation to verify the accuracy of cable design.

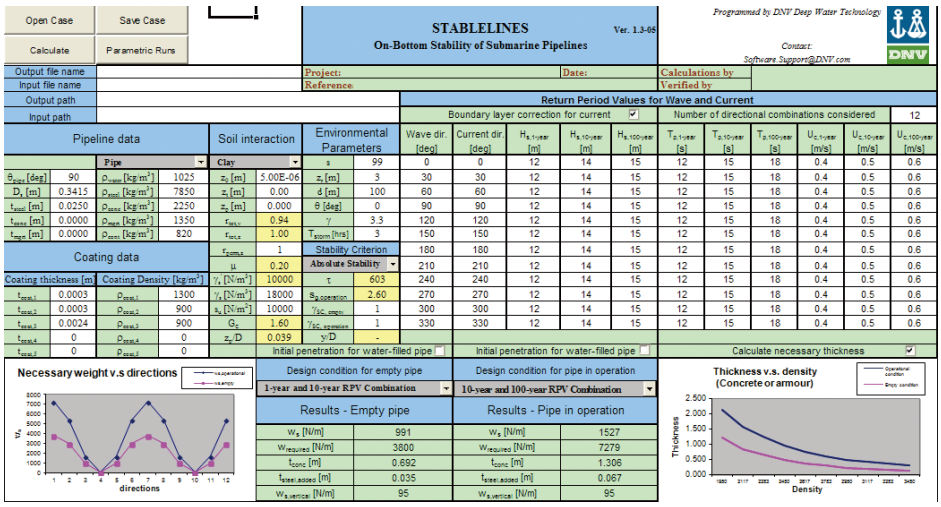


Marine stability analysis software:It can be used for analysing the cable stability conditions when cable is laied directly on the seabed or buried through analysis of the interaction of ocean wave and current, submarine cable and the seabed soil.

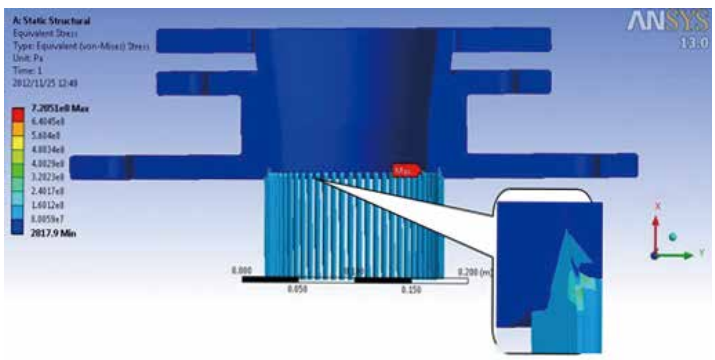




Marine stability analysis software: Can be used for the analysis of submarine cable which laied on the seabed or buried condition. Can be used for analysis of submarine cable stability, free-span, theoritical calculation of fatigue through analysing of the interaction among oncean wave, submarine cable itself and contacted soil.



Finite element analysis & design software of Hang-Off stress point: Can be used for the analysis of Hang-Off of the submarine cable. Providing theoretical basis for Hang-Off design through analysing the tension between Hang-Off and submarine cable under various conditions during operation.



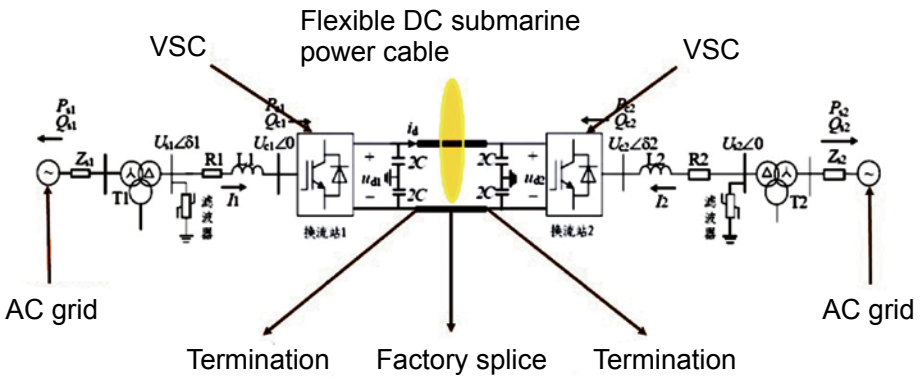
Finite element analysis & design software for Hang-Off stress point

Flexible DC Power transmission with cross-linked polyethylene insulated cable

Production Functions

XLPE insulation flexible HVDC submarine composite P/FO cables as VSC system line power transmission carrier ,it is mainly suitable for Industrial power generation demonstration project, Offshore wind power generation, Different AC system grid interconnected, Submarine power transmission between island and mainland, Increase the power transmission capacity of coastal city, Large oil platform on the sea.

