

Railway Main Line Cables

SWEDEN

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 three renowned commercial brands - Draka, Prysmian and General Cable - based in 50 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures and achieve sustainable and profitable growth.

For 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.

For telecoms, the Group is a leading manufacturer of all types of copper and fibre cables, systems and accessories for 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 needs of our customers across all continents - while 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 rolling stock and vehicles for high-speed trains and urban mass transit lines, to all types of rail transport infrastructure, 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 in order to deliver product and service solutions built on workability, customized solutions and effective supply chain, that help them drive the wheels of industry and achieve sustainable growth and profitability.



Railway Main Line Cables

History of the railways

When George Stephenson's steam locomotive "The Rocket" emerged as the winner of the Rainhill Race in 1829, with an average speed of 12.5 mph = 20 km/h, no one could predict the triumphant progress the railways would make in the almost 200 year period that followed. Within just a few decades, the railway developed into a broadly integrated transport system, which drastically reduced travel times, and made it possible to develop infrastructure - especially in the New World on the continent of North America. The triumph of the railways began with a 330 km railway line, as early as 1830. Over the next fifty years, the industry grew exponentially and reached almost 370,000 km. Nowadays, the railway infrastructure extends to more than 1.1 million km.

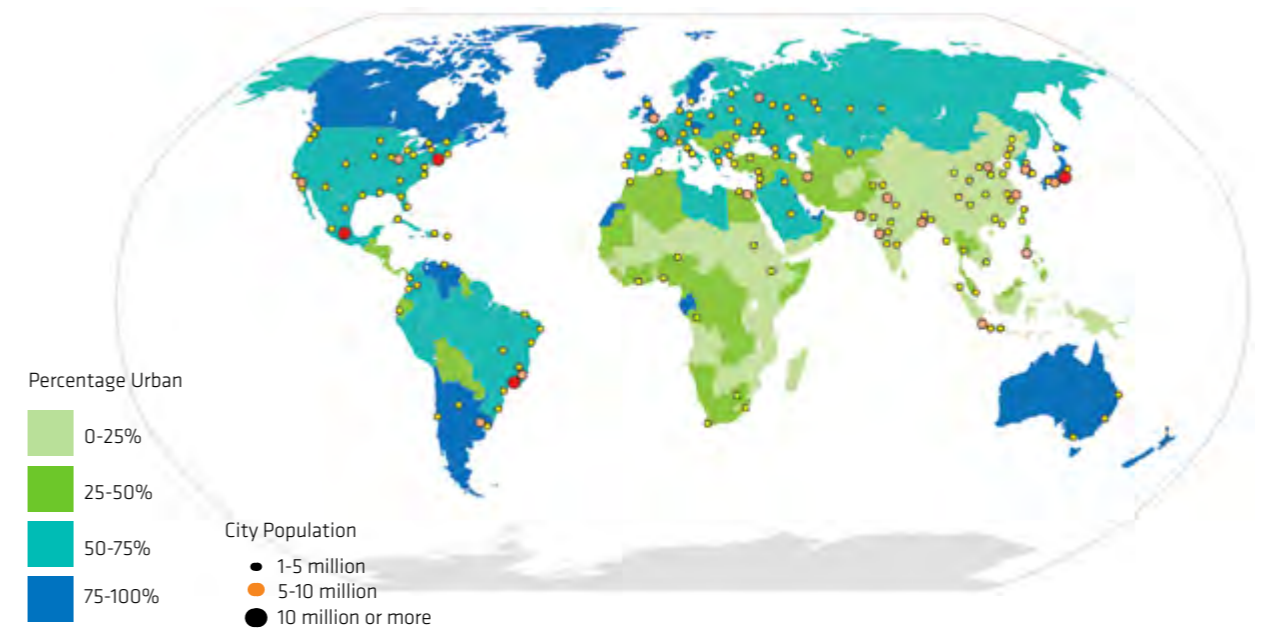
With the advent of civil aviation, the railway lost its role as the main means of transport for middle and long distances, and has long been regarded as outdated, slow and uncomfortable. But in recent years, the railway has experienced a revival. With the introduction of electronic interlocking technology and agreement on a European system for the management and control of railway transport - ERTMS (European Rail Traffic Management System), the rail transport once again plays an important role especially over medium distances. Thanks to a variety of European and other internationally operating system providers in the field of interlocking technology, the ERTMS system, which originated in Europe, has been experiencing an explosive worldwide acceptance over the past few years.

Urbanisation

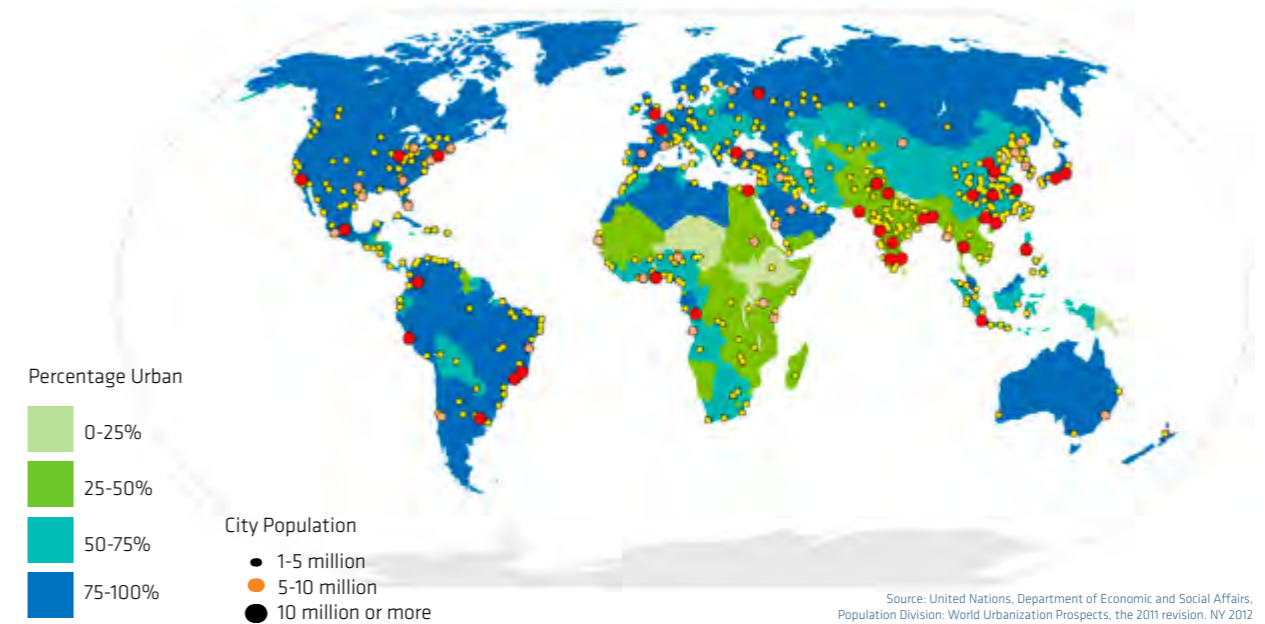
A major challenge for the railways as a means of mass transport, which is also an unparalleled opportunity, is represented by the increasing urbanisation of the world's population. In 2013, approximately 51% of the 7 billion people inhabiting the planet resided in an urban environment. By 2050, not only will the world's population have increased to approximately 9 billion people, but the proportion of people living in cities will have grown to about 70%. Thus, some 6.3 billion inhabitants will reside every day in large cities and be on the move. Car-bound private transport is destined to collapse and a change to rail-based transportation is therefore, without rival.

Tram and metro systems as well as regional trains and light rail vehicles will interconnect the cities into low-emission zones. Megacities are already in planning, such as the Chinese project "Turn The Pearl Delta Into One", in which nine cities with a total of 42 million people are to be merged into a single city. The most modern railway systems will form the backbone of this metropolis. A total of 29 lines with a network of altogether 1500 km will service the region and allow transit times of maximum one hour from one end of town to the other.

Percentage of urban population and agglomerations by size, class 1980



Percentage of urban population and agglomerations by size, class 2025



Source: United Nations, Department of Economic and Social Affairs, Population Division: World Urbanization Prospects, the 2011 revision, NY 2012

Railway Main Line Cables

Development of technology

The safety requirements for the railway technology are extraordinary and similar to that in aviation or aerospace. With increasing traffic volume in both directions on single track lines, continuous monitoring which provides permanent communication between the train conductor's cab and the railway control center is essential for the railway line safety. The rail vehicles cannot leave their track in case of imminent collision by opposing traffic on the same track.

In Europe, there has been a number of train control technologies that worked well within the country borders, but, led to considerable additional costs in the cross-border traffic. Currently, locomotives have more than one train control system installed, which ensure safe participation in railway traffic in neighboring countries without the need to change the locomotive.

Research aimed at reducing the number of systems and develop a uniform operational management approach for railways across Europe already started in the 80's on behalf of the International Union of Railways (UIC) and the European Rail Research Institute (ERRI). In April 2000, the guidelines for adopting specifications were presented under the name ERTMS - European Rail Traffic Management System.

The ERTMS system mainly consists of the following components:

- ETCS (European Train Control System) is a train control system, which is intended to prevent a train entering an occupied sector, or running at too high speed, using interlocking electronic control systems, with integrated train and trackside elements.

- GSM-R (Global System for Mobile Communications - Railway) is a mobile communications system for railway data and voice communications between moving trains and fixed locations, designed to satisfy the highest safety standards.

ERTMS was initially developed for intercity trains on routes of Trans-European Networks (TEN), but is gaining worldwide attention and it is being implemented outside Europe as well.

Another well recognized railway technology is CBTC - Communication Based Train Control system. CBTC systems are commonly used for urban rail traffic such as underground railways, light rail vehicles and trams, in urban areas with short transportation systems.

Both ETCS and CBTC systems are based on the same principles, namely high safety level in highly dense traffic. However, CBTC goes one step further and offers fully automated train operation. The train starts and stops automatically without a driver.

Even though CBTC complies with international standards the systems of each individual developer are not freely replaceable. The implementation of CBTC is highly complex and significantly more expensive than ERTMS on comparable routes. However, CBTC is unbeatable when it comes to achieving the shortest possible intervals between trains, down to 60-90 seconds. During the peak morning and evening periods, thousands of commuters can be comfortably transported and hence the streets can be relieved of congestion.



Prysmian Group has accompanied this development from the outset and today is able to offer a full range of cables for all applications in the railway sector.

Prysmian Group has the experience and the know-how to assist you and your projects worldwide.

Railway projects are unique!

Railway Main Line Cables



NSB type 75 - Christian Niclas Nordmark

Index

Cables for any application	page 10
Designation codes for cables	page 12
Explanation of symbols	page 15
Railway cable data sheets	page 16
Cables with reduction factor	page 92
Requirements for fire characteristics of cable installations in tunnels or stations	page 94
Fire testing	page 95
Construction Product Regulation	page 98
Transport and storage of cable drums	page 100
Important physical characteristics	page 101
Certifications and compliance	page 102
Our responsibilities	page 103
References	page 104

Railway Main Line Cables

Cables for any application



As the leading worldwide supplier, Prysmian Group offers an extensive range of cabling solutions for different railway network applications.

Typical cable applications for main railway lines include:

Substations and Transformers

- HV cables to substations for traction power
- MV cables to transformers for power distribution networks

Traction Tower Networks

- MV cables for AC systems
- MV and LV cables for DC systems

Railway Network Systems

- MV and LV cables to distribute current to control and telecommunication systems, lighting, heating and real estate along the railway.

Grounding of Electrical Systems

- Bare conductors or insulated cables to guarantee the integrity of electrical systems.

Overhead Catenary Lines

- Cables to supply electric power to railway trains and to make them move.

Control and Signalling Systems

- Cables to cover a wide range of control and signalling applications to direct trains and keep trains clear of each other.

Mobile Communication Systems (GSM-R)

- Data and fiber optic cables for railway data and voice communication between moving trains and fixed locations.

Railway Main Line Cables

Designation codes for cables

Letter	First letter Conductor	Second letter Insulation	Third letter Sheath or other construction detail	Fourth letter Construction detail or application	Fifth letter Construction detail or application
A	Aluminium		Aluminium foile sheath and/or aluminium thread		
B	Aluminium alloy	Flame protected thermoplastic polyolefin (halogen free, low smoke)	Flame protected thermoplastic polyolefin (halogen free, low smoke)	Vehicle cable	
				Bonding wire	
			Lead sheath	Lead sheath	
C		Impregnated paper	Concentric copper wire screen	Concentric copper wire screen	
D	Rubber with rubber outer sheath				
E	Copper Class 1 conductor	Ethylene-propylene rubber		Reinforced	Reinforced
F	Copper Class 2 conductor		Braided copper thread	Braided copper or steel thread	
H		Silicon rubber		Elevator cable	Traveling cable
I		Urethane plastic	Urethane plastic		
J	Steel wire		Steel wire armouring	Ground	
K		PVC	PVC	PVC	PVC
L		Polyethylene (PE)	Plastic coated aluminium tape along with copper screen	Polyethylene (PE)	Polyethylene (PE)
M	Copper Class 2 conductor		Polyethylene (PE)		
O		Chloroprene rubber	Chloroprene rubber		Oil cable
P			Galvanized steel tape armour	Galvanized steel tape armour	
Q		Flame protected thermoplastic polyolefin (halogen free, low smoke)	Flame protected thermoplastic polyolefin (halogen free, low smoke)	Flame protected thermoplastic polyolefin (halogen free, low smoke)	
R	Copper Class 5 conductor		Plastic coated aluminium tape armour	Control cable	
S	Copper Class 6 conductor			Self-supporting	
T	Copper Extra fine threaded	Flour plastic	Steel wire armour	Heavy connecting cable or steel wire armour	Steel wire armour
U			No outer sheath		
V		Rubber, no outer sheath	Ethylene propylene rubber	Water	Water
X		Crosslinked polyethylene (PEX)	PVC oval cross section		
Z		Flame protected thermoplastic polyolefin (halogen free, low smoke)	Flame protected thermoplastic polyolefin (halogen free, low smoke)	Cables for neon plants	

Letter	First letter Optical or electrical conductor	Second letter Conductor insulation or secondary protection	Third letter Jacket or other construction detail	Fourth letter Construction detail or property	Fifth letter Construction detail or application
A	Uncoated aluminium	Acrylate coated fiber tape	Aluminium tape screen		
B	Aluminium alloy		Lead sheath	Bonding wire	Halogen-free, flame protected cable
C	Bronze	Combined cell- and homogenous polyolefin		Cable with the sheath embedded overhead line	
D	Glass/plastic, fiber		Cable consisting of only dielectrical material		
E	Copper Class 1 conductor		Individually screened parts or braided groups	Reinforced or low-capacitance cable	
F	Copper Class 2 conductor		Metal wire thread, metal wire braided or metal pull relief		
G	Glass/plastic, fiber		Metal free reinforcement of thread, braid or pull relief		
H	Fiber bundle		Parts around pull relief		
I		Thermoplastic polyurethane elastomer (TPU)			
J	Copper clad steel wire	Fiber without secondary protection	Steel tape armour		
K	Coaxial tube	PVC			
L	Conducting plastic	PE			
M	Copper Class 5 conductor	PP	Metal sheath		
N		PA			
O		Thermoplastic elastomer			
P	Glass/plastic, fiber	Unimpregnated paper	Galvanized steel tape armour		
Q		Halogen-free, flame protected material			
R	Copper Extra fine-threaded	Polyester		Signalling cable	
S	Copper Class 6 conductor	Track center		Self-supporting	
T	Copper (<0,1 mm) Extra fine-threaded	Polytetrafluoroethylene (PTFE, FEP etc.)	Galvanized steel tape armour		
U		Cell polyolefin	Without jacket	Fire resistant cable	
V					Watertight
W			Grooved metal sheath		
X			Oval cross-section	Non weather proof cable	
Y				Weather proof cable	
Z	Spin conductor		Copper tape screen		

SS 424 16 75

Railway Main Line Cables



Explanation of symbols



Conductor temperature

Max. conductor temperature °C in continuous operation.



Halogen free

Halogen free acc. to EN/IEC 60754-1 and EN/IEC 50267-1.



Flexible installation

Due to IEC 60228 class 5 conductor.



Acidity

Corrosivity acc. to EN/IEC 60754-2.



Weather proof



Fire retardant

Flame propagation acc. to EN/IEC 60332-1. Bundled and vertical acc. to EN/IEC 60332-3.



Watertight or proof

Axial or radial water blocking via water swellable tape or yarn.



Screened or armoured

With either copper, aluminium or steel wire, foil and tape.



UV resistant

Filling and or outer sheath suitable for outdoor application.

Railway Main Line Cables

Popular railway cable data sheets

Index of data sheets

1 Electrification of Main Lines		Page
1.1	Power Cable	
	Power Cable	AHXAMK-WM 12kV Multi-Wiski TT 19
	Power Cable	AHXAMK-WM 24kV Multi-Wiski TT 20
	Power Cable	TRV-AXCLJ TT 12 kV 21
	Power Cable	TRV-AXCLJ TT 24 kV 22
	Power Cable	TRV-AXLJ TT 36 KOMBI 23
	Power Cable	TRV-AXLJ TT 36 kV 24
	Power Cable	TRV-AXLJ TT 3,6 kV 25
	Power Cable	TRV-AXLJ TT 36+3,6 kV 26
	Power Cable	TRV-AXQJ RMF 12 kV 27
	Power Cable	TRV-AXQJ RMF 24 kV 28
	Power Cable	TRV-AXQJ TT 36 kV 29
	Power Cable	TRV-AXQJ TT 3,6 kV 30
	Power Cable	TRV-AXQJ TT 36+3,6 kV 31
	Power Cable	TRV-FXQJ TT 12 kV 32
2 Overhead Catenary Lines		Page
2.1	Aluminium Wire	
	Catenary Contact Wire	TRL 35
	Catenary Contact Wire	TRL CuAg 36
	Catenary Wire	KK GZ-II 37
	Dropper	KKM BZ-II 38
	Return Wire	AAC 212 39
	Return Wire	ACSR 85/14 PIGEON 40
	Earthing	CULE 41
	Earthing	76AL-W 42

Many more cable types and tailor-made cables are available for your individual application.

