

RoHS  
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# Umbilical and Tether Cables for Subsea ROV Applications

**Introduction****Tyco Electronics**

Tyco Electronics UK Ltd. is a leading global provider of engineered electronic components, network solutions, wireless systems and undersea telecommunications systems and services, with 2006 sales of US\$12.3 billion to customers in more than 150 countries. We design, manufacture and market products for customers in industries from automotive, appliances and aerospace and defence to telecommunications, computers and consumer electronics.

With approximately 8,000 engineers and worldwide manufacturing, sales and customer service capabilities, Tyco Electronics' commitment is our customers' advantage. More information on Tyco Electronics can be found at:

[tycoelectronics.com](http://tycoelectronics.com)

**Subsea Cables**

Tyco Electronics introduces its ROV product line of heavy lift umbilical cables, neutrally buoyant tether cables and heavy tether cables for all lifting applications in offshore and marine environments. The small size cables all benefit from reduced weight and diameter, providing longer length on current handling equipment.

All three cable types feature high voltage ratings, high temperature, reduced diameter power conductors with flexible conductors, screened



### Subsea Cables (continued)

twisted pairs for instrumentation and co-axial or databus for data and video. Furthermore the cables feature MM or SM Fibre In Steel Tube (FIST) and grounding via copper tapes.

Heavy lift umbilical cables from Tyco Electronics are typically 30% smaller than their competition, allowing longer excursion without the heavy investment cost of new winching equipment. Umbilical cables feature a bespoke cable design, 2 or 3 layer, torque balanced steel wire armour packages, typical depth ratings to 4000m and EMC immunity via tin plated copper braid.

Neutrally buoyant tether cables benefit from a neutrally buoyant TPR sheath providing a flexible, yet mechanically robust product. The cables are available in bespoke designs with aramid yarn armour packages. Excursion lengths are up to 1000m.

Heavy tether cables provide the smallest diameter product with longest excursion length possible. A mechanically robust product is achieved by use of a flexible, mechanically resistant sheath. The cables are available in bespoke designs with aramid yarn armour packages.

### Raychem Products

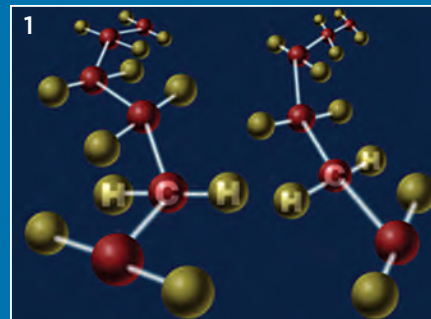
The Tyco Electronics Raychem brand of Wire and Cable products is recognised worldwide, and is backed by a history of proven performance, reliability, innovation and superior quality.

For over forty-five years, customers have recognised the global capabilities of Raychem products. Combining these advanced products with superior technical support and a global sales/services organisation, customers with worldwide operations count on Tyco Electronics to supply

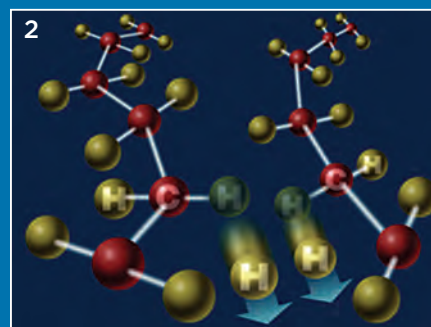
the knowledge and products they need to solve specific problems and help them take advantage of opportunities, anywhere they arise. This philosophy has earned Tyco Electronics a reputation for leadership in materials science technologies.

Developed from these technologies our Umbilical & Tether cables have been engineered to meet the requirements of a very demanding environment and as such, are the cabling solutions for challenging marine applications.

