Wires and Cables
for automotive applications

Keeping you connected.

Coroplast

Contents

Coroplast – experience and innovations from one source

Coroplast is a traditional, family-owned company that has built its reputation on flexibility, innovative strength and reliability since 1928. Production facilities in Germany, Poland, Mexico, Tunisia and China, plus over 20 representative offices and service centres all over the world, demonstrate our global presence and guarantee the best-possible service for our customers.

In the Wires and Cables division, Coroplast has successfully expanded the automotive wires and cables market segment in the last few years. The customer-focused development of modern insulation and sheathing materials in particular has contributed to the successful product range expansion. Today, Coroplast makes a large range of modern wires available to you. With the new high-voltage automotive wires and cables for long-term use up to 180 °C, Coroplast underlines its leading position in the development of forward-looking product technologies. This new generation of automotive wires and cables is also particularly suitable for cabling in purely electric and hybrid-driven vehicles or for use in fuel-cell vehicles. In a current-fed operating condition, the Coroplast HV wires are able to resist temperatures of up to 180 °C in the long term, which allows an optimisation of the wire diameters compared to lower-quality insulation materials. In this way, material can be saved, weight reduced and construction space can be used more efficiently. All these properties support the ecological idea of electromobility.

Our forward-looking insulation and sheathing materials are suitable for applications in an extreme operating temperature range from –40 °C to +250 °C. The industry has diverse system requirements for cables and wires in addition to pure temperature loads. Above all, the wires have to be safe and efficient in terms of design, assembling and installation.

This brochure provides you with an initial overview of the Coroplast Wires and Cables product portfolio. However, our development and delivery scope goes far beyond the content of this brochure. Please contact us to discuss any queries or specific requirements and we will be happy to advise you on customised solutions.

Coroplast – your innovative development supplier.

Quality philosophy

The Coroplast product portfolio and production range offer comprehensive depth and range. They extend from the compounding of insulation materials to system responsibility for entire components such as vehicle wheelhouse wiring. This depth of added value means that our quality management team not only has to ensure the quality of individual products, but also maximum quality levels throughout the entire production and process chain at all production sites.

Our quality philosophy supports the following principles:

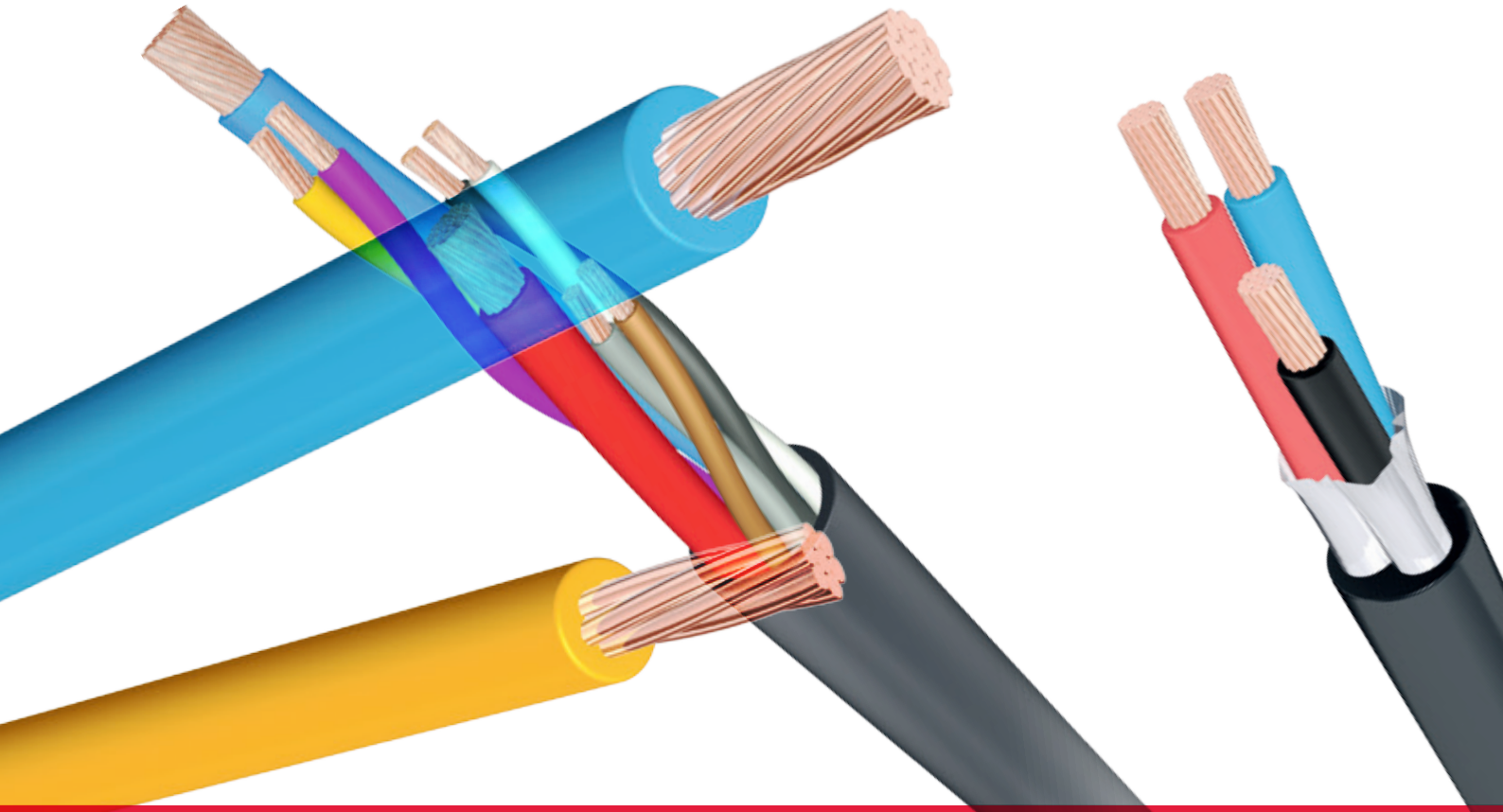
› Our customers' needs have utmost priority.
› Our processing times have to be much shorter than those of our competitors.
› Our products and services must always be of first-rate quality.
› Coroplast is a development company and a solution provider – a technical innovator with attractive prices.
› Keeping investments at a high level, irrespective of economic trends.
› Coroplast always has been and always will be a pioneer in the use of environmentally friendly raw materials.
› Our employees are our company's most valuable asset, and we always promote their further training and motivation.
› Coroplast is a brand that stands for reliability, consistency and continuous improvement.

