PT VOKSEL ELECTRIC Tbk.

A MEMBER OF HENGTONG GROUP

Certificate ID03/00308 Certificate ID10/01456 Certificate ID13/04527 Certificate ID21/05905 Certificate ID23/0000011 OHS.2017.SMC.SK-802

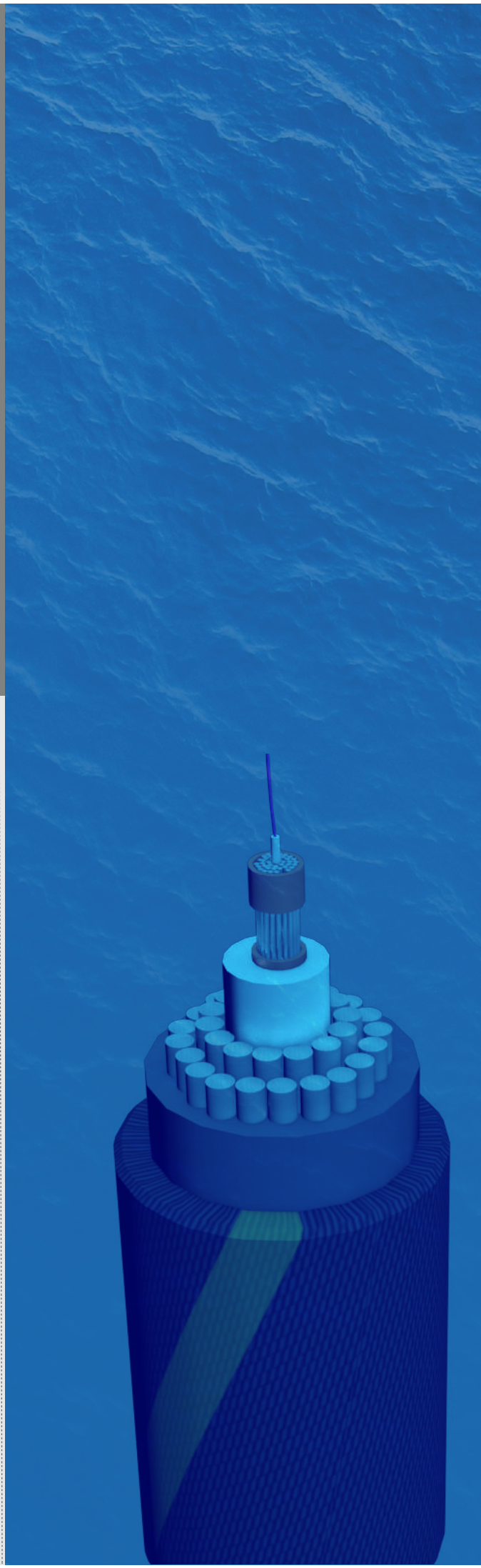
SUBMARINE CABLES

CONTENT

Unrepeatered Submarine Optical Fiber Cable

Repeatered Submarine Optical Fiber Cable

Optical Fiber Composite Submarine Cable



Product Safety Information

Read all Safety Information before using Power Cable products (Low Voltage, Medium Voltage, High Voltage & Market Cables) and Fiber Optic cable products to ensure safe and proper utilization.

CAUTION

COMPOSITION	
1. Glass Reinforced Plastic (GRP) 2. Poly Ethylene (PE) 3. Fiber Optic 4. Water Blocking Yarn (WBY) 5. Polybutylene Terephthalate 6. Ink 7. Jelly Compound 8. Water Blocking Tape 9. Aramid Binder 10. Copper Rod 11. Copper Tape 12. Aluminum 13. Water Blocking Powder 14. Water Blocking Tape 15. Cross-linked polyethylene (XLPE) 16. Poly Ethylene (PE) 17. Binder Tape 18. Polyvinyl Chloride (PVC) 19. Galvanized Steel	1. Semipermanent Drum 2. Wooden Drum 3. Nail 4. Steel plate 5. Paint 6. Semipermanent Drum 7. Wooden Drum 8. Nail 9. Steel plate 10. Paint

CABLE UTILIZATION HAZARDS

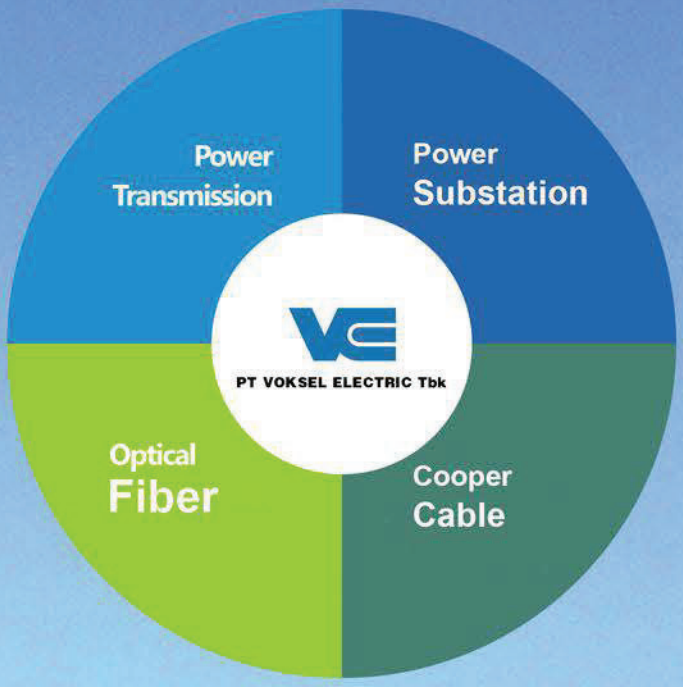
- Be careful when stripping the cable product using the cutter (wounded / slashed).
- Be careful when cutting the cable product using steel scissors.
- Wear cloth gloves when stripping “corrugate steel tape” on cable products.
- Be careful punctured "optical fiber" during the installation process.
- Be careful with “jelly fillings” which can cause irritation when peeling / cutting the cable product.
- Danger of electric currents when installing / connecting cable products (electrocuted high voltage currents).
- Be careful when stripping the cable product using the cutter.
- Be careful threatened by "double steel tape" when stripping cable products.
- Be careful threatened by "cooper wire" when stripping cable products.
- Be careful threatened by "tape screen" when stripping cable products.

PACKAGING HAZARDS

- Be careful with nails which can puncture your hands / feet when closing & opening the drum.
- Be careful when opening the "clamp plate" of the product in the form of drum (wounded / slashed).
- Be careful when stripping the cable product using the cutter (wounded / slashed).

TRANSPORT HAZARDS

- Be careful during the process of loading and unloading the drum from / to the vehicle, because it can cause a potential danger of being pinched and crushed on the hand / foot.
- Do not drop the drum from the vehicle directly. Use a forklift when loading & unloading.
- Do not push the the drum on the opposite direct of the drum arrow marked.
- Push befitting the arrow indicated on the drum. When pushing the drum, the body position must be safe from the threat of danger & ask for help to push if needed.
- To prevent the drum rolling, use chops on both sides (2 chops in front & 2 chops at the back).