Index of data sheets

3 Signalling & Control		Page
3.1	Power Control Cable	
	Power Control Cable	Afumex Easy RZ1-K AS 1 kV 45
	Power Control Cable	DRAKAFLEX H07RN-F 450/750 V 46
	Power Control Cable	EQLR Pure 300/500 V 48
	Power Control Cable	M-Flex HCH Cca 300/500 V 50
	Power Control Cable	RQ Pure 450/750 V 51
	Power Control Cable	RQQ Iåginduktanskabel 450/750 V 52
	Power Control Cable	TRV-ELARL 300/500 V 53
	Power Control Cable	TRV-ELLR 300/500 V 54
	Power Control Cable	TRV-Flex 55
	Power Control Cable	TRV-JLXS 56
	Power Control Cable	TRV-RLAL 300/500 V 57
	Power Control Cable	TRV-RQ 450/750 V 58
	Power Control Cable	TRV-RQQ 450/750 V 59
	Power Control Cable	JZ-500 HMH 300/500 V 60
3.2	Signalling Cable	
	Signalling Cable	ELQYB 61
	Signalling Cable	TRV-ECLALPLE 62
	Signalling Cable	TRV-ECLALPQBEU 63
	Signalling Cable	TRV-ELALE 64
	Signalling Cable	TRV-ELALV 66
	Signalling Cable	TRV-ELAQBUV 68
	Signalling Cable	TRV-ELLALE 100 V 70
	Signalling Cable	TRV-ELLALPLE 100 V 72
	Signalling Cable	TRV-ELLALPQBEU 100 V 74
	Signalling Cable	TRV-ELQTQBU 76
	Signalling Cable	TRV-ENQXBU 77
	Signalling Cable	TRV-ENUBB 78
	Signalling Cable	TRV-FNUBB 79
	Signalling Cable	TRV-FLLAL 80
	Signalling Cable	TRV-FLLAQBU 82
	Signalling Cable	TRV-EQQXB 84
4 Communication		Page
4.1	CAT Cable	
	CAT Cable	UC300 HS24 Cat.5e SF/UTP LSOH 86
	CAT Cable	UC400 Cat.6 U/UTP Dca HD LSHF 88
	CAT Cable	ICE IE UC900 SS23 Cat. 7 PE IE S/FTP 90



Electrification 1. of main lines

POWER CABLE

AHXAMK-WM 6/10 (12) kV Multi-Wiski TT

WATER TIGHT

Application

AHXAMK-WM is assembled from 3-single core cables. Each cable is radial and longitudinal water tight. For fixed outdoor installation, can be ploughed down.

Technical data

Rated voltage:

> 6/10 (12) kV

Impulsive voltage:

> Max 125 kV

Bending radius:

- > In fixed installation: 10 x D
- > When pulling-in: 15 x D
- > When pulling down: 8 x D
- > Max pulling force (N/mm²): 5 x D²

Temperature range

- > Max. operating temperature: +90°C
- > Lowest temp. at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > IEC 60502-2
- > CENELEC HD 620 Part 10 Section F
- > IEC 60228

Construction

Cable shaper:

> Round

Conductor:

- > Stranded
- > Round
- > Class 2. acc. to IEC 60228
- > Longitudinally water tight

Conductor insulation:

> XLPE, minimum 3,4/2,96 mm

Inner semi-conducting layer:

> Extruded

Outer semi-conducting layer:

> Bonded

Longitudinal water tightness:

> Semi conducting water blocking tape

Radial water blocking:

> Aluminium-PE laminate, bonded to sheath

Outer sheath:

> PE, black



90°



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package	Article no.
3x95+62	19	67	2700	500	K24	20022275

Electrical properties						
Conductor and screen area (mm ²)	Conductor resistance (Ω/km)	Inductance (mH/km)	Reactance (Ω/km)	Capacitance (μF/km)	Charging current/phase (A/km)	Earth fault current (A/km)
3x95	0,320	0,39	0,12	0,32	0,8	2,4

Electrical properties					
Conductor and screen area (mm ²)	Current rating at core temp. 65°C in ground * (A)	Current rating at core temp. 65°C in air * (A)	Current rating at core temp. 90°C in air * (A)	Max. short circuit current on the conductor during 1s at initial temp. 65 °C (kA)	Max. short circuit current on the conductor during 1s at initial temp. 90 °C (kA)
3x95	235	230	280	9,9	8,9

POWER CABLE

AHXAMK-WM 12/20 (24) kV Multi-Wiski TT

WATER TIGHT



Application

AHXAMK-WM is assembled from 3-single core cables. Each cable is radial and longitudinal tight sealed. For fixed outdoor installation, can be ploughed down.

Technical data

Rated voltage:

- > 6/10 (12) kV

Impulsive voltage:

- > Max 75 kV

Bending radius:

- > Min. bending radius part: 0,47 m
- > Min. bending radius cable: 0,61 m
- > Max pulling force (N/mm²): 5 x D²

Temperature range

- > Max. operating temperature: +90°C
- > Lowest temp. at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > IEC 60502-2
- > CENELEC HD 620 Part 10 Section F
- > IEC 60228

Construction

Cable shaper:

- > Round

Conductor:

- > Stranded
- > Round
- > Class 2. acc. to IEC 60228
- > Longitudinally water tight

Conductor insulation:

- > PEX, minimum 3,4/2,96 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded

Longitudinal water tightness:

- > Semi conducting water blocking tape

Radial water blocking:

- > Aluminium-PE laminate, bonded to sheath

Outer sheath:

- > PE, black

POWER CABLE

TRV-AXCLJ TT 6/10 (12) kV

WATER TIGHT AND SCREENED

Application

AXCLJ-TT is radially water tight due to an aluminium laminate bonded to the outer sheath and longitudinally water tight due to water-swellable tapes. The screen is made up of circular copper wires, water blocking tapes (replacing water blocking yarns) and the cable has been complemented with two strong ripcords for easier and safer opening of the outer sheath.

The cable is primarily designed for ploughing down in ground, but thanks to its robust design can handle the stresses resulting from installation in lakes with limited currents and of limited depth.

Technical data

Bending radius:

- > In fixed installation: 8 x D
- > When pulling-in: 12 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)
- > D = outer diameter of cable (mm)

Max pulling force - pulling eye (N/mm²):

- > Max. pulling force: 30xS (N)
- > S = cross-sectional area of conductor (mm²)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M

Construction

Cable shaper:

- > Triangular

Conductor:

- > Round
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 3,1/2,96 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded

Longitudinal water tightness:

- > Semi conducting water blocking tape

Filler:

- > PE-profiles

Inner covering:

- > Conductive tape

Shield/screen:

- > Round copper wires in contact with aluminum laminate

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Ripcord:

- > Aramid

Outer sheath:

- > Composite PE, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 75 kV



90°



90°



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package	Article no.
3x95+62	19	67	2700	500	K24	20022275

Electrical properties						
Conductor and screen area (mm ²)	Conductor resistance (Ω/km)	Inductance (mH/km)	Reactance (Ω/km)	Capacitance (µF/km)	Charging current/phase (A/km)	Earth fault current (A/km)
3x95+62	0,320	0,39	0,12	0,32	0,6	1,8

Electrical properties					
Conductor and screen area (mm ²)	Current rating at core temp. 65°C in ground * (A)	Current rating at core temp. 65°C in air *(A)	Current rating at core temp. 90°C in air *(A)	Max. short circuit current on the conductor during 1s at initial temp. 65 °C (kA)	Max. short circuit current on the conductor during 1s at initial temp. 90 °C (kA)
3x95+62	235	230	280	9,9	8,9

Content is subject to changes acc. to current product development and or any changes to standards.

Conductors and screen area (mm ²)	Diameter over insulation (mm)	Diameter over insulation (mm)	Outer diameter (mm)	Weight (kg/km)	Standard length (m)
3x95/25	18,6	50	2035	500	K20

POWER CABLE

TRV-AXCLJ TT 12/20 (24) kV

WATER TIGHT AND SCREENED



Application

AXCLJ-TT is radially water tight due to an aluminium laminate bonded to the outer sheath and longitudinally water tight due to water-swellable tapes. The screen is made up of circular copper wires, water blocking tapes (replacing water blocking yarns) and the cable has been complemented with two strong ripcords for easier and safer opening of the outer sheath.

The cable is primarily designed for ploughing down in ground, but thanks to its robust design can handle the stresses resulting from installation in lakes with limited currents and of limited depth.

Technical data

Bending radius:

- > In fixed installation: 8 x D
- > When pulling-in: 12 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)
- > D = outer diameter of cable (mm)

Max pulling force - pulling eye (N/mm²):

- > Max. pulling force: 30xS (N)
- > S = cross-sectional area of conductor (mm²)

Temperature range

- > Max. operating temperature: +90 °C
- > Temperature at installation: -20 °C
- > Below 0 °C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M

Construction

Cable shaper:

- > Triangular

Conductor:

- > Round
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 5,2/4,85 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded

Longitudinal water tightness:

- > Semi conducting water blocking tape

Filler:

- > PE-profiles

Inner covering:

- > Conductive tape

Shield/screen:

- > Round copper wires in contact with aluminum laminate

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Ripcord:

- > Aramid

Outer sheath:

- > Composite PE, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 125 kV

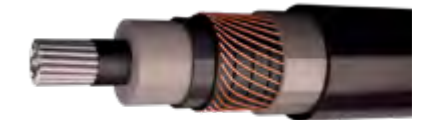
Content is subject to changes acc. to current product development and/or any changes to standards.

Conductors and screen area (mm ²)	Diameter over insulation (mm)	Diameter over insulation (mm)	Outer diameter (mm)	Weight (kg/km)	Standard length (m)
3x95/25	22.8	60	2690	500	K24

POWER CABLE

TRV-AXLJ TT 18/30 (36) kV KOMBI

WATER TIGHT AND SCREENED



Application

Self-supporting XLPE insulated one core cable, for applications in air, ground and water.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90 °C
- > Temperature at installation: -20 °C
- > Below 0 °C exercise caution

Standard, approval & directive

- > SS-EN 50182
- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M

Construction

Cable shaper:

- > Round

Conductor:

- > Round
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 8.0/7.1 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min thickness = 0.4/0.3

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > PE, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 170 kV

Content is subject to changes acc. to current product development and/or any changes to standards.

Conductors and screen area (mm ²)	Diameter over insulation (mm)	Diameter over insulation (mm)	Outer diameter (mm)	Weight (kg/km)	Standard length (m)
1x240/80	34.6	46.2	2502	500	K20

POWER CABLE

TRV-AXLJ TT 18/30 (36) kV

WATER TIGHT AND SCREENED



Application

Single-core, distribution cable for outdoors use in 3-phase formation. Installation in pipes and ground. Can be ploughed down.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M

Construction

Conductor:

- > Round
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 7.6/7.1 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > PE, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 170 kV

90°



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x240/80	34.6	46.2	2502	500	K20
1x500/80	43.2	55.4	3540	500	K22

Electrical properties

Conductor and screen area (mm ²)	Conductor resistance (Ω/km)	Screen resistance (Ω/km)	Inductance in trefoil/ in flat* (mH/km)	Reactance in trefoil/ in flat* (Ω/km)	Capacitance (μF/km)	Charging current/phase (A/km)	Earth fault current (A/km)
1x240/80	0.125	0.216	0.36/0.60	0.11/0.19	0.22	1.2	3.7
1x500/80	0.0605	0.216	0.33/0.54	0.10/0.17	0.29	1.6	4.9

Electrical properties

Conductor and screen area (mm ²)	Current rating at core temp. 65°C in ground * (A)	Current rating at core temp. 65°C in air *(A)	Current rating at core temp. 90°C in air * (A)	Max. short circuit current on the conductor during 1s at initial temp. 65 °C (kA)	Max. short circuit current on the conductor during 1s at initial temp. 90 °C (kA)
1x240/80	385	400	490	25.0	22.7
1x500/80	570	635	775	52.0	47.2

* Trefoil with screen grounded in both end.

POWER CABLE

TRV-AXLJ TT 1,8/3,0 (3,6) kV

WATER TIGHT AND SCREENED



Application

Single-core, distribution cable for outdoors use in 3-phase formation. Installation in pipes and ground. Can be ploughed down.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > IEC 60502-1

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE n

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > PE, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 170 kV

90°



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x240/80	31.2	1413	500	K12
1x500/80	40.7	2265	500	K18

1. Electrification of main lines

1. Electrification of main lines

POWER CABLE

TRV-AXLJ TT 18/30 (36)+3,6 kV

WATER TIGHT AND SCREENED

Application

Single-core, distribution cable for outdoors use in 3-phase formation. Installation in pipes and ground. Can be ploughed down.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 7.6/7.1 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > PE, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 170 kV

POWER CABLE

TRV-AXQJ RMF Pure 6/10 (12) kV

HALOGEN FREE, FLAME RETARDANT AND SCREENED

Application

Halogen free, flame retardant and self-extinguishing in case of fire. Smoke in the event of fire is limited, transparent (to facilitate evacuation) and not harmful to electronic equipment. The cable is primarily designed for indoor installation, tunnels, etc. The cable can be installed outdoors and in ground but ploughing is not recommended. Ripcords for easier and safer stripping of the outer sheath.

Technical data

CPR Performance class:

- > B2ca-s1d0a2

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M
- > CENELEC HD 604
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 3.1/2.96 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Inner covering:

- > Conductive tape

Shield/screen:

- > Annealed copper wires

Ripcord:

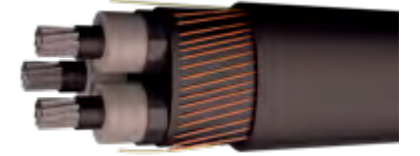
- > Kevlar

Outer sheath:

- > Halogen free compound, flame retardant, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 75 kV



90°



90°



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x400+300/35	40.3	67.2	6150	500	K26

Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
3x95/25	18.6	50	2150	500	K20

Electrical properties							
Conductor and screen area (mm ²)	Conductor resistance (Ω/km)	Screen resistance (Ω/km)	Inductance in trefoil/ in flat* (mH/km)	Reactance in trefoil/ in flat* (Ω/km)	Capacitance (μF/km)	Charging current/phase (A/km)	Earth fault current (A/km)
3x95/25	0.320	0.8	0.30	0.09	0.32	0.6	1.8

Electrical properties					
Conductor and screen area (mm ²)	Current rating at core temp. 65°C in ground * (A)	Current rating at core temp. 65°C in air *(A)	Current rating at core temp. 90°C in air * (A)	Max. short circuit current on the conductor during 1s at initial temp. 65 °C (kA)	Max. short circuit current on the conductor during 1s at initial temp. 90 °C (kA)
3x95/25	205	190	230	9.9	8.9

POWER CABLE

TRV-AXQJ RMF Pure 12/24 (24) kV

HALOGEN FREE, FLAME RETARDANT AND SCREENED



Application

Halogen free, flame retardant and self-extinguishing in case of fire. Smoke in the event of fire is limited, transparent (to facilitate evacuation) and not harmful to electronic equipment. The cable is primarily designed for indoor installation, tunnels, etc. The cable can be installed outdoors and in ground but ploughing is not recommended. Ripcords for easier and safer stripping of the outer sheath.

Technical data

CPR Performance class:

- > B2ca-s1d0a2

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M
- > CENELEC HD 604
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 5.2/4.85 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Inner covering:

- > Conductive tape

Shield/screen:

- > Annealed copper wires

Ripcord:

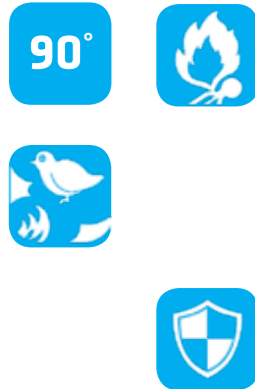
- > Kevlar

Outer sheath:

- > Halogen free compound, flame retardant, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 75 kV



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
3x95/25	22.8	59.5	5785	500	K24

Electrical properties

Conductor and screen area (mm ²)	Conductor resistance (Ω/km)	Screen resistance (Ω/km)	Inductance in trefoil/ in flat* (mH/km)	Reactance in trefoil/ in flat* (Ω/km)	Capacitance (μF/km)	Charging current/phase (A/km)	Earth fault current (A/km)
3x95/25	0.320	0.8	0.34	0.11	0.21	0.8	2.4

Electrical properties

Conductor and screen area (mm ²)	Current rating at core temp. 65°C in ground * (A)	Current rating at core temp. 65°C in air *(A)	Current rating at core temp. 90°C in air * (A)	Max. short circuit current on the conductor during 1s at initial temp. 65 °C (kA)	Max. short circuit current on the conductor during 1s at initial temp. 90 °C (kA)
3x95/25	205	190	230	9.9	8.9

POWER CABLE

TRV-AXQJ TT 18/30 (36) kV

HALOGEN FREE, FLAME RETARDANT AND WATER TIGHT



Application

Halogen free, flame retardant and self-extinguishing in case of fire. Smoke in the event of fire is limited, transparent (to facilitate evacuation) and not harmful to electronic equipment. The cable is primarily designed for indoor installation, tunnels, etc. The cable can be installed outdoors and in ground but ploughing is not recommended.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M
- > CENELEC HD 604
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 7.6/7.1 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper

Radial water blocking:

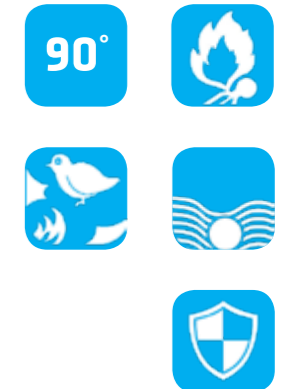
- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > Halogen free compound, flame retardant, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 170 kV



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x240/80	34.6	46.2	2502	500	K20
1x500/80	43.2	55.4	3540	500	K22

Electrical properties

Conductor and screen area (mm ²)	Conductor resistance (Ω/km)	Screen resistance (Ω/km)	Inductance in trefoil/ in flat* (mH/km)	Reactance in trefoil/ in flat* (Ω/km)	Capacitance (μF/km)	Charging current/phase (A/km)	Earth fault current (A/km)
1x240/80	0.125	0.216	0.36/0.60	0.11/0.19	0.22	1.2	3.7
1x500/80	0.0605	0.216	0.33/0.54	0.10/0.17	0.29	1.6	4.9

Electrical properties

Conductor and screen area (mm ²)	Current rating at core temp. 65°C in ground * (A)	Current rating at core temp. 65°C in air *(A)	Current rating at core temp. 90°C in air * (A)	Max. short circuit current on the conductor during 1s at initial temp. 65 °C (kA)	Max. short circuit current on the conductor during 1s at initial temp. 90 °C (kA)
1x240/80	385	400	490	25.0	22.7
1x500/80	570	635	775	52.0	47.2

POWER CABLE

TRV-AXQJ TT 1,8/3,0 (3,6) kV

HALOGEN FREE, FLAME RETARDANT AND WATER TIGHT



Application

Halogen free, flame retardant and self-extinguishing in case of fire. Smoke in the event of fire is limited, transparent (to facilitate evacuation) and not harmful to electronic equipment. The cable is primarily designed for indoor installation, tunnels, etc. The cable can be installed outdoors and in ground but ploughing is not recommended.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > IEC 60502-1
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

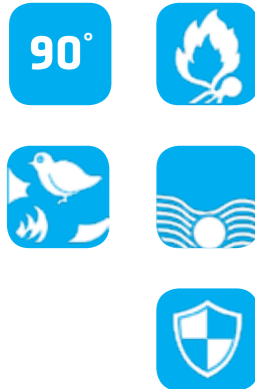
- > Annealed copper

Radial water blocking:

- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > Halogen free compound, flame retardant, black



POWER CABLE

TRV-AXQJ TT 18/30 (36) +3,6 kV

HALOGEN FREE, FLAME RETARDANT AND WATER TIGHT

Application

Halogen free, flame retardant and self-extinguishing in case of fire. Smoke in the event of fire is limited, transparent (to facilitate evacuation) and not harmful to electronic equipment. The cable is primarily designed for indoor installation, tunnels, etc. The cable can be installed outdoors and in ground but ploughing is not recommended.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M
- > CENELEC HD 604
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 7.6/7.1 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper

Radial water blocking:

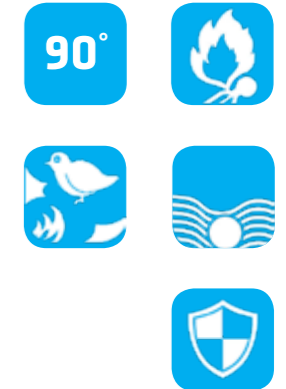
- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > Halogen free compound, flame retardant, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 170 kV



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x240/50	31.2	1511	500	K12
1x500/50	40.7	2410	500	K18

Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x400+300/35	40.3	67.2	6750	500	K26

1. Electrification of main lines

POWER CABLE

TRV-FXQJ TT 6/10 (12) kV

HALOGEN FREE, FLAME RETARDANT AND WATER TIGHT



Application

Halogen free, flame retardant and self-extinguishing in case of fire. Smoke in the event of fire is limited, transparent (to facilitate evacuation) and not harmful to electronic equipment. The cable is primarily designed for indoor installation, tunnels, etc. The cable can be installed outdoors and in ground but ploughing is not recommended.