VSC Topology Drawing



Main Technological Features

- The system can change the current direction of transmission, which does not require polarity reversal
- The cables are operated in bipolar mode, one cable with positive polarity and one cable with negative polarity.
- XLPE insulation submarine cables have high working temperature and superior electrical machinery performance.
- Distance of transmission can be thousands of kilometers, capacity of transmission can be thousands of megawatts.
- Environmentally friendly, risk of oil spill, as in paper-oil-insulated cables, is eliminated.

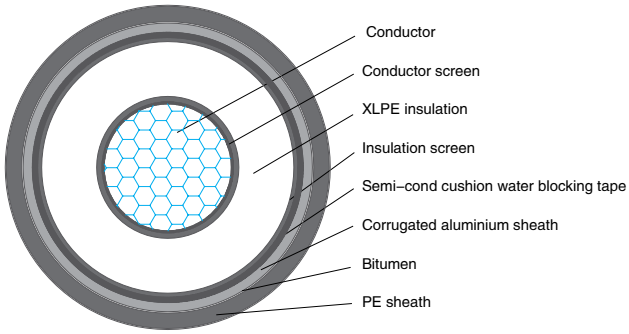
Products Standards

Recommendations for mechanical tests on submarine cables
Recommendations for testing of long AC submarine cables with extruded insulation for system voltage above 30 (36) to 500 (550) kV
Recommendations for testing DC extruded cable systems for power transmission at a rated voltage up to 500 kV
Power cables with extruded insulation and their accessories for rated voltages above 150 kV (Um= 170 kV) up to 500 kV (Um = 550 kV) - Test methods and requirements
The design of submarine power cable is not strictly in accordance with international standards. ZTT's products are all designed meet the project need with consideration of the routing information and operating performance including electrical, thermal, optical, mechanical and water-blocking performance requirements. For special project, ZTT shall have the cables Type test verification, to ensure the long-term operational reliability of the cable

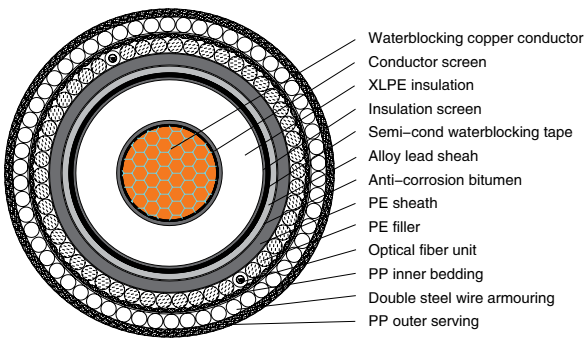
Name and Environment

Name	Applicable environment
Copper conductor XLPE insulation lead sheath thick steel-wire armored submarine optic fiber compodite power cable.	The cable is installed in the submarine environment for power and signal transmission and can withstand the substantial pulling force.
Copper conductor XLPE insulation lead sheath double steel-wire(flat steel wires)armored submarine power cable.	Used in deep water,can aied directly on the seabed with the performance of impact-resisting and high tensile strength withstanding.
Copper or aluminum conductor XLPE insulation corrugated aluminum sheath(lead sheath) PE jacket power cable.	Used in the tunnel or buried in the ground and it is applicable in the damp environment withstanding a certain tension.

