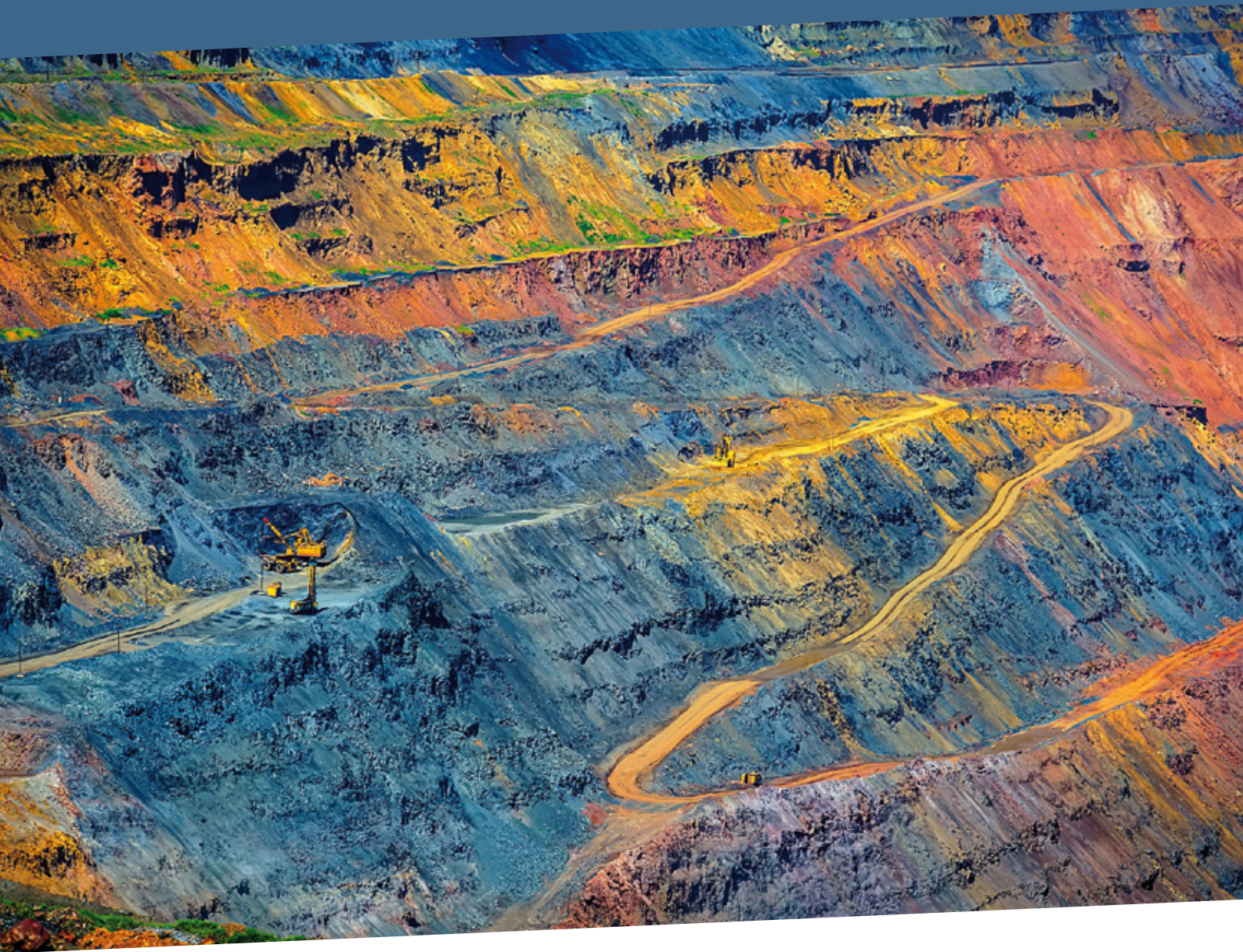


Mining & Tunnelling Cables



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 global expertise to the wheels of industry?

High-performing cable solutions to keep the wheels of industry turning.

