# OCC Corporation

# Cables for Ocean-observation & Resource exploration

OCC Corporation
Sales & Marketing Department　Cable System Business Unit

Queen's Tower C 15F 2-3-5,
Minato-Mirai, Nishi-ku, Yokohama, 2206215, Japan

TEL 045-330-6633
FAX 045-330-6636
E-Mail　seihin@ml.occjp.com

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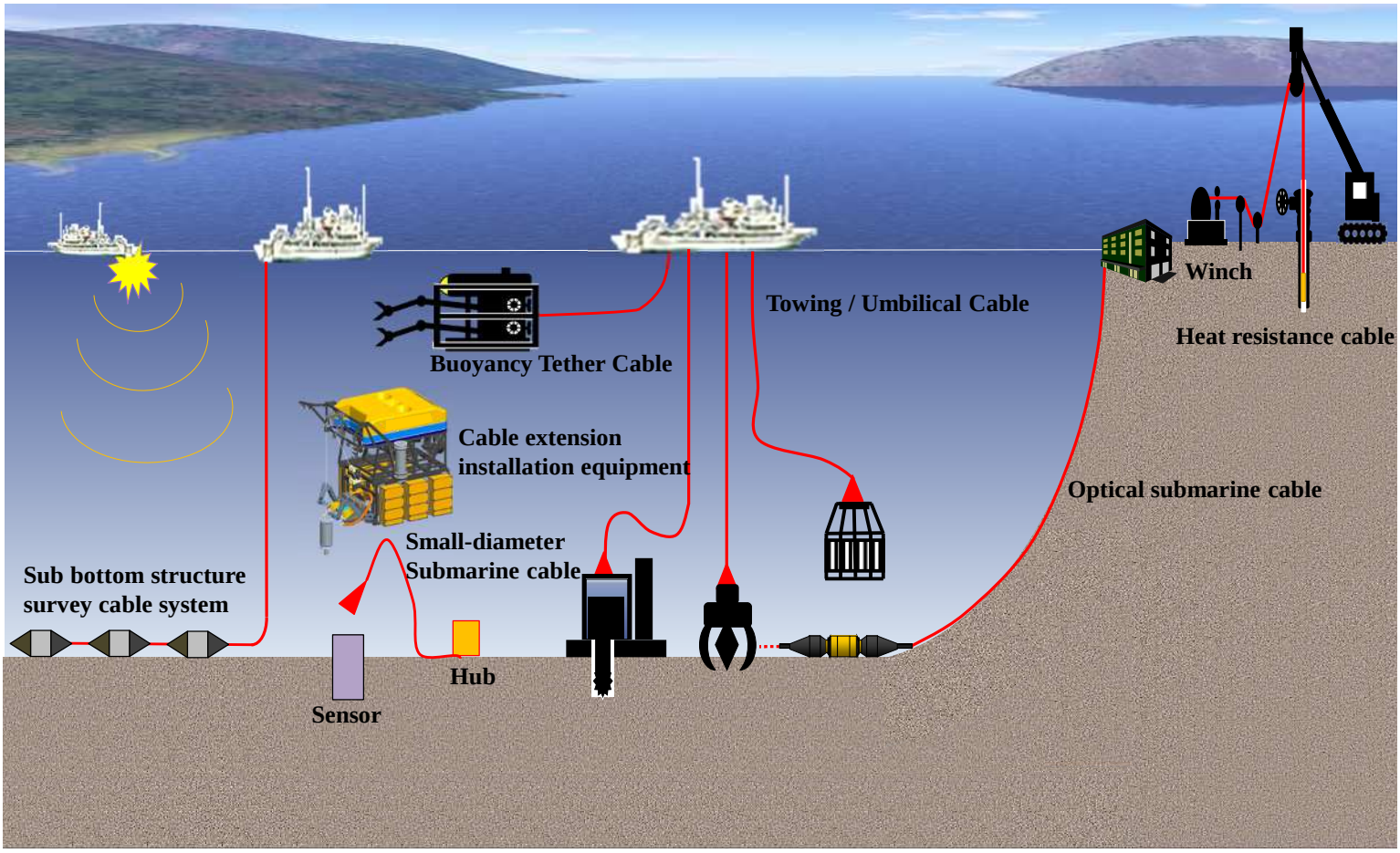
# Cables for Ocean-observation & Resource exploration

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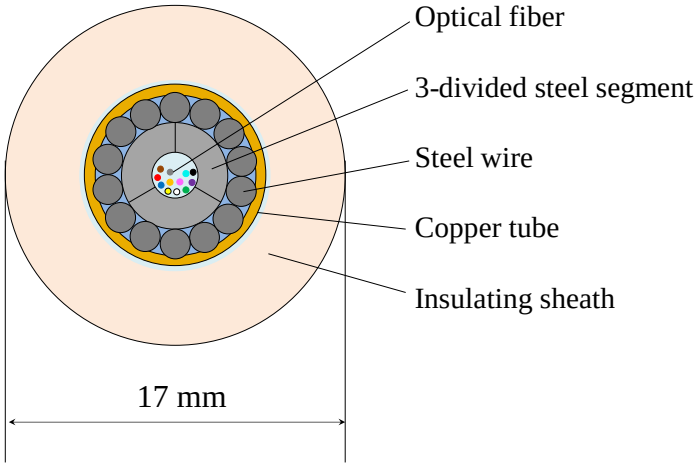
# 1. Seabed Cable

## 1.1 Optical submarine cable (LW Cable)

Features: This cable is designed to protect fibers from seabed environments at a depth of 8,000 m and maintain stable optical electrical properties over a long period of 25 years.

Applications: Transcontinental optical communication, Core cable for submarine sensing systems, etc.




| Specification | |
|---|---|
| Diameter | 17.0 mm |
| Weight in air | Approx. 612 kg/km |
| Weight in water | Approx. 388 kg/km |
| Breaking load | ≥ 77 kN |
| Conductor resistance (20℃) | ≤ 1.2 Ω/km |
| Insulation resistance (DC 500V) | ≥ $2 \times 10^5$ MΩ･km |
| Optical loss (SM 1,550nm) | ≤ 0.18 dB/km |
| Hydrostatic Pressure Resistance | ≥ 80 MPa |

*The above is a general spec. Custom design available on request.

