

PRY-MOULD™

High Voltage Accessories for Extruded Cables



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.

What links power grids to sustainability?

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 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 optimize supply chain processes, reduce total cost of ownership for our customers and help them achieve sustainable, profitable growth.

PRY-MOULD™ accessories for extruded cables

Introduction and concept

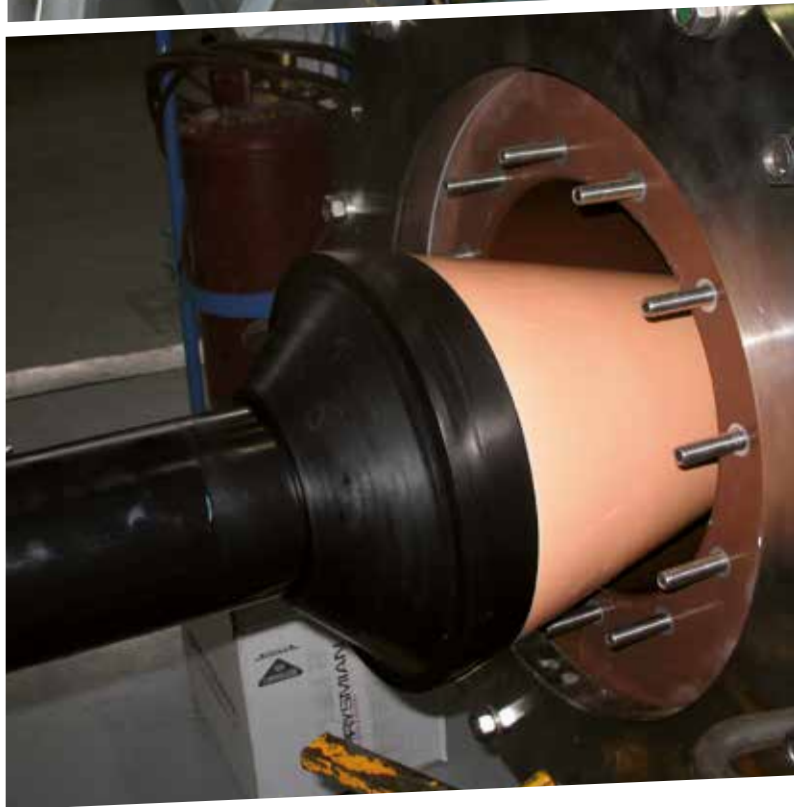
High Voltage accessories based on **prefabricated mouldings** represent a highly reliable solution that is considered a key component in the safe operation of an HV cable system.

The PRY-MOULD™ concept dates back to 1978 when the Group, strong of its very long and successful experience in Fluid Filled cable systems, developed their first generation of accessories, designed to connect High and Extra High Voltage extruded cables. Pre-moulded sleeves and stress cones are currently available for HV extruded cables from **72.5 kV up to 525 kV** and adopt the same design at all voltage classes.

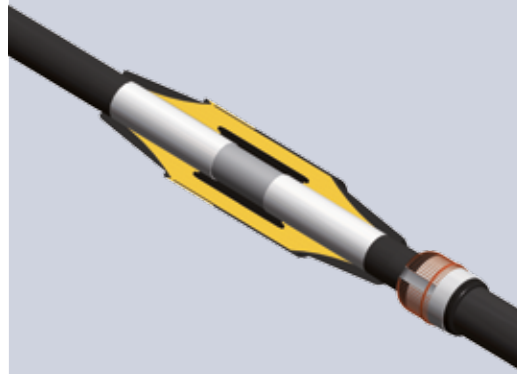
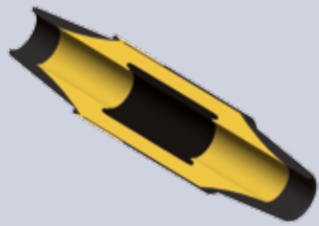
Thanks to outstanding electrical and mechanical properties, **Ethylene-Propylene Rubber (EPR)** has been favoured for the rubber mouldings manufacture. The integrated semi-conductive silicone rubber stress control cones and shielding electrode ensure a smoothly distributed electrical field control.

The mechanical properties of Prysmian special compounds ensure a constant pressure at the cable/moulding interface during the entire lifetime of the accessories. Prysmian one-piece pre-moulded sleeves and stress cones are completely in-house manufactured.









PRE-MOULDED JOINTS

The PRY-MOULD™ joint is a one-piece pre-fabricated and factory pre-tested joint, designed to connect two High Voltage extruded insulation cables. The cable ends are connected to each other by means of compression, MIG-welding or shear-off bolts.

To protect the joint different types of covering (which ensure mechanical protection, protection against moisture ingress and external damages) are available:

- The **compact joint covering** is based on a copper casing with heat shrinkable tubes. It guarantees a good sealing against water penetration and it is generally chosen for installations in concrete manholes or tunnels
- The **universal joint covering** features, in addition, an XLPE protective casing with cold pouring resin. It offers an excellent sealing against water penetration and is normally used in directly buried or fully submersed installations

Main features:

- Straight joints as well as joints with integrated screen interruption for cross bonding purposes. In the case of screen interruption, the metal joint casing is provided with an epoxy-insulating ring.
- Installation procedures and tools for various site conditions (e.g. manhole, open trench, etc.)