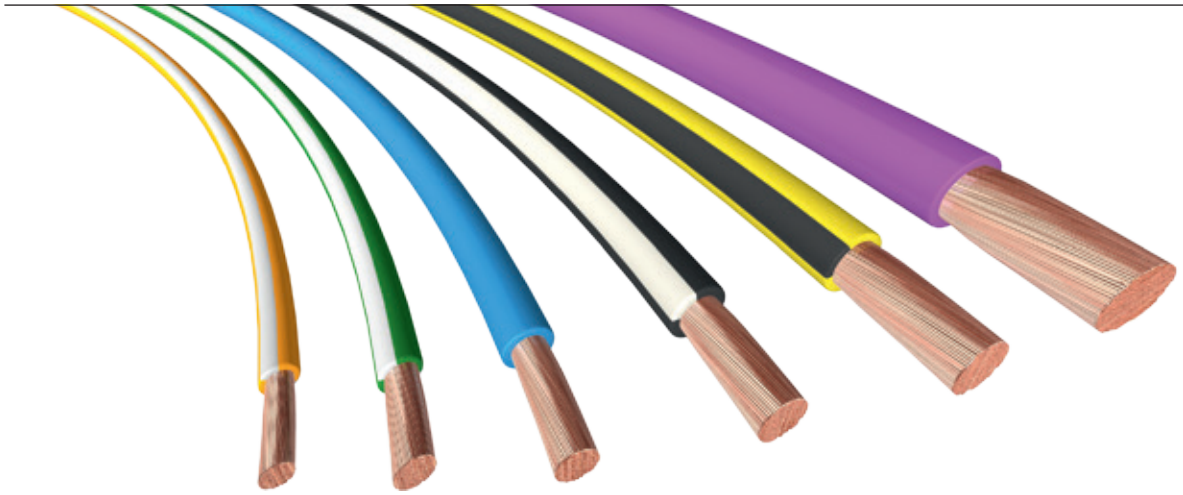
Coroplast obtains annual ISO/TS 16949 certification.
The current certificate can be found on our website: www.coroplast.de.

Quality management system
DQS-certified in accordance with ISO/TS 16949

Automotive wires and cables

Coroplast – solution-orientated systems supplier





PA-/TPE-insulated automotive wires

Application:
Passenger and engine compartment
Fuel tank gauge unit
Door and tailgate wiring

Operating temperature range
in accordance with ISO 6722
–40 °C to +100 °C/3,000 h (FLR4Y)
–40 °C to +125 °C/3,000 h (FLR31Y)

PA-automotive wires FLR4Y 0.22 mm² to 6.0 mm²

Cross–section	Conductor design				Insulation wall thickness	Outer diameter	Conductor resistance	
	Type A		Type B				bare	tinned
	(nom.)	(max.)	(nom.)	(max.)	(min.)		(max.)	(max.)
[mm²]	[mm]		[mm]		[mm]	[mm]	[mΩ/m]	[mΩ/m]
0.22	7 x 0.21		—			1.2 (– 0.1)	84.4	86.5
0.35	7 x 0.26		—		0.20	1.3 (– 0.1)	54.4	55.5
0.35	—		12 x 0.21			1.4 (– 0.2)	54.4	55.5
0.5	19 x 0.19		16 x 0.21		0.22	1.6 (– 0.2)	37.1	38.2
0.75	19 x 0.23		24 x 0.21			1.9 (– 0.2)	24.7	25.4
1.0	19 x 0.26		32 x 0.21		0.24	2.1 (– 0.2)	18.5	19.1
1.5	19 x 0.32		30 x 0.26			2.4 (– 0.2)	12.7	13.0
2.5	19 x 0.41		50 x 0.26		0.28	3.0 (– 0.3)	7.60	7.82
4.0	—		56 x 0.31		0.32	3.7 (– 0.3)	4.71	4.85
6.0	—		84 x 0.31		0.32	4.3 (– 0.3)	3.14	3.23

TPE-automotive wires. wires FLR31Y 0.35 mm² to 6.0 mm²

cross-section	Conductor design				Insulation wall thickness	Outer diameter	Conductor resistance	
	Type f (finely stranded)		Type ff (extra finely stranded)				bare	tinned
	(nom.)	(max.)	(nom.)	(max.)	(min.)		(max.)	(max.)
[mm²]	[mm]		[mm]		[mm]	[mm]	[mΩ/m]	[mΩ/m]
0.35	12 x 0.21		45 x 0.11		0.20	1.4 (– 0.2)	54.4	55.5
0.5	19 x 0.19		64 x 0.11		0.22	1.6 (– 0.2)	37.1	38.2
0.75	19 x 0.23		96 x 0.11			1.9 (– 0.2)	24.7	25.4
1.0	19 x 0.26		126 x 0.11		0.24	2.1 (– 0.2)	18.5	19.1
1.5	19 x 0.32		192 x 0.11			2.4 (– 0.2)	12.7	13.0
2.5	50 x 0.26		320 x 0.11		0.28	3.0 (– 0.3)	7.60	7.82
4.0	56 x 0.31		120 x 0.21		0.32	3.7 (– 0.3)	4.71	4.85
6.0	84 x 0.31		184 x 0.26		0.32	4.3 (– 0.3)	3.14	3.23