LW Cable

LWS Cable

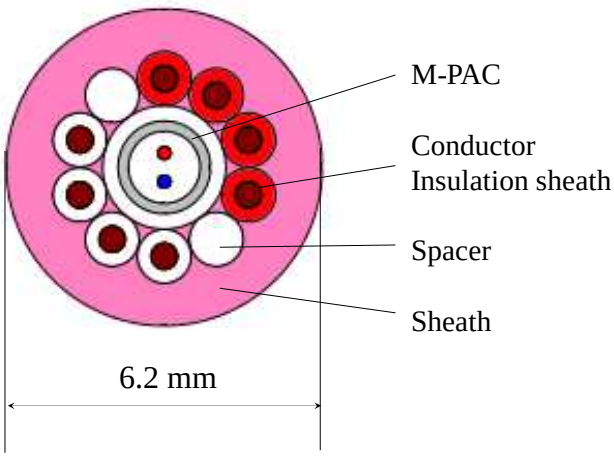
SA Cable

DA Cable

## 1.2 Small-diameter submarine cable

Features: Small diameter and light weight submarine which consist of metal pipe armored fiber (M-PAC) and electric wire.

Applications: connecting underwater equipment installed at the bottom of the sea




| Specification | |
|---|---|
| Diameter | 6.2 mm |
| Weight in air | Approx. 55 kg/km |
| Weight in water | Approx. 23 kg/km |
| Breaking load | ≥ 0.98 kN |
| Conductor resistance (20℃) | ≤ 22.0 Ω/km |
| Insulation resistance (DC500V) | ≥ 1,000 MΩ･km |
| Optical loss (SM 1,550nm) | ≤ 0.3 dB/km |
| Hydrostatic Pressure Resistance | ≥ 30 MPa |

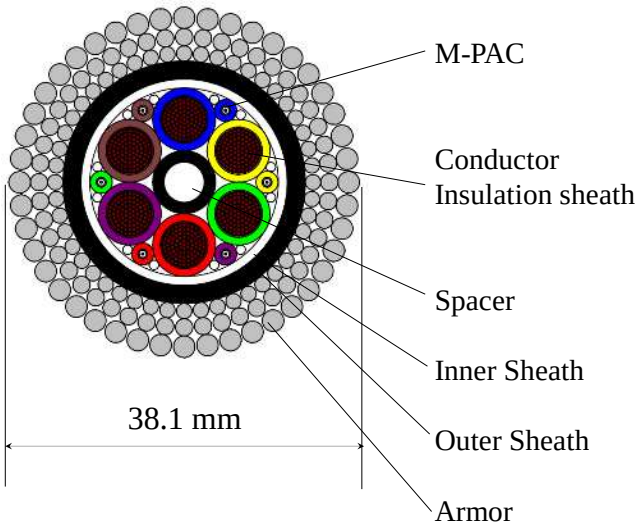
*The above is a general spec. Custom design available on request.

# 2. Towing / Umbilical Cable

## 2.1 Triple armored umbilical

Features: High-strength, torque-balanced, high-depth, optical and electrical composite cable with metal pipe armored fibers (M-PAC).

Applications: Umbilical for ROVs, boring machine, etc.



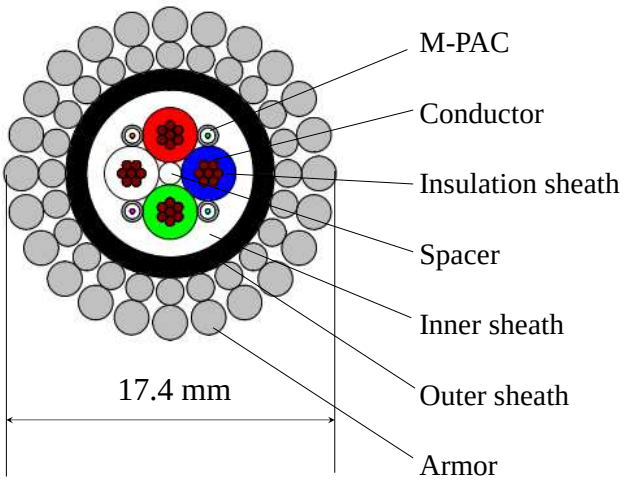

| Specification | |
|---|---|
| Diameter | 38 .1mm |
| Weight in air | Approx. 5,250 kg/km |
| Weight in water | Approx. 4,100 kg/km |
| Breaking load | ≥ 740 kN |
| Conductor resistance (20℃) | ≤ 2.0 Ω/km |
| Insulation resistance (DC500V) | ≥ 1,000 MΩ･km |
| Optical loss (SM 1,310nm) | ≤ 0.7 dB/km |
| Hydrostatic Pressure Resistance | ≥ 30 MPa |

*The above is a general spec. Custom design available on request.

## 2.2 Double armored umbilical

Features: High-strength, kink-resistant, high-depth, optical-electric composite cable with metal pipe armored fibers (M-PAC).

Applications: Umbilical for underwater towing machine, etc.



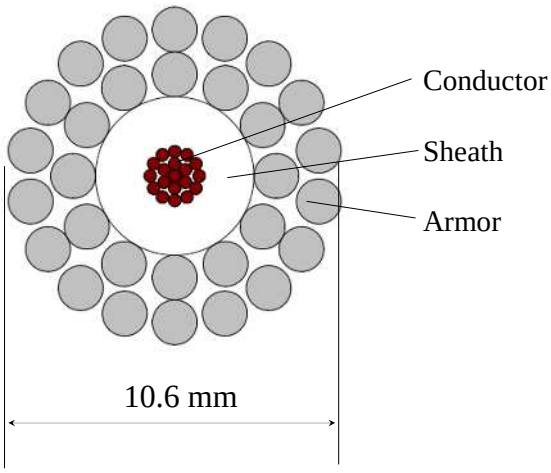

| Specification | |
|---|---|
| Diameter | 17.4 mm |
| Weight in air | Approx. 1,060 kg/km |
| Weight in water | Approx. 820 kg/km |
| Breaking load | ≥ 147 kN |
| Conductor resistance (20℃) | ≤ 18.0 Ω/km |
| Insulation resistance (DC500V) | ≥ 1,000 MΩ･km |
| Optical loss (SM 1,310nm) | ≤ 0.7 dB/km |
| Hydrostatic Pressure Resistance | ≥ 70 MPa |

*The above is a general spec. Custom design available on request.

