



Prysmian
Group

ET ONE LEADER, TWO BRANDS. PASSION FOR INNOVATION LINKING THE FUTURE APPLYING OUR EXPERIENCE ENHANCING CUSTOMER EXPERIENCE
ION **SUPPORTING THE DEVELOPMENT OF** TODAY'S
ANDS **SMARTER AND GREENER POWER GRIDS** AP
TOMORROW
RROW **SUBMARINE CABLE SYSTEMS** LINKING THE
RTUNITIES, TOMORROW'S POSSIBILITIES
L ENERGY AND TELECOMS INFRASTRUCTURES TODAY'S OPPORTUNITIES, ENHANCING CUSTOMER EXPERIENCE
TOMORROW'S POSSIBILITIES CABLE SOLUTIONS



 **PRYSMIAN**

 **Draka**



What links power grids to sustainability?

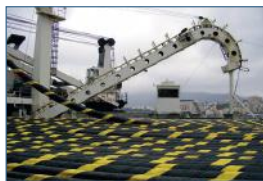
Cable solutions to support the development of smarter and greener power grids

From Asia-Pacific to the Americas, and from Europe to the Middle East to Africa, Prysmian cable solutions sit at the heart of the development of power grids worldwide, helping major utilities in transmitting and distributing power to their customers.

Unmatched in our manufacturing capabilities and with an unwavering commitment to R&D, we design, produce and install low, medium, high and extra-high

voltage underground and submarine cables and systems, along with network components and value-added engineering services.

Always aware of the need to minimize our impact on the planet, we're constantly driving innovation in our industry, aiming to optimise supply chain processes, reduce total cost of ownership for our customers and help them achieve sustainable, profitable growth.



A track record of success

Our track record in submarine power links includes projects working alongside some of the best-known names in the sector for many ground-breaking industry milestones.

Some of our key projects

Westernlink (UK)

Scotland/England – 600 kV DC, 400 km

Phu Quoc Island connection (Vietnam)

Phu Quoc/Vietnam Mainland – 110 kV AC – 58 km

Messina Straits Crossing (Italy)

Sicily/Italy Mainland – 380 kV AC, 43.5 km

Hudson Transmission Project (USA)

New Jersey/Manhattan – 345 kV AC, 13 km

ROMULO (Spain)

Spain mainland/Mallorca – 250 kV DC, 250 km

TransBay Cable (USA)

San Francisco, California – 200 kV DC, 85 km

Doha Bay Crossing Project (Qatar)

Doha, Qatar – 220 kV AC, 10 km

SA.PE.I. (Italy)

Sardinia/Italy Mainland – 500 kV DC, 434 km

GCCIA (Middle East)

Saudi Arabia/Bahrain – 400 kV AC, 51 km

NEPTUNE (USA)

Long Island/New Jersey – 500 kV DC, 105 km

Basslink (Australia)

Victoria/Tasmania – 400 kV DC, 300 km

HVDC connections of offshore wind parks (Germany)

up to 320 kV DC, 205 km (SylWin1)

HVAC and inter-array connections of offshore wind parks (Germany, UK, Netherlands, Denmark)

up to 132 kV AC

Linking the future

As the worldwide leader in the cable industry, Prysmian Group believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities.

With this in mind, we provide major global organisations in many industries with best-in-class cable solutions, based on state-of-the-art technology. Through two renowned commercial brands – Prysmian and Draka – based in almost 100 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures, and achieve sustainable, profitable growth.

In our energy business, we design, produce, distribute and install cables and systems for the transmission and distribution of power at low, medium, high and extra-high voltage.

In telecoms, the Group is a leading manufacturer of all types of copper and fibre cables, systems and accessories – covering voice, video and data transmission.

Drawing on over 130 years' experience and continuously investing in R&D, we apply excellence, understanding and integrity to everything we do, meeting and exceeding the precise needs of our customers across all continents, at the same time shaping the evolution of our industry.

A strong commitment to support the development of smarter and greener power grids

In recent years, the Prysmian Group has been making significant investment in high added-value products and services for our partners with a special focus on submarine cables. Our goal has been to meet the ever-increasing demand in this business segment and support the development of smarter and greener power grids, consolidating our technology and market leadership at the same time.

Following the integration with Draka, the Prysmian Group can now rely on facilities in Arco Felice (near Naples, in Italy), Drammen (Norway) and Pikkala (Finland). So we now offer an even wider range of technologies, products and services, thanks to an extended and strengthened production footprint, capable of anticipating market trends and meeting customers' needs and expectations on time.