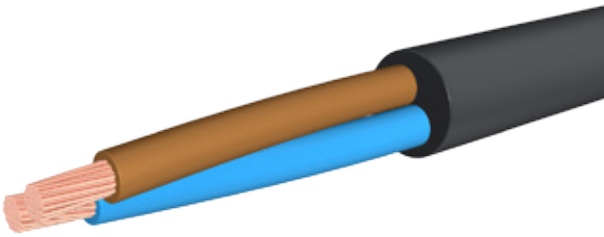
PUR-sheathed cables

Application: Passenger and commercial vehicles – passenger and engine compartments
for data transmission and voltage supply

Operating temperature range in accordance with ISO 6722
–40 °C to +125 °C/3,000 h

Round sheathed cables

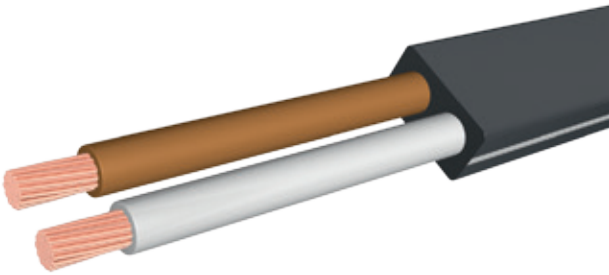
Sheathed cables are always used for automotive applications where the cables have to satisfy particularly stringent requirements. The strand lay lengths are fixed, even if the cabling has a tight bending radius. Chemical and mechanical resistance are considerably enhanced by the sheath. Gas and watertight overmoulding of grommets and the like can be achieved only with round sheathed cables. The selection of suitable insulation and outer sheathing materials is orientated to your requirements. An extensive range of standard and special materials is available.



Flat sheathed cables

Sheathed cables are not always round. Depending on requirements, we extrude sheathed cables in accordance with your specific requirements. Flat sheathed cables are in widespread use. The single wires run parallel to each other underneath the outer sheath. A specific distance between the wires ensures a safe contacting process.

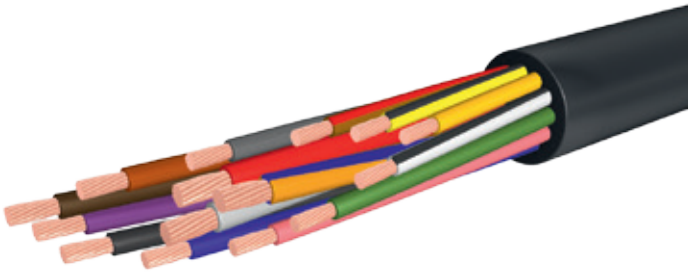
Depending on which insulation and sheathing material you choose, IDC technology is also an option. Flat designs with pre-stranded wires can also be implemented if required.
We look forward to hearing your suggestions.

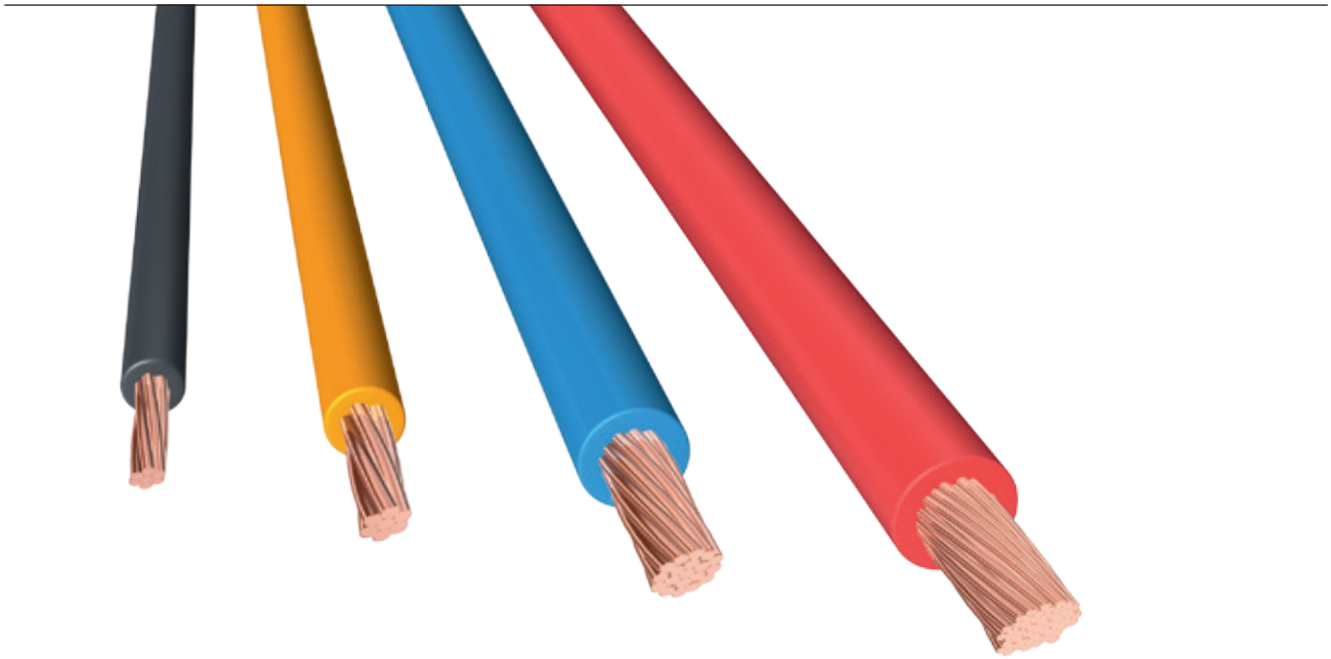


Hybrid sheathed cables

With hybrid sheathed cables, several functions are performed in one sheathed cable. The large-diameter wires enable efficient power supply and the small-diameter wires are used for control functions and data communication.