Technical data

Bending radius:

- > In fixed installation: 10 x D
- > When pulling out: 15 x D
- > When plowing down: 8 x D

Max pulling force - pulling grip (N/mm²):

- > Max. pulling force: 5xD² (N)

Temperature range

- > Max. operating temperature: +90°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 14 16
- > CENELEC HD 620 Part 10 Section M
- > CENELEC HD 604
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2

Construction

Conductor:

- > Round and compacted aluminum
- > Stranded acc. to EN 60228 class 2
- > Longitudinal water tight

Insulation:

- > XLPE nom/min thickness = 3.1/2.96 mm

Inner semi-conducting layer:

- > Extruded

Outer semi-conducting layer:

- > Bonded, nom/min. thickness = 0.4/0.3

Longitudinal water tightness:

- > Semi conducting water blocking tape

Shield/screen:

- > Annealed copper wires in contact with aluminum tape

Radial water blocking:

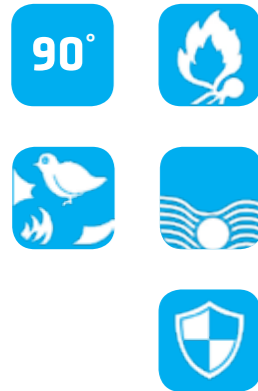
- > Aluminum-PE laminate, 0,2 thickness bonded to sheath

Outer sheath:

- > Halogen free compound, flame retardant, black

Electrical

- > Max. short circuit temperature: +250 °C
- > Impulsive voltage: 75 kV



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over insulation (mm)	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x185/35	23.3	31.1	2450	500	K12





CATENARY CONTACT WIRE

TRL

COPPER CATENARY LINE

Application

Copper wire for power transmission to electric railway lines. Suitable as catenary wire for AC and DC systems.

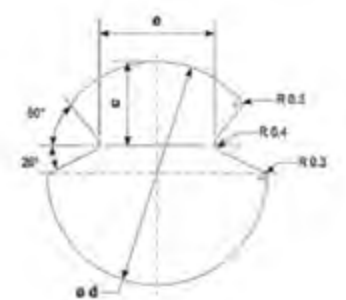
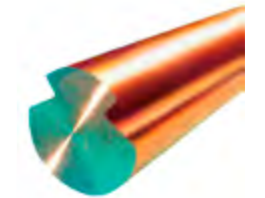
Standard, approval & directive

- > EN 50149 type A

Construction

Conductor:

- > Single strand
- > Pure copper - ETP
- > Hard drawn
- > Grooved
- > Identification marks acc. to EN 50149



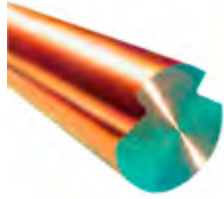
Content is subject to changes acc. to current product development and or any changes to standards.

Conductor cross-section (mm ²)	Conductor diameter (mm)	Cable weight (kg/km)	Rated tensile strength (RT5) kN	Coefficient of linear expansion /°C	Final modulus of elasticity (GPa)	Thermal oxide resistance (kA)
80	10.6	710	28.4	17 x 10 ⁻⁶	120	12
100	12.0	890	35.5	17 x 10 ⁻⁶	120	15
120	13.2	1067	42.0	17 x 10 ⁻⁶	120	

CATENARY CONTACT WIRE

TRL CuAg

COPPER-SILVER ALLOY CATENARY LINE

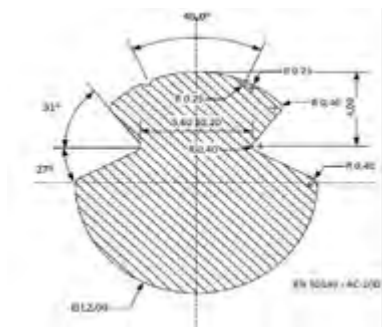
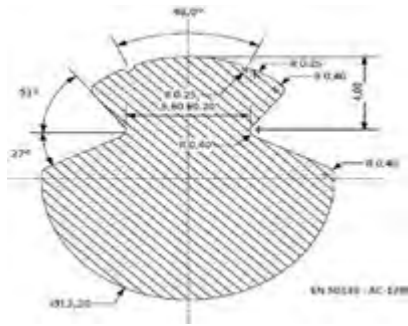


Application
Copper-silver alloyed wire for power transmission to electric railway lines. Suitable as catenary wire for AC and DC systems.

Standard, approval & directive
> EN 50149

Construction

- Conductor:
- > Single strand
 - > Silver alloyed copper
 - > Hard drawn
 - > Grooved
 - > Identification marks acc. to EN 50149



Content is subject to changes acc. to current product development and or any changes to standards.

Conductor cross-section (mm²)	Outer diameter (mm)	Cable weight (kg/km)	Rated tensile strength (RTS) kN	Coefficient of linear expansion /°C	Final modulus of elasticity (GPa)	DC resistance at 20°C (Ω/km)
100	12.0	980	36.0	17 x 10 ⁻⁶	120	0.183
120	13.2	1067	42.0	17 x 10 ⁻⁶	120	0.153

CATENARY WIRE

KK Bz-II

STRANDED BRONZE ALLOYED COPPER CONDUCTOR



Application
Stranded bronze alloyed copper wire concentrically stranded acc. to DIN 48201 part 2.

KK Bz-II 10 mm² suitable as dropper wire and KK Bz-II 50 mm² suitable as catenary wire in railway applications.

Technical data
Tensile strength:
> Min. 618 N/mm²
Resistivity:
> Max.: 27.78 n Ω m

Standard, approval & directive
> DIN 48201 part 2.
> DIN 48200 part 2. Bz-II

Construction

- Conductor:
- > Round
 - > Bronze alloyed copper wires
 - > Hard drawn
 - > Diameter nom: 1.35 or 3.0 mm
 - > Stranded
 - > Outer layer "Z" stranded

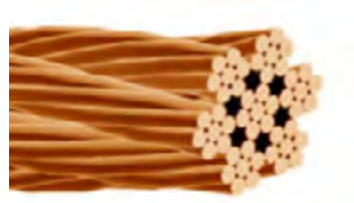
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Conductor cross-section (mm²)	Outer diameter (mm)	Cable weight (kg/km)	Rated tensile strength (RTS) kN	Coefficient of linear expansion /°C	Final modulus of elasticity (GPa)	DC resistance at 20°C (Ω/km)
10 (7x1.35)	4.1	90	5.88	17 x 10 ⁻⁶	113	2.8
50 (7x3.0)	9.0	446	28.58	17 x 10 ⁻⁶	113	0.569

DROPPER

KKM Bz-II

MULTI-STRANDED COPPER ALLOYED CONDUCTOR



Application

Stranded bronze alloyed 0.5 mm copper wire concentrically bundled acc. to DIN 45201 part 2.

Technical data

Tensile strength:

> Min. 618 N/mm²

Resistivity:

> Max.: 27.78 n Ω m

Standard, approval & directive

> DIN 48200 part 2

> DIN 43138

Construction

Conductor:

> Round

> Multi-stranded

> Bronze alloyed copper wires

> Hard drawn

> Diameter nom: 0.5 mm

> Bunched sub-conductor: 7 x 0.5 mm

> Outer layer "S" stranding

Content is subject to changes acc. to current product development and or any changes to standards.

Conductor cross-section (mm ²)	Outer diameter (mm)	Cable weight (kg/km)	Rated tensile strength (RTS) kN	Sub-conductor diameter nom. (mm)	Outer layer stranded	DC resistance at 20°C (Ω/km)
10 (7x7x0.5)	4.5	89	589	7x0.05	Right handed	2.98

RETURN WIRE

AAC 212

STRANDED ALUMINUM CONDUCTOR

Application

Unprotected conductor for overhanging power transmission.

Technical data

Temperature range

> Max. operating temperature: +80°C

> Max. short circuit temperature: +200 °C

Standard, approval & directive

> SS-EN 60889

> SS-EN 50182

Construction

Cable shape:

> Round

Conductor:

> Singel strand

> Aluminum



80°

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor and screen area (mm ²)	Number of conductors and dimensions (mm)	Outer diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
Aluminiumlina	212 mm ²	37x2,7	18,9	1030	1800	TRV5

Electrical properties

Theoretical wire area (mm ²)	Rated tensile strength (kN)	Initial module-elasticity (N/mm ²)	Final module-elasticity (N/mm ²)
211,85	35,7	31 000	58 000

Electrical properties

Linear expansion coefficient (1/K)	Max. DC resistance at 20° (Ω/km)	Loading capacity in air	Max. short circuit current on the conductor during 1s at initial temp. 40°C (kA)
11,5	22,45	649	21,41

RETURN WIRE

ACSR

STEEL REINFORCED ALUMINUM CONDUCTOR



Application

Cable for energy transmission designed with concentric layers of aluminum wires and inside of galvanized and fat enclosed steel wires. Suitable for outdoor fixed installation as return wire for railway applications.

Technical data

Tensile strength:

- > Min. 618 N/mm²

Resistivity:

- > Max.: 27.78 n Ω m

Temperature range

- > Max. operating temperature: +80°C
- > Max. short circuit temperature: +200°C

Standard, approval & directive

- > IEC 61089
- > EN 50182
- > SFS 5701

Construction

Cable Shape:

- > Round

Conductors:

- > Aluminum and galvanized steel wires

Center conductor:

- > Steel

EARTHING

CULE

BARE COPPER

Application

Bare copper conductor for protective earthing of electrical system. For installation in ground.

Construction

Cable shape:

- > Round

Conductor:

- > Stranded, round and uncompacted annealed copper acc. to IEC 60228 class 2



80°

Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Outer diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
12,80	12,80	350	2000	K12

Electrical properties					
Product name	Number of wires (aluminum/steel)	Conductor dimension (mm)	Cross section (mm ²)	Cable weight (kg/km)	Max. permissible short circuit current for 1 sec. ** (kA)
ACSR 85/14 PIGEON	6/1	12.8	99.3	344	9.2
	9.0	446			

Electrical properties						
Product name	Max DC Resistance at +20°C [Ω/km]	Min. tensile strength of the conductor [kN]	Initial modulus of elasticity of conductor [N/mm ²]	Final modulus of elasticity of conductor [N/mm ²]	Coefficient of linear expansion of conductor [1/k]	Current rating in air* [A]
ACSR 85/14 PIGEON	0.337	24.13	64000	78000	19.2x10 ⁻⁶	360

Content is subject to changes acc. to current product development and or any changes to standards.

Conductor and screen area (mm ²)	Diameter over sheath (mm)	Cable weight (kg/km)	DC Resistance at +20°C [Ω/km]	Standard delivery length (m)	Delivery package	E-number
16 (7 wires)	5.0	141	1.15	500	K6	0622825
25 (7 wires)	6.3	219	0.727	500	K6	0622835
35 (7 wires)	7.6	316	0.524	500	K6	0622845
50 (19 wires)	8.9	427	0.387	500	K6	0622855
70 (19 wires)	10.5	595	0.268	500	K7	0622865
95 (19 wires)	12.4	836	0.193	500	K8	0622875
120 (37 wires)	14.0	1055	0.153	500	K9	0622885
150 (37 wires)	15.8	1335	0.124	500	K11	

2. Overhead catenary lines

EARTHING

76AL-W

HALOGEN FREE AND WATER TIGHT

Application

Isolated aluminum cable for protection and operation earthing.

Technical data

Bending radius:

- > In fixed installation: 0,2 m
- > When during installation: 0,16 m

Temperature range

- > Max. operating temperature: +70°C
- > Temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > DIN EN 60228
- > SS-EN 50182
- > EN 50183
- > HD 626 S1
- > SS 424 14 26

Construction

Cable shape:

- > Round

Conductor:

- > AlMgSi strings
- > Longitudinal water protection

Insulation:

- > Halogen free PE, thickness: 1,7 mm, black
- > Longitudinal water protection

Electrical

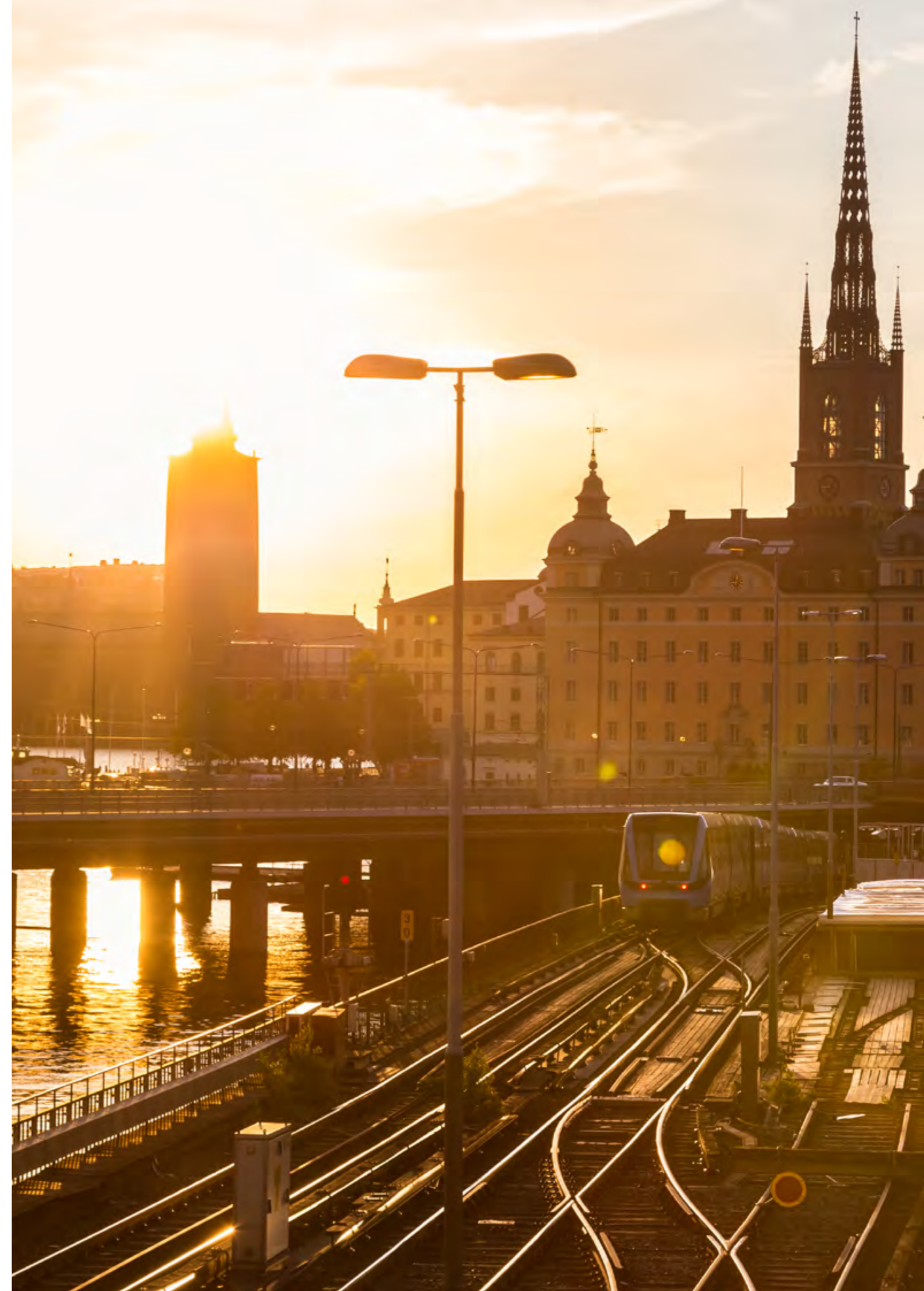
- > Max. short circuit temperature: +200 °C

70°



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor and screen area (mm ²)	Outer diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
76AL-W	76.2	14,9	330	500	K10
Electrical properties					
Conductor diameter (mm)	Rated tensile strength (kN)	Loading capacity in air		Max. short circuit current on the conductor during 1s at initial temp. 40°C kA	
11,5	22,45	235		7,2	





POWER CONTROL CABLE

AFUMEX EASY RZ1-K AS 1 kV

HALOGEN FREE, UV RESISTANT AND FLAME RETARANT

Application

Halogen free, UV resistant, flame retardant and self-extinguishing Installation cable, low smoke. The cable is for fixed installation, indoors and outdoors, in pipes, ducts, concrete, soil and water.