VOKSEL OPTIC-ELECTRIC

Connecting A Smarter Future

VOKSEL OPTIC-ELECTRIC, a member of the VOKSEL GROUP, is a global information and energy network service provider focusing on high-end technology and products. It is adapts to telecommunications and electricity trends and is dedicated to optical communication, power distribution and transmission, and a range of special transmission applications.

COMPANY HISTORY

PT. Voksel Electric Tbk. issued its initial public offering in the Jakarta Stock Exchange (now Indonesia Stock Exchange) and Surabaya Stock Exchange on December 20, 1990.

1971 PT. Voksel Electric Tbk was founded as a small factory producing low voltage electrical cable and wire.

1975 The Company has expanded its facilities to produce enameled wire, and automotive cable.

1980 During the 80's the Company managed to acquire an aluminum wire rods producer, and an aluminum casting alloys producer, PT. Alcarindo Prima and PT. Alcas Dharma Pratama. With the support of these new subsidiaries, the company expanded into a wider range of products, producing various aluminum cable and conductors.

1987 The Company also started to produce telecommunication cable and enter the telecommunication market.

1989 The Company changed from domestic investment company into a foreign investment through a joint venture operation with Showa Electric Wire & Cable Co, Ltd. Japan, which has facilitated the transfer of technology, and export markets. That same year, to expand its production capabilities PT. Voksel Electric Tbk. has obtained PT. Kawat Mas Prakarsa, producers of copper wire.

1990 During the 90's to support its expansion program, Voksel's shares were listed on Jakarta and Surabaya Stock Exchange, and successfully generated the required fund to increase the production output and expand its facilities.

1993 The Company expanded its market by producing medium voltage cables.

1997 Through the Technical Cooperation with Showa Electric Wire & Cable Co, Ltd. Japan, the Company finally produces Optical Fiber Cable.

2004 PT. Prima Mitra Elektrindo was set up as a main distributor for building and industrial cables.

2006 PT. Bangun Prima Semesta was set up as an engineering company specializing in power transmission and distribution networks and telecommunication distribution networks.

2008 The Company has expanded its Optical Fiber Cable production capacity to 1 million single core km per year.

2009 Cendikia Global Solusi was set up as a telecommunication network provider focusing on last mile network.

2010 The Company has acquired ISO 9001:2008, ISO 14001 and OHSAS 18001 certification from SGS Yarsley International Certification Services, Ltd.

OUR MARKET

PT. Voksel Electric Tbk. manufactures almost 40% of its production for export markets. The Company remains dedicated and continues to expand our coverage and experience for export market in Brunei, Philippines, Singapore, Malaysia, Thailand, Cambodia, Vietnam, Srilanka, Myanmar, Hong Kong, India, Bangladesh, Japan, Nepal, Korea, UAE, Yemen, Fiji Island, Australia, Egypt, Cyprus, Brazil, Pakistan, Dubai, Abu Dhabi, Mauritius, Nigeria, Sudan, Ethiopia, Congo and Bhutan.

For domestic market, PT. Voksel Electric Tbk. is the leading Power Cable supplier for PT. Perusahaan Listrik Negara (PLN).
The Company is also one of the main telecommunication Optical Fiber Cable suppliers for PT. Telekomunikasi Indonesia Tbk. (Telkom).

Industry Locations

34 Sales&service Institutions	**5** Brands
120 Operating In 120 Countries	**9** Overseas Manufacturing Bases

INDONESIA

PT Voksel Eletric Tbk.
LV/HV Power cable/Copper communication cables /Optic fiber/OPGW

SOURTH AFRICA

Aberdare Cable Proprietary Limited
LV/MV/HV power cables / Overhead bare conductors

SPAIN

Cables De Comunicaciones Zaragoza,s.l
Optical fiber / Data cables / Digital signal cable for railway

PORTUGAL

Alcobre - Condutores Eléctricos, S.a.
Telecommunication cables /LV power cables/ Digital signal cable for railway

Sales & technical service institution

Indonesia	Peru
Jordan	Thailand
Iran	Myanmar
Egypt	Vietnam
Algeria	United Arab Emirates
Kenya	Cambodia
Nigeria	Philippines
South Africa	Malaysia
Mozambique	Sri_Lanka
Ethiopia	Taiwan
Congo	Australia
Ghana	Pakistan
Sudan	India
Zambia	Russia
Columbia	Turkey
Chile	Poland
Brazil	Ecuador

Company Introduction

Company Introduction

PT Voksel Electric Tbk. Located in Cileungsi, Bogor. It manufactures Power Cables with Aluminium consumption by 68,500 tons per year, the use of copper to 21,000 tons per year and the use of 1.8 million km per year for Optical Fiber Cable. In addition, it also has the latest technology machines and applies strict quality control in order to be able to produce electric wire and cable operator with international standards. The factory also has adequate warehouse with tight security at the entrance and exit of goods which makes the loading and unloading prosesses faster.

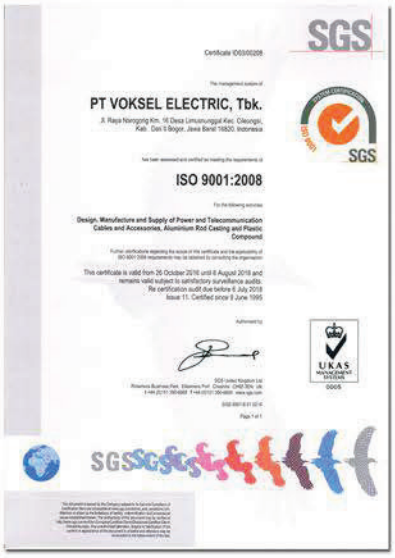



Project




Certification

ISO 14001 : 2004

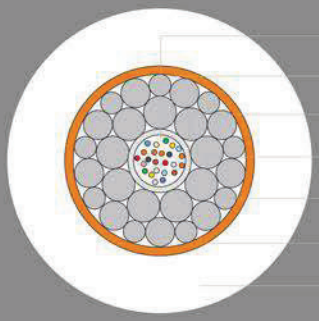


ISO 19001 : 2008

ISO 19001 : 2008

PROPER

Unrepeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath

HOUC-1 LW

Fiber	G652D or G654
Fiber count	1-24 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.4mm
PE	Nature Color HDPE

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply an electrical tone for cable tracking and fault location.

Applications

- Suitable for large capacity optical transmission systems with maximum 5000 meters water depth.

Operation and installation temperature range:-10°C~40°C

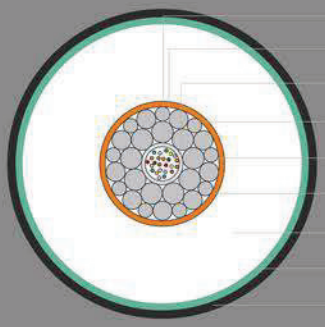
storage temperature range:-30°C~60°C

Technical Specification

Type		HOUC-1 LW
Nominal OD(mm)		13.6
Nominal Weight (kg/km)	In air	444
	In water	295
CBL(kN)		65
NTTS(kN)		50
NOTS(kN)		30
NPTS(kN)		20
No Load Min Bend Radius(m)		1.0
Crush(kN)		15
Impact(N.m)		60
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.5

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Unrepeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Metal Tape
- PE Sheath

HOUC-1 LWP

Fiber	G652D or G654
Fiber count	1-24 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.4mm
PE	Nature Color HDPE
Tape	Corrugated Steel Tape
PE	Black HDPE

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply an electrical tone for cable tracking and fault location.