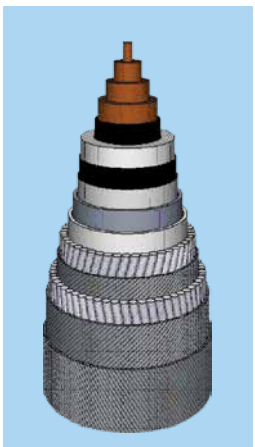
Product Structure Drawing

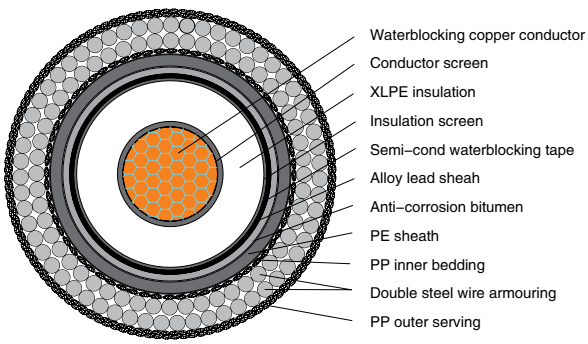


Land Power Cable

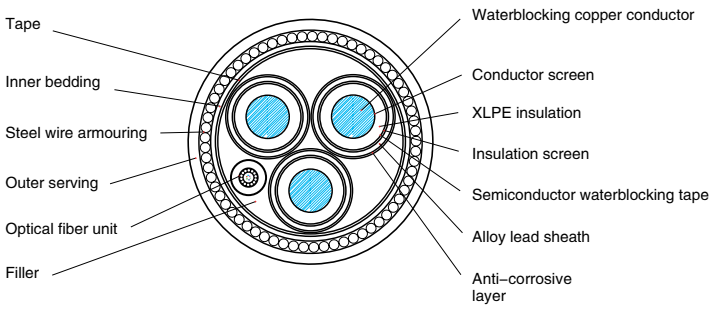


Submarine Optic Fiber Compodite Power Cable

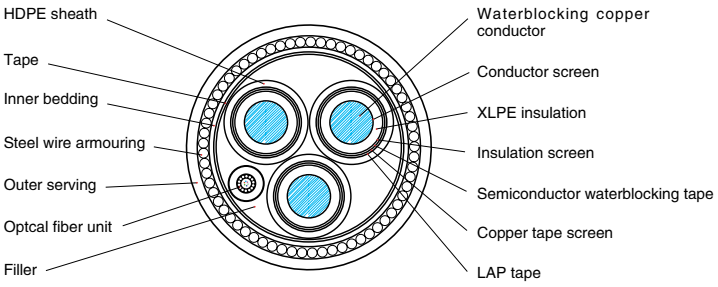




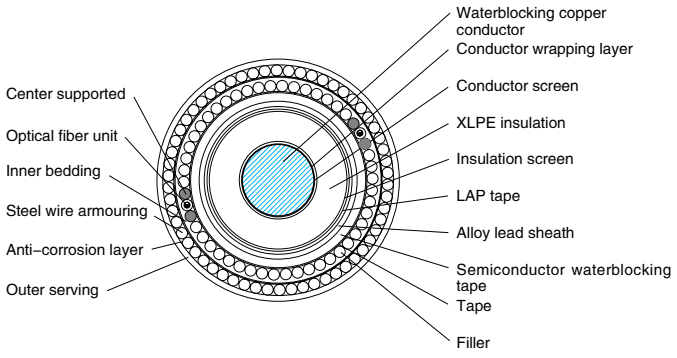
High strength double armored submarine power cable



XLPE insulated separately lead sheathed thick steel wire armored fiber covering submarine optical fiber composite power cable

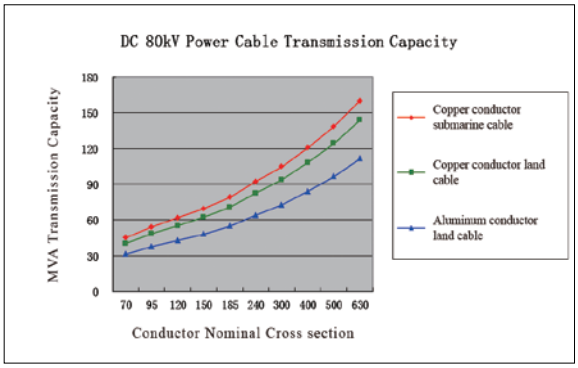


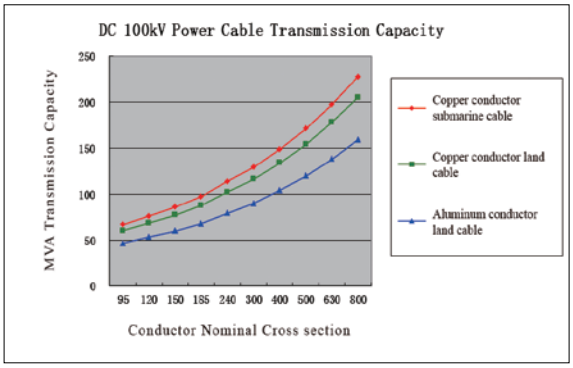
XLPE insulated separately LAP sheathed thick steel wire armored fiber covering submarine optical fiber composite power cable