Technical data

CPR Performance Class:

- > Dca-s2d2a2

UV resistance:

- > UV resistant

Bending radius:

- > 6xD

Temperature range

- > Max. operating temperature: +90°C
- > Min. operating temperature: -40°C
- > Temperature at installation: -5°C to +50°C

Standard, approval & directive

- > IEC 60228
- > HD 64364-5-52:2011 table B.52.12
- > RACH
- > RoHS

Construction

Conductor:

- > Round
- > Flexible Cl. 5 acc. to IEC 60228

Insulation:

- > XLPE

Electrical

- > Max. short circuit temperature: +250°C
- > Test voltage: 3.5 kV AC



Content is subject to changes acc. to current product development and or any changes to standards.

Conductors and screen area (mm ²)	Outer sheath colour	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
1x35	Black	12.7	392	2500	K12
1x70	Black	15.7	712	1500	K12
1x95	Black	17.9	928	1000	K12

POWER CONTROL CABLE

DRAKAFLEX H07RN-F 450/750 V

FLEXIBLE, UV RESISTANT AND WEATHER PROTECTED



Application

A highly flexible weather- and oil-resistant cable. For use where the mechanical stress have medium hard character, in spaces with explosion risks or dry and humid spaces. Outdoors e.g. in agricultural buildings and for temporary installations in working sites. Also for fixed installation in temporary buildings and cabins. Use up to 1000 V AC is permitted for fixed, protected installation (in conduit or appliances) and also for motor connections of hoisting motors and the like. Max direct voltage 742/1238 V DC.

Technical data

Bending radius:

- > Min. 6xD

Temperature range:

- > Max. operating temperature: +60°C
- > Temperatures at installation: -25°C at flex operation

UV Resistance:

- > Good

Max pulling force - pulling eye (N/mm²):

- > Total copper area x 15 N/mm²

Standard, approval & directive

- > CE
- > EN 50525-2-21
- > REACH
- > RoHS
- > HAR
- > Byggsvaruhusbedömningen
- > SundaHus

Construction

Conductor:

- > Extra multi-stranded copper acc. to IEC 60228 class 5

Insulation:

- > EPDM-rubber class E14

Core colouring:

- > 2 core: blue, brown
- > 3 core: blue, brown, green/yellow
- > 4 core: black, brown, green/yellow, grey
- > 5 core: blue, black, brown, green/yellow, grey
- > 7 core: green/yellow, 6 cores black number-marked 1-6

Outer sheath:

- > Weather and oil resistant rubber, class EM2

Electrical

- > Max. short circuit temperature: 200°C
- > Test voltage: 2.5 KV



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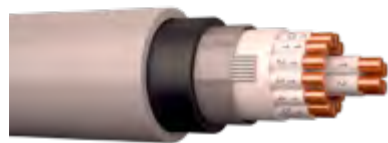
Conductor and screen area (mm ²)	Outer sheath colour	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package	E-number
2x1	Black	8.2	90	100	Coil	0530542
2x1	Black	8.3	90	500	K6	0530545
2x1,5	Black	9.5	120	100	K6	0530552
2x1,5	Black	9.5	120	500	K6	0530555
2x2,5	Black	11	170	100	Coil	0530562
2x2,5	Black	11	170	500	K6	0530565
3G1	Black	8.8	109	100	Coil	0530612
3G1	Black	8.8	109	500	K6	0530615
3G1,5	Black	9.6	112	100	Buddy	0530629
3G1,5	Black	9.8	139	50	Coil	0530621

Conductor and screen area (mm ²)	Outer sheath colour	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package	E-number
3G1,5	Black	10	140	100	Coil	0530622
3G1,5	Black	10	140	500	K6	0530625
3G1,5	Black	9.6	130	50	Coil	0530627
3G2,5	Black	11.6	202	50	Coil	0530631
3G2,5	Black	12	210	100	Coil	0530632
3G2,5	Black	12	210	500	K6	0530635
3G4	Black	13.4	283	500	K7	0530645
3G6	Black	16	390	500	K8	0530655
4G1,5	Black	10.5	161	50	Box	
4G1,5	Black	10.8	172	50	Coil	0530721
4G1,5	Black	11	170	100	Coil	0530722
4G1,5	Black	11	170	500	K6	0530725
4G2,5	Black	12.4	232	40	Box	
4G2,5	Black	12.8	249	50	Coil	0530731
4G2,5	Black	13	250	100	Coil	0530732
4G2,5	Black	13	250	500	K7	0530735
4G2,5	Black	12.8	249	1000	K8	0530736
4G4	Black	14.7	351	500	K7	0530745
4G6	Black	17	480	500	K8	0530755
4G10	Black	23	840	500	K10	0530765
4G16	Black	26	1200	500	K11	0530775
5G1,5	Black	10.5	161	50	Buddy	0530829
5G1,5	Black	11.9	208	50	Coil	0530821
5G1,5	Black	12	210	100	Coil	0530822
5G1,5	Black	12	210	500	K6	0530825
5G2,5	Black	10.5	161	35	Buddy	0530839
5G2,5	Black	14.1	302	50	Coil	0530831
5G2,5	Black	14	300	100	Coil	0530832
5G2,5	Black	14	300	500	K7	0530835
5G4	Black	16.4	431	500	K8	0530845
5G6	Black	19	550	500	K9	0530855
5G10	Black	26	1000	500	K11	0530865
5G16	Black	29	1400	500	K12	0530875
7G1,5	Black	15.6	330	500	K8	0530925
7X2,5	Black	17.7	460	500	K9	0530935
4G25	Black	30.5	1674	500	K12	0540190
4G35	Black	33.9	2170	500	K14	0540200
	Black	40	3100	500		
4G70	Black	43	3971	500	K18	0540220
	Black	55	5600	500	K22	
5G25	Black	33.9	2083	500	K14	0540390
5G50	Black	43.4	3786	500	K18	0530430
5G95	Black	54	6380	500	K20	0530440

POWER CONTROL CABLE

EQLR Pure 300/500 V

HALOGEN FREE AND FLAME RETARDANT



Application

Halogen free and flame retardant cable. Smoke in case of fire is limited, transparent (facilitates evacuation) and not harmful to electronic as equipment. Fixed installation indoors and outdoors, even hanging on the suspension cable as well as in soil or water. The outer sheath is UV-protected for outdoor use in the north. The cable is well suited for installations where external electrical interference feared.

Technical data

CPR Performance class:

- > Dca-s2d2a2

Bending radius:

- > 12xD
- > 8xD at final assembly

Temperature range

- > Max. operating temperature: +70°C
- > Temperatures at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > CE
- > SS 424 03 21
- > CENELEC HD 627 Part 4 Section C-1
- > CENELEC HD 604
- > SS-EN 60754-1, -2
- > SS-EN 61034-1, -2
- > EN 50575:2014

Construction

Conductor:

- > Round
- > Solid annealed copper
- > Acc. to IEC 60228 class 1.

Insulation:

- > Halogen free polymer, white

Marking of cores:

- > Numbers

Shield/screen:

- > Aluminum with adhesive PE

Inner sheath:

- > Halogen free polymer or plastic tape

Outer sheath:

- > PE

Overall sheath:

- > Halogen free polymer, grey



Conductors and screen area (mm²)	Outer Sheath Colour	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery Package	E-number
7x1,5	Grey	12.3	230	500	K6	0120305
7x1,5	Grey	12.3	230	1000	K8	0120306
5x2x1,5	Grey	16.7	335	500	K8	0120325
5x2x1,5	Grey	16.7	335	1000	K11	0120326
14x1,5	Grey	16.2	385	500	K8	0120335
14x1,5	Grey	16.2	385	500	K8	0120336
19x1,5	Grey	17.9	490	500	K9	0120345
11x2x1,5	Grey	21.8	590	500	K11	0120355
11x2x1,5	Grey	21.8	590	1000	K12	0120356
15x2x1,5	Grey	25.2	780	500	K11	0120375
15x2x1,5	Grey	25.2	780	1000	K14	0120376
37x1,5	Grey	24	885	500	K11	0120385
37x1,5	Grey	24	885	1000	K14	0120386
48x1,5	Grey	27.3	1125	500	K12	0120395
48x1,5	Grey	27.3	1125	1000	K16	0120396
61x1,5	Grey	29.7	1375	500	K12	0120405
61x1,5	Grey	29.7	1375	1000	K18	0120406
36x2x1,5	Grey	37.5	1675	500	K16	0120415

Product	Conductor cross-section (mm²)	Conductor diameter (mm)	Insulation nom. thickness (mm)	Insulation nom. diameter (mm)	Screen nom. thickness (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)
EQLR 7x1,5	1,5	1,4	0,7	2,8	0,15	1,5	12,3
EQLR 5x2x1,5	1,5	1,4	0,7	2,8	0,15	1,5	16,7
EQLR 14x1,5	1,5	1,4	0,7	2,8	0,15	1,5	16,2
EQLR 19x1,5	1,5	1,4	0,7	2,8	0,15	1,5	17,9
EQLR 27x1,5	1,5	1,4	0,7	2,8	0,15	1,7	21,4
EQLR 37x1,5	1,5	1,4	0,7	2,8	0,15	1,8	24,0
EQLR 48x1,5	1,5	1,4	0,7	2,8	0,15	1,9	27,3

Product	Max. conductor resistance (Ω/km)	Min. insulation resistance (GΩxkm)	Max. screen resistance (Ω/km)	Test voltage between pairs at 50 Hz 60 sec (V)
EQLR 7x1,5	12,1	5000	4,5	DC: 10000, AC: 5000
EQLR 5x2x1,5	12,1	5000	3,4	DC: 10000, AC: 5000
EQLR 14x1,5	12,1	5000	3,4	DC: 10000, AC: 5000
EQLR 19x1,5	12,1	5000	3,0	DC: 10000, AC: 5000
EQLR 27x1,5	12,1	5000	2,8	DC: 10000, AC: 5000
EQLR 37x1,5	12,1	5000	2,6	DC: 10000, AC: 5000
EQLR 48x1,5	12,1	5000	2,2	DC: 10000, AC: 5000

POWER CONTROL CABLE

M-FLEX HCH Cca 300/500 V

HALOGEN FREE AND FLEXIBLE



Application

Halogen free flexible machine cable with good oil resistance. Use in installations where security is sought as in industrial facilities, data and signal systems as well as cooling and ventilation systems. In case of fire the risk of corrosion on plant and machinery is minimized. Can be installed in dry and humid environment and outdoors with protection, but not in water.

Equipped with a screen of tinned braided copper wire which protects against mechanical strain EMI.

Technical data

Bending radius:

- > Flexible applications: 15xD
- > Fixed installations: 5xD

Standard, approval & directive

- > CE
- > EN 50525-2-21
- > EN 50299-2-22 (in applicable parts)
- > NEN 8012
- > EN 50575:2014

Construction

Conductor:

- > Round
- > Multistrand copperd acc. to EN 60228 class 5

Insulation:

- > Halogen free polymer

Marking of cores:

- > 2 cores: black, numbered
- > Multicores: green/yellow, black numbered acc. to VDE 0293

Shield/screen:

- > Tinned copper band

Outer sheath:

- > Halogen free polymer, grey



POWER CONTROL CABLE

RQ Pure 450/750 V

HALOGEN FREE, FLAME RETARDANT AND FLEXIBLE



Application

Halogen free and flame retardant cable connection. Smoke in the event of a fire is limited, transparent (facilitates evacuation) and not harmful for electronic equipment.

For retraction of pipes, ducts and cabinets.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Temperature range

- > Max. operating temperature: +70°C
- > Temperatures at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > CE
- > IEC 60228
- > SS-EN 50525-3, -31
- > EN 50575:2014

Construction

Conductor:

- > Round
- > Multistranded flexible copper
- > Acc. to EN 60228 class 5

Insulation:

- > Halogen free polymer



Content is subject to changes acc. to current product development and or any changes to standards.

Conductors and screen area (mm ²)	Outer Sheath Colour	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)
3G1,5	Grey	7.7	95	500
25G1,0	Grey	16.4	410	500

Content is subject to changes acc. to current product development and or any changes to standards.

Conductors and screen area (mm ²)	Outer Sheath Colour	Diameter over sheath (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery Package
25	Black	8.9	250	500	K6
25	Green/yellow	8.9	249	500	K6
35	Black	10	339	500	K6

POWER CONTROL CABLE

RQQ låginduktanskabel 450/750 V

HALOGEN FREE, FLAME RETARDANT AND FLEXIBLE

Application

Flame retardant, Halogen free, flexibel installation wire. For applications with high demand on low inductance and good temperature resistance.

Technical data

Temperature range

- > Max. operating temperature: +90°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 03 21
- > IEC 60502-1
- > SS-EN 50525-3, -1

Construction

Conductor:

- > Fine thread, flexible
- > Multistrand copper acc. to EN 60228 class 5
- > Annealed

Insulation:

- > Flame protected PE

Marking of cores:

- > 2 cores: black, grey

Outer sheath:

- > Flame protected PE, grey



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
RQQ låginduktans 2x10 mm ²	288	500	K6
RQQ låginduktans 2x6 mm ²	204	750	K6
RQQ låginduktans 2x2,5 mm ²	95	500	Bobin
RQQ 2x1,5 mm ²	91	300	Bobin

POWER CONTROL CABLE

TRV-ELARL 300/500 V

SCREENED

Application

For fixed applications indoors. The cable are suitable for installation with risk of electrical interruptions.

Technical data

Bending radius:

- > 10xD
- > At final installation: 8xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 03 21

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed
- > Copper acc. to IEC 60228, class 1

Insulation:

- > Halogen free PE, acc. to SS-EN 50363-63 dielectric constant = 2.3

Marking:

- > Numbers acc. to SS 424 03 21

Shield/screen:

- > Aluminum with adhesive PE

Drain wire:

- > Tinned copper wire

Outer sheath:

- > PE acc. to HD 603 S1 table 4B, DMP 6, black



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELARL 7x2,5 mm ²	275	1000	K9
TRV-ELARL 19x2,5 mm ²	640	1000	K12
TRV-ELARL 7x1,5	200	1000	K8
TRV-ELARL 5x2x1,5	295	1000	K8
TRV-ELARL 14x1,5	345	1000	K11
TRV-ELARL 19x1,5	440	1000	K11
TRV-ELARL 27x1,5	600	1000	K12
TRV-ELARL 37x1,5	810	1000	K14
TRV-ELARL 48x1,5	1030	1000	K16

POWER CONTROL CABLE

TRV-ELLR 300/500 V

TINNED AND ANNEALED



Application

Suitable as connection for track conduits and objects in road protection establishments in a signalling system.

Temperature range

- > Max. operating temperature: +70°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 03 21

Construction

Conductor:

- > Solid
- > Tinned
- > Annealed
- > Copper acc. to IEC 60228, class 1

Insulation:

- > PE, dielectric constant = 2.3, black

Marking of cores:

- > 2 cores: black, white
- > 7 cores: numbers acc. to SS 424 03 21

Outer sheath:

- > PE, black

70°

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELLR 2x2,5 mm ²	90	1000	K6
TRV-ELLR 7x2,5 mm ²	250	1000	K8

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Insulation diameter nom. (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)	Cable shape
TRV-ELLR 2x2,5 mm ²	2.5	1.8	0.8	3.4	1.4	6.5x10	Flat
TRV-ELLR 7x2,5 mm ²	2.5	1.8	0.8	3.4	1.5	13.3	Round

Electrical properties

Conductor resistance max. (Ω/km)	7.56
Insulation resistance min. (GΩxkm)	5000
Test voltage between pairs at 50 Hz 60 sec (V)	DC: 10000, AC: 5000

POWER CONTROL CABLE

TRV-FLEX

HALOGEN FREE AND SCREENED

Application

Flexible, Halogen free and screened cable for stands in technical buildings, as well as road protection. Suitable for applications where you try to avoid EMI interference.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

UV resistance:

- > Yes

Temperature range

- > Operating temp. in flexible installation: -30°C to +70°C
- > Operating temp. in fixed installation: -40°C to +80°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > EN 50575:2014
- > EN 50289-1-2
- > EN 50289-1-4
- > EN 13501-6

Construction

Cable shape:

- > Round

Conductor:

- > Fine thread acc. to IEC 60228 class 5

Insulation:

- > Halogen free polymer

Marking of cores:

- > 25G1: Black with white number acc. to VDE 0293
- > 3G1,5: Acc. to VDE 0293-308 (app. T9) HD 21.14 S1 VDE 0281 Part 14

Band:

- > Halogen free plastic tape

Shield/screen:

- > Tinned copper braid

Inner sheath:

- > Halogen free polymer, grey

Outer sheath:

- > Halogen free polymer, grey

70/80°



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-FLEX 3G1,5 mm ²	100	500	Bobin B4
TRV-FLEX 25G1 mm ²	410	500	K8

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Insulation diameter nom. (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)
TRV-FLEX 3G1,5 mm ²	1.5	1.5		2.7	0.8	7.7
TRV-FLEX 25G1 mm ²	1	1.3	0.5	2.2	1.2	16.4

Electrical properties

Product name	TRV-FLEX 3G1,5 mm ²	TRV-FLEX 25G1 mm ²
Conductor resistance max. (Ω/km)	13.3	19.5
Screen resistance max. (f/km)	0.2	0.2
Rated voltage (V)	0.6/1 kV	300/500 V

POWER CONTROL CABLE

TRV-JLXS

FLAT AND COPPER COATED

Application

Flat cable for landslide warning systems. Yellow PE insulation around two parallel conductors made out of copper coated steel wires.

Temperature range

- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > EN 50289-1-2
- > EN 50289-1-4
- > IEC 60189-1 part 6.3

Construction

Cable shape:

- > Flat

Conductor:

- > Solid, glossy and copper coated acc. to IEC 60228 class 1

Insulation:

- > LLDPE, yellow, dielectric constant = 2.3

Twisted parts:

- > Two parallel conductors

Marking of cores:

- > No marking

POWER CONTROL CABLE

TRV-RLAL 300/500 V

SCREENED

Application

Mainly used for power supply of point machines, but also for other power supply applications to a max. of 500 V AC.

Technical data

Bending radius:

- > Min. bending radius fixed installation: 12xD
- > Min. bending radius during installation: 8xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS 424 03 21
- > IEC 60502-1

Construction

Cable shape:

- > Round

Conductor:

- > Acc. to IEC 60228

Insulation:

- > Black PE, dielectric constant = 2.3

Marking of cores:

- > Numbers acc. to SS 424 03 21

Inner sheath:

- > LLDPE, black



70°

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Insulation nom. measurements HxW (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-JLXS 2x0,58	0.3	0.6	0.6	2.0 x 4.4	11	1000	Bobin B4

Electrical properties

Conductor resistance max. (Ω/km)	<225
Insulation resistance min. (GΩxkm)	5000
Conductor elongation (%)	Min. 610 Mpa

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Screen. nom thickness (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-RLAL 6x4 mm ²	4	2.5	0.7	0.15	1.18	16	345	1000	K10

Electrical properties

Conductor resistance max. (Ω/km)	4.95
Shorting max 1 sec.	0.572
Test voltage between pairs at 50 Hz 60 sec (V)	DC: 10000, AC: 5000

POWER CONTROL CABLE

TRV-RQ 450/750 V

HALOGEN FREE AND FLAME RETARDANT



Application

Flame protected typ LSZH connecting cable for track circuit connections in signalling systems. The cable can be installed in ducts or ground. When installed in macadame, extra protection is needed.