Speed™ LINE JOINTS

Prysmian has taken the major advantages of each type of design available on the market and has developed a new generation of one piece pre-moulded joints that are delivered to final customers with a rubber moulding already expanded (factory expanded) over carrier spiral tubes.

The Prysmian Speed™ product range consists of 2 main joint families:

- Sixty Speed™ joints for U_m 72.5 kV
- Oneten Speed™ joints for U_m 123 kV

Outer protection is available in the form of heat shrinkable tubes (for Cu wires screens) or copper casing plus heat shrinkable tubes (for metallic sheaths). Totally cold shrinkable solutions are available instead of the heat shrinkable ones for joints up to 72.5 kV.

- Considerable reduction of installation time and efforts
- No specific tools needed for the installation
- Straight joints as well as joints with integrated screen interruption for cross bonding purposes
- Within the same voltage class, a single joint size applies to a wide range of cable diameters





OUTDOOR TERMINATIONS

Prysmian outdoor termination solutions, based on EPR pre-moulded stress cones, include a wide range of products for the connection of underground circuits and overhead lines.

The pre-moulded stress cones, available for a wide range of cable sizes, are designed to fit with controlled interference over the cable insulation and to follow the cable's diameter variations.

The terminations are filled with an insulating compound up to a level where the electric field is substantially reduced. A recent development consists in a new patented medium that becomes partially solid within a short time after the filling of the termination, thus avoiding any possibility of leakage

1) PORCELAIN

- Self-supporting porcelain insulator with sheds
- Several different creepage distances available
- Filling with silicon fluid or new patented medium

2) COMPOSITE (POLYMERIC)

- Light, easy to install and resistant to vandalism
- Self-supporting insulator of glass fibre reinforced epoxy resin tube, covered with silicone rubber sheds
- Excellent environmental properties by water repelling silicone outer layer and sheds
- Several different creepage distances available
- Filling with silicon fluid (unpressurized, thus no oil or gas pressure monitoring system is required) or new patented medium
- Prysmian terminations can include optical fibers management and partial discharge sensors upon request
- Reduction of overall installation time and cost by simple installation procedure and low weight composite insulators.





OIL IMMERSED TRANSFORMER TERMINATIONS

Prysmian HV Accessories product portfolio features a complete range of terminations for direct connection to oil insulated transformers based on EPR pre-moulded stress cones.

The cable ends are encased in a specially designed and in-house manufactured epoxy resin (Voltalit™) insulator that is to be positioned directly inside the transformer's cable enclosure.

Prysmian has developed a special epoxy resin insulator version in which the outer part of the top connector is directly embedded.

- Both dry and wet solutions available
- Solutions for non-standard transformer cable enclosure available
- Plug-in solution for easy removal



SF6 IMMERSED GIS TERMINATIONS

Prysmian HV Accessories product portfolio features a complete range of terminations for direct connection to Gas Insulated Switchgears based on EPR pre-moulded stress cones.

The cable ends are encased in a specially designed and in-house manufactured epoxy resin (Voltalit™) insulator that is to be positioned directly inside the GIS enclosure.

Prysmian has developed a special epoxy resin insulator version in which the outer part of the top connector is directly embedded.

- Both dry and wet solutions available
- Solutions for non-standard GIS enclosure available
- Plug-in solution for easy removal
- Possible to install the epoxy insulator inside the GIS in the factory and/or to fill the GIS with gas on site and then complete the installation before the cable head is fitted

OTHER PRODUCTS

Additional equipment, such as link boxes, grounding sets and installation tools can be supplied.

Link Boxes

- Single phase and three phase
- cross bonding and single point bonding
- earthing design with and without surge voltage limiters
- single core and concentric bonding cable connections
- boxes and cabinets, including stainless steel box for wall or floor mounting, suitable for indoor, outdoor and underground installation

Accessories for power cables with integrated Optical Fiber

All accessories can be provided, with connections for optical fibers integrated in the power cable.

Partial discharge sensors

All accessories can be provided with integrated partial discharge sensors.

RELATED SERVICES

- Tailor made solutions for specific needs (such as optimised installation, modified accessories to meet special demands)
- Engineering
- Special tools
- Training and certification of jointers
- Supervision
- Installation
- Diagnostics and testing of installed components
- Partial Discharges monitoring performed with Prysmian's unique PryCam system



TEST AND QUALIFICATION PROGRAMMES

Prysmian High Voltage Accessories quality system complies with both ISO 9001 and ISO 14001 standards.

Integrity of all Prysmian Products is thoroughly proven by comprehensive programmes. These validation programmes include items such as:

- Electrical routine test on each individual accessory body
- Type tests according to international standards (IEC-60840, IEC 62067, IEEE 404, IEEE 48, NEN 3629) witnessed by independent institutes - Reports available on request.
- Long term development and prequalification tests up to 550 kV
- Statistical evaluation of impulse breakdown tests
- Short circuit tests
- Compatibility of materials
- Electrical field calculations
- Thermo-mechanical stability



Linking power grids
to sustainability

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