# 2. Towing / Umbilical Cable

**2.3** Umbilical for CTD

Features: This is suitable for CTD（Conductivity Temperature Depth） profiling and can be deployed to a maximum depth of 7,000 meters.

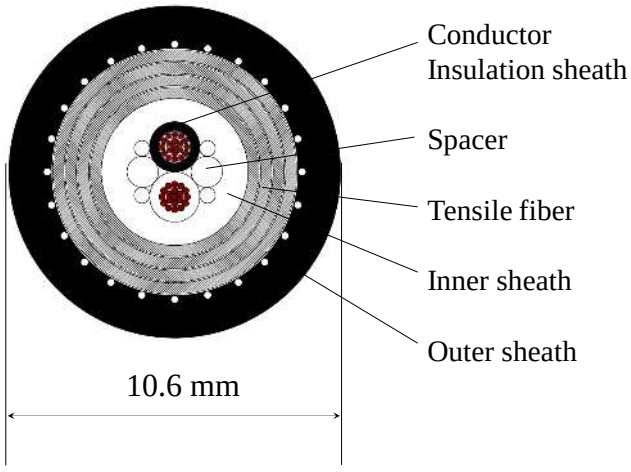



| Specification | |
|---|---|
| Diameter | 10.6 mm |
| Weight in air | Approx. 380 kg/km |
| Weight in water | Approx. 320 kg/km |
| Breaking load | ≥ 70 kN |
| Conductor resistance(20℃) | ≤ 10.0 Ω/km |
| Insulation resistance(DC500V) | ≥ 1,000 MΩ･km |
| Optical loss | — |
| Hydrostatic Pressure Resistance | ≥ 68MPa |

*The above is a general spec. Custom design available on request.

**2.4** Tensile fiber umbilical

Features: this is high-strength, lightweight cable using Tensile fibers and can be utilized to deploy CTDs at a maximum depth of 10,000 m or more.




| Specification | |
|---|---|
| Diameter | 10.6 mm |
| Weight in air | Approx. 120 kg/km |
| Weight in water | Approx. 25 kg/km |
| Breaking load | ≥ 29 kN |
| Conductor resistance(20℃) | ≤ 36.0 Ω/km |
| Insulation resistance(DC500V) | ≥ 1,000 MΩ･km |
| Optical loss | — |
| Hydrostatic Pressure Resistance | ≥ 100 MPa |

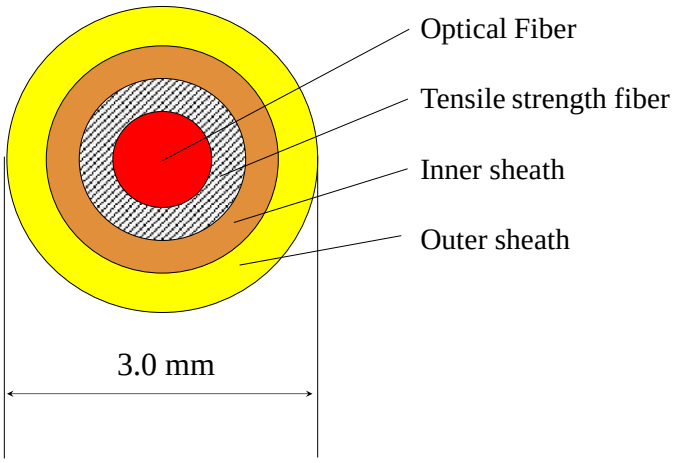
*The above is a general spec. Custom design available on request.

# 3. Buoyancy Tether Cable

**3.1** Buoyancy optical cable

Features: Small diameter, high-strength and buoyancy tether cable for ROV or Under Water Drone.
Not disturbing movement of vehicle in the water and enabling stable operation.

Applications: Tether cable for ROVs, under water camera, etc.



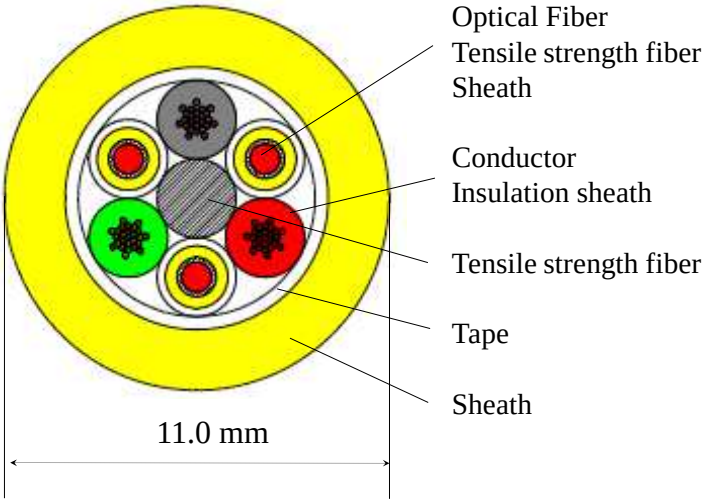

| Specification | |
|---|---|
| Diameter | 3.0 mm |
| Weight in air | Approx. 7.0 kg/km |
| Weight in water | Approx. -0.3 kg/km |
| Breaking load | ≥ 1.8 kN |
| Conductor resistance (20℃) | — |
| Insulation resistance (DC500V) | — |
| Optical loss (SM 1,310nm) | ≤ 0.4 dB/km |
| Hydrostatic Pressure Resistance | ≥ 3.0 MPa |

*The above is a general spec. Custom design available on request.