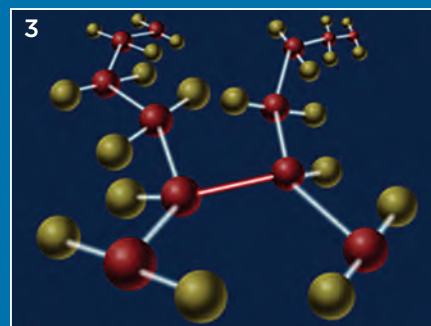
### Radiation Cross-Linking



Molecular Chain



Crosslinking



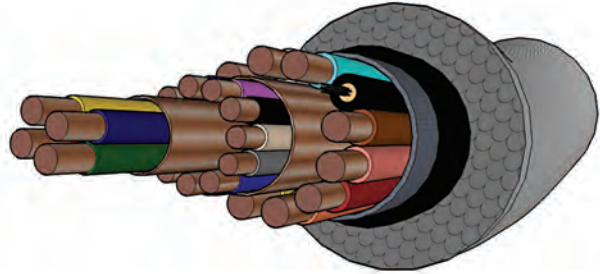
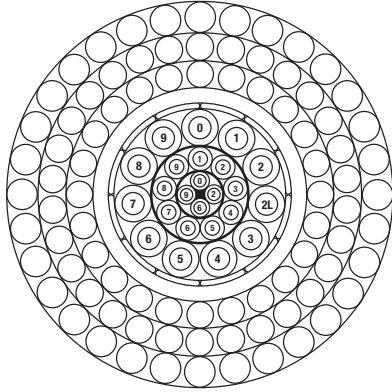
Crosslinked Molecular Chain

Raychem was the first company to commercialise radiation cross-linking of the insulation materials, initially for aerospace applications.

To achieve crosslinking, a polymer product is exposed to high-energy radiation. This is generally done by exposure to beta radiation (high energy electrons) using an electron beam;

Crosslinked insulations in Wire & Cable products are lightweight, mechanically tough and thermally stable.

## Umbilical Cables



### TMS and ROV POWER

- Voltages ratings to 3000V AC (3 phase)
- Cross sections from 18 AWG to 10 AWG
- 19 and 37 strand tin plated copper conductors
- 0.2 to 0.5mm dual wall, irradiation cross linked insulation
- Temperature rating -65 to +110°C

### TMS and ROV Instrumentation

- Voltages ratings to 2400V AC (3 phase)
- Cross sections from 24 AWG to 18 AWG
- 19 strand tin plated copper conductors
- 0.20 to 0.35mm dual wall, irradiation cross linked insulation
- Temperature rating -65 to +110°C
- Constructed as pairs, triples or quads
- Aluminium laminate foil or tin plated copper braid
- Controlled impedance components available on request

### Fibre Package

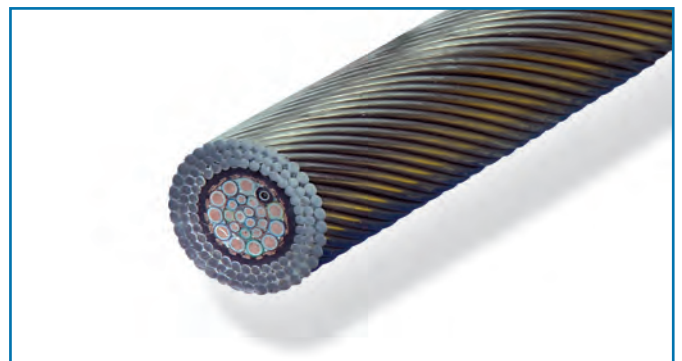
- Single mode, multimode or mixed fiber packages
- 1 to 60 fibres
- 0.8 to 5.0mm OD Fibre In Steel Tube
- Sheathed in Polyolefin
- Temperature rating -65 to +110°C

### Sheath, Screening and Water Blocking

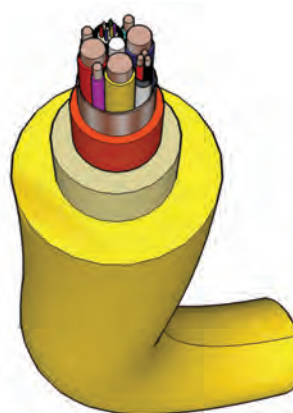
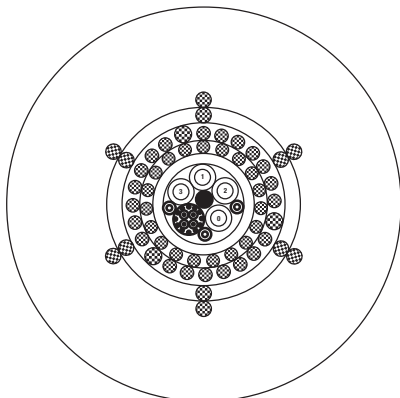
- Cross linked water block
- Copper laminate tape for grounding
- Tin plated copper braid for grounding and screening
- Polyolefin Sheath
- Temperature rating -55 to +100°C
- Water Resistant

### Armour and Cable Design

- Bespoke small size, light weight cable designed to meet customer electrical requirements
- Reduced diameter and weight provides longer length on current handling equipment
- Bespoke steel wire armour designed to meet customer working and breaking load requirements
- Torque balanced 2 or 3 layer steel wire armour package
- Pressure injected lubricant to maximise life in the field
- 4000m depth rated