Technical data

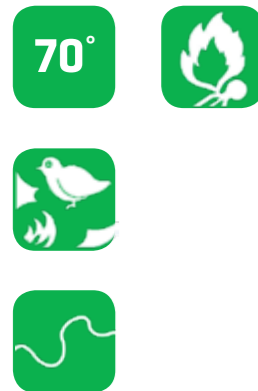
CPR Performance class:
> Dca-s2,d2,a2

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -10°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS-EN 50525 -3 -31
- > EN 50575:2014
- > EN 13501-6



Construction

Cable shape:

- > Round

Conductor:

- > Fine thread, flexible, annealed, tinned copper acc. to IEC 60228 class 5

Insulation:

- > Flame protected acc. to SS-EN 50525-3-31, black

POWER CONTROL CABLE

TRV-RQQ

HALOGEN FREE AND FLAME RETARDANT

Application

Flame protected typ LSZH connecting cable for track circuit connections in signalling systems. The cable can be installed in ducts or ground. When installed in macadame, extra protection is needed.

Technical data

CPR Performance class:
> Dca-s2,d2,a2

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -10°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > SS-EN 50525 -3 -31
- > EN 50575:2014
- > EN 13501-6

Construction

Cable shape:

- > Flat

Conductor:

- > Fine thread, flexible, annealed, tinned copper acc. to IEC 60228 class 5

Insulation:

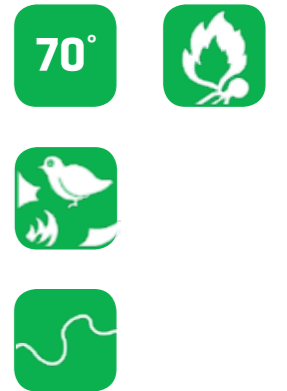
- > Flame protected PE acc. to SS-EN 50525-3-31, black

Marking of cores:

- > 2 core: black, white

Inner sheath:

- > Flame protected PE acc. to SS-EN 50525-3-31



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-RQ 1x10 mm ²	107	500	K6

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-FQQ 2x10 mm ²	259	500	K6

Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Insulation diameter nom. (mm)	Insulation nom. measurements HxW (mm)	Outer sheath nom. thickness (mm)	Outer diameter nom. thickness (mm)
10	4.1	1	6.1	7.7 x 13.8	0.8	7.7 x 13.8

Electrical properties	
Conductor resistance max. (Ω/km)	<1.92

POWER CONTROL CABLE

JZ-500 HMH 300/500 V

HALOGEN FREE AND FLEXIBLE

Application

The cable is for fixed installation where flexibility is necessary because of vibrations and motion, for example a.c. and TKK.

The cable should be used indoors and outdoors in air, ducts or ground.

Technical data

Bending radius:

- > Min. bending radius installation: 6xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C

Standard, approval & directive

- > IEC 60332-3-24
- > IN 60811-504
- > EN 50525-2-51

Construction

Shape:

- > Round

Conductor:

- > Fine thread acc. to IEC 60228 class 5

Insulation:

- > Halogen free polymer acc. to SS-EN 50525-3-11, dielectric constant = 2.3

Twisted parts:

- > Twisted in layers

Marking of cores:

- > 1 Green/yellow, the rest is black with numbers acc. to SS-EN 50334

Outer sheath:

- > Halogen free polymer acc. to SS-EN 50525-3-11, grey

SIGNALLING CABLE

ELQYB

HALOGEN FREE AND FLAME PROTECTED

Application

Halogen free four-stranded client cable with halogen free, flame protected sheath.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Temperature range

- > Max. operating temperature: +70°C

Standard, approval & directive

- > SS 424 16 53
- > EN 50575:2014
- > IEC 60754-1, -2
- > SS-EN 61034-1, -2
- > EN 61034-1-2
- > EN 13501-6

Construction

Conductor:

- > Solid copper
- > Acc. to IEC 60028, class 1

Insulation:

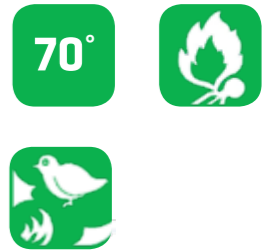
- > PE acc. to SS-EN 50290-2-23 table 1

Core marking:

- > IEC 60304

Inner sheath:

- > Halogen free polymer, grey



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
HZ-500 HMH 7G1	140	1000	K7
HMH 7G1,5 anslutning TKK	195	1000	K8
HMH 12G1,5	320	1000	K10
HMH 25G1,5	648	1000	K12

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. measurements HxW (mm)
HZ-500 HMH 7G1	1.0	1.3	0.6	0.75	10
HMH 7G1,5 anslutning TKK	1.5	1.4	0.7	0.84	11
HMH 12G1,5	1.5	1.4	0.7	0.84	15
HMH 25G1,5	1.5	1.4	0.7	0.84	21

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Weight (kg/km)	Standard length (m)	Delivery package
ELQYB 4x0,6	35	500	Bobin B4

Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation nom. thickness (mm)	Insulation nom. diameter (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)
0.3	0.6	0.5	1.6	0.8	5.5

Electrical properties

Conductor resistance max (Ω/km)	66,5
Rated voltage	100 V

SIGNALLING CABLE

TRV-ECLALPLE 100 V

WATER TIGHT AND SCREENED



Application

The cable can be used in pressurized as well as non-pressurized networks. The cable is for outdoor use. Installation in ducts or direct burial.

Technical data

Bending radius:

- > Bending radius: 20xD
- > Min. bending radius at installation: 20xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C
- > Temperature at installation: -10°C to +50°C

Standard, approval & directive

- > IEC 60189-1, avsnitt 8.1
- > IEC 60189-1, avsnitt 8.2
- > IEC 60189-1, avsnitt 8.4
- > IEC 60189-1, avsnitt 5.3
- > IEC 60189-1, avsnitt 8.5
- > SS-EN 50289-1-8
- > SS-EN 50289-1-10

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Uncoated copper acc. to IEC 60228, class 1

Insulation:

- > PE, dielectricityconstant = 2.3

Twisted parts:

- > Twisted pairs with cross-wired 5 or 10 pair strands

Marking of cores:

- > Colours acc. to IEC 60304

Radial water blocking:

- > Aluminum band with adhesive PE (AL/PET 150µ/50µ)

Shield/screen:

- > Aluminum thread, diameter: 1.5 mm

Reinforcement:

- > Galvanized steel strip, thickness: 0.5 mm

Inner sheath:

- > LLDPE acc. to SS-EN 50290-2-24, black

Outer sheath:

- > LLDPE, black

Extra outer sheath:

- > LLDPE acc. to SS-EN 50290-2-24, black

70°



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor diameter (mm)	Insulation nom. diameter (mm)	Inner sheath nom. thickness (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ECLALPE 20x2x0.9	0.9	1.8	1.4	2.4	32.3	1412	1000	K18
TRV-ECLALPE 30x2x0.9	0.9	1.8	1.4	2.4	36.6	1724	1000	K22
TRV-ECLALPE 50x2x0.9	0.9	1.8	1.8	2.4	43.6	2378	1000	K24

Electrical properties

Conductor resistance max. (Ω/km)	56
Resistance unbalance (%)	2
Mutual capacitance average (nF/km)	41
Mutual capacitance max. (nF/km)	43
Capacitance unbalance max. (pf/500m)	150
Capacitance grounding balance	1200
Attenuation at max. 1000 kHz (dB/km)	<10
Characteristic impedans at 1 MHz (Ω)	120±15 ohm at frequencies between 150 kHz and 1 MHz
Test voltage between pairs at 50 Hz 60 sec (V)	1000
Test voltage between pairs at 50 Hz 3 sec (V)	2000
Test voltage between pair and screen at 50 Hz 60 sec (V)	3000
Test voltage between pair and screen at 50 Hz 3 sec (V)	6000
Rated voltage (V)	100 V

SIGNALLING CABLE

TRV-ECLALPQBEU 100 V

HALOGEN FREE, WATER TIGHT AND SCREENED



Application

For both pressurized and non-pressurized networks. Suitable for tunnels as well as other applications in need of flame protection. The cable should not be exposed to direct sunlight or installed with risk of being under water.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C
- > Temperature at installation: -10°C to +50°C

Standard, approval & directive

- > EN 50575:2014
- > IEC 60189-1, part 8.1
- > IEC 60189-1, part 8.2
- > IEC 60189-1, part 8.4
- > IEC 60189-1, part 8.5
- > SS-EN 50289-1-8
- > SS-EN 50289-1-10
- > IEC 60189-1, part 5.3
- > EN 13501-6

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Uncoated copper acc. to IEC 60228, class 1

Insulation:

- > Foam skin PE

Twisted parts:

- > Twisted pairs with cross-wired 5 or 10 pair strands

Marking of cores:

- > Colours acc. to IEC 60304

Radial water blocking:

- > Aluminum band with adhesive PE (AL/PET 150µ/50µ)

Shield/screen:

- > Aluminum thread, diameter: 1.5 mm

Reinforcement:

- > Galvanized steel strip, thickness: 0.5 mm

Inner sheath:

- > LLDPE acc. to SS-EN 50290-2-24, black

Outer sheath:

- > LLDPE, black

Extra outer sheath:

- > LLDPE acc. to SS-EN 50290-2-24, black

70°



Product name	Conductor diameter (mm)	Insulation nom. diameter (mm)	Inner sheath nom. thickness (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ECLALPQBEU 30x2x0.9	0.9	1.8	1.4	2.4	36.6	1412	1000	K18
TRV-ECLALPQBEU 50x2x0.9	0.9	1.8	1.8	2.4	43.6	1724	1000	K22

Electrical properties

Conductor resistance max. (Ω/km)	56
Resistance unbalance (%)	2
Insulation resistance (GΩ.km)	1000
Mutual capacitance average (nF/km)	41
Mutual capacitance max. (nF/km)	43
Capacitance unbalance max. (pf/500m)	150
Capacitance grounding balance (pF/km)	1200
Attenuation at max. 1000 kHz (dB/km)	<10
Characteristic impedans at 1 MHz (Ω)	120±15 ohm at frequencies between 150 kHz and 1 MHz
Test voltage between pairs at 50 Hz 60 sec (V)	1000
Test voltage between pairs at 50 Hz 3 sec (V)	2000
Test voltage between pair and screen at 50 Hz 60 sec (V)	3000
Test voltage between pair and screen at 50 Hz 3 sec (V)	6000
Rated voltage (V)	100 V

Content is subject to changes acc. to current product development and or any changes to standards.

SIGNALLING CABLE

TRV-ELALE

WATER TIGHT AND SCREENED



Application

Telecom cable. Used as balise cable in serial-ATC signalling systems. Suitable for conduits as well as in ground. When installed in macadam, extra protection is needed.

Technical data

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C
- > Max. temperature at installation: +50°C
- > Min. temperature at installation: -20°C
- > Below 0°C exercise caution

Standard, approval & directive

- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > EN 50289-1-5
- > SS-EN 50289-1-11
- > SS-EN 50289-1-8
- > SS-EN 50289-1-10
- > IEC 60189-1, part 6.3

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed copper acc. to IEC 60228, class 1

Insulation:

- > Solid PE, acc. to SS-EN 50290-2-23 table 1 dielectric constant = 2.3

Twisted parts:

- > Twisted pairs with cross-wired 10 pair strands

Marking of cores:

- > Colours acc. to IEC 60304

Band:

- > Blue plastic band

Radial water blocking:

- > Översätt

Shield/screen:

- > Aluminum strips, lengthwise laid and on one side coated with an ethylene copolymer, nom. thickness 0.15 mm, pressure tight

Drain wire:

- > Tinned copper wire (7x0,2 mm)

Outer sheath:

- > LLDPE acc. to SS-EN 50290-2-24 table 1

Extra outer sheath:

- > PE acc. to SS-EN 50290-2-24, table 1 grade LLD

Electrical properties

Conductor resistance average (Ω/km)	<27,9
Conductor resistance max. (Ω/km)	<29
Resistance unbalance (%)	2
Insulation resistance (GΩ.km)	10000
Mutual capacitance average (nF/km)	<41
Mutual capacitance max. (nF/km)	<45
Capacitance unbalance max. (F/500m)	<150
Capacitance unbalance RMS (F/500m)	<22
Capacitance grounding balance average (pF/km)	600
Capacitance grounding balance max. (pF/km)	1200
Attenuation at max. 8,8MHz (dB/km)	<1,7
Attenuation at max. 25MHz (dB/km)	<2,1
Attenuation at max. 50MHz (dB/km)	<2,4
Attenuation at max. 100MHz (dB/km)	<2,4
Attenuation at max. 250MHz (dB/km)	<4,7
Attenuation at max. 565MHz (dB/km)	<7
Attenuation at max. 1000MHz (dB/km)	<10
Characteristic impedans at 1 MHz (Ω)	125±12
Test voltage between pairs at 50 Hz 60 sec (V)	DC: 1500
Test voltage between pairs at 50 Hz 3 sec (V)	DC: 3000
Test voltage between pair and screen at 50 Hz 60 sec (V)	DC: 5000
Test voltage between pair and screen at 50 Hz 3 sec (V)	DC: 10000
Conductor elongation (%)	Min. 15 %
Rated voltage (V)	100 V

70°



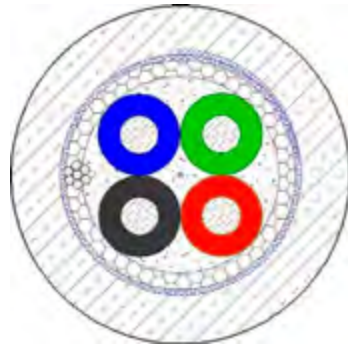
Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor diameter (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELALE 10x2x0,9	0.9	1.6	17.8	278	1000	K11

SIGNALLING CABLE

TRV-ELALV

WATER TIGHT



60°



Application

Mainly used for connecting av ATC-serial ground equipment and other transmission applications. The cable can be installed in conduits or ground, but for installations in macadame, extra protection is needed.

Technical data

Bending radius:

- > Fixed installation: 10xD

Temperature range

- > Max. operating temperature: +60°C
- > Min. temperature at installation: -40°C
- > Below 0°C exercise caution

Standard, approval & directive

- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > EN 50289-1-5
- > SS-EN 50289-1-11
- > SS-EN 50289-1-8
- > SS-EN 50289-1-10
- > IEC 60189-1, part 6.3
- > EN 50289-4-2 Metod B

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Glossy copper acc. to IEC 60228, class 1

Insulation:

- > PE, acc. to SS-EN 50290-2-23 table 1 dielectric constant = 2.3

Filling:

- > Water blocking material

Twisted parts:

- > Phillips screw

Marking of cores:

- > Colours in order: blue, green, red, black

Band:

- > Plastic band

Drain wire:

- > Tinned copper wire (7x0.2 mm)

Outer sheath:

- > LLDPE acc. to SS-EN 50290-2-24 table 1

Electrical properties

Conductor resistance max. (Ω/km)	<58
Resistance unbalance (%)	2
Insulation resistance min. (GΩ.km)	5000
Mutual capacitance max. average (nF/km)	<45±3
Mutual capacitance max. individual (nF/km)	<52
Capacitance unbalance (pF/km)	<800
Attenuation at 1000 kHz (dB/km)	<12
NEXT at 1MHz (dB)	58
Characteristic impedans at 1 MHz (Ω)	110±10
Test voltage between pairs at 50 Hz 60 sec (V)	DC: 1000, AC: 700
Test voltage between pairs at 50 Hz 3 sec (V)	DC: 2000, AC: 1300
Test voltage between pair and screen at 50 Hz 60 sec (V)	DC: 3000, AC: 2000
Test voltage between pair and screen at 50 Hz 3 sec (V)	DC: 6000, AC: 4000
Conductor elongation (%)	Min. 15%
Rated voltage (V)	100 V

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation nom. diameter (mm)	Screen nom. thickness (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELALV 4x0,9	0.6	0.9	1.9	0.15	2.4	11	115	1000	K9

SIGNALLING CABLE

TRV-ELAQBUV

HALOGEN FREE AND WATER TIGHT



Application

Mainly used for ATC-serial ground equipment and other transmission applications with demand of flame protection LSZH. The cable can be installed in conduits or ground, but for installations in macadame, extra protection is needed.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Bending radius:

- > Fixed installation: 10xD

Temperature range

- > Max. operating temperature: +60°C
- > Min. temperature at installation: -40°C
- > Below 0°C exercise caution

Standard, approval & directive

- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > EN 50289-1-5
- > SS-EN 50289-1-11
- > SS-EN 50289-1-8
- > SS-EN 50289-1-10
- > IEC 60189-1, part 6.3
- > EN 50289-4-2 Metod B

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Glossy copper acc. to IEC 60228, class 1

Insulation:

- > PE, acc. to SS-EN 50290-2-23 table 1

Filling:

- > Dry water blocking material

Twisted parts:

- > Phillips screw

Marking of cores:

- > Colours in order: blue, green, red, black

Band:

- > Plastic band

Radial water blocking:

- > Aluminium tape with polymer film on one side, nom. thickness 0.15 mm, min. 3 mm overlapping

Drain wire:

- > Tinned copper wire (7x0,2 mm)

Outer sheath:

- > Halogen free, flame protected PE acc. to SS-EN 50290-2-27

Extra outer sheath:

- > Halogen free, flame protected PE acc. to SS-EN 50290-2-27

Electrical properties

Conductor resistance max. (Ω/km)	<58
Resistance unbalance (%)	2
Insulation resistance min. (GΩ.km)	5000
Mutual capacitance average (nF/km)	<45 ± 13
Mutual capacitance max. (nF/km)	<52
Capacitance unbalance (pF/km)	<800
Attenuation at 1000MHz max. (dB/km)	<12
NEXT at 1 MHz (dB)	58
Characteristic impedance at 1 MHz (Ω)	120 ± 10
Test voltage between pairs at 50 Hz 60 sec (V)	DC: 1000, AC: 700
Test voltage between pairs at 50 Hz 3 sec (V)	DC: 2000, AC: 1300
Test voltage between pairs and screen at 50 Hz 60 sec (V)	DC: 3000, AC: 2000
Test voltage between pairs and screen at 50 Hz 3 sec (V)	DC: 6000, AC: 4000
Conductor elongation	Min. 15%
Rated voltage (V)	100 V



Content is subject to changes acc. to current product development and/or any changes to standards.

