

Railway & Underground Cables

Application

The rapid development of railway technologies in recent years has impacted all areas, from mass transit to high-speed lines. The railway systems themselves, from DC to 2x25 kV AC, have undergone a similar evolution. System complexity and reliability, as well as safety, are the key results of this remarkable change.

A key effect of these advances is the development of cables with high levels of performance in terms of chemical and mechanical resistance, fire resistance, EMC behaviour and transmission capacity.



Benefits

> Lower Total Cost of Ownership

- Durability: **Technergy™** Railway & Underground cables have a proven track record in extended working lifetime versus standard railway cables and need minimum maintenance.
- EO and easy-stripping compounds make installation easier, faster and – as a result – less expensive.
- Components: Prysmian supplies sets of assembly components, tailor-made to your needs that significantly reduce installation time.

> Outstanding Product

- Completeness: a comprehensive product range, covering all functionalities (MV/LV, Control and Signalling, Video and Data Transmission, Optical Fibers).
- Railway's Cable Outfit: **Technergy™** Railway & Underground cables are suitable for any power and communication system, as well as signalling and control devices. Prysmian provides cables, such as **BOA, EUROBALISE, ENCODER-BOA, ZCO3**, for the most demanding and advanced applications.
- Customised Cable Design: Prysmian can provide cables and compounds tailor-made to specific applications, according to specified customer requirements (e.g. for extraordinarily heavy duty and harsh environments).

> Unique Safety in Fire Hazard

- Prysmian has always focused its attention on both human and material safety in all working conditions. In railway applications, cables are often installed in very critical conditions such as tunnels and deep underground lines. In this case, it is very important to use cables that under fire conditions, do not increase fire related hazards and that ensure the proper running of safety devices under extreme circumstances.

Under fire conditions the typically required light transmittance for LSOH cables' smoke emissions is not lower than 60%. **Technergy™** Railway & Underground cables comply with the highest standards, which establish that smoke emissions must have a light transmittance higher than 75%.

TRAVELLING IN COMPLETE SAFETY



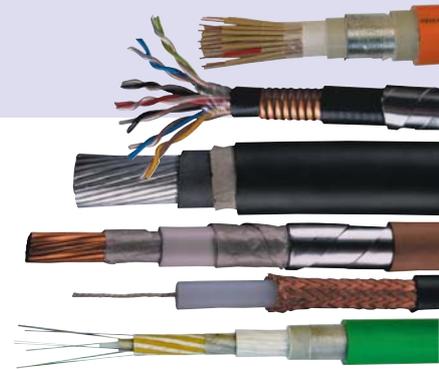
Afumex®



Furthermore, new cable designs and materials have been developed in order to meet the most demanding requirements of the Railway and Underground industry.

Technergy™ provides a full range of products that incorporate these railway technologies, including Medium and Low Voltage Power cables, Communication cables, and Control and Signalling cables.

Technergy™ Railway & Underground cables offer Rail and MTR authorities and operators, contractors, specifiers, system designers and installers the following benefits:



> Fire Resistant Cables

- **Technergy™** Railway & Underground cables include a full range of Fire Resistant cables specifically developed for underground lines and tunnels. For human and equipment safety purposes, in these types of installations, emergency exits and vital lifeguard services must operate properly even under fire conditions, for a minimum time necessary to let people out and to permit the intervention of firefighters. For these applications, Prysmian offers a complete range of cables, which exceed the most severe fire resistance standards, even for communication purposes.

> ERTMS Compliance

- Prysmian has always been at the forefront of meeting the requirements of the most advanced railway standards within the ERTMS (European Rail Traffic Management System) and according to the requirements of European transportation companies, railway designers and installers. New standards are aimed at creating a single railway signalling and control system, which guarantees interoperability throughout the European Rail Network. The ERTMS require high levels of EMC performance.

Technergy™ Railway & Underground cables are designed and built to comply with such demanding EMC requirements and use special materials and screening designs.

> Contract Management and Stock Availability

- Prysmian has an international network of technically skilled sales offices coordinated by the headquarters, which ensures that our customers have a local and easy-to-reach sales and technical contact point.
- Full project documentation and technical consulting is supplied to all of our customers as part of our sales support program.
- **Technergy™** Railway & Underground cables are available on short lead times or from stock.

SUBSTATION

UNDERGROUND

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.

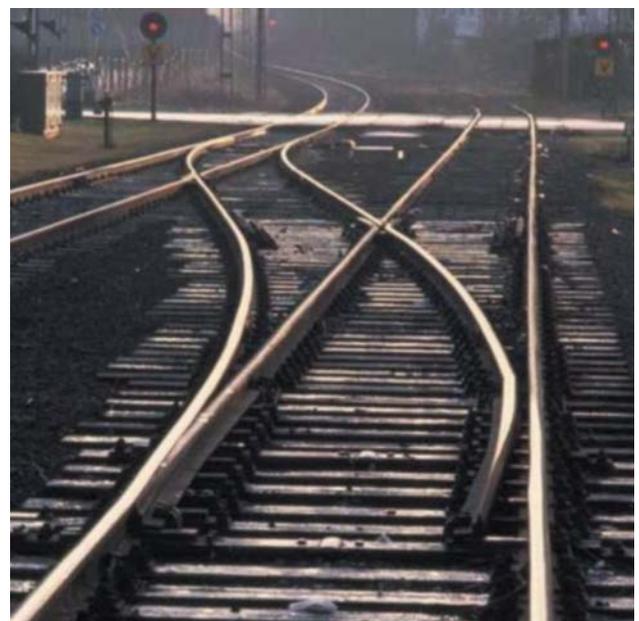


Prysmian's TECHNERGY integrated cabling solutions™ is one of the world's most comprehensive and technologically advanced answers to industry, infrastructure, contractors and OEM's specific requirements.

