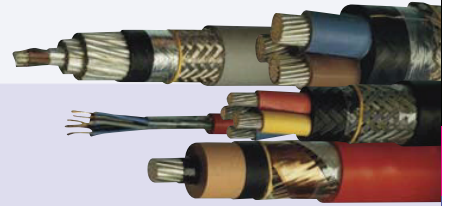




# Offshore Cables





all power and communication network cabling needs for such harsh and critical environments.

Prysmian **Technergy™** Offshore cables are designed and engineered with the close cooperation of the main international O&G operators, and are manufactured with the most advanced material and technologies from Prysmian laboratories. Prysmian **Technergy™** Offshore are harmonized cabling solutions suitable for any type of offshore application such as FPO, FPSO, Drilling Ship, Topside and FSU. The range encompass products for upstream, downstream and processing, land based power generation and marine uses as well.

**Technergy™** Offshore range offer O&G companies, contractors, engineers, installers, OEMs and component manufacturers, the following benefits:



## > Prysmian Innovation: Technology for Longer Life

The exposure to aggressive substances and vapours, solvent penetration and sea contamination constantly threaten the integrity and the lifetime of offshore cables. Prysmian **Technergy™** Offshore cables' chemical resistant properties (low gas permeability, hydrocarbon, mud and moisture resistance) are critical to a longer fault free lifetime.

Prysmian's **Technergy™** Offshore cables have: high working temperatures, very high short circuit temperatures, outstanding mechanical resistance and low deformation under load conditions, all substantially exceeding the standard requirements.

**AFUMUD™** sheathing compound has been especially developed to withstand harsh environments and extreme temperatures, from the Poles to the Equator. This special sheathing means our cables are also extremely resistant to marine salt and UV rays and range of chemicals used on offshore platforms.

## > The Safest Choice in Fire Hazard

Prysmian **Technergy™** Offshore cables promote increased human and material safety, both in normal working conditions and in the event of fire: low toxicity, reduced smoke emissions and fire propagation resistance are key features of the **Technergy** range.

Additionally, for emergency and vital circuits, to cope with continuous operation during a fire, an optional fire resistant design (up to 1000 °C) is offered in accordance with IEC, BS and IEEE.

## > Contract Management

Central co-ordination and a network of Prysmian technically skilled sales offices provide our customers with local and easy-to-reach points of contact.

Due to the multinational manufacturing presence of Prysmian and controlled production planning, we ensure sufficient production capacity even for large and very long-term projects.

The highly sophisticated IT systems implemented in all the manufacturing sites provide real time order processing and tracking.

Full sets of project documentation (data sheets, drawings, certificates, manuals, etc) are provided within the standard scope of supply.

Long term partnerships (e.g. product traceability, product replacement) are also offered by Prysmian.

## Application

Every offshore platform requires an extensive, integrated power, instrumentation & control and communication system that excels at three core characteristics:

1. It performs under the most demanding working conditions.
2. It preserves human safety.
3. It protects the environment.

Over the last 25 years, Prysmian **Technergy™** Offshore, has provided cabling solutions for more than a hundred projects world wide that satisfies these conditions. **Technergy™** Offshore delivers a tailored, single-stop source for

## Benefits

### > Technical Competence

Prysmian's know-how is built on a pyramid of excellence: considerable international expertise, permanent collaboration with universities and research institutes and strong innovation activities. Our commitment is underlined by our R&D expenditure which is in excess of 3% of the annual turnover and by our exclusively in-house production processes.

Prysmian's international teams of experts provide proactive solutions to problems for every customer need, in both topside and underwater applications.

### > A Complete Range of Customised Products: Topside and Underwater

Prysmian's **Technergy™** Offshore cable range incorporates a broad variety of power cables - from 1 kV up to 20 kV - all of which comply with the main international standards (BS, NEK, IEC, IEEE, etc.).

Telecommunications, instrumentation and control, special bus, coaxial, radiating and Cat. 5 and 6 cables are part of our standard product range.

State-of-the-art dynamic and hybrid umbilicals and composite electro-optical underwater cables as well as a broad variety of accessories, glands and terminations are also available.

Prysmian also offers fully customised solutions for special applications and provides all the necessary technical support for our customers at every stage of their projects.

### > Ease of Installation and Handling

Installation and cable handling on a platform (topside) or on a ship (FPSO) is always difficult, time consuming and expensive.

Prysmian's **Technergy™** Offshore cables are flexible, easy to peel and to pull, with a reduced bending radius (down to 4x diameter) and with high tensile strength.

Cable diameter tolerances exceeding the requirements of recognised standards are achieved through reliable process controls and state-of-the-art manufacturing equipment, thus allowing reduced installation times.

## About us

Prysmian Cables & Systems is a world-class multinational company. Founded in 1872 as "Ditta Pirelli & C.", it has achieved a leading position for more than a century of operations in its two key international markets - "Energy Cables & Systems" and "Telecom Cables & Systems".

Prysmian Cables and Systems is the world's largest manufacturer of power and telecommunications cables, with 52 manufacturing facilities in 21 countries in five continents and a market share in excess of 10%.