Our modern production technology enables the integration of pre-stranded wire pairs – as interscreened voice circuits if required. Our experienced cable designers develop robust and production-friendly solutions.





Coroflex TT3 insulated automotive wires

Application:
Engine compartment and gearbox

Development of wiring systems and
wiring harnesses for engine compartment and engine wiring

Operating temperature ranges in accordance with ISO 6722

–40 °C to +125 °C/3,000 h
–40 °C to +150 °C/240 h

PP-single wires FLR9Y 0.35 mm² to 6.0 mm²

cross-section	Conductor design		Insulation wall thickness	Outer diameter	Conductor resistance	
	Type A (nom.) (max.)	Type B (nom.) (max.)	(min.)		bare (max.)	tinned (max.)
[mm²]	[mm]	[mm]	[mm]	[mm]	[mΩ/m]	[mΩ/m]
0.35	7 x 0.26	–	0.20	1.3 (– 0.1)	52.0	55.5
	–	12 x 0.21		1.4 (– 0.2)		
0.5	19 x 0.19	16 x 0.21	0.22	1.6 (– 0.2)	37.1	38.2
0.75	19 x 0.23	24 x 0.21	0.24	1.9 (– 0.2)	24.7	25.4
1.0	19 x 0.26	32 x 0.21		2.1 (– 0.2)	18.5	19.1
1.5	19 x 0.32	30 x 0.26		2.4 (– 0.2)	12.7	13.0
2.5	19 x 0.41	50 x 0.26	0.28	3.0 (– 0.3)	7.6	7.82
4.0	–	56 x 0.31	0.32	3.7 (– 0.3)	4.7	4.85
6.0	–	84 x 0.31		4.3 (– 0.3)	3.1	3.23

PP-battery and generator cables FLR9Y 10 mm² to 35 mm²

cross-section	Conductor design		Insulation wall thickness	Outer diameter	Conductor resistance	
	Type f (finely stranded) (nom.) (max.)	Type ff (extra finely stranded) (nom.) (max.)	(min.)		bare (max.)	tinned (max.)
[mm²]	[mm]	[mm]	[mm]	[mm]	[mΩ/m]	[mΩ/m]
10	80 x 0.41	320 x 0.21	0.48	5.8 (– 0.4)	1.82	1.85
12	96 x 0.41	380 x 0.21	0.50	6.5 (– 0.5)	1.52	1.60
16	126 x 0.41	512 x 0.21	0.52	7.0 (– 0.5)	1.16	1.18
20	152 x 0.41	610 x 0.21		7.9 (– 0.5)	0.96	1.03
25	196 x 0.41	790 x 0.21	0.64	8.8 (– 0.6)	0.743	0.757
30	224 x 0.41	900 x 0.21	0.76	9.7 (– 0.7)	0.674	0.684
35	276 x 0.41	1,070 x 0.21	0.80	10.5 (– 0.7)	0.527	0.538

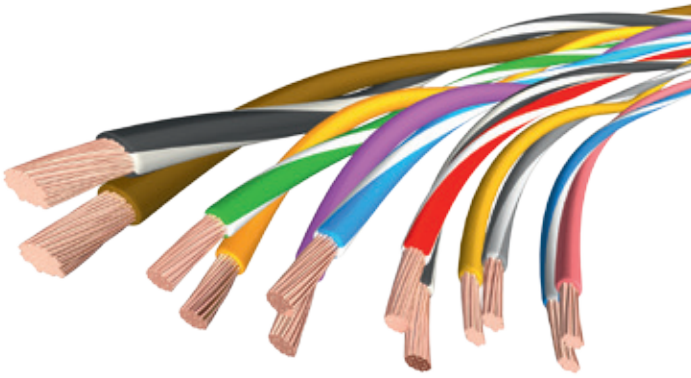
The Coroflex TT3 range stands for thermoplastic wires in temperature class T3

Coroflex TT3 wires are the better alternative to similar products in this temperature class. The excellent product features of the Coroplast compound in combination with the thermoplastic manufacturing process render additional, energy-intensive cross-linking unnecessary.There are also ecological benefits such as the recyclability of all Coroflex TT3 wires.

Wires in the Coroflex TT3 product family are distinguished by their comparatively higher mechanical threshold reserves compared to other wires in temperature class 3. As a result of their low weight, these wires are gaining in popularity. Energy and weight saving opportunities round off the ecological benefits of the Coroflex TT3 product family.

The Coroflex TT3 product family

Single automotive wires and twisted cores are available. The product family is rounded off by battery and generator wires plus multi-core, screened and unscreened sheathed cables.

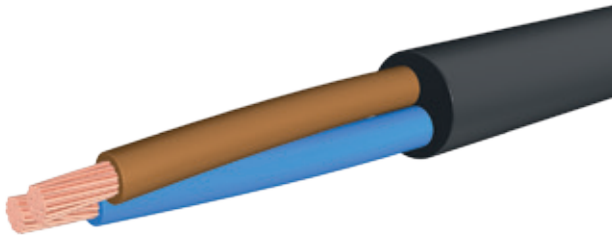


Coroflex TT3 – single wires

Wires for use in wiring systems are listed in the table opposite. Copper wires can be either bare or tinned depending on contact requirements.

Coroflex TT3 – stranded wires

Stranded single wires, for example for loudspeaker or data transmission applications, are produced in long lengths. We are happy to offer custom designs. For this we require information such as the number of cores, nominal cross-sections and strand lay length.