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



Cable families at a glance

TERAIL POWER CABLES

- TERAIL - P - 1,8 kV**

General Description: Single core medium voltage cables 1.8 kV

Use: Power cabling with special fire performance, used for track feeder circuits.
- TERAIL - P - M3 kV**

General Description: Multicore medium voltage cables 1.8/3 kV

Use: Power cabling with special fire performance, used for track feeder circuits.
- TERAIL - P - 25 kV**

General Description: Single core medium voltage cables 25 kV

Use: Power cabling with special fire performance used for track side aerial lines.
- TERAIL - P - M**

General Description: Multicore low voltage cables 0.6/1 kV

Use: Power cables used for lighting and low voltage circuits.
- TERAIL - P - M6 kV**

General Description: Multicore medium voltage cables 3.6/6 kV

Use: Power cables for the supply of signalling and auxiliary circuits.
- TERAIL - P - 0,75 kV**

General Description: Single core low voltage cables 0.45/0.75 kV

Use: Power flexible cables for equipment and rail track connections.
- TERAIL - P - FR**

General Description: Fire Resistant Power cables adapted to provide all services listed above

Use: Fire hazard safety systems for general indoor use.



TERAIL SIGNALLING CABLES

- TERAIL - S - M**

General Description: Multicore cables

Use: General signalling system, detection and
- TERAIL - S - MA**

General Description: Multicore cables A

Use: General signalling system, detection and s
- TERAIL - S - TA**

General Description: Unscreened (T) multipair c

Use: General signalling system when mechan
- TERAIL - S - TSAX**

General Description: Screened (T) mutlipair and multiquad cable

Use: Signalling system in lines with 25 kV ra
- TERAIL - S - FM**

General Description: Flexible Multicore

Use: Cabling of indoor equipment of signalling
- TERAIL - S - FMS**

General Description: Screened Flexible Mult

Use: Cabling of signalling circuits indoor equ
- TERAIL - S - FT**

General Description: Flexible (T) multipa

Use: Cabling of signalling circuits, indoor equ
- TERAIL - S - FTS**

General Description: Screened Flexible (T) mu

Use: Cabling of signalling circuits indoor equ
- TERAIL - S - FR**

General Description: Fire Resistant signalling cables with

Use: Fire hazard safety systems for general i

CABLES

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TERAIL COMMUNICATION CABLES

TERAIL - C - TSA

General Description Screened (T) multipair and multiquads cables Armoured

Use Cabling of line and local Telecommunication systems.

TERAIL - C - TS

General Description Screened (T) multipair and multiquad cables

Use Cabling of local Telecommunication systems.

TERAIL - C - COAX

General Description 75 Ohm COAXial cable

Use Video communication systems.

TERAIL - C - OPTIC

General Description Single mode and multi mode OPTICAL fiber cables

Use High bit-rate data transmission with dangerous EMC conditions and long distance connections.

TERAIL - C - FR

General Description Fire Resistant communication cables with all options listed above

Use Fire hazard safety systems for general indoor use.



Quality commitment



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

The quality control 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.



Prysmian's **Technergy™** cable factories have approvals for their cables at:

- > **APPROVALS**
- ATM – Ferrovie dello Stato
- Metropolitana Milanese
- Rail Track – RATP – SNCF

Prysmian works closely with major classification societies.

References project

Project	Customer	Country
Alta Velocità, (Tratta Roma-Napoli)	Ansaldo, Alstom	Italy
CTRL (High Speed London-Channel)	CSEE	U.K.
Eurotunnel	Eurotunnel	France, U.K.
LUL Central Line	Westinghouse	U.K.
LUL Northern Line	LUL	U.K.
Metro Milano	ATM	Italy
Metro Napoli	Ansaldo, Italtel	Italy
MTR North-East Line	Singapore Technology	Singapore
MTRC Hong Kong	Matra Transport	Hong Kong
Oslo Metro	Westinghouse	Norway
Railways Mexico	Matra International	Mexico
Tram Lisbonne	CSEE	Portugal

Accessories and modular systems

Today's industrial world recognises the importance of "system solutions" in many areas. A system gives more than raw materials alone: it gives benefits and added value that mean competitive advantage. Traditional installation methods for tunnels, bridges and street lighting involve a considerable amount of on-site connection work through the preparation of termination boxes or cable joints.



LIGHTING MODULAR SYSTEM

Flexo™ modular power cable systems have integral socket outlets, which are factory produced throughout the length of the main supply cable. This allows simple plug-in connections that remove the need for junction boxes and time-consuming on-site glanding and termination. The plug leads can be connected to the lights prior to their being secured. The main cable system, with integrated sockets, supplied on standard drums can then be installed as simply as a cable. When installed, the sockets align with the light fittings and connections are made by a simple plug-in action.



BENEFITS

- > **Cost**
Installation cost savings of up to 30%
- > **Speed**
Typically 250m can be installed in only 90 minutes
- > **Skill**
Reduced skill requirement for plug-in connections
- > **Flexibility**
Selectable phase loading easily achieved
- > **Accuracy**
Right first time, every time, guaranteed
- > **Reliability**
Factory produced and tested to ensure highest quality connections
- > **Simplicity**
Maintenance free, simple light fitting replacement



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