Prysmian Energy Cables and Systems is a global solutions provider, offering a wide range of integrated solutions, such as cable systems, system design and engineering, project management, installation and post-sale services.

Prysmian Energy Cables and Systems concentrates on continuous product innovation and on achieving a competitive edge by focusing on research and development. This is done through Prysmian's own R&D centres and by co-operating with universities, scientific institutions and above all, our customers. Prysmian's world-wide organisation makes and delivers advanced technological solutions to customers anywhere in the world.



Prysmian's TECHNERGY integrated cabling solutions™ is one of the world's most comprehensive and technologically advanced answers to industry, infrastructure, contractors and OEM's specific requirements.

TECHNERGY integrated cabling solutions™ are designed and structured into twelve different product lines. Each of these offer tailored designs and added value solutions to the most diverse functional and environmental requirements in the following fields:

- > Trains
- > Marine
- > Oil & Gas
- > Plant & Petrochem
- > Mining & Tunnelling
- > Defence
- > Cranes & Mobile Equipments
- > Electro-Mechanical
- > Data & Communication
- > Transportation Infrastructures
- > Building & Civil Engineering
- > Power Plants

To find out more about the TECHNERGY integrated cabling solutions™, Prysmian Cables and Systems invites you to visit the web site: [www.prysmian.com](http://www.prysmian.com)



# Cable families at a glance

## > According to BS 6883/BS 7197

Product Family	General Description	Use and Installation
<b>TEOF</b>	Unarmoured 1 kV power and control cables	General 1 kV power cables
<b>TEOF - G</b>	Galvanized steel wire braid armoured 1 kV power and control cables	General 1 kV power cables where mechanical and/or electrical protection is needed.
<b>TEOF - FR</b>	Fire Resistant unarmoured 1 kV power and control cables	1 kV power cables for applications where the cables should function in the event of fire.
<b>TEOF - GFR</b>	Galvanized steel wire braid armoured Fire Resistant 1 kV power and control cables	1 kV general power cables where mechanical and/or electrical protection is needed and for applications where the cables should function in the event of fire.
<b>TEOF - TI</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individually screened (Aluminum backed polyester), unarmoured 60 & 250 V	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk but where protection against outer disturbances, both mechanical and electrical, is less critical.
<b>TEOF - TIG</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individually screened (Aluminum backed polyester), Galvanized steel wire braid armoured 60 & 250 V	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk and where mechanical and/or electrical protection is required.
<b>TEOF - TO</b>	Pair/triple twisted cables for Telecommunication and instrumentation Overall screened (Aluminum backed polyester), unarmoured 60 & 250 V	Telecommunication and instrumentation cables for applications where protection against external electrical disturbance is critical.
<b>TEOF - TOG</b>	Pair/triple twisted cables for Telecommunication and instrumentation Overall screened (Aluminum backed polyester), Galvanized steel wire braid armoured 60 & 250 V	Telecommunication and instrumentation cables for applications where protection against external electrical disturbances critical where a mechanical protection is required.
<b>TEOF - TIO</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individual and Overall screened (Aluminum backed polyester), unarmoured 60 & 250 V	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk and external electrical disturbance is critical. but where mechanical protection is not required.
<b>TEOF - TIOG</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individual and Overall screened (Aluminum backed polyester), Galvanized steel wire braid armoured 60 & 250 V	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk, where external electrical disturbance is critical and where mechanical protection is required.
<b>TEOF - TIGFR</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individual screened (Aluminum backed polyester), Armoured (Galvanized steel) 60 & 250 V, Fire Resistant	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk, where mechanical and/or electrical protection is required, where the cables should function in the event of fire.
<b>TEOF - TOGFR</b>	Pair/triple twisted cables for Telecommunication and instrumentation Overall screened (Aluminum backed polyester), Galvanized steel wire braid armoured 60 & 250 V, Fire Resistant	Telecommunication and instrumentation cables for applications where protection is needed against external electrical disturbances, where mechanical protection is required, and where the cables should function in the event of fire.
<b>TEOF - SB</b>	Single core insulated conductor	Power cable used in switchboards, earth conductors and wiring in various applications.
<b>TEOF - G</b> 6/10kV - 8,7/15kV - 12/20kV	Galvanized steel wire braid armoured radial field or non radial field, MV power cable	Main power supply when medium voltage is needed.
<b>TEOF Profibus</b>	Screened copper twisted pairs	For feeding data to various systems or field devices according to EN 50170-2 or EN 20254 (Interbus).
<b>TEOF Interbus</b>	Single and multi element COAXial cables (50 and 75 Ohm)	Video and data transmission for system applications.