Applications

- Suitable for large capacity optical transmission systems with maximum 4000 meters water depth.

Operation and installation temperature
range:-10℃~40℃

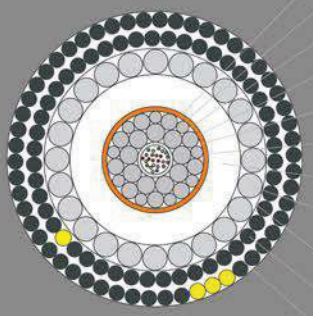
storage temperature
range:-30℃~60℃

Technical Specification

Type		HOUC-1 LWP
Nominal OD(mm)		18.1
Nominal Weight (kg/km)	In air	617
	In water	353
CBL(kN)		65
NTTS(kN)		50
NOTS(kN)		30
NPTS(kN)		20
No Load Min Bend Radius(m)		1.0
Crush(kN)		15
Impact(N.m)		60
Operating Temp.(℃)		-10 to +40
Storage Temp.(℃)		-30 to +60
DC Resistance(Ω/km)		< 1.5

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Unrepeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt

HOUC-1 SAL

Fiber	G652D or G654
Fiber count	1-24 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.4mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel Wire (GSW)
Outer Sheath	PP Rope

TLC

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

Applications

- Suitable for large capacity optical transmission systems with maximum 2000 meters water depth.

Technical Specification

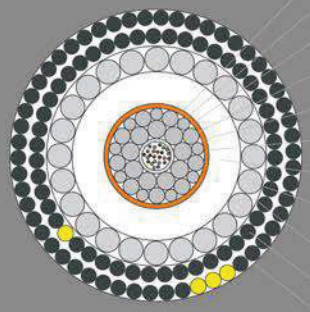
Type		HOUC-1 SAL
Nominal OD(mm)		24.6
Nominal Weight (kg/km)	In air	1150
	In water	709
CBL(kN)		140
NTTS(kN)		100
NOTS(kN)		65
NPTS(kN)		50
No Load Min Bend Radius(m)		1.0
Crush(kN)		35
Impact(N.m)		200
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.5

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Operation and

storage

Unrepeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt

HOUC-1 SA

Fiber	G652D or G654
Fiber count	1-24 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.4mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel Wire (GSW)
Outer Sheath	PP Rope

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

Applications

- Suitable for large capacity optical transmission systems with maximum 2000 meters water depth.

Technical Specification

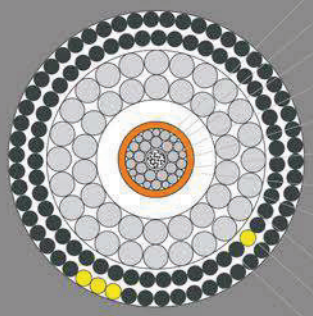
Type		HOUC-1 SA
Nominal OD(mm)		26.2
Nominal Weight (kg/km)	In air	1443
	In water	940
CBL(kN)		190
NTTS(kN)		150
NOTS(kN)		100
NPTS(kN)		75
No Load Min Bend Radius(m)		1.0
Crush(kN)		35
Impact(N.m)		250
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.5

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Operation and

storage

Unrepeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt

HOUC-1 DA

Fiber	G652D or G654
Fiber count	1-24 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.4mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel Wire (GSW)
Outer Sheath	PP Rope

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

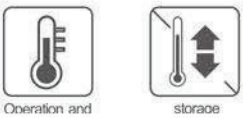
Applications

- Suitable for large capacity optical transmission systems with maximum 600 meters water depth.

Technical Specification

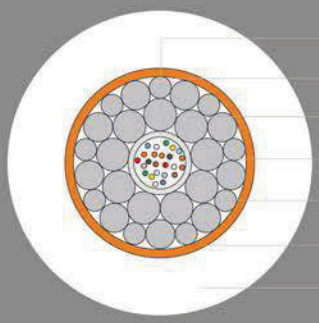
Type		HOUC-1 DA
Nominal OD(mm)		31.6
Nominal Weight (kg/km)	In air	2594
	In water	1850
CBL(kN)		340
NTTS(kN)		240
NOTS(kN)		160
NPTS(kN)		120
No Load Min Bend Radius(m)		1.0
Crush(kN)		40
Impact(N.m)		300
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.5

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.



Operation and storage

Repeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath

HORC-1 LW

Fiber	G652D or G654
Fiber count	1-16 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.6mm
PE	Nature Color HDPE

TLC

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply power for subsea repeaters and an electrical tone for cable tracking, depth of burial measurement and fault location.

Applications

- Suitable for long distance repeatered optical transmission systems with maximum 8000 meters water depth.The cable has to be integrated with subsea repeaters.

Operation and installation temperature

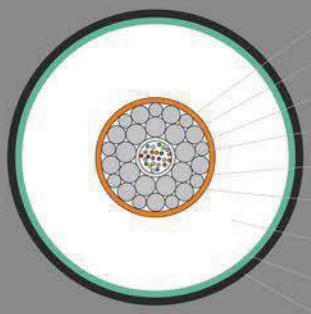
storage temperature range:-30°C~60°C

Technical Specification

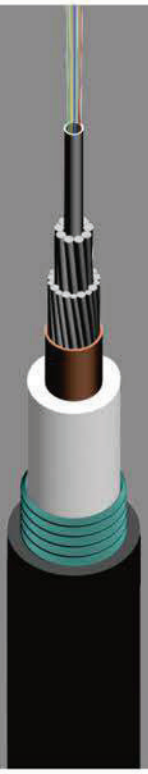
Type		HORC-1 LW
Nominal OD(mm)		18.0
Nominal Weight (kg/km)	In air	589
	In water	328
CBL(kN)		65
NTTS(kN)		50
NOTS(kN)		30
NPTS(kN)		20
No Load Min Bend Radius(m)		1.0
Crush(kN)		15
Impact(N.m)		100
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.0

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Repeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Metal Tape
- PE Sheath



HORC-1 LWP

Fiber	G652D or G654
Fiber count	1-16 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.6mm
PE	Nature Color HDPE
Tape	Corrugated Steel Tape
PE	Black HDPE

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply power for subsea repeaters and an electrical tone for cable tracking, depth of burial measurement and fault location.

Applications

- Suitable for long distance repeatered optical transmission systems with maximum 7000 meters water depth.

  The cable has to be integrated with subsea repeaters.