Product name	Conductor cross-section (mm²)	Conductor diameter (mm)	Insulation nom. diameter (mm)	Screen nom. thickness (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELAQBUV 4x0,9	0.6	0.9	1.0	0.15	2.4	13	180	1000	K12

SIGNALLING CABLE

TRV-ELLALE 100 V

HALOGEN FREE, WATER TIGHT AND SCREENED



Application

The cable can be used in pressurized as well as non-pressurized network. For outdoor applications.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Bending radius:

- > Min. bending radius: 15xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C
- > Temperature at installation: -10°C to +50°C

Standard, approval & directive

- > IEC 60189-1, part 8.1
- > IEC 60189-1, part 8.2
- > IEC 60189-1, part 8.4
- > IEC 60189-1, part 8.5
- > IEC 60189-1, part 5.3

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed
- > Uncoated
- > Copper acc. to IEC 60228, class 1

Insulation:

- > PE, dielectric constant = 2.3

Twisted parts:

- > Twisted pairs with cross-wired 5 or 10 pair strands

Marking of cores:

- > Colours acc. to IEC 60304

Band:

- > Plastic band

Radial water blocking:

- > Aluminum with adhesive PE

Shield/screen:

- > Aluminum, diameter = 1.5 mm

Inner sheath:

- > Halogen free PE, black

Outer sheath:

- > Weather resistant LLDPE, black

Electrical properties

Conductor resistance average (Ω/km)	58.1
Conductor resistance max. (Ω/km)	60.4
Resistance unbalance (%)	2
Insulation resistance (GΩ.km)	1000
Mutual capacitance max. (nF/km)	45
Capacitance unbalance max. (pF/500m)	Same strands: 150, different strands: 30
Capacitance grounding balance max. (pF/km)	1000
Test voltage between pairs at 50 Hz 60 sec (V)	1000
Test voltage between pairs at 50 Hz 3 sec (V)	2000
Test voltage between pairs and screen at 50 Hz 60 sec (V)	3000
Test voltage between pairs and screen at 50 Hz 60 sec (V)	6000
Rated voltage (V)	100 V

70°



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELLALE 10x2x0,63	370	1000	K14
TRV-ELLALE 20x2x0,63	512	1000	K14
TRV-ELLALE 30x2x0,63			
TRV-ELLALE 50x2x0,63			

Product name	Conductor diameter (mm)	Insulation nom. diameter (mm)	Inner sheath nom. thickness (mm)	Inner sheath nom. diameter (mm)	Screen nom. diameter (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)
TRV-ELLALE 10x2x0,63	0.63	1.4	1.4	12	15	1.4	18.4
TRV-ELLALE 20x2x0,63	0.63	1.4	1.5	15	18	1.4	22.5
TRV-ELLALE 30x2x0,63	0.63	1.4	1.5	18	21	1.5	25.7
TRV-ELLALE 50x2x0,63	0.63	1.4	1.8	23	26	1.7	31.0

SIGNALLING CABLE

TRV-ELLAPLE 100 V

WATER TIGHT AND SCREENED



Application

The cable can be used in pressurized as well as non-pressurized network. For outdoor applications.

Technical data

Bending radius:

- > Min. bending radius: 20xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C
- > Temperature at installation: -10°C to +50°C

Standard, approval & directive

- > IEC 60189-1, part 8.1
- > IEC 60189-1, part 8.2
- > IEC 60189-1, part 8.4
- > IEC 60189-1, part 8.5
- > IEC 60189-1, part 5.3

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed
- > Uncoated
- > Copper acc. to IEC 60228, class 1

Insulation:

- > PE, dielectric constant = 2.3

Twisted parts:

- > Twisted pairs with cross-wired 5 or 10 pair strands

Marking of cores:

- > Colours acc. to IEC 60304

Band:

- > Plastic band

Radial water blocking:

- > Aluminum with adhesive PE

Shield/screen:

- > Aluminum, diameter = 1.5 mm

Reinforcement:

- > Galvanized steel band, thickness: 0.5 mm
zinc coating min. 250g/m²

Inner sheath:

- > LLDPE

Outer sheath:

- > LLDPE, black

Electrical properties

Conductor resistance average (Ω/km)	58.1
Conductor resistance max. (Ω/km)	60.4
Resistance unbalance (%)	2
Insulation resistance (GΩ.km)	1000
Mutual capacitance max. (nF/km)	45
Capacitance unbalance max. (pF/500m)	Same strands: 150, different strands: 30
Capacitance grounding balance max. (pF/km)	1000
Test voltage between pairs at 50 Hz 60 sec (V)	1000
Test voltage between pairs at 50 Hz 3 sec (V)	2000
Test voltage between pairs and screen at 50 Hz 60 sec (V)	3000
Test voltage between pairs and screen at 50 Hz 3 sec (V)	6000
Rated voltage (V)	100 V

70°



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELLAPLE 10x2x0,63	675	1000	K14
TRV-ELLAPLE 20x2x0,63	872	1000	K16
TRV-ELLAPLE 30x2x0,63	1056	1000	K16
TRV-ELLAPLE 50x2x0,63	1369	1000	K20

Product name	Conductor diameter (mm)	Insulation nom. diameter (mm)	Inner sheath nom. thickness (mm)	Inner sheath nom. diameter (mm)	Screen nom. diameter (mm)	Armour nom. thickness (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)
TRV-ELLAPLE 10x2x0,63	0.63	1.4	1.4	12	15		1.4	22.5
TRV-ELLAPLE 20x2x0,63	0.63	1.4	1.5	15	18	23	1.5	26.6
TRV-ELLAPLE 30x2x0,63	0.63	1.4	1.6	18	21		1.5	30
TRV-ELLAPLE 50x2x0,63	0.63	1.4	1.8	23	26		1.5	35.1

SIGNALLING CABLE

TRV-ELLALPQBEU 100 V

HALOGEN FREE, WATER TIGHT AND SCREENED



70°



Application

The cable can be used in pressurized as well as non-pressurized network. For applications in tunnels and other installations that demands flame protection. Should not be exposed to direct sunlight or risk of being under water.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Bending radius:

- > Min. bending radius: 20xD

Temperature range

- > Max. operating temperature: +70°C
- > Min. operating temperature: -40°C
- > Temperature at installation: -10°C to +50°C

Standard, approval & directive

- > IEC 60189-1, part 8.1
- > IEC 60189-1, part 8.2
- > IEC 60189-1, part 8.4
- > IEC 60189-1, part 8.5
- > IEC 60189-1, part 5.3
- > SS-EN 50575
- > EN 13501-6

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed
- > Uncoated
- > Copper acc. to IEC 60228, class 1

Insulation:

- > PE, dielectric constant = 2.3

Twisted parts:

- > Twisted pairs with cross-wired 5 or 10 pair strands

Marking of cores:

- > Colours acc. to IEC 60304

Band:

- > Plastic band

Radial water blocking:

- > Aluminum with adhesive PE

Shield/screen:

- > Aluminum, diameter = 1.5 mm

Reinforcement:

- > Galvanized steel band, thickness: 0.5 mm
zinc coating min. 250g/m²

Inner sheath:

- > Halogen free, flame protected PE, black

Outer sheath:

- > Halogen free, flame protected PE, black

Electrical properties

Conductor resistance average (Ω/km)	58.1
Conductor resistance max. (Ω/km)	60.4
Resistance unbalance (%)	2
Insulation resistance (GΩ.km)	1000
Mutual capacitance max. (nF/km)	45
Capacitance unbalance max. (pF/500m)	Same strands: 150, different strands: 30
Capacitance grounding balance max. (pF/km)	1000
Test voltage between pairs at 50 Hz 60 sec (V)	1000
Test voltage between pairs at 50 Hz 3 sec (V)	2000
Test voltage between pairs and screen at 50 Hz 60 sec (V)	3000
Test voltage between pairs and screen at 50 Hz 3 sec (V)	6000
Rated voltage (V)	100 V

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELLALPQBEU 30x2x0,63	1200	1000	K16
TRV-ELLALPQBEU 50x2x0,63	1549	1000	K20

Product name	Conductor diameter (mm)	Insulation nom. diameter (mm)	Inner sheath nom. thickness (mm)	Inner sheath nom. diameter (mm)	Screen nom. diameter (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)
TRV-ELLALPQBEU 30x2x0,63	0.63	1.4	1.6	18	21	1.5	30.0
TRV-ELLALPQBEU 50x2x0,63	0.63	1.4	1.8	23	26	1.5	35.1

SIGNALLING CABLE

TRV-ELQTQBU

HALOGEN FREE



Application

Halogen free connection cable with PE insulation and reinforced threads between double sheaths of flame protected thermo plastic.

Technical data

CPR Performance class:
> Dca-s2,d2,a2

Temperature range

> Max. operating temperature: +70°C
> Min. operating temperature: -15°C

Standard, approval & directive

> EN 50575:2014
> EN 13501-6
> IEC 60189-1
> IEC 60811-1-4
> EN 50289-1-4

Construction

Conductor:

> Solid
> Annealed
> Copper acc. to IEC 60228, part 5.2, class 1

Insulation:

> Solid
> Colourized PE, dielectric constant = 2.3,

Marking of cores:

> Colours acc. to IEC 60304

Reinforcement:

> Galvanized steel thread

Inner sheath:

> Halogen free, flame protected PE, grey

Outer sheath:

> Halogen free, flame protected PE, black



Content is subject to changes acc. to current product development and/or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ELQTQBU 4x0,6	215	500	K6

Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation nom. thickness (mm)	Insulation nom. diameter (mm)	Inner sheath thickness nom. (mm)	Armour nom. thickness (mm)	Armour nom. diameter (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)
0.3	0.6	0.5	1.6	0.8	1.25	8	1	10.1

Electrical properties

Conductor resistance max. (Ω/km)	68
Insulation resistance min. (GΩ.km)	5000
Mutual capacitance max. (nF/km)	52
Capacitance unbalance max. (pF/500m)	200
Test voltage between pairs at 50 Hz 60 sec (V)	DC: 1000
Test voltage between pairs and screen at 50 Hz 60 sec (V)	2000
Rated voltage (V)	100 V

SIGNALLING CABLE

TRV-ENQXBU

HALOGEN FREE AND FLAME PROTECTED

Application

Halogen free control cable for substation 65. Tinned copper conductor with flame protected PA insulation and flame protected thermo-plastic sheath.

Technical data

CPR Performance class:
> Dca-s2,d2,a2

Temperature range

> Max. operating temperature: +70°C
> Min. temperature at installation: -15°C
> Below 0°C exercise caution

Standard, approval & directive

> EN 50575:2014
> EN 50289-1-2
> EN 50289-1-3
> EN 50289-1-4
> EN 60811-504
> IEC 60189-1
> EN 13501-6

Construction

Cable shape:

> Round

Conductor:

> Solid
> Annealed
> Tinned
> Copper acc. to IEC 60228, class 1

Insulation:

> Flame protected PA

Twisted parts:

> Twisted in concentric bearings

Marking of cores:

> Colours acc. to IEC 60304

Band:

> Plastic foile with overlapping layers

Outer sheath:

> Halogen free, flame protected thermo plastic, grey



Content is subject to changes acc. to current product development and/or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ENQXBU 20x0,75 mm ²	280	500	K7
TRV-ENQXBU 40x0,8 (40x0,5 mm ²)	360	500	K8

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation thickness nom. (mm)	Insulation diameter nom. (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)
TRV-ENQXBU 20x0,75 mm ²	0.75	1	0.6	2.2	1.2	15
TRV-ENQXBU 40x0,8 (40x0,5 mm ²)	0.5	0.8	0.5	1.8	1.2	17

Electrical properties

Product name	TRV-ENQXBU 20x0,75 mm ²	TRV-ENQXBU 40x0,8 40x0,5 mm ²
Conductor resistance max. (Ω/km)	24.5	38.0
Screen resistance max. (Ω/km)	10	10
Test voltage between pairs at 50 Hz 60 sec. (V)	DC: 3000, AC: 2000	DC: 3000, AC: 2000
Conductor elongation (%)	Min. 15%	Min. 15%
Rated voltage (V)	300 V	150 V

SIGNALLING CABLE

TRV-ENUBB

HALOGEN FREE AND FLAME PROTECTED



Application

Halogen free, flame protected connection cable with PA insulation for tele-signalling applications.

Temperature range

- > Max. operating temperature: +90°C
- > Min. operating temperature: -40°C
- > Below 0°C exercise caution

Standard, approval & directive

- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > SS-EN 60811-401
- > SS 424 14 26, bilaga B, F3
- > SS-EN 50289-3-2
- > SS-EN 60754-2
- > SS 424 16 91

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed
- > Tinned
- > Copper acc. to IEC 60228, class 1

Insulation:

- > Flame protected PA

Marking of cores:

- > Colours acc. to IEC 60304



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-ENUBB 1x0,75 mm ²	10	300	Spole
TRV-ENUBB 1x1,5 mm ²	18	250	Spole
TRV-ENUBB 2x0,5	5	600	Spole
TRV-ENUBB 4x0,5	10	300	Spole
TRV-ENUBB 1x0,6	1,3	1200	Spole
TRV-ENUBB 2x0,6	6	500	Spole
TRV-ENUBB 4x0,6	6	500	Spole
TRV-ENUBB 1x0,8	7	450	Spole
TRV-ENUBB 2x0,8	13	100	Spole

SIGNALLING CABLE

TRV-FNUBB

HALOGEN FREE AND FLAME PROTECTED

Application

Halogen free, flame protected connection wire with stranded conductor.

Temperature range

- > Max. operating temperature: +90°C
- > Min. operating temperature: -40°C

Standard, approval & directive

- > SS-EN 60811-401
- > SS 424 14 26, bilaga B, F3
- > SS-EN 50289-3-2
- > SS-EN 60754-2
- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4

Construction

Cable shape:

- > Round

Conductor:

- > Annealed, tinned copper with 7 threads acc. to IEC 60228 class 2

Insulation:

- > Flame protected PA

Marking of cores:

- > Brown with two continuous, spiral shaped black stripes acc. to IEC 60304



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation nom. thickness (mm)	Insulation nom. diameter (mm)	Outer sheath diameter nom. (mm)	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-FNUBB 1x0,75 mm ² brun	0.75	1.0	0.52	2.15	2.15	10	300	Spole

Electrical properties	
Conductor resistance max. (Ω/km)	24.8
Corrosivity	pH: min 4.3
Insulation resistance min. (GΩ.km)	10
Test voltage between pairs at 50 Hz 60 sec. (V)	DC: 1500, AC: 1000
Conductor elongation (%)	Min. 10%
Rated voltage (V)	100 V

SIGNALLING CABLE

TRV-FLLAL

WATER TIGHT



Application

Used by balise manufacturers like stub cables for connections to balises. The ATC cable is used for connections of parallel ATC balises to decoders and BIF cards. The cable can be installed in ducts or ground. When installed in macadame, extra protection is needed.

TRV-FLLAL comes in two versions:
9x0.5 mm²: for pre-signal or main-signal
18x0.5 mm²: for combined signal information with pre-signal and main-signal.

Connection cable between signal box and the stub cable of the balise.

Standard, approval & directive

- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > EN 50289-1-5
- > SS-EN 50289-11
- > SS-EN 50289-8
- > SS-EN 50289-10
- > IEC 60189-1 part 6.3



Construction

Cable shape:

- > Round

Conductor:

- > Stranded, annealed and tinned copper acc. to IEC 60228 class 2

Insulation:

- > PE acc. to SS-EN 50290-2-23 table 1, dielectric constant = 2.3

Twisted parts:

- > Crossed

Marking of cores:

- > Colours on conductor insulation:
- > Thread 1-9: white, grey, violett, blue, green, yellow, orange, red, brown
- > Thread 10-18: white/bk, grey/bk, violette/bk, blue/bk, green/bk, yellow/bk, orange/bk, red/bk, brown/bk

Band:

- > Transparent PETP foile with 30% overlapping, longitudinal transparent PETP foile to ease stripping the inner sheath

Radial water blocking:

- > Aluminum with polymer film on one side, nom. thickness = 0,15 mm, min. 6 mm overlap

Inner sheath:

- > LDPE acc. to SS-EN 50290-2-24 table 1, grade LD/MD, black

Outer sheath:

- > HDPE acc. to SS-EN 50290-2-24 table 1, grade HD

Electrical properties

Conductor resistance max. (Ω/km)	<42.7
Insulation resistance min. (GΩ.km)	5000
Screen resistance max. (Ω/km)	<4
Mutual capacitance max. (nF/km)	<52
Capacitance, part-screen max. (nF/km)	<70
Test voltage between pairs at 50 Hz 60 sec. (V)	DC: 2000
Test voltage between pairs and screen at 50 Hz 60 sec. (V)	DC: 6000
Conductor elongation (%)	Min. 10%
Rated voltage (V)	100 V

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-FLLAL 9x0,5 mm ²	166	1000	K9
TRV-FLLAL 18x0,5 mm ²	241	1000	K10

Product name	Conductor cross-section (mm ²)	Conductor diameter (mm)	Insulation nom. thickness (mm)	Insulation nom. diameter (mm)	Inner sheath nom. thickness (mm)	Inner sheath nom. diameter (mm)	Screen nom. thickness (mm)	Outer sheath nom. thickness (mm)	Outer sheath nom. diameter (mm)
TRV-FLLAL 9x0,5 mm ²	0.5	1.0	0.3	1.7	1.0	9	0.15	1.5	12.5
TRV-FLLAL 18x0,5 mm ²	0.5	1.0	0.3	1.7	1.0	10	0.15	1.5	14.1

SIGNALLING CABLE

TRV-FLLAQBU

HALOGEN FREE AND WATER TIGHT



Application

Used by balise manufacturers like stub cables for connections to balises. The ATC cable is used for connections of parallel ATC balises to decoders and BIF cards. The cable can be installed in ducts or ground. When installed in macadame, extra protection is needed.

Connection cable between signal box and the stub cable of the balise.