**3.2** Buoyancy O/E composite cable

Features: Buoyancy tether cable that can supply power and communication with minimal impact of the cable's own weight in water

Applications: Tether cable for ROVs, under water camera, etc.




| Specification | |
|---|---|
| Diameter | 11.0 mm |
| Weight in air | Approx. 100 kg/km |
| Weight in water | Approx. -2 kg/km |
| Breaking load | ≥1.8 kN |
| Conductor resistance (20°C) | ≤ 30.1 Ω/km |
| Insulation resistance (DC500V) | ≥ 1,000 MΩ･km |
| Optical loss (SM 1,310nm) | ≤ 0.4 dB/km |
| Hydrostatic Pressure Resistance | ≥ 2.0 MPa |

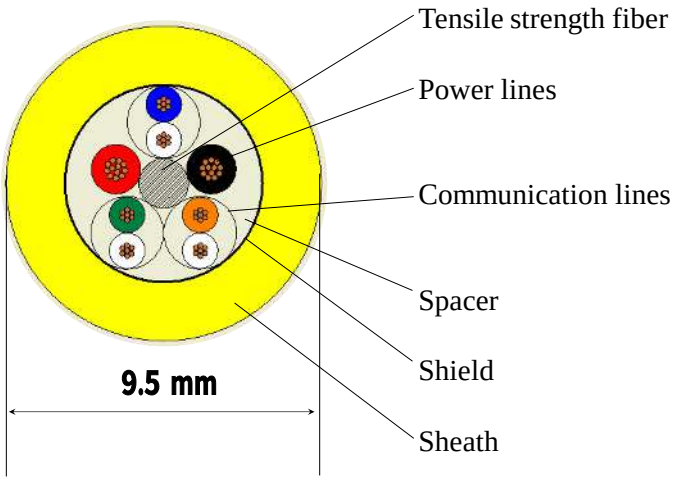
*The above is a general spec. Custom design available on request.

# 3. Buoyancy Tether Cable

## 3. 中性浮力ケーブル

**3.2** Buoyancy Power and Communication cable

Features: Buoyancy tether cable that can supply power and communication
Applications: Tether cable for ROVs, under water camera, etc.



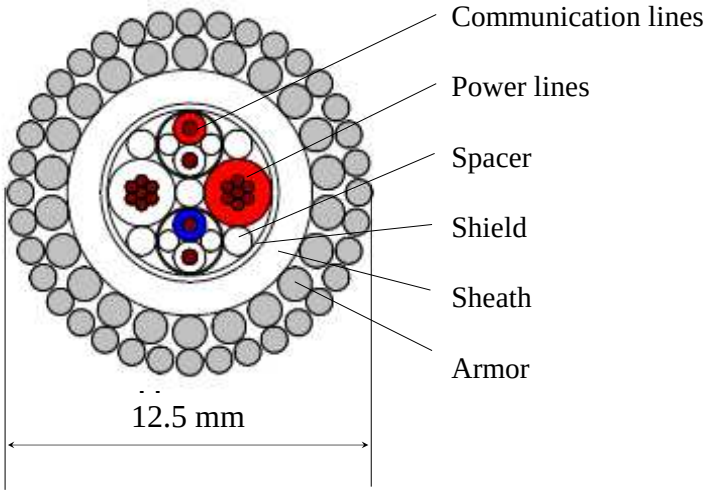

| 仕様 | |
|---|---|
| Diameter | 9.5 mm |
| Weight in air | Approx. 70.0 kg/km |
| Weight in water | ≦0 kg/km |
| Breaking load | ≧ 2.25 kN |
| Conductor resistance (20°C) | Power lines：≦66.1Ω/km Communication lines :≦144.8Ω/km |
| Insulation resistance (DC500V) | ≧1000MΩ･km |
| Optical loss (SM 1,310nm) | — |
| Hydrostatic Pressure Resistance | 1.0 MPa |

*The above is a general spec. Custom design available on request.

# 4. Heat resistance cable/ Radiation resistance Cable

**4.1** Heat resistant cable (100 °C /212 °F)

Features: This cable has a heat resistance of 100 °C (212 °F), and can be used in high temperature environments.
Applications: Seismometers, in-hole sensors, etc.

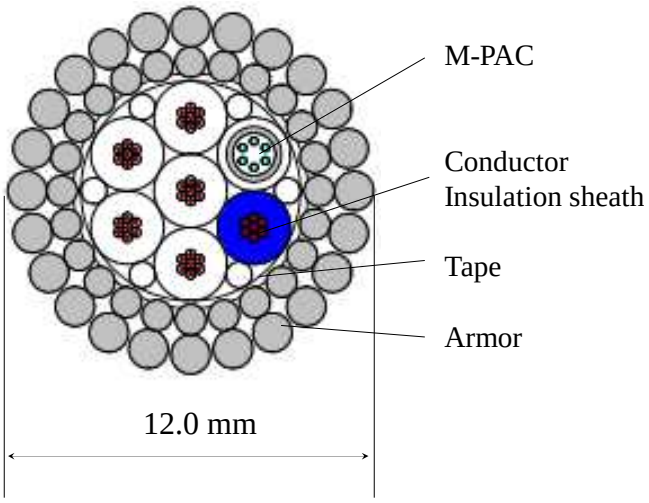



| Specification | |
|---|---|
| Diameter | 12.5 mm |
| Weight in air | Approx. 530 kg/km |
| Weight in water | Approx. 430 kg/km |
| Breaking load | ≥ 54.2 kN |
| Conductor resistance(20℃) | Communication lines ≤ 97.6 Ω/km Power lines ≤ 22.6 Ω/km |
| Insulation resistance(DC500V) | ≥ 1,000 MΩ･km |
| Optical loss | — |
| Hydrostatic Pressure Resistance | ≥ 19.6 MPa |
| Operation Temperature | -15 ～ +100 °C |

*The above is a general spec. Custom design available on request.

**4.2** Heat resistant O/E composite cable(150 °C /302 °F)

Features: This cable has a heat resistance of 150 °C(302 °F), and it can be used in high temperature environments.
Applications: Seismometers, in-hole sensors, etc.




| Specification | |
|---|---|
| Diameter | 12.0 mm |
| Weight in air | Approx. 535 kg/km |
| Weight in water | Approx. 440 kg/km |
| Breaking load | ≥ 78.4 kN |
| Conductor resistance(20℃) | ≤ 35.9 Ω/km |
| Insulation resistance(DC500V) | ≥ 1,000 MΩ･km |
| Optical loss(SM 1,310nm)<br>(GI 1,300nm)<br>(GI 850nm) | ≤ 0.7 dB/km<br>≤ 2.0 dB/km<br>≤ 4.0 dB/km |
| Hydrostatic Pressure Resistance | ≥ 19.6 MPa |
| Operation Temperature | -15 ～ +150 °C |

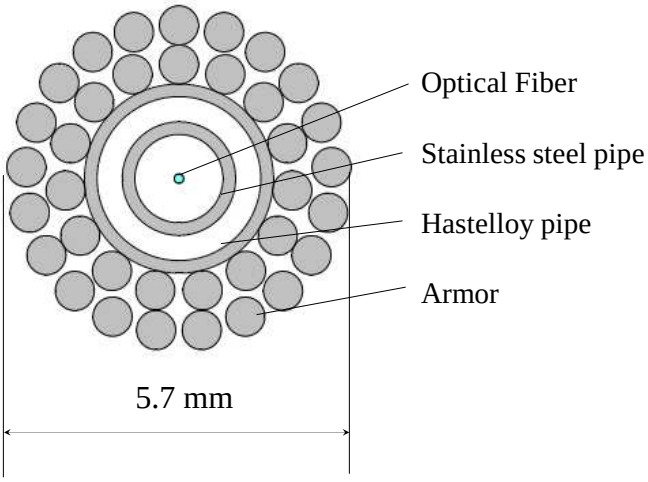
*The above is a general spec. Custom design available on request.