Operation and installation temperature range:-10°C~40°C

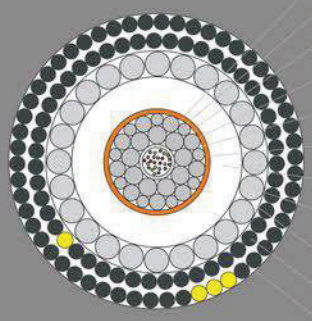
storage temperature range:-30°C~60°C

Technical Specification

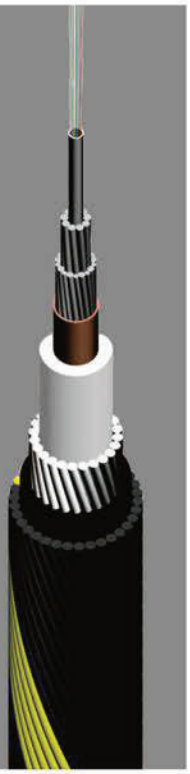
Type		HORC-1 LWP
Nominal OD(mm)		22.5
Nominal Weight (kg/km)	In air	809
	In water	401
CBL(kN)		65
NTTS(kN)		50
NOTS(kN)		30
NPTS(kN)		20
No Load Min Bend Radius(m)		1.0
Crush(kN)		15
Impact(N.m)		100
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.0

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Repeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt



HORC-1 SAL

Fiber	G652D or G654
Fiber count	1-16 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.6mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel wire(GSW)
Outer Sheath	PP Rope

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply power for subsea repeaters and an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

Applications

- Suitable for long distance repeatered optical transmission systems with maximum 2000 meters water depth.

Technical Specification

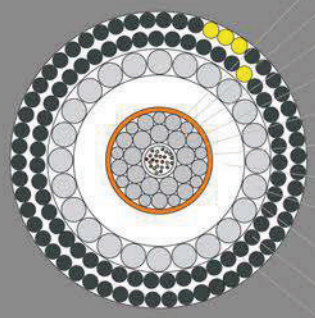
Type		HORC-1 SAL
Nominal OD(mm)		29.4
Nominal Weight (kg/km)	In air	1852
	In water	1155
CBL(kN)		200
NTTS(kN)		150
NOTS(kN)		100
NPTS(kN)		75
No Load Min Bend Radius(m)		1.0
Crush(kN)		35
Impact(N.m)		200
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.0

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

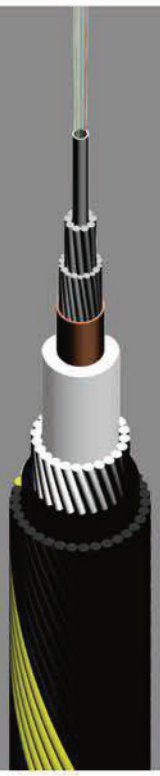
Operation and

storage

Repeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt



HORC-1 SA

Fiber	G652D or G654
Fiber count	1-16 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.6mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel wire(GSW)
Outer Sheath	PP Rope

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply power for subsea repeaters and an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

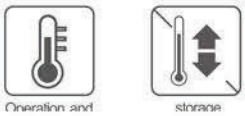
Applications

- Suitable for long distance repeatered optical transmission systems with maximum 2000 meters water depth.

Technical Specification

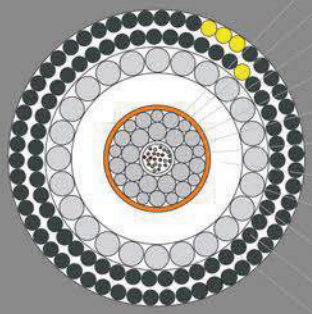
Type		HORC-1 SA
Nominal OD(mm)		31.6
Nominal Weight (kg/km)	In air	2355
	In water	1561
CBL(kN)		275
NTTS(kN)		210
NOTS(kN)		140
NPTS(kN)		100
No Load Min Bend Radius(m)		1.0
Crush(kN)		40
Impact(N.m)		300
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.0

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.



Operation and storage

Repeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt

HORC-1 SA

Fiber	G652D or G654
Fiber count	1-16 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.6mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel wire(GSW)
Outer Sheath	PP Rope

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armor consists of two layers of high strength steel wires surrounded by compound.
- The copper conductor can be used to apply power for subsea repeaters and an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

Applications

- Suitable for long distance repeatered optical transmission systems with maximum 2000 meters water depth.

Technical Specification

Type		HORC-1 SA
Nominal OD(mm)		31.6
Nominal Weight (kg/km)	In air	2355
	In water	1561
CBL(kN)		275
NTTS(kN)		210
NOTS(kN)		140
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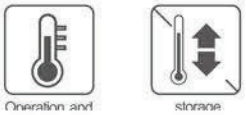
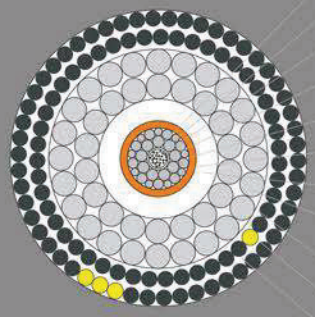
No Load Min Bend Radius(m)		1.0
Crush(kN)		40
Impact(N.m)		300
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.0

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.



Operation and storage

Repeatered Submarine Optical Fiber Cable



- Fiber
- Fiber Gel
- FIMT
- Inner Armoring Steel
- Water Blocking Gel
- Copper Tube
- PE Sheath
- Outer Armoring Steel
- Asphalt
- PP Rope
- Asphalt

HORC-1 DA

Fiber	G652D or G654
Fiber count	1-16 cores
Inner Armor	Phosphated Steel Wire(PSW)
Copper Tube	Thickness 0.6mm
PE	Nature Color HDPE
Outer Armor	Galvanised Steel wire(GSW)
Outer Sheath	PP Rope

Features

- The Fiber In Metal Tube (FIMT) provides effective protection against water ingress, mechanical & external forces and prevents hydrogen induced loss.
- The inner armour consists of two layers of high strength steel wire surrounded by compound.
- The copper conductor can be used to apply power for subsea repeaters and an electrical tone for cable tracking, depth of burial measurement and fault location.
- The LW cable core can be armoured with single or double layers of GSW to give the cable increased tensile strength, excellent abrasion protection and enhanced crush and impact resistance.
- Asphalt is added onto the armor, rope and sheath.

Applications

- Suitable for long distance repeatered optical transmission systems with maximum 600 meters water depth.

Technical Specification

Type		HORC-1 DA
Nominal OD(mm)		39.2
Nominal Weight (kg/km)	In air	4530
	In water	3293
CBL(kN)		560
NTTS(kN)		420
NOTS(kN)		280
NPTS(kN)		200
No Load Min Bend Radius(m)		1.0
Crush(kN)		50
Impact(N.m)		400
Operating Temp.(°C)		-10 to +40
Storage Temp.(°C)		-30 to +60
DC Resistance(Ω/km)		< 1.0

• The min bend radius can be adjusted depending on the time duration over which the cable bend is sustained.

Operation and

storage

127/220kV Three Core Optical Fiber Composite Submarine Cable

- Water blocking conductor
- Conductor screen
- XLPE insulation
- Insulation screen
- Longitudinal water blocking layer
- Metallic sheath (Lead alloy)
- Semi-conductive PE sheath
- Filler
- Binder tape
- Inner layer
- Galvanized steel wire
- Optic fiber unit
- Serving

Operational performance

1. Maximal allowable working temperature of the cable conductor is 90°C
2. Under short circuit condition with maximal duration not exceeding 5s, the operating temperature of cable conductor shall not exceed 250°C
3. Installed temperature shall not be lower than 0°C.
4. Cable shall meet smart gird control, transmit communication signal,and realize safety early warning and temperature measure control.
5. Factory joint shall have the same electric and mechanical performance of the main body of the cable.