On every continent, in applications that range from air and rail transport infrastructure to heavy duty industries such as mining, tunnel drilling and defence, Prysmian's specialist cable solutions sit at the heart of significant international projects; supporting the work of major customers, with high-performing, durable and safe technology. As the world leader in cabling, we draw on global expertise and local presence to work in close proximity with our customers, delivering products

and service platforms, built on easy contact, customised solutions and effective supply chains, meeting their specialised requirements, to help them drive the wheels of industry and achieve sustainable growth and profitability. 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.



Application

Opencast and underground mining requires ever-increasing performance of machines and methods. This has led to the large machines in use today. On bucket wheel and dragline excavators for instance, installed power of more than 15 MW and voltages up to 35 kV are no longer unusual.

These large, movable machines require medium voltage flexible reeling and trailing cables for power supply and are suitable for operation under the most extreme conditions.

Prysmian and Draka branded reeling and trailing cables for opencast and underground mining have been field-proven worldwide for decades. In these

mining applications, particular requirements such as mechanical strength and safety have led to the use of high-grade mechanically resistant rubber.

Prysmian Group has developed extensive know-how over many years about the special operational conditions of opencast and underground mining. The decisive factor was close cooperation with many significant mining companies.

The experience we gain every day contributes to the design of our mining cables. The high operational reliability and service life of Prysmian's reeling and trailing cables for mining is based on this experience.

mined material is extracted across a horizontal plane making horizontal arrays of rooms and pillars. The ore is extracted in two phases: first leaving "pillars" of untouched material to support the roof overburden and extracting open areas or "rooms" underground, then extracting left pillars partially. It is usually used for relatively flat-lying deposits, such as those that follow a particular stratum.

Continuous Miners have a large rotating drum that moves up and down. Strong bits on the drum cut the coal. As the coal falls, large arms under the drum gather the coal onto a conveyor chain. The conveyor chain carries the coal to the back of the machine. **LHD** (Load, Haul, Dump) remove the ore from the stope.

Glossary

Opencast Mining

Opencast mining is a surface mining technique of extracting rock or minerals from the earth by their removal from an open pit or borrow.

Underground Mining

Longwall Mining (Coal Shearer)

Longwall mining is a form of underground mining where a long wall of coal is mined in a single slice (typically 0.6–7.0 m thick). The longwall panel (the block of coal that is being mined) is typically 3–4 km long and 250–400 m wide. The coal is cut from the coalface by a machine called the shearer.

Board/Room and Pillar Mining (Continuous Miner)

Room and pillar is a mining system in which the

Benefits

Prysmian Group's Mining and Tunnelling cables offer significant benefits to a broad variety of specialized mining professionals such as OEMs, specifiers, contractors, installers, mining companies and more. These benefits include:

Unique Mechanical Performance

Prysmian Group's Mining and Tunnelling cables have been designed to withstand extreme conditions in terms of:

- Tensile loads
- Torsional stresses occurring during misalignment of cable guidance systems and oblique pay out
- Minimum bending radius at any ambient temperature range and stress conditions
- High travel speeds and acceleration.

Chemical and Climate Resistance

Prysmian Group's Mining and Tunnelling cables have been designed to withstand the most severe conditions. For these applications Prysmian has developed the high performance compounds that are used in Mining and Tunnelling cables to guarantee resistance to extreme conditions (such as high-speed, oil and fuel, mud, moisture, and acids and basis), as well as to harsh environments (for instance, extreme low/hot temperature, UV irradiation and ozone).

Miniaturised

Prysmian Group's Mining and Tunnelling cables

have the smallest possible dimensions. For instance, in MV cables:

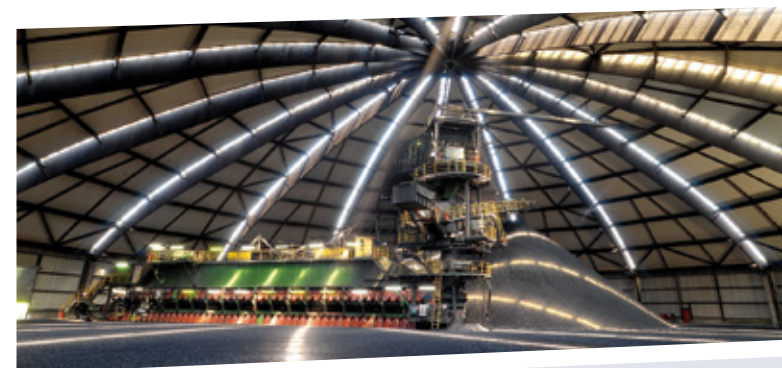
- Dimension - up to 30% less and yet in strict compliance with the existing standards.
- Weight - higher cable performance allow up to a 40% reduction in the cable weight.
- Robustness - higher physical/mechanical resistance, exceeding standard requirements in terms of abrasion, cut-through and repeated bending.