# 4. Heat resistance cable/ Radiation resistance Cable

**4.3** Heat resistant optical cable (300 °C /572 °F)

Features: This cable is highly heat-resistant and corrosion-resistant, with optical fiber protected with stainless steel and Hastelloy.

Applications: In-hole fiber sensing cable



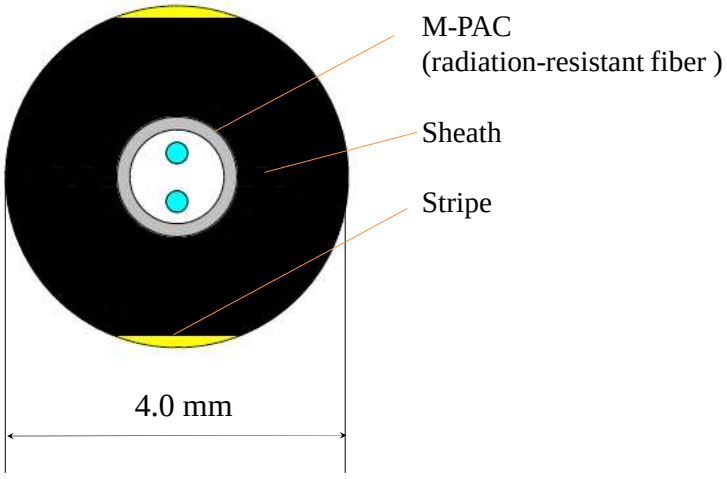

| Specification | |
|---|---|
| Diameter | 5.7 mm |
| Weight in air | Approx. 140 kg/km |
| Weight in water | Approx. 110 kg/km |
| Breaking load | ≥ 14 kN |
| Conductor resistance | — |
| Insulation resistance | — |
| Optical loss(SM 1,310nm) | ≤ 0.7 dB/km |
| Hydrostatic Pressure Resistance | ≥ 30 MPa |
| Operation Temperature | -30 ～ +300 °C |

*The above is a general spec. Custom design available on request.

**4.4** Radiation resistance Cable

Features: This cable consists of a radiation-resistant fiber protected by a metal tube. It can also be used under high radiation area.

Applications: Communication and optical sensing in high-radiation areas




| Specification | |
|---|---|
| Diameter | 4.0 mm |
| Weight in air | Approx. 20 kg/km |
| Weight in water | — |
| Breaking load | ≥ 0.4 kN |
| Conductor resistance | — |
| Insulation resistance | — |
| Optical loss(GI 1,300nm) | ≤ 1.0 dB/km |
| Hydrostatic Pressure Resistance | — |
| Operation Temperature | -40 ～ +60 °C |

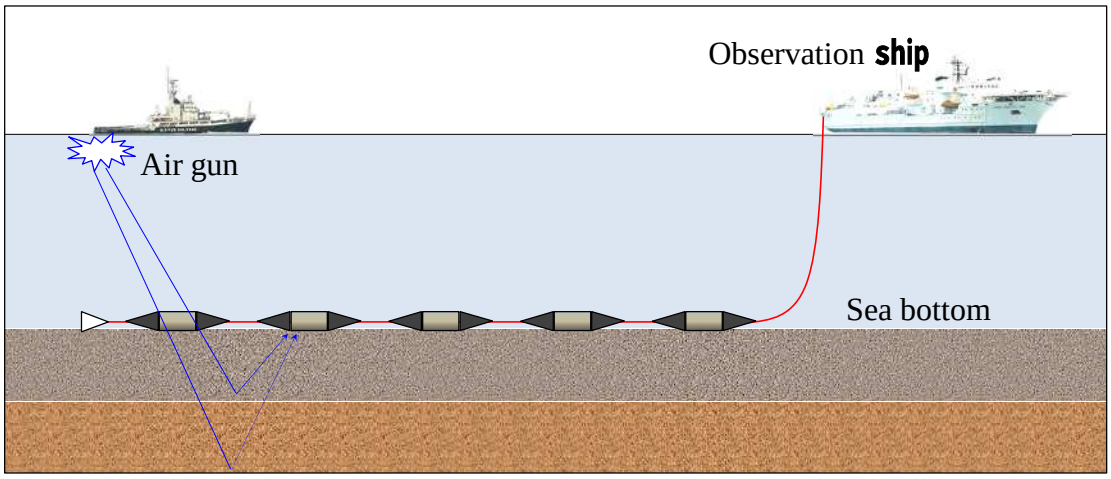
*The above is a general spec. Custom design available on request.

# 5. Cable System/Equipment

**5.1** Sub bottom structure survey cable system

Features: This system collects reflection and refraction waves with high S/N. The receivers can be buried directly under seabed.

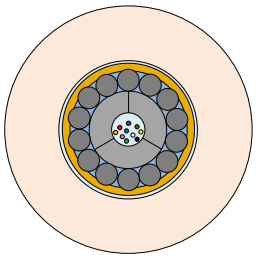
Applications: Refraction seismic sub bottom structure survey, Reflection seismic sub bottom structure survey.




| Specification | |
|---|---|
| Sensor | 3 axis Accelerometers, Hydrophone |
| Hydrostatic Pressure Resistance | ≥ 20 MPa |
| Receiver interval | 25 m ～ |
| Cable | Optical submarine cable |
| Sampling rate | 1 kHz |
| A/D | 24 bit |
| Receiver size | 1,600 mm×Φ136 mm |

*The above is a general spec. Custom design available on request.