Conductor	400~1600mm^2 annealed stranded wire
Insulation	XLPE
Armour	Galvanized steel wire
Metallic sheath	Lead alloy
Temperature	–30ºC ~+90ºC
Rated voltage	127/220kV
Scope of application	applies to solidly earthed system with power frequency of 50-60 Hz and rated voltage of 127/220kV(U_m=245kV).Mainly used for high-power electric power transmission between mainland and island,island and island or mainland and platform; control signal transmission of smart grid and communication signal transmission.

Installation temperature Min.0°C

Max. operating temperature:90°C

Max. short circuit temperature:250°C

In air

In conduit

127/220kV Three Core Optical Fiber Composite Submarine Cable

- Water blocking conductor
- Conductor screen
- XLPE insulation
- Insulation screen
- Longitudinal water blocking layer
- Metallic sheath (Lead alloy)
- Semi-conductive PE sheath
- Filler
- Binder tape
- Inner layer
- Galvanized steel wire
- Optic fiber unit
- Serving

Operational performance

1. Maximal allowable working temperature of the cable conductor is 90°C
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Conductor	400~1600mm^2 annealed stranded wire
Insulation	XLPE
Armour	Galvanized steel wire
Metallic sheath	Lead alloy
Temperature	–30ºC ~+90ºC
Rated voltage	127/220kV
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Installation temperature Min.0°C

Max. operating temperature:90°C

Max. short circuit temperature:250°C

In air

In conduit

Specification		mm^2	3x400	3x500	3x630	3x800	3x1000	3x1200	3x1400	3x1600
Conductor O.D.(approx.)		mm	23.4	26.6	29.9	33.6	38.5	42.2	45.6	48.4
XLPE Insulation Thickness(nom.)		mm	27.0	27.0	26.0	25.0	24.0	24.0	24.0	24.0
Cable O.D.(approx.)		mm	249. 5	256. 4	259.7	263.7	270.4	297.7	287.4	295.2
Min. Bending Radius		mm	3742. 5	3846. 0	3895. 5	3955. 5	4056. 0	4195. 5	4311. 0	4428. 0
Weight	Air	kg/km	126084	134363	139446	147336	156604	170258	180847	192347
	Sea	kg/km	77193	82730	86476	92721	99179	108815	115974	123905
Maximal Tensile Strength	Armor	kN	265.8	275. 6	278. 0	285. 3	290. 2	302. 4	312. 1	321. 9
	Conductor	kN	84. 0	105. 0	132. 3	168. 0	210. 0	252. 0	294. 0	336. 0

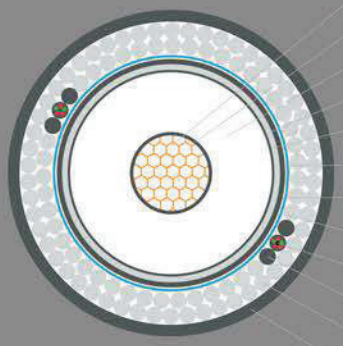
Electrical Parameters

Resistance	Max. DC Resistance at20℃	Ω/km	0.047	0.0366	0.0283	0.0221	0.0176	0.0151	0.0129	0.0113
	Max. AC Resistance at 90℃	Ω/km	0.061	0.0486	0.0387	0.0315	0.0247	0.0218	0.0193	0.0176
Capacitance		μF/km	0.117	0.124	0.137	0.151	0.166	0.179	0.188	0.197
Inductance		mH/km	0.475	0.459	0.439	0.419	0.398	0.387	0.378	0.370
Design Power (Reference power factor 0. 85)		MVA	164.2	181. 7	200. 5	218. 0	237. 7	258. 5	273. 7	286. 6
Max short circuit current of conductor		kA/1s	57.8	72.2	91.0	115.6	144.5	173.4	202.2	231.1
Max short circuit current of Lead sheath		kA/1s	17.6	18.7	19.3	20.7	22.7	24.5	26.3	28.1

Ampacity

Ampacity	Seabed	A	683	760	844	922	1018	1106	1174	1231
	Intertidal zone	A	614	682	754	820	899	976	1035	1084
	Land	A	507	561	619	673	734	798	845	885

127/220kV Single Core Optical Fiber Composite Submarine Cable



- Water blocking conductor
- Conductor screen
- XLPE insulation
- Insulation screen
- Longitudinal waterblocking layer
- Metallic sheath(Lead alloy)
- Semi-conductive PE sheath
- Inner covering
- Optional fiber unit
- Filler
- Armor
- Serving

Operational performance

1. Maximal allowable working temperature of the cable conductor is 90°C
2. Under short circuit condition with maximal duration not exceeding 5s, the operating temperature of cable conductor shall not exceed 250°C
3. Installed temperature shall not be lower than 0°C.
4. Cable shall meet smart gird control, transmit communication signal,and realize safety early warning and temperature measure control.
5. Factory joint shall have the same electric and mechanical performance of the main body of the cable.

Conductor	400~2500mm^2 annealed stranded wire
Insulation	XLPE
Armour	Galvanized steel wire
Metallic sheath	Lead alloy
Temperature	–30ºC ~+90ºC
Rated voltage	127/220kV
Scope of application	applies to solidly earthed system with power frequency of 50-60 Hz and rated voltage of 127/220kV(U_m=245kV).Mainly used for high-power electric power transmission between mainland and island,island and island or mainland and platform; control signal transmission of smart grid and communication signal transmission.

Installation temperature Min.0°C

Max. operating temperature:90°C

Max. short circuit temperature:250°C

In air

In conduit

Specification		mm^2	1x400	1x500	1x630	1x800	1x1000	1x1200	1x1400	1x1600	1x1800	1x2000	1x2200	1x2500
Conductor O.D.(approx.)		mm	23.4	26.6	29.9	33.6	38.5	42.2	45.6	48.4	51.8	54.7	57.4	61.2
XLPE Insulation Thickness(nom.)		mm	27.0	27.0	26.0	25.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0
Cable O.D.(approx.)		mm	136.4	139.6	140.9	143.0	146.1	150.4	154.0	157.6	160.8	164.1	167.2	171.4
Min. Bending Radius		mm	2728	2792	2818	2860	2922	3008	3080	3152	3216	3282	3344	3428
Weight	Air	kg/km	38034	40553	419664	44488	47476	51541	54722	58118	61579	65148	68419	73174
	Sea	kg/km	23422	25247	404072	28427	30712	33775	36095	38610	41271	43998	46463	50101
Maximal Tensile	Armor	kN	146.3	151.2	151.2	153.6	158.5	163.4	168.3	170.7	175.6	180.5	182.9	187.8
	Conductor	kN	28	35.0	44.1	56.0	70.0	84.0	98.0	112.0	126.0	140.0	154	175