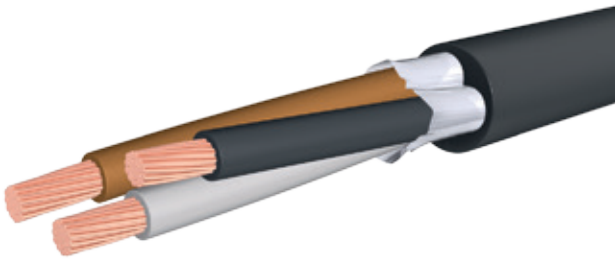


Coroflex TT3 – battery and generator cables

Battery and generator cables with reduced insulation wall thickness up to a conductor cross-section of 35 mm² are listed in the adjacent table. For higher thermal requirements, we would be happy to advise you on our product family of silicone automotive wires and cables.

Coroflex TT3 – sheathed cables

Screened and unscreened sensor, control and actuator cables are available. Customer-specific requirements can be implemented based on data pertaining to the number of cores, nominal cross-sections, screening variants and cable assembly requirements.

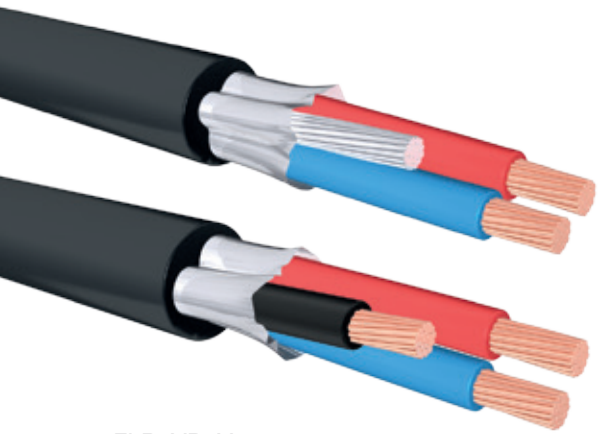


Sheathed cables, screened

Application: Passenger and motor compartment

Sensor and control cables, voltage supply,
Screening measures to eliminate EMC interference

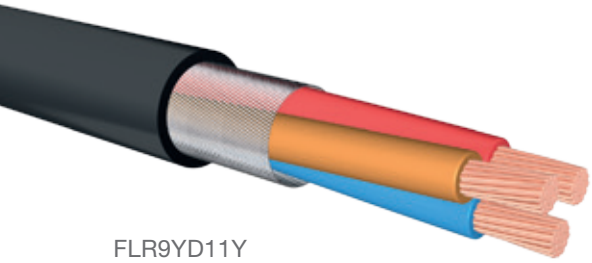
The use of either screened or unscreened cables in vehicles depends on the electromagnetic compatibility (EMC) requirements of the system. In addition to the stranding of individual wires, which is the most common and inexpensive method of screening, metal foil screens, spiral screens and braided screens are also used. The above-mentioned screening options can also be combined for specific application or vehicle installation situations.



FLR9YB9Y
2 x 0.5 mm² + 0.5 mm²/T125

Metal foil screen

The element to be screened is enclosed in metal foil. The electrical contact is established by way of a stranded drain wire. It can either be a separate stranded wire or a wire with a conductive coating. This enables the use of proven and inexpensive insulation crimp technology without the need for any additional heat shrinking sleeves.

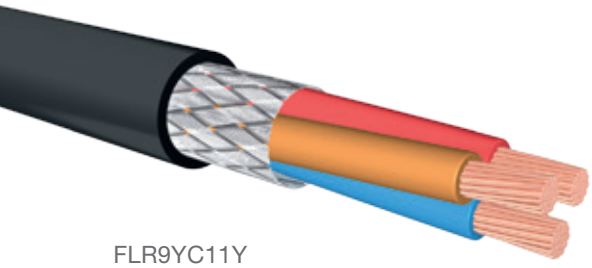


FLR9YD11Y
3 x 0.5 mm²/T125

Spiral screen

Single wires made of metal (e.g. copper) are spun in a coil around the element to be screened. Degrees of optical coverage of approximately 96% are possible.

The required screen attenuation depends on the effective use of the metal and the degree of optical coverage. Spiral screens are good for highly flexible applications because of their variable design parameters.



FLR9YC11Y
3 x 0.5 mm²/T125

Braided screen

The braided screen is made of multiple metal wires that are braided diagonally together. Normally, braided screens are used to prevent high-frequency interference. High-frequency transmission cables (antenna cables) have braided screens.

Optical coverage of approximately 85% is reflected in very efficient screening attenuation.

PUR-sheathed cables for ABS application

Application: Axle and wheelhouse wiring

ABS, brake lining indicator, dynamic chassis control, headlamp levelling

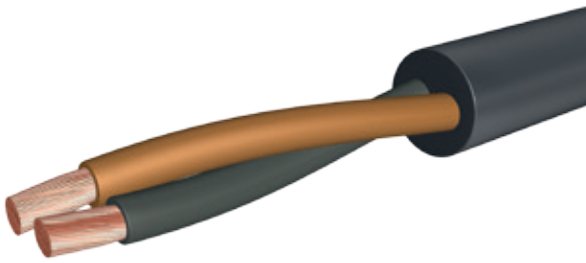
Operating temperature range in accordance with ISO 6722

–40 °C to +125 °C/3,000 h
–40 °C to +150 °C/240 h

ABS wheelspeed sensor cables

In the product group ABS cables, requirements of the highest order are fulfilled for connecting the ABS wheelspeed sensor to the electronic control box. The wiring in the wheelhouse requires a safe signal transmission during all vibrations and motions of the chassis and the steering wheel. Environmental influences, e.g. stone chipping or low temperature, demand a great deal from the cables during the entire life span of the vehicle.