Receiver



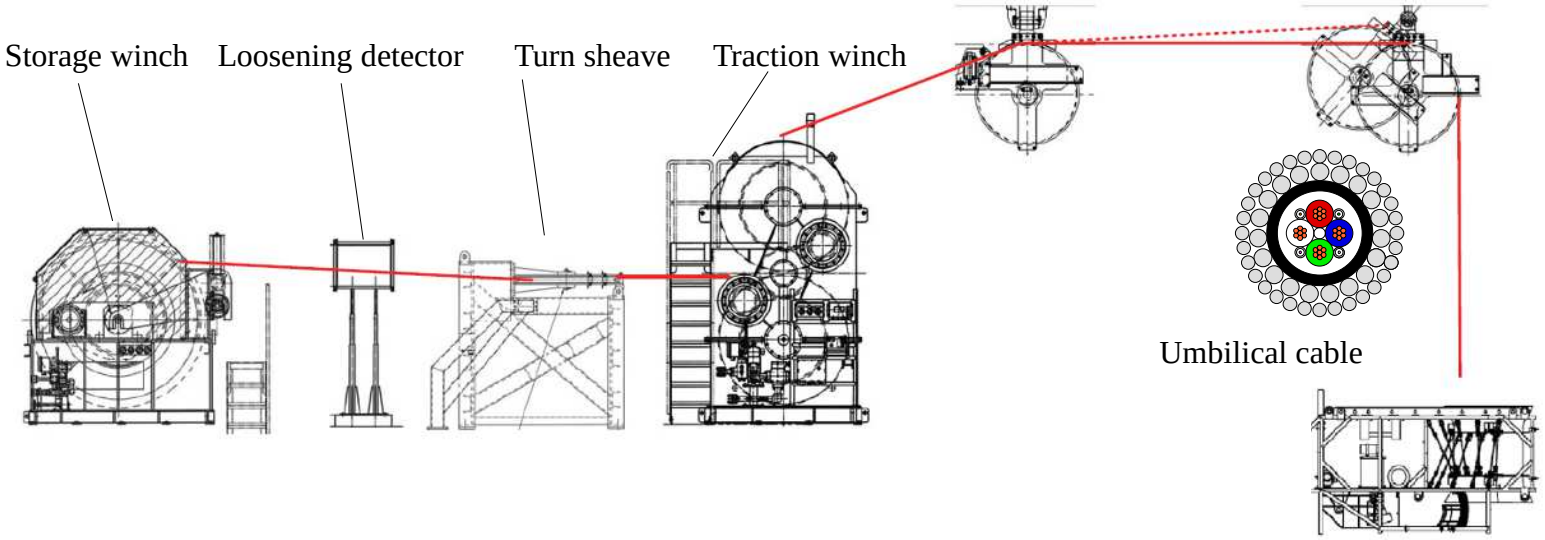
Optical submarine cable

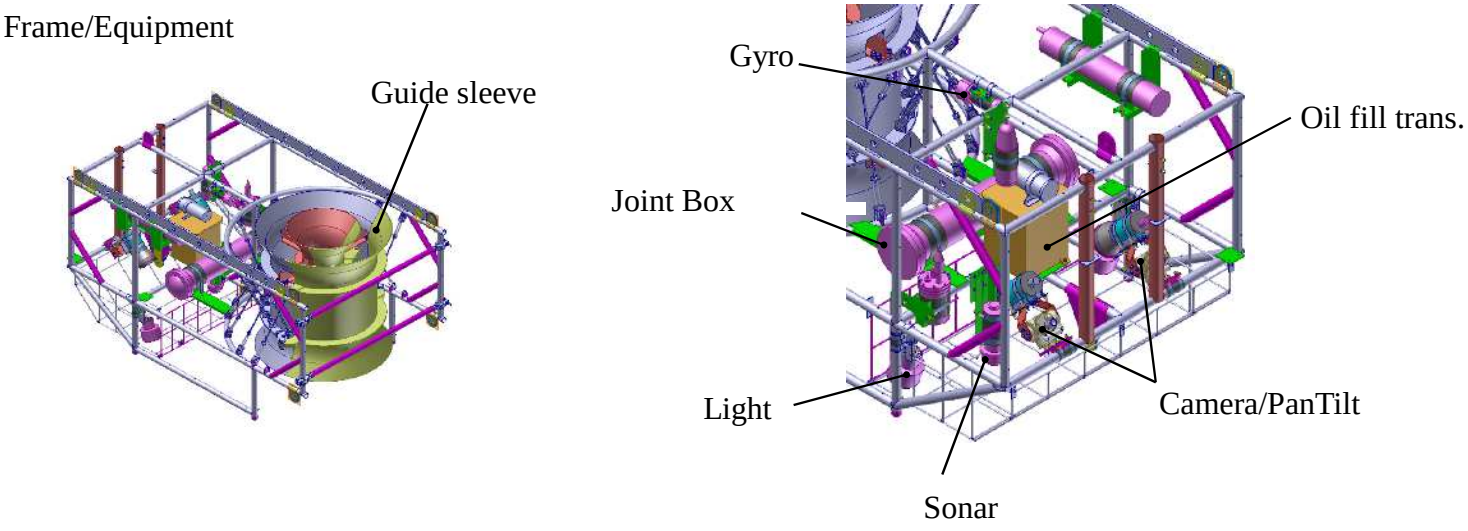
# 5. Cable System/Equipment

## 5.2 Under Water TV camera system

Features: This system dives down to 7,000m water depths, with TV camera, light, other equipment and sends to support ship clear video images and data in real time.

Applications: For surveillance of sea bottom drilling operations.