Product range



HVAC AND HVDC SELF-CONTAINED FLUID FILLED CABLES

These cables are suitable for voltages up to 600 kV HVDC and 1000 kV HVAC. A special low permittivity - low loss insulation system consisting of Paper Polypropylene Laminate (PPL) has been adopted for some years for HVAC SCFF cables, to improve electrical performances and reduce losses. Benefits of PPL insulated cables are either increase of transmitted power or reduction of the conductor size and cable dimensions at the same power in comparison with conventional paper insulated cables. The use of PPL is in general considered for large sizes and for HVAC voltages above 275 kV. SCFF cables designs depend on the feeding length - max connection lengths range from 60 to 100 km depending on system features. So far, SCFF cables have met the requirements of carrying the highest levels of power in both AC and DC systems nevertheless they have intrinsic limitations in distance by the oil feeding hydraulic system. They can be laid at depths down to approximately 800 m without special precautions; with the use of special fluids and proper armour designs, depths of 2000 m can be reached (Hawaii Deep-Water Cable development program).



HVDC MASS IMPREGNATED CABLES

These cables are suitable for voltages of up to 600 kV DC. The insulation consists of high-density paper tapes impregnated with a high-viscosity compound which does not require fluid pressure feeding, thus allowing cables to be installed in HVDC links in very long lengths, up to several hundreds of kilometres. Nevertheless, they have intrinsic limitations in voltage/power given by kraft paper's electrical and thermal performances. Research and development work on materials and technologies carried out by Prysmian over the years has led to a product that combines the advantages of PPL and MI technologies. The use of PPL in combination with a viscous compound has significantly increased HVDC cables electrical and thermal performances and paved the way for system planners to a range of unprecedented technical and economical possibilities and for bulk power transmission, mass impregnated cables still prove to be the most suitable solution. Present experience and trials report record installation at water depths of more than 1600 m, using special design features.



MV, HVAC AND HVDC EXTRUDED INSULATION CABLES

Both EPR and XLPE can be used for insulation. In most cases, XLPE requires an impervious metallic sheath (e.g. lead sheath) to be applied over each core to avoid direct contact with water. EPR compounds can be formulated in such a way as to give an excellent performance in terms of both electrical reliability and ageing, thus removing the need for an impervious metallic sheath (the so called "Wet Design"). Absence of impregnating fluids and/or pressure feeding requirements, reduced cable weight and dimensions and relative ease of jointing are the key features of this technological innovation. Where system requirements permit, the use of an extruded dielectric offers several remarkable advantages and makes for lighter and easier-to-handle cables, which can operate at high temperatures and at high electrical stresses. Recent developments on converters technology have led to the adoption of extruded insulation cables for HVDC transmission systems up to 320 kV, in particular when associated with VSC (Voltage Source Converter) technology.



ACCESSORIES

For all types of submarine cable systems, Prysmian offers a complete end-to-end system, including all types of accessories.

PROJECT MANAGEMENT

Prysmian's ability to supply and install complete cable systems would not be possible without our specialist Project Managers that assemble teams of experts to supervise the project from the planning phase, throughout the manufacturing and installation stages, to the delivery of the final project documentation and ensure that the project comes in on time, pursuant to the customer's specifications and on budget.

ENGINEERING

Prysmian Submarine Energy Systems are characterised by a competent and experienced approach to global turnkey solutions, with improved engineering research and manufacturing resources. The advantages this organisation can offer are a strong engineering capability able to solve, develop and even anticipate the most innovative and demanding needs of the market.

SURVEY

A correct analysis of all data categories (seabed topography and morphology, weather characteristics, sea currents, tides, etc.) collected during the marine survey will result in an accurate definition of the route and of the procedures of laying, repair and protection of the cable. It will also result in a safe system design.

INSTALLATION

As far as installation services are concerned, C/S "Giulio Verne" – a modern and versatile cable ship capable of laying all types of submarine cables even under severe weather and environmental conditions – is one of Prysmian's most remarkable assets. It is equipped with a 7,000 tons turntable for high voltage cables and for anti-torsional cable designs and with a capstan machine capable of operating with a pulling tension of 55 tons. The ship is also set up to simultaneously lay up to three cables in bundle configuration. Thanks to its Dynamic Positioning System – SIMRAD SDP 21 – the vessel can follow a predetermined route with extremely high accuracy. Prysmian has also the necessary in-house equipment and skills to provide additional cable-laying solutions with a wide range of vessels, both in shallow and deep waters. Trenching and embedding machines are also available for cable protection. For each single project, the machines are chosen on the basis of the seabed morphology and depth. Where necessary, either specific equipment is designed and produced, or the existing one is modified to cope with unusual conditions.

POST-SALE AND MAINTENANCE

Post-sale and Maintenance Services are provided with the support of proper procedures, techniques, equipment and vessels or barges in order to cover all possible situations and needs. The adopted solutions are chosen on a case-by-case basis by taking into consideration both the technical and the economic aspects.





Linking power grids to sustainability

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