These cables are assembled in fully automated production processes as a result of the widespread use of ABS systems in vehicles.
Our cable surfaces are designed to satisfy the customer's specific requirements and these customised surfaces make process-safe and low-tolerance overmoulding of grommets, etc. possible.

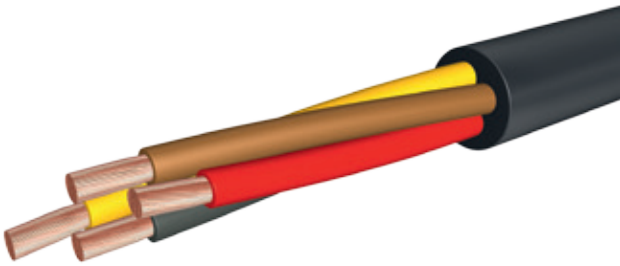


Sheathed cable
2 x 0.5 mm²

ABS wheelspeed sensor and brake lining wear indicator

Vehicles' servicing intervals are continuously extended to save costs. An additional safety feature is a brake lining indicator in the vehicle's cockpit. For this purpose, the two core ABS sensor cable requires two additional wires for the indicator.

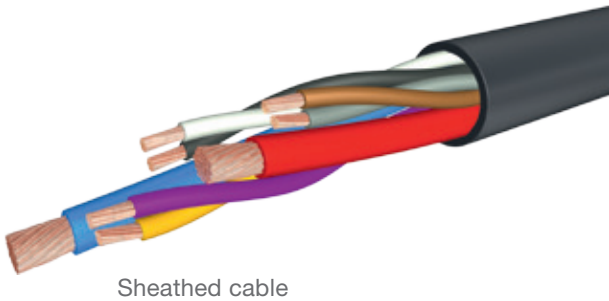
The whole range od requirements of the ABS cable are met by this four-core, ABS wheelspeed sensor and break lining wear indicator cable. The use of modern insulation and sheathing material guarantees compliance with the total demands of the cable and also of future applications.



Sheathed cable
4 x 0.5 mm²

Hybrid sheathed cables for wheelhouse cabling

Several technical functions are covered by one sheathed cable. Large-diameter wires enable efficient power supply for various electrical actuators. Twin single wires with small wire diameters ensure signal transmission from the sensors in the wheelhouse, such as the ABS wheelspeed sensor and the brake lining wear indicator. All design parameters of these hybrid sheathed cables are specially designed for paraxial and thus bend-dynamic use.