Customised and Multifunctional Engineering

Prysmian designs, compounds and builds cables according to specific customer needs. This allows us to have an exhaustive product range covering all functionalities (MV/LV, Instrumentation and Control, Optical fibres). Prysmian designs multifunctional cables from the simplest to the most sophisticated.

Longer Lifetime

Prysmian Group's Mining and Tunnelling cables guarantee an extended working lifetime (lower failure rate) in comparison with standard and traditional Mining and Tunnelling cables. As a consequence the total cost of ownership is lower.



Our Products and Brands

PROTOMONT™ and PROTON™

Worldwide very well-known brands for mining applications. The family covers single- and multicore cables from 100 V to 35 kV. Power cables, signaling cables and fibre optic cables for mining operations are available.

TENAX™

The Draka brand TENAX is well known for premium mining cables. It covers single- and multicore cables. Flexible cables for reeling, trailing and fixed installations are available.

CORDAFLEX™

The brand CORDAFLEX is worldwide well-known as low voltage (0.6/1 kV) reeling cable. In mining applications it is used for underground scoop/LHD operations and in opencast stacker/reclaimer operations.

SUPROMONT™

SUPROMONT is a typical underground cable for fixed installation and as feeder cable for shiftable MV equipment in tunnelling sites.

NSSHOEU

NSSHOEU is the standard flexible cable for the use in underground and opencast mines (voltage 0.6/1 kV).

TUNNELFLEX

These flexible cables are used for tunnelling sites. Available as low voltage cable (0.6/1 kV) and as reeling cable for TBM (tunnelling boring machines) with MV 6/10 up to 18/30 kV.

MINEMASTER™

Flexible and semi-flexible cables acc. local standard AS/NZS 1802 for use in underground mines, e.g. Type 241. Flexible and semi-flexible cables acc. local standard AS/NZS 2802 for use in opencast mines, e.g. Type 450. Different cable types for trailing, reeling and semi-fixed installation available.

SUPERPRENE™

Brazil made cables acc. ICEA S-75-381 and NBR. Types SHD-GC, G-GC, W and G. Mainly used in South America.

MT 818

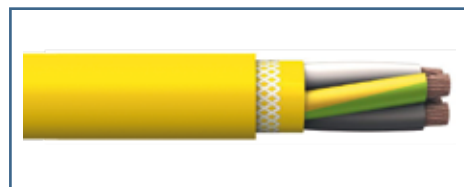
Flexible and non-flexible cables for underground and opencast applications acc. to Chinese standard MT 818 (the standard defines a wide range of cables for different use), e.g. MYP, MYPT, MCPJB, MCPT.



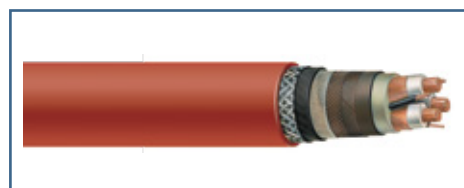
PROTOMONT™



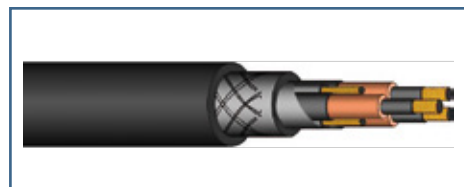
TENAX™



CORDAFLEX™



SUPROMONT™



TUNNELFLEX



MINEMASTER™

Type SHD-GC

General requirements from ICEA S-75-381, NEMA WC58, CSA and MSHA prescriptions. The family covers from 2 kV (multicore) and 5 kV-25 kV (single- and multicore). Construction: two ground wires and insulated ground check, class 1 tinned copper (flexible), 90 °C rated EPR, tinned copper braid shield, CPE sheath. Mainly used in North and South America.