## > According to NEK 606/IEC 60092-300 (series)

Product Family	General Description	Use and Installation
<b>TEOF - RU</b>	Unarmoured 1 kV power and control cables	1 kV general power cables.
<b>TEOF - RFOU</b>	Armoured (tinned copper) 1 kV power and control cables	1 kV general power cables where mechanical and/or electrical protection is needed.
<b>TEOF - BU</b>	Fire Resistant unarmoured 1 kV power and control cables	1 kV power cables for applications where the cables should function in the event of fire.
<b>TEOF - BFOU</b>	Armoured (tinned copper) Fire Resistant 1 kV power and control cables	1 kV general power cables where mechanical and/or electrical protection is needed and for applications where the cables should function in the event of fire.
<b>TEOF - RU (i)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individually screened (Copper backed polyester), unarmoured 250 V	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk, but where protection against outer disturbances, both mechanical and electrical is less critical.
<b>TEOF - RFOU (i)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individually screened (Copper backed polyester), Armoured (tinned copper) 250 V	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk and where mechanical and/or electrical protection is required.
<b>TEOF - RU (c)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Overall screened (Copper backed polyester), unarmoured 250 V	Telecommunication and instrumentation cables for applications where protection against external electrical disturbance is critical.
<b>TEOF - RFOU (c)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Overall (Copper backed polyester), Armoured 250 V	Telecommunication and instrumentation cables for applications where protection against external electrical disturbance is critical and where mechanical protection is required.
<b>TEOF - RU (i+c)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individual and Overall screened (Copper backed polyester), unarmoured 250 V	Telecommunication and instrumentation cables for applications where very strong protection against cross talk and external electrical disturbance is critical, but where mechanical protection is not required.
<b>TEOF - RFOU (i+c)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individual and Overall screened (Copper backed polyester), Armoured (tinned copper) 250 V	Telecommunication and instrumentation cables for applications where very strong protection against cross talk and external electrical disturbance is critical, and where mechanical protection is required.
<b>TEOF - RFOU (i)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Individual screened (Copper backed polyester), Armoured (tinned copper) 250 V, Fire resistant	Telecommunication and instrumentation cables for applications where very strong protection is needed against cross talk, where mechanical and/or electrical protection is required and where the cables should function in the event of fire.
<b>TEOF - RFOU (c)</b>	Pair/triple twisted cables for Telecommunication and instrumentation Overall screened (Copper backed polyester), Armoured (tinned copper) 250 V, fire resistant	Telecommunication and instrumentation cables for applications where protection is needed against external electrical disturbances, where mechanical protection is required and where the cables should function when exposed to fire.
<b>TEOF - UX</b>	Single core insulated conductor	Power cable used in switchboard, earth conductors and wiring in various application.
<b>TEOF - RFOU 6/10 kV - 8,7/15 kV</b>	Armoured Radial field MV power cables	Main power supply when medium voltage is needed.
<b>TEOF Umbilicals</b>	Armoured high pressure hydraulic control hoses + electrical power and control cables (optional optical fiber control core can be provided)	Hydraulic control of sea bottom equipment (WCT), chemical injection and electrical monitoring of well data (pressure and temperature) for water depths up to 2000 m.
<b>TEOF Electro-Optical</b>	Armoured low or medium voltage power cores + Multi fiber optical core	Power distribution and two-way communication between production units, submarine or down well pumps power and monitoring, for water depths up to 2000 m.

## Quality commitment



Prysmian has a built-in multi-step quality assurance program, covering the production process from cable design and raw material purchases to final inspection and testing documentation.

The quality system of Prysmian has been assessed and approved, and is audited regularly, by **Lloyd's Register of Quality Assurance to the ISO 9001 and ISO 14001 Quality System Standards.**

The ISO 14001 is the environment quality standard.



### > APPROVALS

Prysmian works closely with major classification societies. Our cable factories have approvals for their cables at:

- Lloyd's Register of Shipping (LRS)
- Det Norske Veritas (DNV)
- Registro Italiano Navale (RINA)
- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)

## References offshore project

Project name	Customer
AGC Azerbaijan	AIOC - Halliburton
Aries & Carina	Total Fina Elf - J. McDermott
Barracuda P43	Petrobras - Halliburton
Bayu Undan	Phillips Petroleum
Caratinga P48	Petrobras - Halliburton
Clair phase I	BP - Mustang engineering
Erha	MSE Malaysia
Rig 185	Global Santa Fe
Sable Module	Flare
Sabratha	Agip - Hyundai Heavy Industries

## Service

### TECHNICAL CONSULTING

- > Technical literature and specs (also available on line)
- > Specification writing service available on request
- > Design assistance with Contractors and Engineers, both on site and from our technical help desk
- > Tailored cabling solutions
- > International call center and sales consulting network
- > Quick budgeting service to Contractors during the tendering phase
- > Short lead-times (with reliable delivery)
- > Long term products availability
- > International distributor network
- > Technical training available on request

### ACCESSORIES

Prysmian can also offer a wide range of cable accessories. Hazardous environment flameproof cable glands, cable connectors and tooling, cable joints and terminations.



### UMBILICALS

In response to the needs of floating production system technology, Prysmian has developed electro-optical submarine cables and umbilicals. Prysmian has been producing umbilical cables and accessories since the early 80s. Today Prysmian can meet your full requirements for the supply of submarine cables, umbilicals, flexible pipes and accessories for offshore installations.



### MARINE

Marine cables can be found in our family of offshore products. They have been specifically designed for on-board installations, and work in damp or wet situations, inside machinery compartments and where harmful vapours may be present.