Sheathed cable
2 x 4.0 mm² + 3 x 2 x 0.5 mm²

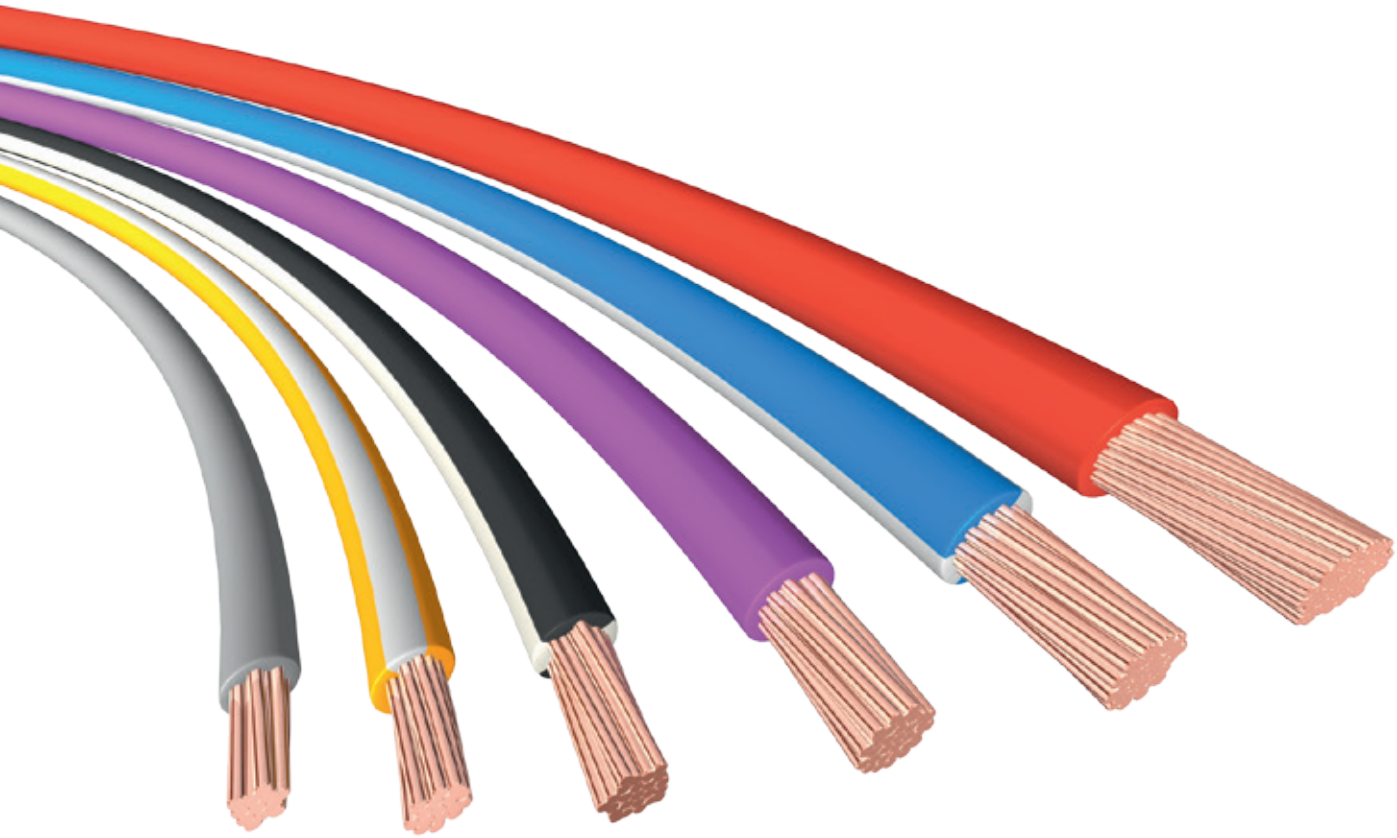
Silicone-insulated automotive wires

Application: Engine compartment and gearbox
Conductor material: copper

Single wires for engine and gearbox wiring

Operating temperature range
in accordance with ISO 6722

–40 °C to +200 °C/3,000 h



Silicone-insulated automotive wires FL2G 0.35 mm² to 6.0 mm²

cross-section	Conductor design (exemplary)		Insulation wall thickness	Outer diameter	Conductor resistance	
	Type f (finely stranded) (nom.) (max.)	Type ff (extra finely stranded) (nom.) (max.)			bare (max.)	tinned (max.)
[mm²]	[mm]	[mm]	(nom.) [mm]	(max.) [mm]	[mΩ/m]	[mΩ/m]
0.35	12 x 0.21	43 x 0.11	0.5	1.9	54.4	55.5
0.5	16 x 0.21	28 x 0.16	0.6	2.3	37.1	38.2
0.75	24 x 0.21	42 x 0.16	0.6	2.5	24.7	25.4
1.0	32 x 0.21	52 x 0.16	0.6	2.7	18.5	19.1
1.5	30 x 0.26	82 x 0.16	0.6	3.0	12.7	13.0
2.5	50 x 0.26	140 x 0.16	0.7	3.6	7.60	7.82
4.0	56 x 0.31	228 x 0.16	0.8	4.4	4.71	4.85
6.0	84 x 0.31	189 x 0.21	0.8	5.0	3.14	3.23

Silicone-insulated battery and generator cables

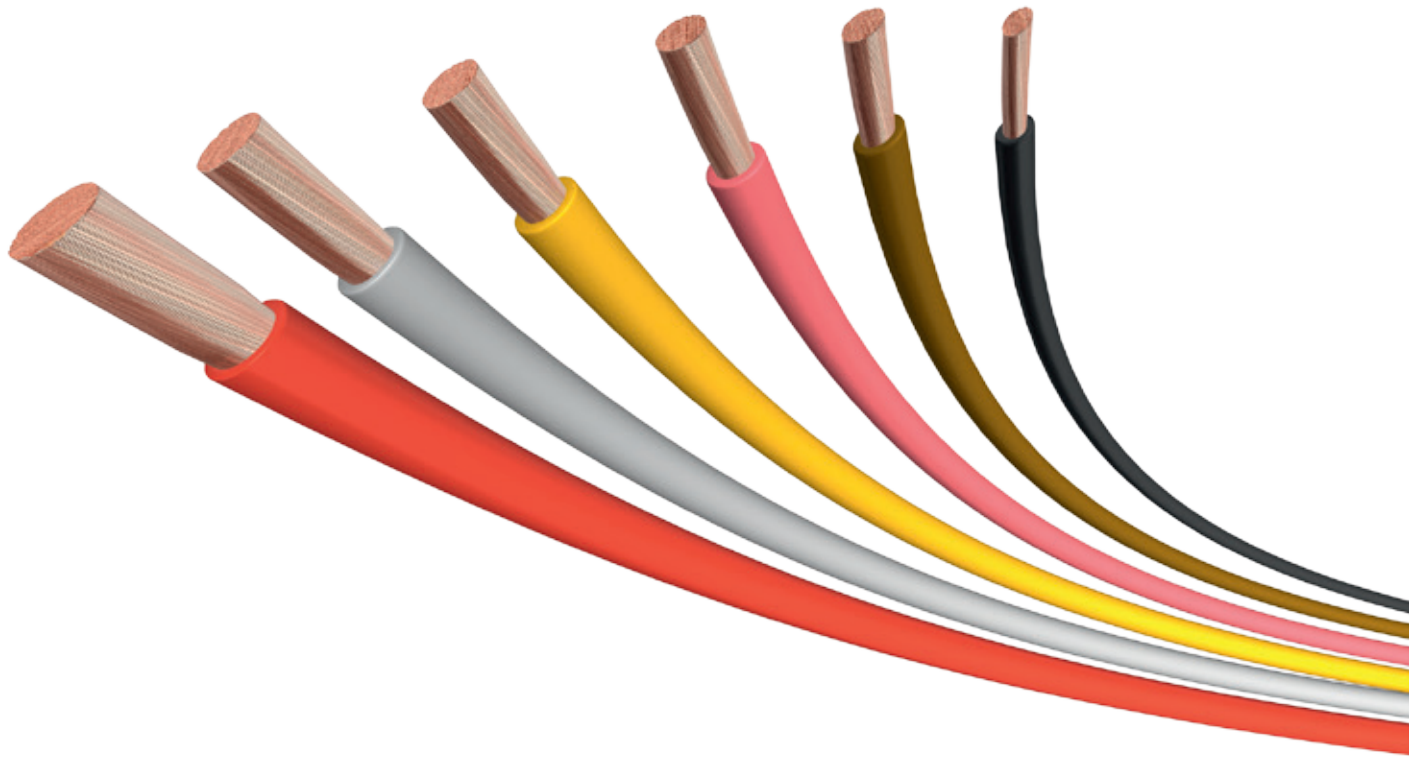
Application: Engine compartment and gear box
Conductor material: copper
Highly flexible even at low operating temperatures

Operating temperature range in accordance with ISO 6722
–40 °C to +200 °C/3,000 h

Silicone rubber is distinguished as an insulation and sheathing material by its outstanding flexibility at extremely low temperatures in combination with a long life span at extremely high-temperatures. Modern, highly tear-resistant special silicone compounds facilitate applications in particularly critical areas where high mechanical stresses exist without any impairment to the other temperature properties. Silicone compounds with optimised outgassing properties demonstrate particularly excellent mechanical properties. Cables with these low-fogging silicone types are used in places where fogging could cause interference, such as on headlamp reflectors. We offer a comprehensive range of state-of-the-art silicone cables. Please contact us for further information.