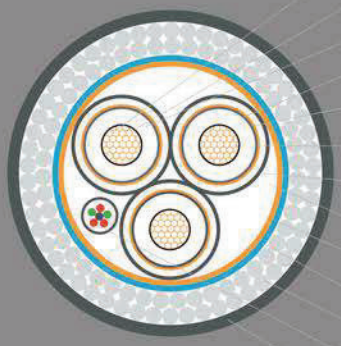
Electrical Parameters

Resistance	Max. DC Resistance at20℃	Ω/KM	0.047	0.0366	0.0283	0.0221	0.0176	0.0151	0.0129	0.0113	0.0101	0.009	0.0082	0.0072
	Max. AC Resistance at 90℃	Ω/KM	0.061	0.0486	0.0387	0.0315	0.0233	0.020	0.0174	0.0154	0.0162	0.0154	0.0142	0.0131
Capacitance		μF/km	0.117	0.124	0.137	0.151	0.166	0.179	0.188	0.197	0.205	0.213	0.22	0.23
Inductance		mH/km	0.628	0.663	0.643	0.623	0.604	0.591	0.579	0.571	0.563	0.556	0.55	0.542
Design Power (Reference power factor 0. 85)		MVA	144.8	154.5	162.6	170.4	173.6	181.1	186.2	191.7	196.9	201.8	206.0	212.2
Max short circuit current of conductor		kA/1s	57.8	72.2	91.0	115.6	144.5	173.4	202.2	231.1	26.0	288.9	317.8	361.2
Max short circuit current of Lead sheath		kA/1s	17.61	18.69	19.3	20.69	22.74	24.53	26.3	28.07	29.82	31.6	33.37	35.5

Ampacity

Ampacity	Seabed	A	684	741	792	841	874	917	949	982	1011	1047	1066	1101
	Intertidal zone	A	583	626	663	698	716	749	772	796	818	840	859	885
	Land	A	447	477	502	526	536	559	575	592	608	623	636	655

64/110kV Three Core Optical Fiber Composite Submarine Cable



- Water blocking conductor
- Conductor screen
- XLPE insulation
- Insulation screen
- Longitudinal waterblocking layer
- Metallic sheath(Lead alloy)
- Semi-conductive PE sheath
- Filler
- Binder tape
- Inner covering
- Galvanized steel wire
- Optic fiber unit
- Serving

Operational performance

1. Maximal allowable working temperature of the cable conductor is 90°C
2. Under short circuit condition with maximal duration not exceeding 5s, the operating temperature of cable conductor shall not exceed 250°C
3. Installed temperature shall not be lower than 0°C.
4. Cable shall meet smart gird control, transmit communication signal,and realize safety early warning and temperature measure control.
5. Factory joint shall have the same electric and mechanical performance of the main body of the cable.

Conductor	240~1600mm^2 annealed stranded wire
Insulation	XLPE
Armour	Galvanized steel wire
Metallic sheath	Lead alloy
Temperature	–30ºC ~+90ºC
Rated voltage	64/110kV
Scope of application	applies to solidly earthed system with power frequency of 50-60 Hz and rated voltage of 64/110kV(U_0=126kV).Mainly used for high-power electric power transmission between mainland and island,island and island or mainland and platform; control signal transmission of smart grid and communication signal transmission.

Installation temperature Min.0°C

Max. operating temperature:90°C

Max. short circuit temperature:250°C

In air

In conduit

Specification		mm^2	3x240	3x300	3x400	3x500	3x630	3x800	3x1000	3x1200	3x1400	3x1600
Conductor O.D.(approx.)		mm	18. 4	20.6	23.4	26.6	29.9	33.6	38.5	42.2	45.6	48.4
XLPE Insulation Thickness(nom.)		mm	19.0	18.5	17.5	17.0	16.5	16.0	16.0	16.0	16.0	16.0
Cable O.D.(approx.)		mm	195.4	198.4	201.0	205.7	210.7	217.4	228.8	237.6	245.8	253.6
Min. Bending Radius		mm	3908	3968	4020	4114	4214	4348	4576	4752	4916	5072
Weight	Air	kg/km	83172	86102	90133	96045	101949	110914	123377	134444	145398	156313
	Sea	kg/km	53185	55187	58402	62813	67082	73794	82262	90105	97946	105802
Maximal Tensile	Armor	kN	202.4	204.8	209.7	214.6	219.5	229.2	241.4	251.2	260.9	270.7
	Conductor	kN	50. 4	63.0	84.1	105.0	132.0	168.0	210.0	252.0	294.0	336.0

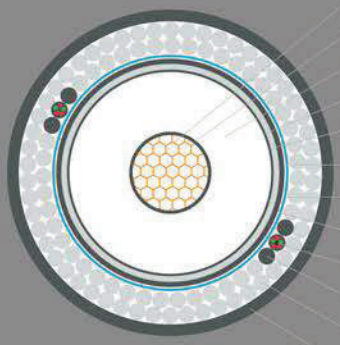
Electrical Parameters

Resistance	Max. DC Resistance at20℃	Ω/KM	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176	0.0151	0.0129	0.0113
	Max. AC Resistance at 90℃	Ω/KM	0.098	0.078	0.061	0.0486	0.0387	0.0315	0.0233	0.020	0.0174	0.0154
Capacitance		μF/km	0.125	0.135	0.153	0.169	0.186	0.207	0.223	0.242	0.256	0.269
Inductance		mH/km	0.667	0.645	0.616	0.594	0.57	0.547	0.52	0.501	0.486	0.474
Design Power (Reference power factor 0. 85)		MVA	66.4	74.0	83.1	92.1	102.0	112.6	118.7	130.7	138.3	144.9
Max short circuit current of conductor		kA/1s	34.7	43.3	57.8	72.2	91	115.6	144.5	173.4	202.2	231.1
Max short circuit current of Lead sheath		kA/1s	17.0	17.3	17.6	18.7	19.3	20.7	22.7	24.5	26.3	28.1

Ampacity

Ampacity	Seabed	A	550	616	695	776	863	957	1020	1123	1191	1250
	Intertidal zone	A	496	554	622	692	767	847	897	988	1047	1097
	Land	A	410	457	513	569	630	695	733	807	854	895

64/110kV Single Core Optical Fiber Composite Submarine Cable



- Water blocking conductor
- Conductor screen
- XLPE insulation
- Insulation screen
- Longitudinal waterblocking layer
- Metallic sheath(Lead alloy)
- Semi-conductive PE sheath
- Inner covering
- Optional fiber unit
- Filler
- Armor
- Serving

Operational performance

1. Maximal allowable working temperature of the cable conductor is 90°C
2. Under short circuit condition with maximal duration not exceeding 5s, the operating temperature of cable conductor shall not exceed 250°C
3. Installed temperature shall not be lower than 0°C.
4. Cable shall meet smart gird control, transmit communication signal,and realize safety early warning and temperature measure control.
5. Factory joint shall have the same electric and mechanical performance of the main body of the cable.

Conductor	240~1600mm^2 annealed stranded wire
Insulation	XLPE
Armour	Galvanized steel wire
Metallic sheath	Lead alloy
Temperature	–30℃ ~+90℃
Rated voltage	64/110kV
Scope of application	applies to solidly earthed system with power frequency of 50-60 Hz and rated voltage of 64/110kV(U_m=126kV).Mainly used for high-power electric power transmission between mainland and island,island and island or mainland and platform; control signal transmission of smart grid and communication signal transmission.