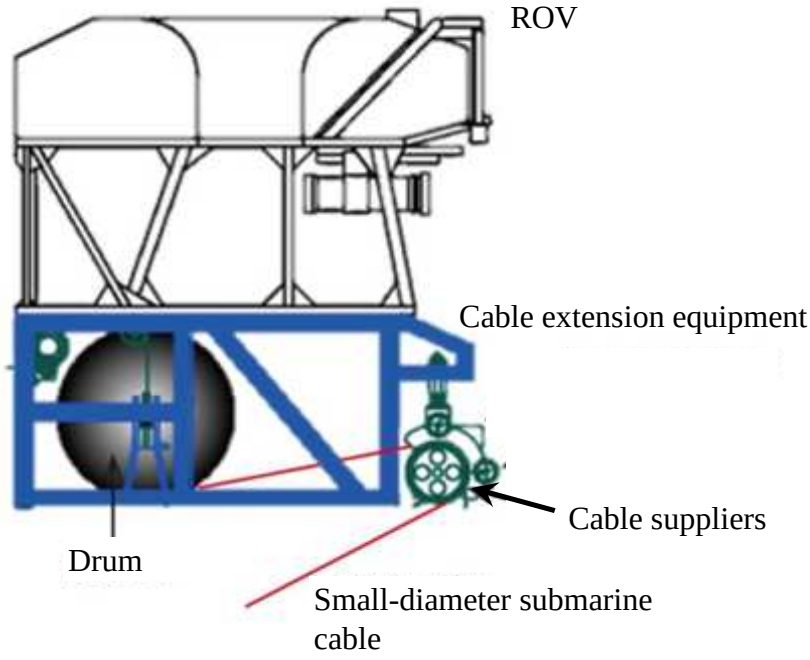

| Specification | |
|---|---|
| Weight in air | Approx. 1200kg |
| Weight in water | Approx. 1000kg |
| Depth | max 7000m |
| Equipment | Camera, Light, Sonar, Gyro, etc. |

# 5. Cable System/Equipment

**5.3** Cable extension equipment

Features: This system installs equipment on the seabed precisely location and connect the extension cable up to 10km use with ROV.

Application：Subsea earthquake and Tsunami observation system installation.





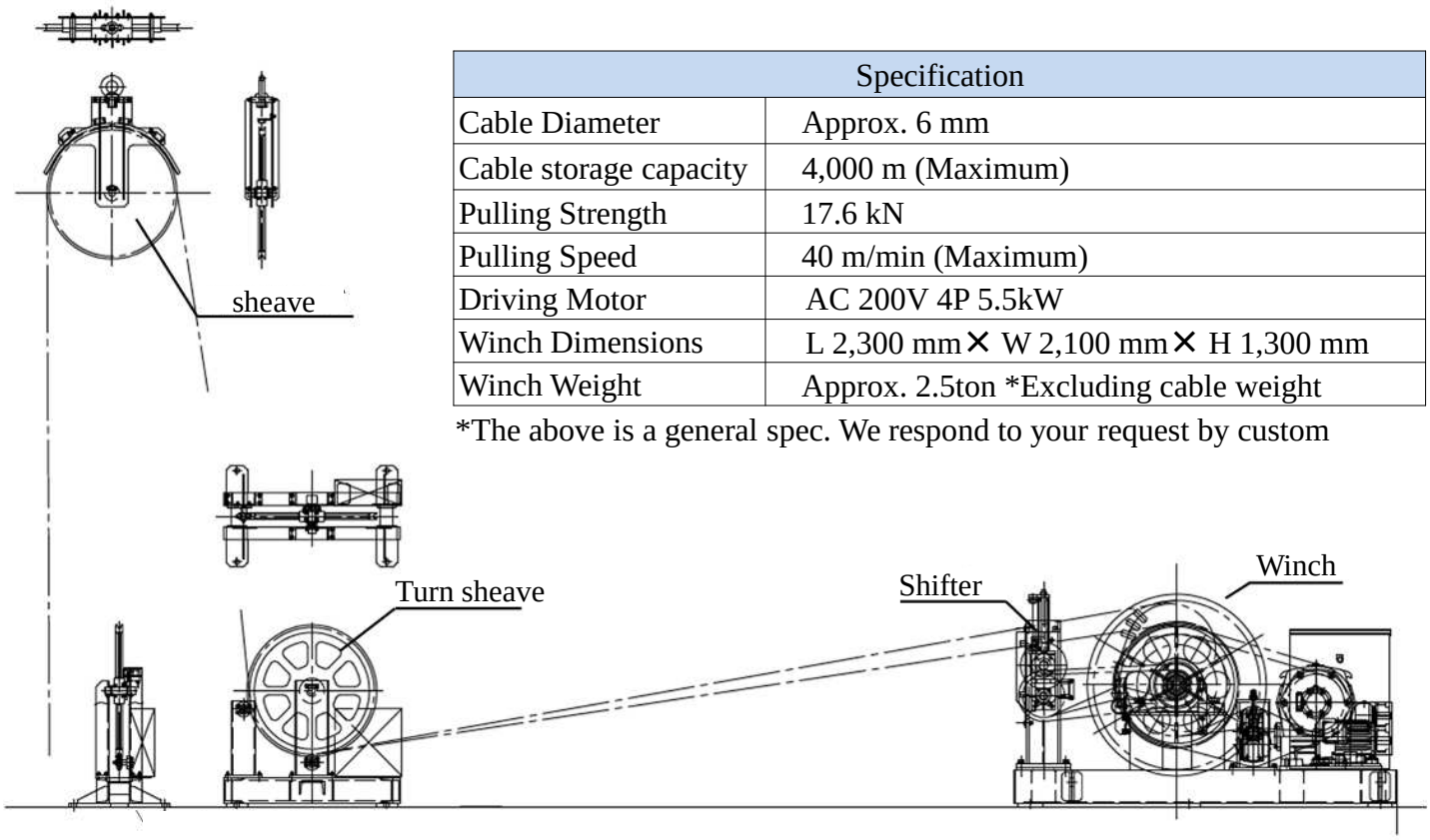
Courtesy of Japan Agency for Marine-Earth Science and Technology

| Specification | |
|---|---|
| Size | W1,120×L1,700×H1,120 mm |
| Weight in air | Approx. 150 kg |
| Weight in water | Approx. 55 kg |
| Extension range | 11,000 m |
| Depth | 6,000 m |
| Extension speed | 2 knot |
| Cable | Small-diameter Submarine cable |

*The above is a general spec. Custom design available on request.