## Neutrally Buoyant Tether Cable



### TMS and ROV POWER

- Voltages ratings to 3000V AC (3 phase)
- Cross sections from 18 AWG to 10 AWG
- 19 and 37 strand tin plated copper conductors
- 0.2 to 0.5mm dual wall, irradiation cross linked insulation
- Temperature rating -65 to +110°C

### TMS and ROV Instrumentation

- Voltages ratings to 2400V AC (3 phase)
- Cross sections from 24 AWG to 18 AWG
- 19 strand tin plated copper conductors
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- Temperature rating -65 to +110°C
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- Aluminium laminate foil or tin plated copper braid
- Controlled impedance components available on request

### Fibre Package

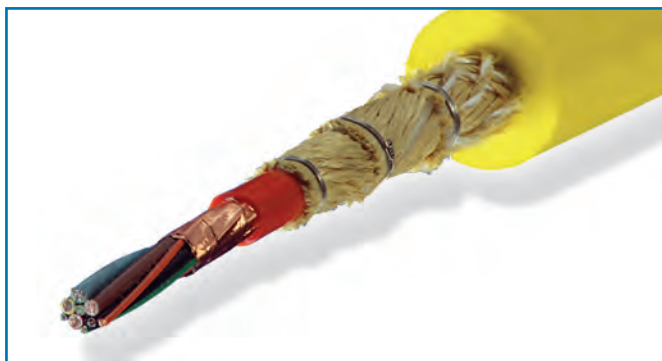
- Single mode, multimode or mixed fiber packages
- 1 to 60 fibres
- 0.8 to 5.0mm OD Fibre In Steel Tube
- Sheathed in Polyolefin
- Temperature rating -65 to +110°C

### Inner Sheath, Screening and Water Blocking

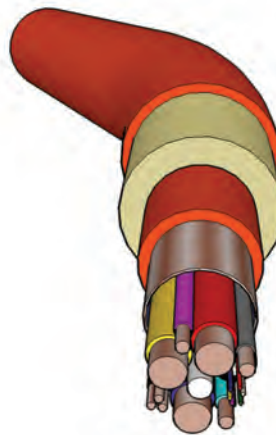
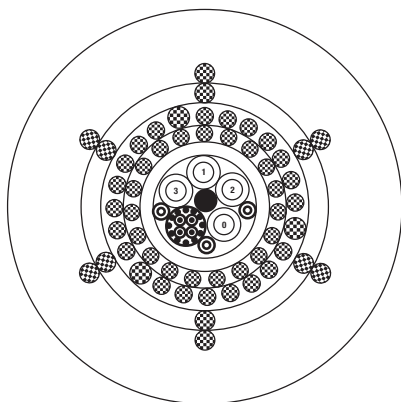
- Petroleum Jelly water block
- Copper laminate tape for grounding
- Tin plated copper braid for grounding and screening
- Polyolefin Sheath
- Temperature rating -55 to +100°C
- Water Resistant

### Cable Design, Armour and Outer Sheath

- Bespoke small size, light weight cable designed to meet customer electrical requirements
- Reduced diameter and weight provides longer length on current handling equipment
- Highly flexible design
- Bespoke Aramid Yarn Armour designed to meet customer working and breaking load requirements
- Bespoke design to ensure "locking" of outer jacket and armour
- Neutrally Buoyant TPR Sheath
- Mechanically Resistant TPR Sheath
- Excursion lengths to 1000m



## “Heavy” Tether Cable



### TMS and ROV POWER

- Voltages ratings to 3000V AC (3 phase)
- Cross sections from 18 AWG to 10 AWG
- 19 and 37 strand tin plated copper conductors
- 0.2 to 0.5mm dual wall, irradiation cross linked insulation
- Temperature rating -65 to +110°C

### TMS and ROV Instrumentation

- Voltages ratings to 2400V AC (3 phase)
- Cross sections from 24 AWG to 18 AWG
- 19 strand tin plated copper conductors
- 0.20 to 0.35mm dual wall, irradiation cross linked insulation
- Temperature rating -65 to +110°C
- Constructed as pairs, triples or quads
- Aluminium laminate foil or tin plated copper braid
- Controlled impedance components available on request

### Fibre Package

- Single mode, multimode or mixed fiber packages
- 1 to 60 fibres
- 0.8 to 5.0mm OD Fibre In Steel Tube
- Sheathed in Polyolefin
- Temperature rating -65 to +110°C