Installation temperature Min.0°C

Max. operating temperature:90°C

Max. short circuit temperature:250°C

In air

In conduit

Specification		mm^2	1x240	1x300	1x400	1x500	1x630	1x800	1x1000	1x1200	1x1400	1x1600
Conductor O.D.(approx.)		mm	18. 4	20.6	23.4	26.6	29.9	33.6	38.5	42.2	45.6	48.4
XLPE Insulation Thickness(nom.)		mm	19.0	18.5	17.5	17.0	16.5	16.0	16.0	16.0	16.0	16.0
Cable O.D.(approx.)		mm	111.8	113.0	114.2	116.4	118.7	121.8	127.1	131.2	135.0	138.6
Min. Bending Radius		mm	2236	2260	2284	2328	2374	2436	2542	2624	2700	2772
Weight	Air	kg/km	25369	26113	27440	29207	31039	33853	37502	40918	44235	47625
	Sea	kg/km	15552	16084	17197	18566	19973	22201	24814	27399	29921	32538
Maximal Tensile	Armor	kN	117.1	117.1	119.5	121.9	124. 4	129.2	134.1	139	143.9	148.8
	Conductor	kN	16. 8	21.0	28.0	35.0	44.1	56.0	70.0	84.0	98.0	112.0

Electrical Parameters

Resistance	Max. DC Resistance at20℃	Ω/KM	0.0754	0.0601	0.047	0.0366	0.0283	0.0221	0.0176	0.0151	0.0129	0.0113
	Max. AC Resistance at 90℃	Ω/KM	0.098	0.078	0.061	0.0486	0.0387	0.0315	0.0233	0.020	0.0174	0.0154
		μF/km	0.125	0.135	0.153	0.169	0.186	0.207	0.223	0.242	0.256	0.269
Inductance		mH/km	0.667	0.645	0.616	0.594	0.57	0.547	0.52	0.501	0.486	0.474
Design Power (Reference power factor 0. 85)		MVA	59.4	63.2	66.9	70.8	74.2	77.6	83.1	86.2	89.1	91.8
Max short circuit current of conductor		kA/1s	34.7	43.3	57.8	72.2	91	115.6	144.5	173.4	202.2	231.1
Max short circuit current of Lead sheath		kA/1s	17.0	17.3	17.6	18.7	19.3	20.7	22.7	24.5	26.3	28.1

Ampacity

Ampacity	Seabed	A	553	597	643	688	730	771	835	872	907	938
	Intertidal zone	A	475	508	542	575	605	636	684	711	737	761
	Land	A	367	390	413	437	458	479	513	532	550	567

26/35kV Three Core Optical Fiber Composite Submarine Cable

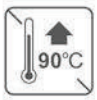
- Water blocking conductor
- Conductor screen
- XLPE insulation
- Insulation screen
- Longitudinal water blocking layer
- Metallic sheath (Lead alloy)
- Semi-conductive PE sheath
- Filler
- Binder tape
- Inner layer
- Galvanized steel wire
- Optic fiber unit
- Serving

Operational performance

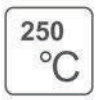
1. Maximal allowable working temperature of the cable conductor is 90°C
2. Under short circuit condition with maximal duration not exceeding 5s, the operating temperature of cable conductor shall not exceed 250°C
3. Installed temperature shall not be lower than 0°C.
4. Cable shall meet smart gird control, transmit communication signal,and realize safety early warning and temperature measure control.
5. Factory joint shall have the same electric and mechanical performance of the main body of the cable.

Conductor	70~500mm^2 annealed stranded wire
Insulation	XLPE
Armour	Galvanized steel wire
Metallic sheath	Lead alloy
Temperature	–30ºC ~+90ºC
Rated voltage	26/35kV
Scope of application	applies to solidly earthed system with power frequency of 50-60 Hz and rated voltage of 26/35kV(U_m=245kV).Mainly used for high-power electric power transmission between mainland and island,island and island or mainland and platform; control signal transmission of smart grid and communication signal transmission.

Installation temperature Min.0°C



Max. operating temperature:90°C



Max. short circuit temperature:250°C

In air

In conduit

Specification		mm^2	3x70	3x95	3x120	3x150	3x185	3x240	3x300	3x400	3x500
Conductor O.D.(approx.)		mm	10.0	11.6	13.0	14.6	16.2	18.4	20.6	23.4	26.6
XLPE Insulation Thickness(nom.)		mm	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Cable O.D.(approx.)		mm	116.6	120.1	123.5	127.4	130.8	136.4	142.0	149.4	157.1
Min. Bending Radius		mm	1749	1802	1853	1911	1962	2046	2130	2241	2357
Weight	Air	kg/km	27730	29951	31198	33706	35860	39715	43766	48878	54932
	Sea	kg/km	17052	18262	19219	20958	22432	25103	27929	31348	35539
Maximal Tensile	Armor	kN	120.2	125	127.4	132.2	137	144.2	151.4	158.6	168.2
	Conductor	kN	14.7	20.0	25.2	31.5	38.9	50.4	63.0	84.0	105.0