Replace TRV-FLLAL where the installations demands flame protected cables type LSZH.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Standard, approval & directive

- > EN 50575:2014
- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > EN 50289-1-4
- > SS-EN 50289-11
- > SS-EN 50289-8
- > SS-EN 50289-10
- > IEC 60189-1 part 6.3
- > EN 13501-6

Construction

Cable shape:

- > Round

Conductor:

- > Stranded, annealed and tinned copper acc. to IEC 60228 class 2

Insulation:

- > PE acc. to SS-EN 50290-2-23 table 1, dielectric constant = 2.3

Twisted parts:

- > Crossed

Marking of cores:

- > Colours on conductor insulation:
- > Thread 1-9: white, grey, violett, blue, green, yellow, orange, red, brown
- > Thread 10-18: white/bk, grey/bk, violette/bk, blue/bk, green/bk, yellow/bk, orange/bk, red/bk, brown/bk

Tape:

- > Transparent PETP foile with 30% overlapping, longitudinal transparent PETP foile to ease stripping the inner sheath

Radial water blocking:

- > Aluminum with polymer film on one side, nom. thickness = 0,15 mm, min. 6 mm overlap

Inner sheath:

- > LDPE acc. to SS-EN 50290-2-24 table 1, grade LD/MD, black

Outer sheath:

- > HDPE acc. to SS-EN 50290-2-24 table 1, grade HD

Electrical properties

Conductor resistance max. (Ω/km)	<42.7
Insulation resistance min. (GΩ.km)	5000
Screen resistance max. (Ω/km)	<4
Mutual capacitance max. (nF/km)	<52
Capacitance, part-screen max. (nF/km)	<70
Test voltage between pairs at 50 Hz 60 sec. (V)	DC: 2000
Test voltage between pairs and screen at 50 Hz 60 sec. (V)	DC: 6000
Conductor elongation (%)	Min. 10%
Rated voltage (V)	100 V



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-FLLAQBU 18x0,5	260	1000	K9

Conductor cross-section (mm²)	Conductor diameter (mm)	Insulation nom. thickness (mm)	Insulation nom. diameter (mm)	Inner sheath thickness nom. (mm)	Inner sheath diameter nom. (mm)	Screen nom. thickness (mm)	Outer sheath thickness nom. (mm)	Outer sheath diameter nom. (mm)
0.5	1.0	0.3	1.7	1.0	10	0.15	1.5	14.1

SIGNALLING CABLE

TRV-EQQXB

HALOGEN FREE AND FLAME RETARDANT

Application

Halogen free, flame protected cable for low-frequency tele-signalling applications indoors.

Technical data

CPR Performance class:

- > Dca-s2,d2,a2

Standard, approval & directive

- > EN 50575:2014
- > EN 50289-1-2
- > EN 50289-1-3
- > EN 50289-1-4
- > EN 50289-1-5

Construction

Cable shape:

- > Round

Conductor:

- > Solid
- > Annealed
- > Copper acc. to IEC 60228, class 1

Insulation:

- > Solid LLDPE

Twisted parts:

- > Twisted conductors in pair

Marking of cores:

- > Colours acc. to IEC 60304

Band:

- > Plastic tape

Ripcord:

- > Polyester yarn thread

Outer sheath:

- > Halogen free, flame protected thermo plastic (HFFR), white, blue marking



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
TRV-EQQXB 40x2x0,5	240	1000	K9

Electrical properties	
Conductor resistance max. (Ω /km)	98
Mutual resistance unbalance (%)	2
Insulation resistance min. ($G\Omega$ xkm)	5000
Capacitance, part-screen max. (nF/km)	80
Capacitance unbalance (F/500m)	400
Test voltage between pairs at 50 Hz 60 sec. (V)	DC: 1500, AC: 1000
Rated voltage (V)	100 V



CAT CABLE

UC300 HS24 Cat.5e SF/UTP LSOH

SCREENED AND ACIDITY PROTECTED



Application

Primary (campus), secondary (riser), tertiary (horizontal).
IEEE802.3: 10Base-T; 100Base-T; 1000Base-T;
IEEE802.5: 16 MB; ISDN; TPDDI; ATM Power over Ethernet (PoE)/PoE+

Technical data

CPR Performance class:

- > ECA

Bending radius:

- > Min. bending radius at installation: >25 mm
- > Min. bending radius with load: >50 mm

Flame resistance:

- > PVC: IEC 60332-1
- > LSHF (LSOH): IEC 60332-1; IEC 60754-2; IEC 61034
- > LSHF (LSFROH): add. IEC 60332-3-24

Temperature range

- > Max. operating temperature: +60°C
- > Min. operating temperature: -20°C

Standard, approval & directive

- > IEC 60754-2
- > EN 50173-1
- > EN 50288-2-1
- > ISO/IEC 11801
- > IEC 61156-5
- > EIA/TIA-568-C.2
- > IEEE 802.3at

Construction

Conductor:

- > Bare copper wire Ø 0.51 mm (AWG 24)

Insulation:

- > PE, Ø 1.1 mm

Twisting:

- > 2 cores to the pair

Cable lay up:

- > 4 pars to the core

Screen:

- > Al-laminated plastic foil and copper braid, tinned

Sheath:

- > PVC alt. LSHF
- > Duplex sheath: two cables parallel, separable

Colour:

- > Grey, RAL 7035

Electrical properties

Loop resistance (Ω/km)	<190
Resistance unbalance (%)	<2
Insulation resistance (MΩxkm)	>2000
Mutual capacitance nom. (nF/km)	48
Capacitance unbalance (pF/km)	<1500
Mean characteristic impedance 100 MHz(Ω)	100 ± 5
Nominal velocity of propagation (%)	approx. 67
Propagation delay (ns/100m)	<535
Delay skew (ns/100 m)	<20
Test voltage (V)	1000
Transfer impedance at 1 MHz (mΩ/m)	<20
10 MHz	<20
30 MHz	<30
100 MHz	<60
Coupling attenuation (dB)	>75
Segregation class	C

Electrical data acc. to CAT.5 (at 20°C)

F (MHZ)	Attenuation (dB/100 m)	NEXT (dB)	PS-NEXT (dB/100 m)	ACR (dB/100 m)	PS-ACR (dB/100 m)	ELFEXT (dB/100 m)	PS-ELFEXT (dB/100 m)	Return loss (dB)
1.0	1.9	71	68	69.1	66.1	68	65	20
4.0	3.7	62	59	58.3	55.3	56	53	23
10.0	6.0	56	53	50.0	47.0	48	45	25
16.0	7.6	53	50	45.4	42.4	44	41	25
20.0	8.5	51	48	42.4	39.5	42	39	25
31.2	10.7	49	46	38.3	35.3	38	35	24
62.5	15.7	44	41	28.3	25.3	32	29	22
100.0	19.8	41	38	21.2	18.2	28	25	20
125.0	22.3	40	37	17.7	14.7	26	23	19
155.5	24.2	38	35	13.8	10.8	24	21	
175.0	25.7	37	34	11.3	8.3	23	20	
200.0	27.5	36	33	8.5	5.5	22	19	
250.0	29.2	35	32	5.8	2.8	20	17	
300.0	32.0	34	31	2.0	-1.0	16	13	

Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
UC300 HS24 Cat.5e SF/UTP 4P LSHF	47	500	K5

CAT CABLE

UC400 Cat.6 U/UTP HD LSHF Dca

FLAME RETARDANT AND ACIDITY PROTECTED



Application

Primary (campus), secondary (riser), tertiary (horizontal).
IEEE 802.3: 10Base-T; 100Base-T; 1000Base-T;
IEEE 802.5: 16 MB; ISDN; TPDDI; ATM

Technical data

Bending radius:

- > Min. bending radius at installation: 8xD
- > Min. bending radius installed: 4xD

Flame resistance:

- > EN: 50399: Class Dcas2d2a1; Class Eca
- > LSHF Dca (FRNC): IEC 60332-1; 60754-2; IEC 61034

Temperature range

- > Max. operating temperature: +60°C
- > Min. operating temperature: -20°C

Standard, approval & directive

- > EIA/TIA-568-C.2
- > ISO/IEC 11801
- > IEC 61156-5
- > EN 50288-6-1
- > EN 50173-1
- > EN 50399
- > IEC 60754-2

Construction

Conductor:

- > Bare copper wire: nom. 0.54 mm

Insulation:

- > PE, Ø 0.95 nom. mm

Twisting:

- > 2 cores to the pair

Cable lay up:

- > 4 pars to the core
- > non-metallic cross separator (spline)

Sheath:

- > LSHF-FR

Colour:

- > Blue, RAL 5012

Electrical properties

DC loop resistance (Ω/km)	<176
Resistance unbalance (%)	<2
Insulation resistance (MΩxkm)	>5000
Capacitance nom. at 800 Hz (nF/km)	48
Capacitance unbalance pair to ground (pF/km)	<1500
Mean impedance 100 MHz(Ω)	100 ± 5
Nominal velocity of propagation (%)	approx. 67
Propagation delay nom. (ns/100m)	535
Delay skew nom. (ns/100 m)	20
Test voltage DC 1 min. core/core (V)	1000

Electrical data acc. to CAT.6 (at 20°C)

F (MHZ)	Attenuation (dB/100 m)		NEXT (dB)		PS-NEXT (dB/100 m)		ACR (dB/100 m)		PS-ACR (dB/100 m)		ELFEXT (dB/100 m)		PS-ELFEXT (dB/100 m)		Return loss (dB)
	max.	nom.	min.	nom.	min.	nom.	min.	nom.	min.	nom.	min.	nom.	min.	nom.	
1.0	2.1	1.9	74	78	72	75	72.0	76.1	70.0	73.1	68	82	65	80	20
4.0	3.8	3.8	65	69	63	66	6.2	65.2	59.2	62.2	56	70	53	68	23
10.0	6.0	6.0	59	63	57	60	53.0	57.0	51.0	54.0	48	62	45	60	25
16.0	7.6	7.6	56	60	54	57	48.4	52.3	46.4	49.3	44	58	41	56	25
20.0	8.5	8.5	55	59	53	56	46.5	50.0	44.5	47.0	42	56	39	54	25
31.2	10.7	10.7	52	56	50	53	41.3	45.0	39.3	42.0	38	52	35	50	23.6
62.5	15.5	15.1	47	51	45	48	31.5	36.0	29.5	33.0	32	46	29	44	21.5
100.0	19.9	19.1	44	48	42	45	24.1	28.9	22.1	25.9	28	42	25	40	20.1
125.0	22.5	21.3	43	47	41	44	20.5	25.2	18.5	22.2	26	40	23	38	19.5
155.5	25.4	23.8	42	45	40	42	16.6	21.3	14.6	18.3	24	38	21	36	18.8
175.0	27.1	25.3	41	44	39	41	13.9	19.1	11.9	16.1	23	37	20	35	18.4
200.0	29.2	27.0	40	44	38	41	10.8	16.5	8.8	13.5	22	36	19	34	18.0
250.0	33.0	32.0	38	42	36	39	5.0	10.0	2.0	7.0	20	34	17	33.2	17.3
300.0		36.1		41		38		4.8		1.8		32		30	
400.0		41.7		39		36		-2.7		-5.7		30		28	

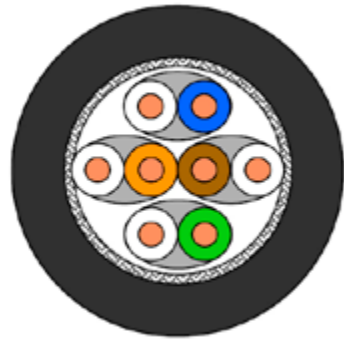
Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
UC400 Cat.6 U/UTP Dca HD 4P LSHF (violet) 305BR	26	500	

CAT CABLE

UCS IE UC900 SS23 CAT.7 PE IE S/FTP

SCREENED



Application

Primary (campus), secondary (riser), tertiary (horizontal).
IEEE 802.3: 10Base-T; 100Base-T; 1000Base-T; 10GBase-T
IEEE 802.5: 16 MB; ISDN; TPDDI; ATM; Power over Ethernet (PoE)/PoE+

Technical data

Bending radius:
> Min. during installation: > 40 mm

Temperature range

> Max. operation temperature: +60°C
> Min. operating temperature: -55°C

Standard, approval & directive

> EN 50173-1
> EN 50288-4-1
> ISO/IEC 11801
> IEC 61156-5
> IEEE 802.3af

Construction

Conductor:
> Bare copper wire Ø 0.56 mm (AWG 23)
Insulation:
> Foam-skin PE Ø 1.4 mm
Twisting:
> 2 cores to the pair
Pair screen:
> AL-laminated plastic foil
Cable lay up:
> 4 pars (PIMF) to the core
Screen:
> Copper braid, tinned
Sheath:
> PE, for outdoor installation
Colour:
> Black, RAL 9005

60°



Content is subject to changes acc. to current product development and or any changes to standards.

Product name	Cable weight (kg/km)	Standard delivery length (m)	Delivery package
IE S/FTP cable 4x2xASW23/1	95	1000	K6

Electrical properties

Loop resistance (Ω/km)	<165
Resistance unbalance (%)	<2
Insulation resistance (MΩxkm)	>5000
Mutual capacitance nom. (nF/km)	43
Capacitance unbalance (pF/km)	<1500
Characteristic impedance 1-100 MHz(Ω)	100 ± 15
100-250 MHz	100 ± 18
250-600 MHz	100 ± 25
Nominal velocity of propagation (%)	approx. 79
Propagation delay (ns/100m)	<427
Delay skew (ns/100 m)	<12
Test voltage DC 1 min. core/core and core/screen (V)	1000
Transfer impedance at 1 MHz (mΩ/m)	<10
10 MHz	<10
30 MHz	<30
100 MHz	<60
Coupling attenuation (dB)	>85

Electrical data acc. to CAT.7 (at 20°C)

F (MHZ)	Attenuation (dB/100 m)	NEXT (dB)	PS-NEXT (dB/100 m)	ACR (dB/100 m)	PS-ACR (dB/100 m)	ELFEXT (dB/100 m)	PS-ELFEXT (dB/100 m)	Return loss (dB)
1.0	1.8	100	97	98	95	105	105	-
4.0	3.4	100	97	97	94	105	102	27
10.0	5.4	100	97	95	92	97	94	30
16.0	6.8	100	97	93	90	93	90	30
20.0	7.7	100	97	92	89	91	88	30
31.2	9.6	100	97	90	87	87	84	30
62.5	13.7	100	97	86	83	81	78	30
100.0	17.4	100	97	83	80	77	74	30
125.0	19.5	95	92	75	72	75	72	26
155.5	21.9	94	91	72	69	73	70	26
175.0	23.3	93	90	70	67	72	69	25
200.0	25.0	92	89	67	64	71	68	25
250.0	28.1	90	87	62	59	69	66	24
300.0	30.9	89	86	58	55	67	64	24
450.0	38.3	87	84	48	45	64	61	23
600.0	44.8	85	82	40	37	61	58	22
750.0	52.0	83	80	31	28	59	56	21
900.0	59.4	82	79	23	20	58	55	20
1000.0	63.1	80	77	17	14	57	54	20

Railway Main Line Cables

Cables with reduction factor

Parallel laid railway cables on electrified tracks using alternating current or under high voltage power lines are exposed to the influence electromagnetic fields. These electromagnetic fields induce current in the cables, which can lead to disturbances and destruction of the equipment connected to them as well as present a hazard to life and limb. In order to reduce this influence to a non-hazardous level, the cables are provided with a metallic shield according to their cross-section. This shield has to be earthed on both sides of the cable.

The measure of quality used to shield cables in railway applications is referred to as the reduction factor. The reduction factor is the ratio of induced tension with shielding to the induced tension without shielding. A reduction factor of 1 would mean "no shielding effect". A reduction factor of 0.5, for example, would mean a reduction of the induced tension by one half.

The effect of shielding of the materials used (copper, steel, aluminium, etc.) is dependent on the conducting cross-section of shielding as well as the frequency of the interfering signal.

Depending upon the local circumstances, the cable design and hence the resultant reduction factor can be optimised to best match the expected field strength along the railway track. A typical description for the request for a cable protected against inductive interference shall include disturbing frequency and field intensity as well as the requested reduction factor. For example:

- Reduction factor < 0.5 at 16.7 Hz in the range of 80 – 150 V/km or
- Reduction factor < 0.3 at 50 Hz in the range of 80 – 250 V/km.

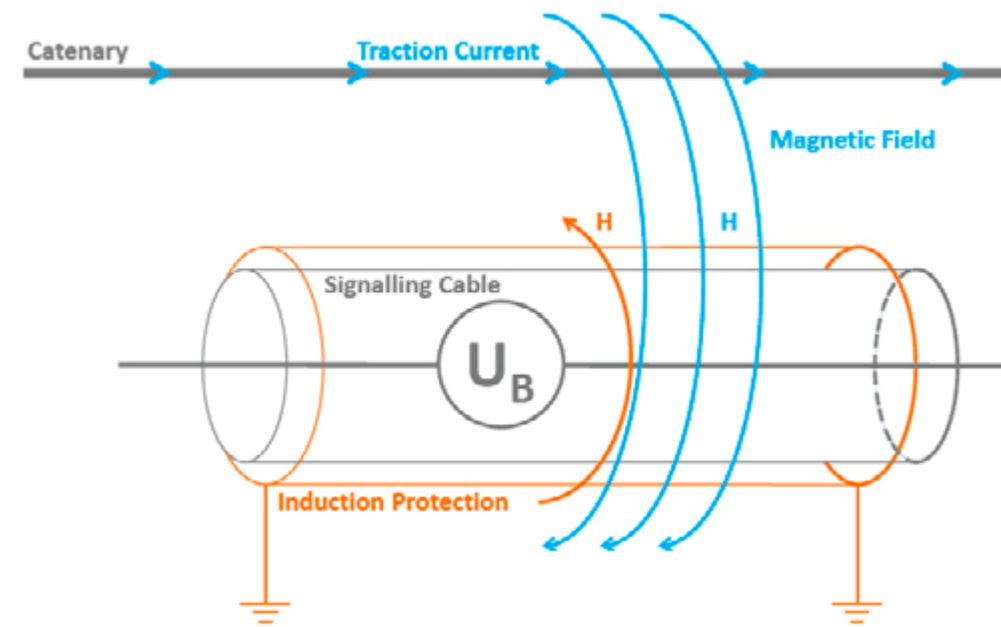
The tension induced in the cable increases with the length the cable is exposed to the electrical field. A cable which is exposed over a length of 2000 m to the field can require a lower (better) reduction factor than the same cable, which is only exposed to the induced field over a length of 1000 m.

The calculation of the actually required reduction factor is very complicated and depends on a multitude of different parameters:

- Distance of the cable to be shielded from the interfering cable (overhead line...),
- Type of installation (underground, in conduits, on the ground...),
- Characteristics of the ground,
- etc.

A respective calculation of the required reduction factor can only be carried out by experts. The cable manufacturer then develops the correct cable design based on the given factors.

As a supplier of cables for railway applications and development partners of well-known European railway operators of long standing, We are pleased to develop the right cable design for you according to your needs.



Picture: Magnetic field compensation by inductive protection



Picture: Cable AJ-2Y(L)2YDB2Y 10x4x1.4 mm S (H45) rk 600 of Deutsche Bahn with protection against inductive interference

Railway Main Line Cables

Requirements for fire characteristics of cable installations in tunnels or stations

Prysmian provides a complete product range of cables and circuits for the railway infrastructure sector. We also take into consideration the special requirements needed for laying cables in closed environments.