Type G-GC

General requirements from ICEA S-75-381, NEMA WC58, CSA and MSHA prescriptions. The family covers from 2 kV (multicore) and 5 kV-25 kV (single- and multicore). Construction: two ground wires and insulated ground check, class 1 tinned copper (flexible), 90 °C rated EPR, CPE sheath. Mainly used in North and South America.

Type G, W

General requirements from ICEA S-75-381, NEMA WC58, CSA and MSHA prescriptions. The family covers from 2 kV (multicore) and 5 kV-25 kV (single- and multicore). Construction: two ground wires and insulated ground check, class 1 tinned copper (flexible), 90 °C rated EPR, CPE sheath, textile reinforcing braid.

AIRGUARD™

General requirements from MSHA or CSA MPF or MPF-GC. The product uses proprietary Prysmian AIRGUARD Technology - eliminating need for metallic armoring. Product available from 5 kV-35 kV, with class 2 bare copper conductor. 90 °C XLPE or 105 °C EPR insulation with extruded semi-conductive layer, polymeric AIRGUARD armor layer, DRYLAM sealed aluminum tape available, CPE or PVC sheath.

Teck

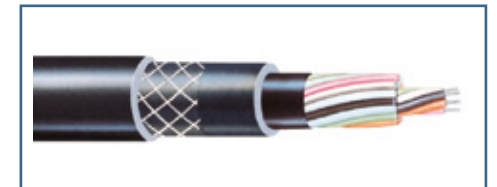
Low voltage and medium voltage cables, with XLPE insulation and aluminum or galvanized steel interlock armor. Design according to CSA.

Fibre Optic

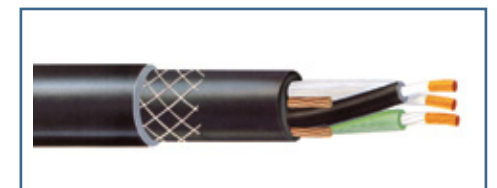
General requirements from MSHA, TIA/EIA-568, ANSI/ICEA S-104-696, UL-1666, CSA 22,2; Telecordia GR-409, Telecordia GR-20, RoHS. Available with single-mode and multi-mode fibres in loose tube or tight buffer configuration from 2 to 144 fibres, interlocked armoring.



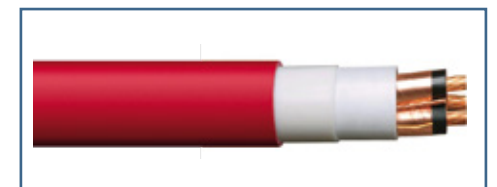
Type SHD-GC



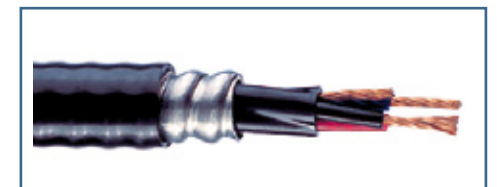
Type G-GC



Type G



AIRGUARD™



Teck



Fibre Optic

Cable families at a glance

Application Glossary

Opencast Mining

Reeling
LV and MV reeling cables for underground and opencast use. Special long life cables with semi-conductive rubber screen (VDE-based design).

Trailing
MV cables for the use in trailing applications in opencast mines for the power supply of excavators, drills etc.

Dredger/Submersible Pumps
LV and MV cables for permanent use in water in submersible pump and dredger applications.

Fixed installed along conveyor
Flexible cables for applications in fixed installations along conveyor.

On-board Installation
LV and MV flexible cables for fixed installation onboard.

Underground & Tunnelling

Chain/cable handler
Flexible cables for use in underground chain (cable handler) applications. Used as feeder cables for coal cutters (drag chain application).

Reeling (LHD, scoop, drill, etc.)
LV and MV reeling cables for underground and opencast use. Special long life cables with semi-conductive rubber screen (VDE-based design).

Submersible Pumps
Flexible cables for underground applications in festoon operations. Used as feeder cable to transformers etc.

Fixed installed along conveyor or side wall
Flexible cables for underground applications in fixed installations.