# 5. Cable System/Equipment

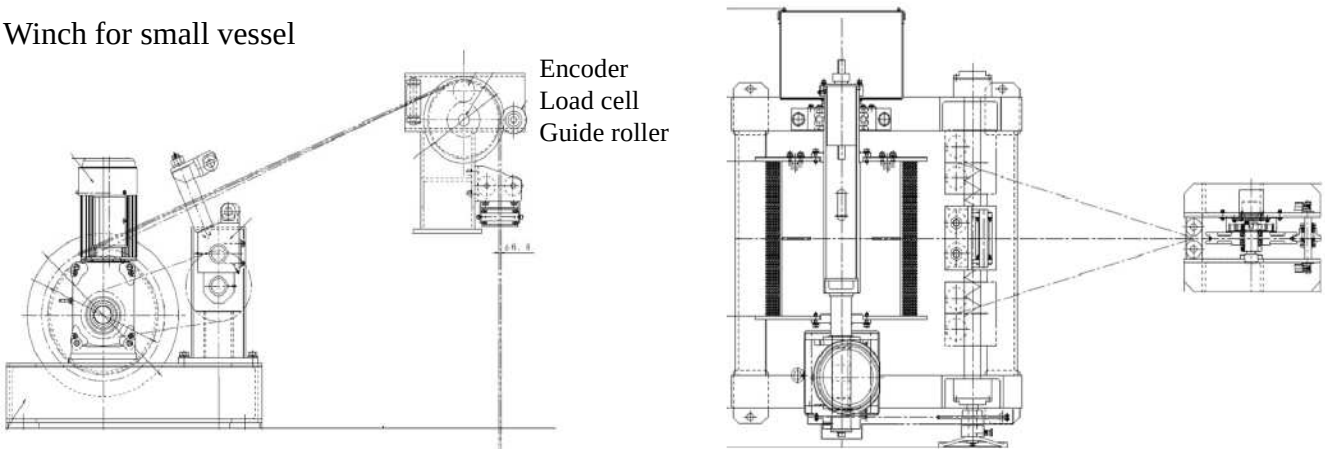
## 5.4 Winch for borehole logging cable




| Specification | |
|---|---|
| Cable Diameter | Approx. 6 mm |
| Cable storage capacity | 4,000 m (Maximum) |
| Pulling Strength | 17.6 kN |
| Pulling Speed | 40 m/min (Maximum) |
| Driving Motor | AC 200V 4P 5.5kW |
| Winch Dimensions | L 2,300 mm✕ W 2,100 mm✕ H 1,300 mm |
| Winch Weight | Approx. 2.5ton *Excluding cable weight |

*The above is a general spec. We respond to your request by custom

## 5.5 Winch for small vessel




| Specification | |
|---|---|
| Cable Diameter | Approx. 7 mm |
| Cable storage capacity | 250 m (Maximum) |
| Pulling Strength | 2.0 kN |
| Pulling Speed | 10 m/min (Maximum) |
| Driving Motor | AC200V 4P 0.75kW |
| Winch Dimensions | L 800 mm✕ W 800 mm✕ H 800 mm |
| Winch Weight | Approx. 300 kg *Excluding cable weight |

*The above is a general spec. Custom design available on request.

# 6. Other products

## 6.1 Cable joint box

We provide cable joint box for under water use. Please let us know your preference about material, size, pressure and connectors etc.


| Specification | |
|---|---|
| Material | Stainless steel, Aluminum, Titanium, etc. |
| Shape | Customized upon request |
| Hydrostatic pressure resistance | |
| Connector | |

## 6.2 Water pressure proof mold

We provide water pressure proof mold for cable termination.

| Specification | |
|---|---|
| Material | Rubber, urethane, PE, fluoro resin, etc. |
| Shape | Customized upon request |

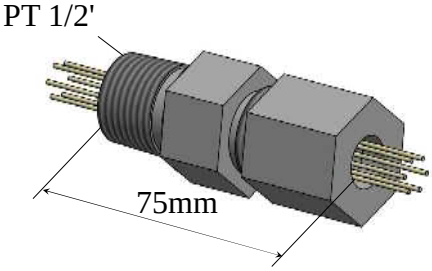
## 6.3 Water pressure proof feed through

We provide special designed feed through. ex. multiple optical fibers feed through, heat resistant feed through.

Optical Fiber feed through

| Specification | |
|---|---|
| Material | Stainless steel, Khobar |
| Size | Approx. Φ30✕L30 |
| Hydrostatic Pressure Resistance | ≥ 30 MPa |
| Number of fiber | 1 ～ 45 |
| Loss(SM 1,310nm) | ≤ 0.3 dB |
| Operation Temperature | -10 ～ +40 °C |

Heat resistant feed through




| Specification | |
|---|---|
| Material | Stainless steel |
| Size | PT1/2'✕L75 |
| Hydrostatic Pressure Resistance | ≥ 20 MPa |
| Number of electric wire | 1 ～ 6 |
| Operation Temperature | -15 ～ +100 °C |

*The above is a general spec. Custom design available on request.

# Our Capabilities

Cables used in the fields of Ocean-observation and Resource exploration must withstand extremely harsh environments such as high water pressure, high temperature corrosion and high tensile strength and must provide the electrical power and communication links required for operation.
Utilizing our technological expertise supported by many years of manufacturing submarine cables and land Cables, we provide optimal products to our customers.

●Optical Fiber
Standard SMF/MMF, Harsh environment (High temperature, High radiation), Sensing (FBG), Metal Pipe Armored, etc.

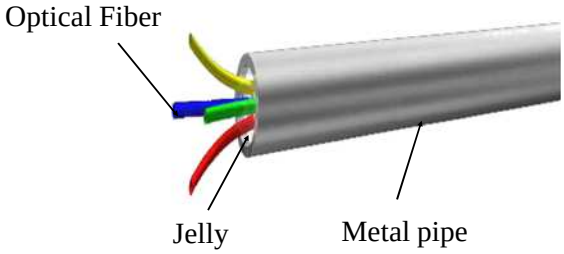
●Insulation sheath
PVC, Polyethylene, Polypropylene, Fluoro resin, Urethane, etc.

●Shielding
Aluminum or Copper tape, Soft copper wire Braided shield, etc.

●Armoring
Steel, Stainless steel, FRP, Strength Fiber etc.

●Jacketing
PVC, Polyethylene, Polyurethane, Rubber

M-PAC




●Special Process
Watertight processing, Terminations, molding, Winch/Drum Custom Spooling, Pre-tensioning, etc.

●Testing
Electrical, Optical, Mechanical, Hydrostatic (max 10000m), High Tensile Breaks, Cyclical Fatigue, ITU-T G.976 Compliant and others.
Main test equipment
・1000kN×100m Tensile test rig
・ 600kN×30m×Φ3.5m(max) Sheave test
Water Pressure
・100MPa Φ1,000mm× 1.2m
・ 80MPa Φ 30mm×100m
・ 80MPa Φ 230mm× 5m

100MPa Water Pressure testing machine

600kN Sheave test machine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