Most railway infrastructure operators specify cables with a black polyethylene (PE) outer sheath for use in the open air. PE is extremely robust and resistant, has very good UV resistance due to the black colouring and guarantees a cable life of about 35 years. PE is halogen-free and burns with low smoke emissions without releasing toxic gases.

In closed areas and narrow spaces, in applications such as tunnels or railway stations, the requirements for the cables are very demanding.

Even though PE is halogen-free and burns with low smoke, it is not recommended for such applications. PE is not self-extinguishing and contributes to further propagation of fire. The fire can penetrate into adjacent rooms and cause more damage. Cables with PVC outer sheath are no alternative either. Although PVC is flame retardant and usually self-extinguishing, it burns producing dark soot and releases toxic gases.

The ideal materials combine the advantages of PE and PVC, are halogen free, produce little smoke, and are flame retardant and self-extinguishing. Such materials are manufactured, refined and improved in Prysmian's material laboratories.

Known halogen-containing materials are, for example, chloroprene rubber (CR), ethylene tetrafluoroethylene (ETFE), perfluoroethylene propylene (FEP) or polyvinyl chloride (PVC). Halogen-free materials are, among others, silicone rubber (SIR), polyamide (PA), ethylene propylene polymers (EPR), thermoplastic elastomers (PE) or polyethylene (PE).

There are European and international standards regarding the unique and comparable classification of flammability properties of cables. We want to briefly introduce to you the most important test procedures.

Fire testing

EN/IEC 60332-1

(Tests on electric and optical fibre cables under fire conditions: test for vertical flame propagation for single insulated wire or cable)

The flame propagation is tested according to IEC 332-1 on a single cable. A vertical sample of cable about 600 mm in length is exposed to a flame for 60 s and/or 120 s in an area 100 mm above the lower end with a 1 kW Bunsen burner. After removing the burner, the flame must self-extinguish. The zones of the cable damaged by the flame should not reach to the upper end of the cable. The flaming time is dependant on the diameter of the cable.

Comparable tests are DIN VDE 0482-332-1-2, EN 50265-2-1, NF C 32-070 C2, BS 4066-1.



EN/IEC 60332-3

(Tests on electric and optical fibre cables under fire conditions: test for vertical flame spread of vertically mounted bunched wires or cables)

The test for the spread of the flame with an array of several cables, i.e. a bunch of cables, is normally carried out according to IEC 332-3 (EN 50266-2, test method A, B, C or D – for use of different volumes of non-metallic materials).

The test specimens, mounted in a vertical frame, are exposed to a flame over a length of 3600 mm starting in the lower section using a special burner with a high output. During and/or after exposure to the intensive flame for 20 and/or 40 minutes, the cables may not continue to burn to their upper end.

Comparable tests are DIN VDE 0482-266-2-4, EN 50266, NBN C30-004 Cat. F2, BS 4066-3.



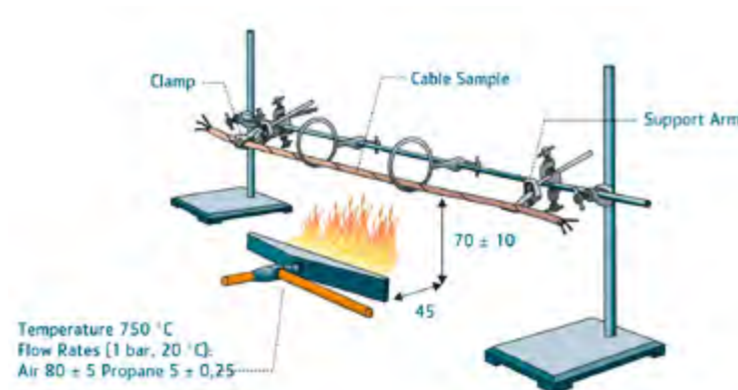
Railway Main Line Cables

IEC 331

(Cable with insulation integrity)

A horizontal cable sample is exposed to a flame over a width of 1200 mm with a flame temperature of at least 750 °C for a recommended duration of at least 90 minutes. The cable is connected up electrically and under tension. During flaming and a cooling down time of an additional 15 minutes, no short circuiting or interruption of the current may arise.

Comparable tests are EN 50200, EN 50263, NF C 32070 CR1, BS 6287.



DIN 4102 part 12

(Cable with functional integrity – system testing of cable and the cable mounting system)

This test is very extensive. As it is a test of the system which includes the cable and the cable mounting system, the product to be tested is completely walled into a closed space. The cables are connected up electrically and are kept under tension during the test. The entire room is set alight with a defined temperature unit curve. After at least 30 minutes flame exposure, neither short-circuiting or interruption of circuit may arise. It is extremely difficult to pass the test, as the cable mounting system has a considerable influence on the result. Cable clips, ducts or conductors exert mechanical loads on the cable, as the material changes during flaming: cable ducts start to bend through the load exerted by the cable and the originally smooth cable suddenly hangs down at several points. This mechanical change of position of the burned cable can lead to interruption or short-circuiting.

IEC 61034

(Measurement of smoke density of cables burning under defined conditions)

A plastic sample is burned under controlled conditions. In this way, the light transmission through the combustion gases which arise is measured.

Comparable tests are DIN VDE 0482-286-1 and -2, NFX 10702, BS 7622-2.

IEC 60754-1

(Test on halogen acid gases evolved during combustion of materials from cables)

A plastic sample is burned under controlled conditions. In this way, the smoke gases are measured for their halogen content.

Comparable tests are DIN VDE 0482-267-2-1 and EN 50267-2, NF C 20454, BS 6425-1.

IEC 60754-2

(Test on acidity of gases evolved during combustion of materials from cables)

A plastic sample is burned under controlled conditions. In this way, the pH-value and the conductivity of the smoke gases are measured.

A comparable test is DIN VDE 0276-604.

With the exception of the small fire test according to EN/IEC 60332-1, the cable is normally destroyed during the flame test. Although no short-circuiting or interruptions should arise, it is difficult to speak about defined electrical values such as operating capacity or characteristic impedance. In this case we are talking about either: current flowing or not. This may in reality be adequate for loudspeaker announcements or sprinkler systems. Control and safety technology using electronic interlocking is during or after a cable fire, if at all, hardly still sensible and feasible. Under these circumstances, the need to maintain fire testing standards according to EN/IEC 60331 (insulation integrity) and/or DIN 4102 part 12 (functional integrity) makes little sense for railway signalling cables for electronic interlocking.

Railway Main Line Cables

Construction Product Regulation

Since 01/07/2013, the “Construction Product Directive” (CPD) in the EU has been replaced by the “Construction Product Regulation” (CPR) and is thus valid law in all member states of the EU. The CPR and/or the building product directive (BPVo) affects all cables which are intended for permanent installation in a building. Products have to fulfil requirements in terms of behaviour and/or resistance in the case of fire.

CPR itself does not define any performance requirements regarding the affected products. The definition of safety requirements remains the responsibility of the national authorities.

CPR has introduced binding performance requirements (Declaration of Performance, DoP) and the corresponding CE-mark for labelling the products. The cable’s fire characteristics shall be marked in the future with a combination of different classes (The index “ca” stands for “cable”):

CPR classes are: A_{ca} , $B1_{ca}$, $B2_{ca}$, C_{ca} , D_{ca} , E_{ca} , F_{ca} (see table to the right)

Smoke classes are: s1, s1a, s1b, s2, s3 (EN 50399/EN 61034-2)

Acidity classes are: a1, a2, a3 (EN 60754-2)

Flaming droplets classes are: d0, d1, d2 (EN 50399)

The CPR has no class or guideline for railway cables laid in exposed outdoor areas. These cables may continue to be designed, produced and installed as previously. For railway cables in tunnels or train stations, the relevant cable manufacturers associations recommend a classification according to the EU regulation (1303/2014), clause 4.2.2.4: “In case of fire, exposed cables shall have the characteristics of low flammability, low fire spread, low toxicity and low smoke density. These requirements are fulfilled when the cables fulfil as a minimum the requirements of classification $B2_{ca}$, s1a, a1, as per Commission Decision 2006/751/EC.”

Prysmian Group will observe these obligations and, as far as they do not satisfy existing cable designs, will provide cables and products to the market with the corresponding properties.

Class	Test method(s)	Classification criteria	Additional classification
A_{ca}	EN ISO 1716	PCS \leq 2,0 MJ/kg and PCS \leq 2,0 MJ/kg and	
$B1_{ca}$	EN 50399 and	FS \leq 1.75 m and THR1200s \leq 10 MJ and Peak HRR \leq 20 kW and FIGRA \leq 120 Ws-1	Smoke production and Flaming droplets/particles and Acidity
	EN 50265-2-1	H \leq 425 mm	
$B2_{ca}$	EN 50399 and	FS \leq 1.5 m; and THR1200s \leq 15 MJ; and Peak HRR \leq 30 kW; and FIGRA \leq 150 Ws-1	Smoke production and Flaming droplets/particles and Acidity
	EN 50265-2-1	H \leq 425 mm	
C_{ca}	EN 50399 and	FS \leq 2.0 m; and THR1200s \leq 30 MJ; and Peak HRR \leq 60 kW; and FIGRA \leq 300 Ws-	Smoke production and Flaming droplets/particles and Acidity
	EN 50265-2-1	H \leq 425 mm	
D_{ca}	EN 50399 and	THR1200s \leq 70 MJ; and Peak HRR \leq 400 kW; and FIGRA \leq 1300 Ws-1	
	EN 50265-2-1	H \leq 425 mm	
E_{ca}	EN 50265-2-1	H \leq 425 mm	
F_{ca}	no performance determined		

Table: Overview of the CPR classifications

Transport and storage of cable drums

Even if cable and drum look very strong, there are certain rules to follow to avoid damage of the cable and an accompanying impairment of mechanical and electrical characteristics.

Transport and storage of cable drum

It is possible to store cable drums outdoors. When storage has occurred in heated rooms, a minimum 24-hour acclimatisation period must be observed before installation (possible condensation build-up in the cable!).

For outdoor storage the ground must be even and clean. Stones or bumps in the ground should be removed or smoothed out. Damage to the wound goods/cable should be avoided at all costs.

Cables should be secured against accidental rolling away. Under no circumstances should the drum flange of neighbouring cables touch any wound goods.

Cable drums should always be stored and transported standing on both flanges.

They should not be pushed along the ground standing on the flanges. It is possible that the strength of the cable drum would then no longer be guaranteed.

Observe the rolling direction. The arrow printed on the drum flange indicates the rolling direction so that the wound goods do not become loose.

Always uncoil the cable at a tangent, never over the flange, since the torsion thus resulting would damage the cable and laying would not be possible.

Cable ends

Finally it remains for us to point out the necessity of having faultless cable ends. Pressure-tight and impermeable cable ends are particularly essential for cables which are not longitudinally water-proof, as well as for cables which are insulated with paper, cellular-PE and foam-skin-PE. Carelessness in this area can lead to moisture penetration which is accompanied by a drastic deterioration in the electrical transmission rate. Power failures and expensive replacement work are the result. Pressure-tight and impermeable cable ends can be achieved, for example, through the use of synthetic sealing resin or compressed air sealing stoppers.



Important physical characteristics

Temperature range

The temperature range of the cable is of great importance for both the user and fitter. After all the cable is meant to function equally well in cold and hot temperatures. It is particularly during the fitting process that powerful mechanical forces act on the cable. The plastic used serves as the limiting element for the possible temperature range. At overly warm temperatures the plastic becomes very soft and can change into a thermoplastic state (up to melting point), which causes irreversible changes in the cable.

At very cold temperatures, however, the material stiffens and becomes hard and inflexible. Here, too, irreparable damage can occur.

Tears in the sheath allow dampness and moisture in and impair the transmission rate. Details about the permissible temperature range during laying and use (following successful fitting) can be found in the information sheets of the cable manufacturer. Since the mechanical strain on the cable in its laid form is significantly less, the permissible temperature range is greater than the range valid for the installation period.

Bending radius

Regarding the bending radius we distinguish between multiple and single bending (shaping into the final position).

Multiple bending occurs mainly during the laying process. Cables are laid under tension around deflector rolls. The particular stress of multiple bending lies in the alternating stress on the materials, which can be stretched several times as well as compressed during the laying process.

To prevent permanent damage there are prescribed minimum bending radii of, for example, 10 x cable external diameter for multiple bending.

The stress on the material during final bending is not characterised by alternating stress. The cable is bent into form a final time and stays in this position for the duration of its use. The minimum bending radius in this case is, for example, 7.5 x cable external diameter. During final bending the cable can, therefore, be bent more tightly.

Exact minimum bending radii for specific cables can be found in the information sheets of the cable manufacturer.

Tension

During laying of the cable particular attention must be paid to the maximum possible tension. The cable is very quickly damaged by the use of too much force and must then be replaced. The maximum possible tension depends in the first place on the overall cross section and the tensile strength of the conducting materials used.

For cables with steel tape or copper wire spiral armouring it is the internal copper conductors alone which determine the maximum tension! The armouring has no influence on the maximum tension or can possibly reduce it through additional weight. For armouring with steel or steel profile wires, however, the tension is determined solely by the steel and steel profile wires.

Cable weight

The cable weight of larger cable dimensions can take weights of up to more than 10 t/km (without the reel!).

Railway Main Line Cables

Certifications and compliance

Certifications of Railway and Infrastructure Authorities

Being a very complex system with a high safety integrity level, railway products are subject to detailed requirements and strong supervision. Many railway infrastructure operators issued dedicated cable specifications which require homologation and frequent auditing. Prysmian Railway Cables are designed and produced according to a number of railway cables standards, like DB, SBB, ÖBB, SNCF, TCDD, ADIF/RENFE, RFI, RATP and many more in Europe and around the globe. High quality manufacturing processes, many decades of experience in cable design and engineering as well as intense testing procedures guarantee state-of-the-art cable products and satisfied customers worldwide.

REACH (Registration, Evaluation and Authorisation of Chemicals)

Adopted on December 18th, 2006, the Regulation of the European Parliament and the European Union Council, modernized the European legislation regarding chemical substances, and set up a unique integrated system of chemical substances in the European Union. Its objective is to improve the protection of the human health and of the environment, while maintaining the European chemical industry's competitiveness and strengthening its spirit of innovation. All Prysmian railway cables are REACH compliant.

RoHS (Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment)

The RoHS directive aims at restricting the use of certain dangerous substances commonly used in electric and electronic equipment (EEE). Cables concerned by this directive are any cables rated below 250V, which function is the connection or the extension of an EEE to electrical outlet or the connection of two or more EEE to each other. All Prysmian railway cables are RoHS compliant.

Management Systems

- Quality Management System EN ISO 9001:2008
- Environmental Management System EN ISO 14001:2005
- Energy Management System EN ISO 50001:2011

Our responsibilities

Social Responsibility

Within the social dimension of its business, the Prysmian Group recognises its commitment and responsibility towards the persons who work as part of the Organisation, as well as those who form the local communities in the territories in which the Group is active. Accordingly, consistent with its values, Prysmian constantly seeks to ensure the personal and professional satisfaction of its human resources, and to communicate with and involve local populations, in order to generate value for these important categories of stakeholder.

Environmental responsibility

The Group's commitment to safeguarding the environment and conserving natural resources is expressed not only by the intrinsic characteristics of our products, but also by how our production systems are managed. In particular, the prevention and reduction of their environmental impact is achieved, for example, by the efficient use of natural resources, the optimisation of logistics flows and the responsible management of waste.

During 2015, HSE further consolidated its activities at various levels within the Group (corporate, country or geographical area, business unit, production unit), centralising activities and coordinating the work of the local HSE functions. Group policies for Health, Safety and Environment, as well as the related Operating Procedures and Technical Standards, have been adopted and applied at operating unit level. The HSE function, with support from the Group audit team, periodically checks the effectiveness and proper application of the HSE rules at local level.

The aspects monitored by HSE using indicators include compliance with health and safety at work standards, energy consumption, waste management, water usage and greenhouse gas emissions. In particular, with reference to the greenhouse gas emissions, the Group has begun to collect energy consumption data in order to track both "direct" emissions (deriving from production processes) and "indirect" emissions (deriving from the energy purchased). This system of monitoring and reporting enabled the Group to participate in 2015, once again, in the Carbon Disclosure Project (CDP), which seeks to contribute to the pursuit of the objectives agreed in the Kyoto Protocol regarding the global reduction of greenhouse gas emissions

Product responsibility

Quality and innovation are the hallmarks of Prysmian's approach, both in sectors where the level of technology, the ability to innovate constantly and the commitment to offering high value-added services together establish a differentiated competitive positioning, and in those sectors where products are more standardised, such as medium and low-voltage cables. The Group applies a customer-centric approach, reflecting an ability to anticipate and satisfy the needs of customers with the maximum possible attention.

Railway Main Line Cables

References

Prysmian Group has been supplying the railway industry for many decades. We supply all renowned European railway infrastructure companies, often as part of long-term master agreements. Many important projects have been completed in the recent years all around the world, even more are yet to come. There is always our office close to you.

The following excerpt of our success records shall give you an idea about our local and global presence.

North Europe:

- Denmark: ERTMS Signalling Program, Electrification of Danish Railways, Renewal of Danish Rail Infrastructure, Copenhagen Metro and S-Bane, Aarhus Tram
- Finland: Länsi Metro, Helsinki Metro, Rail Safety Project, Electrification of Jyväskylä-Äänekoski Line
- Norway: LKAB Narvik-Kiruna Line, InterCity Project, GSM-R Network for the ERTMS Signalling Program
- Sweden: Renewal of Stockholm Metro, Lund Tramway
- Latvia: Modernization of LZD-infrastructure

Rest of the world:

- Australia: QueenslandRail, conversion to axle counter detection technology
- Egypt: Cairo – Alexandria line
- Bulgaria: Plovdiv-Burgas line
- Chile: Rancagua project
- Germany: Framework contract and development partner of Deutsche Bahn
- Israel: Ashkelon – Netivot line
- Canada: Toronto Transit Authority
- Croatia: Zagreb Central Station
- Malaysia: Thomson Line project
- Morocco: Casablanca – Tanger line
- Mexico: Metro Monterey
- Saudi Arabia: North-South-Rail project, Mecca Metro
- Switzerland: Framework contract with SBB
- Singapore: Singapore Metro Subaqua Cable
- Spain: Vandellos-Tarragona line, Madrid – Leon – Burgos high speed Line
- Turkey: Ankara-Konya high speed line, Eskisehir – Balıkesir line, Metro Istanbul, Metro Ankara
- USA: JFK Air Train, New York City Transit, Oakland Bay Area Rapid Transit