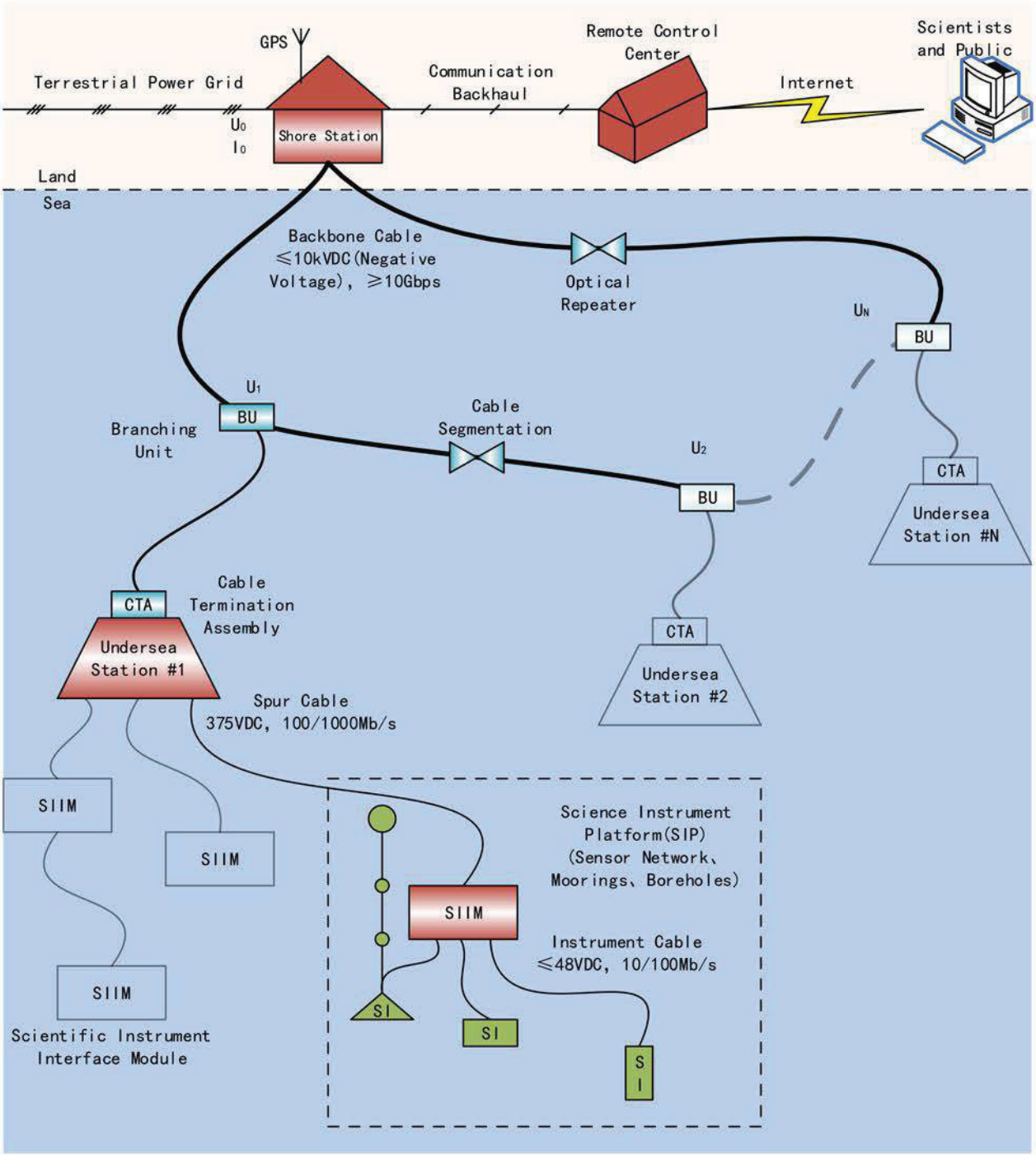
Electrical Parameters

Resistance	Max. DC Resistance at20°C	Ω/KM	0.268	0.193	0.153	0.124	0.0991	0.0754	0.0601	0.0470	0.366
	Max. AC Resistance at 90°C	Ω/KM	0.342	0.247	0.196	0.159	0.128	0.098	0.079	0.063	0.050
		μF/km	0.124	0.134	0.146	0.156	0.167	0.181	0.197	0.217	0.360
Inductance		mH/km	0.482	0.459	0.44	0.428	0.414	0.399	0.389	0.369	0.359
Design Power (Reference power factor 0. 85)		MVA	11.1	13.0	14.7	16.3	18.2	20.8	22.8	25.3	27.8
Max short circuit current of conductor		kA/1s	10.0	13.6	17.2	21.5	26.5	34.3	42.9	57.3	71.6
Max short circuit current of Lead sheath		kA/1s	18.2	19.01	19.7	21.6	22.4	24.8	27.3	29.1	32.3

Ampacity

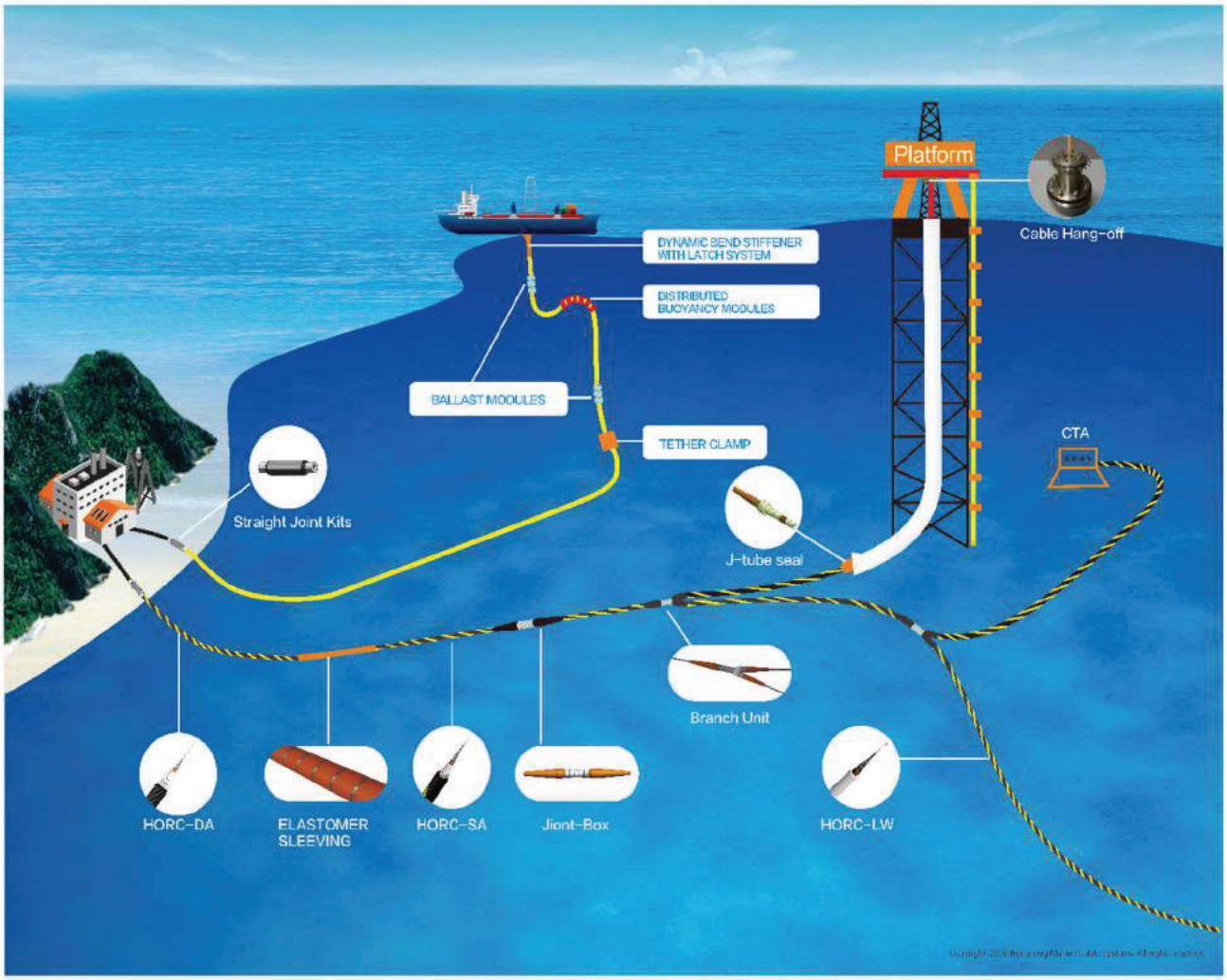
Ampacity	Seabed	A	286	340	383	427	477	544	606	676	746
	Intertidal zone	A	258	306	345	385	427	485	538	603	660
	Land	A	215	253	285	316	353	404	442	491	540

Cabled Seafloor Observatory Network



PT VOKSEL ELECTRIC Tbk

Offshore Oil And Gas Platform Communication System Solutions



Oil & Gas platform systems are tailored to meet client specifications, requirements and environmental conditions. Cable designs are suitable for static platform J-Tube pull-ins or for floating platform dynamic riser cable configurations. A full range of cable accessories including Hang-Offs, Tether Clamps, Bend Stiffeners & Cable Termination Assemblies (on Mud Mats) are also engineered for clients. Optical & electrical wet-mate connectors can be utilised to allow for future system expansion and connectivity to other subsea equipment.

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