Tunnelling sites
LV and MV cables for underground and opencast use. Special long life cables with semi-conductive rubber screen (VDE-based design).
MV cables for the use in trailing applications in opencast mines for the power supply of excavators, drills etc.
Flexible cables for underground applications in fixed installations.

Opencast Mining

	Reeling	Trailing	Dredger/ Submersible Pumps	Fixed installed along conveyor	On-board installation
PROTOLON(M)-R > 1 kV	●			○	○
CORDAFLEX ≤ 1 kV	●			○	○
TENAX M > 1 kV	●			○	○
Prysmian SHD-GC ≥ 2 kV	○	●	●	●	●
Mine Master Type 450/451	○	●		○	○
TENAX SAS > 1 kV		●		○	○
PROTOLON(SB-SAM) > 1 kV		●		○	○
Prysmian G-GC ≤ 2 kV			●	●	●
Prysmian Type W ≤ 2 kV			●	●	●
Mine Master Type 440			●	●	●
Prysmian MYPT/MYPTJ		●		●	●
Prysmian MYP/MCPT ≤ 1,1 kV		●			●
PROTOLON(M)-F > 1 kV			●	●	●
PROTOLON(ST) > 1 kV			●	○	○
PROTOMONT NSSHOEU ≤ 1 kV			●	●	●
PROTOMONT(M) (N) SHOEU			●	●	●
Prysmian MYP ≤ 1,1 kV				○	

● recommended ○ suitable



An outstanding track record

Among our main projects and customers:

- Europe**
- Germany: RWE, Vattenfall, MIBRAG, RAG Mining Solution, Solvay, K+S
 - Poland: Bełchatów, KWB Turów, Adamów, Bogdanka, Kompania Węglowa
 - Sweden: LKAB Kiruna
 - Czech Republic: Czech MUS, Coal Mine Sokolov
 - Serbia: RB Kolubara
 - Hungary: Mátra
 - Bulgaria: Mini Maritza

- America**
- Barrick Gold, CODELCO, Glencore, Vale

- Asia**
- China: Shenhua Group, Yankuang Group, Pingshuo Coal Industry
 - Indonesia: Bukit Asam
 - Thailand: Lampang Coal Mine, EGAT Mae Moh Coal Mine
 - India: Neyveli Lignite Corporation, Singareni Collieries Company Limited

- Australia**
- Glencore, BHP Billiton Mitsubishi Alliance (BMA), Anglo American

- Africa/Middle East**
- Morocco: Office Chérifien des Phosphates (OCP)
 - Senegal: Grande Côte Operation (TiZir)
 - Jordan: Jordan Phosphate Mines
 - South Africa: Richards Bay Minerals



Underground & Tunnelling

	Chain/ cable handler	Reeling (LHD, scoop, drill, etc)	Submersible Pumps	Fixed installed along conveyor or side wall	Tunnelling sites
PROTOMONT(V) and (VO)	●			○	
TENAX CTE	●			○	
PROTOMONT Type 7/7M/7S	○		●	●	
PROTOMONT Type 307/S/M	○		○	●	●
Prysmian SHD-GC ≥ 2 kV	○	○	●	●	●
Prysmian G-GC ≤ 2 kV	○	○	●	●	●
Mine Master Type 245 ultra flex	●	●	○	○	○
Prysmian MCPT/MCPJB/MCP	○			○	○
PROTOMONT(S)		●		○	○
CORDAFLEX(S)		●		○	○
TENAX(LK)		●		○	○
PROTOMONT Type11		○		○	○
Mine Master Type 275		●		○	○
PROTOMONT NSSHOEU.../3E			●	●	●
PROTOMONT NSSHOEU			●	●	●
PROTOMONT(M) (N)SHOEU			●	●	●
Prysmian Type W ≤ 2 kV			●	●	●
Mine Master Type 241			●	●	●
PROTOMONT Festoon > 1 kV				●	●
SUPROMONT > 1 kV				●	●
PROTOMONT Type 201/211				●	●
PROTOMONT Type 331/631				●	●
Mine Master Type 209/240				●	●
Prysmian MYPT/MYPTJ				●	●
PROTOLON Tunnel reeling > 1 kV				○	●
TENAX HTT reeling > 1 kV				○	●
TUNNELFLEX				○	●

● recommended ○ suitable

Linking global expertise to the wheels of industry

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