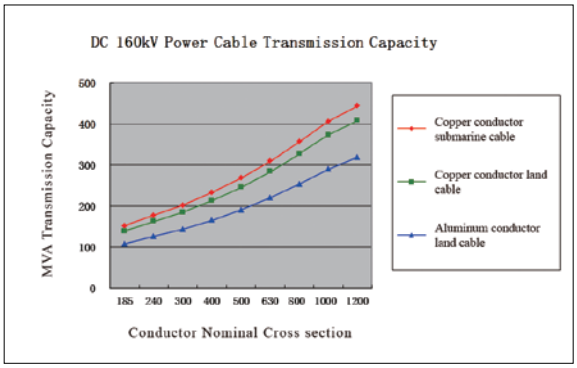


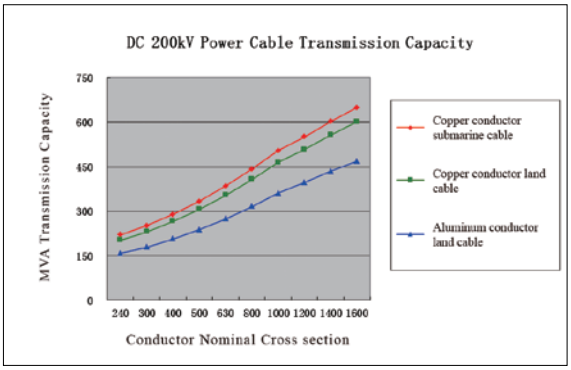
XLPE insulated lead sheath thick steel armored fiber covering submarine optical fiber composite power cable

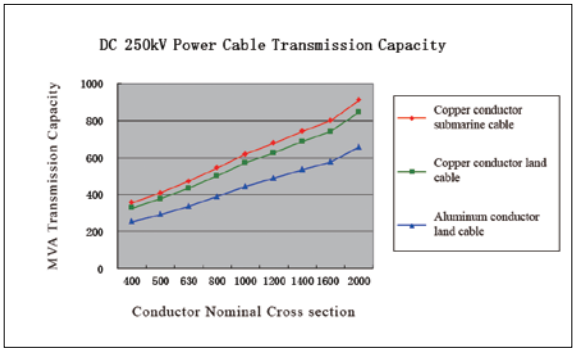
Power Transmission Capacity

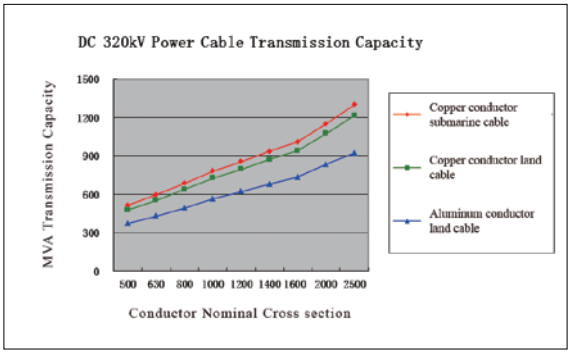












Note: Submarine cable environment design conditions, earth tem.=25℃, earth thermal resistivity 1.2 k.m/W buried depth 2m.

Land cable environment design conditions, earth tem.=30℃, earth thermal resistivity 2.0 k.m/W buried depth 0.5m.

Technical requirement

ZTT's submarine cable laid under sea is used for power and information transmission between platforms, island and mainland. It's of large capacity, long length and high reliability for information and power transmission. It can meet the special mechanical performance requirements of under sea conditions.

Technical standards

Recommendations for mechanical tests on submarine cables
Submarine cable (the rated voltage below 35kV) meets the reqirements of the enterprise standard Q/320623AP 27-2006 “Rated Voltage 1KV-35KV XLPE Insulated Submarine Power Cable”.
The rated voltage 110kV of submarine cable accords with the enterprise standard Q/320691AAG 01-2008 “Rated Voltage 110KV XLPE Insulated Submarine Cable”.
The rated voltage 220kV of submarine cable accords with the enterprise standard Q/320691AAG 04-2010 “Rated Voltage 220KV XLPE Insulated Submarine Cable”.