### Inner Sheath, Screening and Water Blocking

- Petroleum Jelly water block
- Copper laminate tape for grounding
- Tin plated copper braid for grounding and screening
- Polyolefin Sheath
- Temperature rating -55 to +100°C
- Water Resistant

### Cable Design, Armour and Outer Sheath

- Bespoke small size, light weight cable designed to meet customer electrical requirements
- Reduced diameter and weight provides longer length on current handling equipment
- Highly flexible design
- Bespoke Aramid Yarn Armour designed to meet customer working and breaking load requirements
- Bespoke design to ensure “locking” of outer jacket and armour
- Mechanically Resistant TPR Sheath
- Maximum benefit of Tyco Electronics small size and light weight design
- Excursion lengths to 2500m

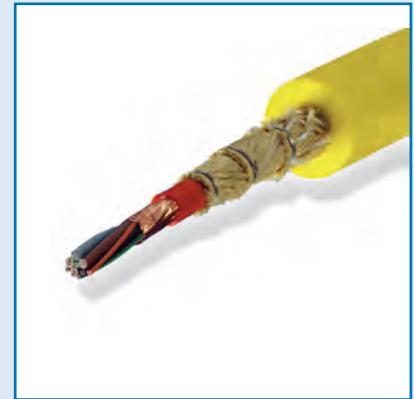
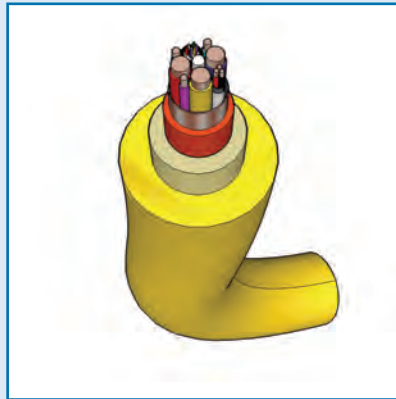


## Case Study

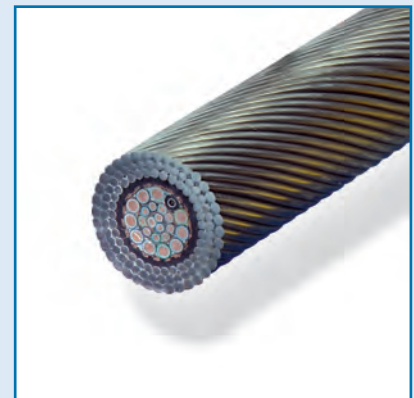
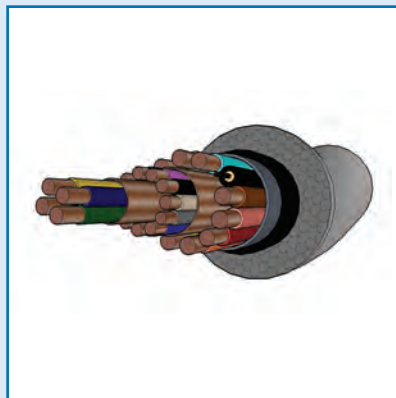
### Prestige Oil Tanker Shipwreck

Following the shipwreck of the Prestige Oil Tanker off of the coast of Spain during 2003, Saipem were awarded a contract to safely remove the oil from the wreckage. This was outside the scope of any previous recovery operations with the wreckage split in half 240km from land and in 3800m of water. Saipem had 3 months to provide a complete solution which included the long length Tyco Electronics heavy lift umbilical cable which was 20 - 30% smaller than the market standard offering allowing an umbilical length of 3800m using standard winching equipment.

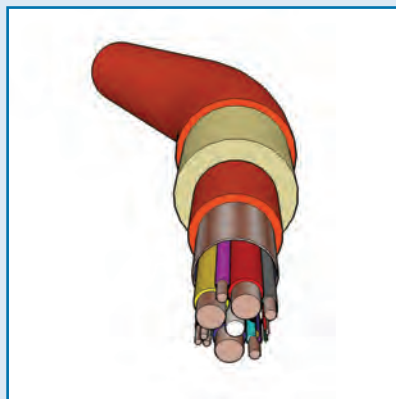
More recently this umbilical has showed its tremendous flexibility by allowing Saipem to utilise the same umbilical for their standard 150HP Innovator heavy work class ROV and their new 250HP Innovator Leviathan ROV. Extended tether excursions on the new 250HP Innovator Leviathan ROV have been made possible by Tyco Electronics thin wall tether technology which provides a tether 15 - 20% smaller than the market standard.



Neutrally Buoyant Tether Cable



Umbilical Cables



"Heavy" Tether Cable

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