Name and Environment

Name	Applicable environment
Copper conductor XLPE insulated LAP sheathed or separately LAP sheathed thick steel-wire armored fiber covering submarine optical fiber composite power cable	Used in seabed, platform and underwater, it is able to bear external mechanical force and much tension.
Copper conductor XLPE insulated lead sheathed or separately lead sheathed thick steel-wire armored fiber covering submarine optical fiber composite power cable	Used in seabed, it is able to bear external mechanical force and much tension.

Cable accessory

The deployment of submarine cable is a highly professional piece of engineering work. Installation vessel outfitted with special equipment. Professional desktop design and supervision service at site is vital to the operation. ZTT not only produces submarine cable but also supply related accessory, including J-tube seal, cable clamp, pulling head and joint box etc..

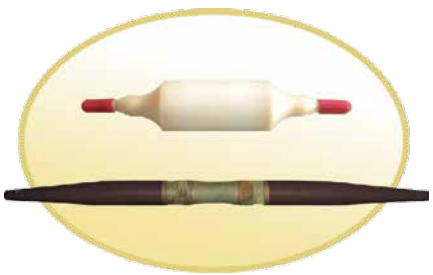
Submarine joint box is necessary for submarine cable project. ZTT possess its own intellectual property for submarine joint box. The product series includes direct joint box, branch joint box, joint box for submarine composite cable, flexible joint, onshore joint box, etc..

Joint box for shallow sea application / model: GJHQ

- Suitable for cable connection and repair in shallow sea condition, less than 200m water depth.
- High mechanical strength, good sealing and strong anti-corrosion.
- Tin alloy cover has good performance of anticorrosion.
- Cone-shape locking of steel wire ensures good recovery of cable tensile strength.

Joint box for deep sea application / model: GJSH

- Suitable for cable connection and repair in deep sea condition, less than 8000m water depth.
- Guarantee the power circuit of deep sea SOFC, and the splicing between repeater and cable.
- Adopt overall injection and molding art for the splicing closure.
- Use special gimbal to adjust the bending radius. Good performance of water sealing and electrical insulation under 8000m water depth.
- Withstand the strength above 90% UTS of deep sea SOFC.



Beach Joint box / model: GPJ-JA48

- Use to connect SOFC to land FO cable after exit from the manhole.
- High mechanical strength, good sealing and strong anti-corrosion
- Stainless steel cover has a good performance of anti-corrosion
- Cone-shape locking of steel wire ensures good recovery of cable tensile strength

Joint box for submarine composite cable / model: GDFH-JT

- Use for cable connection and repair of submarine composite cable
- High mechanical strength, good sealing and strong anti-corrosion
- Stainless steel cover has a good performance of anti-corrosion
- Cone-shape locking of steel wire ensures good recovery of cable tensile strength
- Half structure of out cover

Quality and Quality Assurance

Quality and quality assurance has always been and will be the key element of ZTT's objective. ZTT established its own high technical laboratory to perform the necessary product tests before shipping. Having certified ISO9001 and ISO14001, every cable product carries a quality stamp label and certificate.

Health, Safety & Environment

HSE is ensured by a safety management system. All equipment meets National Standards and are subjected to a strict maintenance program and periodic calibration by qualified personnel or institutes. A constant reduction of raw material and energy as well as product improvement also forms part of ZTT environment policy.

Standard and Recommendations

Although submarine cables are usually produced according to specific project requirement, ZTT embraces international scientific consortium standards like IEC, ITU, CIGRE etc...

Research and Development

ZTT's R&D engineering experts are grouped from the Pioneers of Engineers for Submarine Cable System in China. To date, they still collaborate closely with specialists from leading laboratories, research institutes, professors from famous universities. With constantly upgrading in State-of-the-Art equipment and technology, they created and received many First in invention prize award for related products in the industry.

ZTT CABLE

ZTT is a leading and global manufacturer of cable systems, which provides package solutions for telecommunication and power applications around the world. With its rich heritage of highly advanced R&D results, ZTT owns the cutting-edge technology within the industry.

ZTT was established in 1992 and became a listed company in 2002. Up to now, ZTT has developed to be a Group Company with 26 subsidiaries in China. Our products are widely used in telecommunication industry, power transmission industry, mining cable industry, marine and submarine cable industry, railway industry, cable manufacturing and so on.

ZTT has always committed to be market-oriented, meeting various demands of our customers and providing economical & reliable solutions. With innovative product design, ZTT can also guarantee the high-end engineering capabilities and life cycle maintenance services.

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