Battery and generator cables, silicone-insulated FL2G 10 mm² to 95 mm²

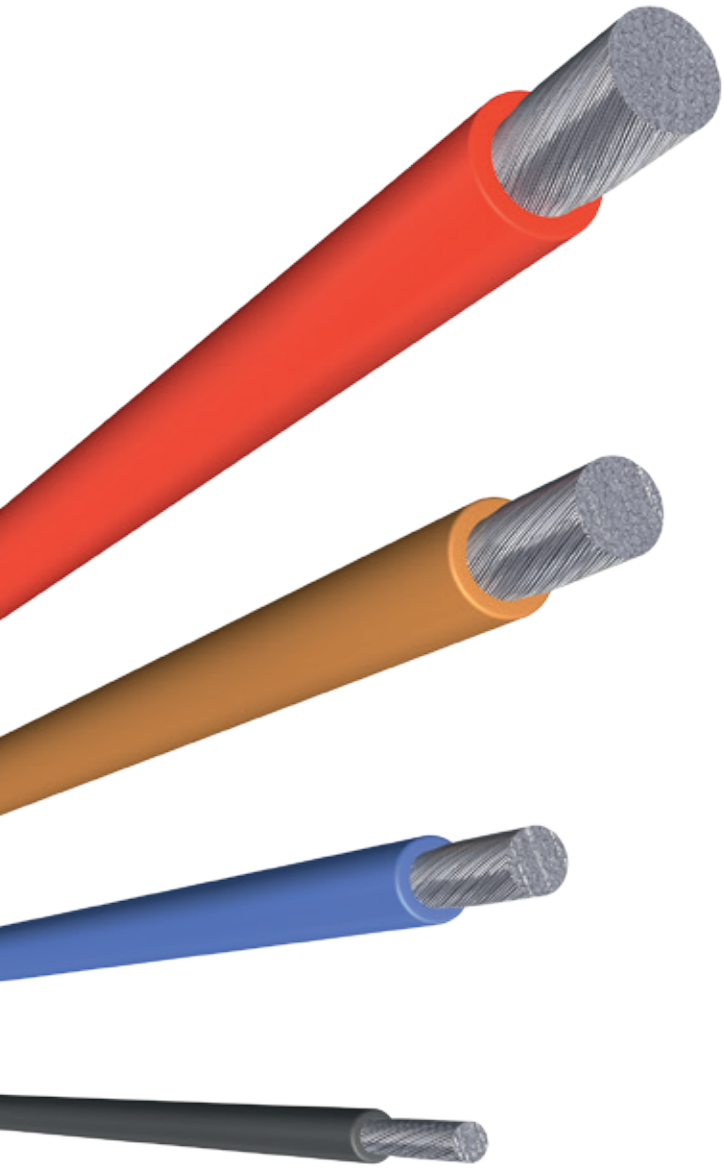
cross-section	Conductor design (exemplary) Type f (finely stranded)) (nom.) (max.)	Type ff (extra finely stranded) (nom.) (max.)	Insulation wall thickness	Outer diameter	Conductor resistance	
					bare	tinned
[mm²]	[mm]	[mm]	(nom.) [mm]	(max.) [mm]	(max.) [mΩ/m]	(max.) [mΩ/m]
10	80 x 0.41	320 x 0.21	1.0	6.5	1.16	1.18
12	96 x 0.41	380 x 0.21		7.4	1.52	1.60
16	126 x 0.41	512 x 0.21		8.3	1.16	1.18
20	152 x 0.41	610 x 0.21	1.1	9.1	0.955	0.999
25	196 x 0.41	790 x 0.21	1.3	10.4	0.743	0.757
30	224 x 0.41	900 x 0.21		10.9	0.647	0.648
35	276 x 0.41	1,070 x 0.21		11.6	0.527	0.538
40	308 x 0.41	1,200 x 0.21	1.4	12.4	0.473	0.500
50	396 x 0.41	1,592 x 0.21	1.5	13.5	0.368	0.375
70	360 x 0.51	1,427 x 0.26		15.5	0.259	0.264
95	457 x 0.51	1,936 x 0.26	1.6	18.0	0.196	0.200



Aluminium cables

Applications:
Car body and engine compartment
Battery and generator wiring harnesses, actuator power supply

It is only practical to use aluminium in combination with aluminium-compatible contacts



Conductor material: aluminium

Aluminium cables are used in road vehicles to save weight. A direct comparison with the conductor material of copper demonstrates the weight advantages of aluminium with the material-dependent limitation of tensile strength. Depending on the necessary operating temperature ranges, aluminium cables are produced with the insulation materials of Coroflex TT3 up to mechanically modified and low-outgassing silicone compounds. Silicone-insulated aluminium cables for use in the engine compartment and in the gear compartment are available as an alternative to the copper cables. We would be happy to produce comparative derating curves for you to help you choose the optimum conductor cross-sections.

Material comparison Al – Cu

	Aluminium	Copper
Standard:	DIN EN 573-3	DIN EN 13602
Abbreviation:	E-AL 99,7	Cu-ETP/Cu-ETP1
Material no.:	1.370	CW 003A/004A
Conductivity:	35.5 Sm/mm²	58.0 Sm/mm²
Tensile strength:	min. 70 – 120 N/mm²	min. 200 N/mm²
Density:	2.7 g/cm³	8.9 g/cm³

Silicone-insulated battery and generator cables

Application:
Engine compartment and gearbox
Conductor material: aluminium

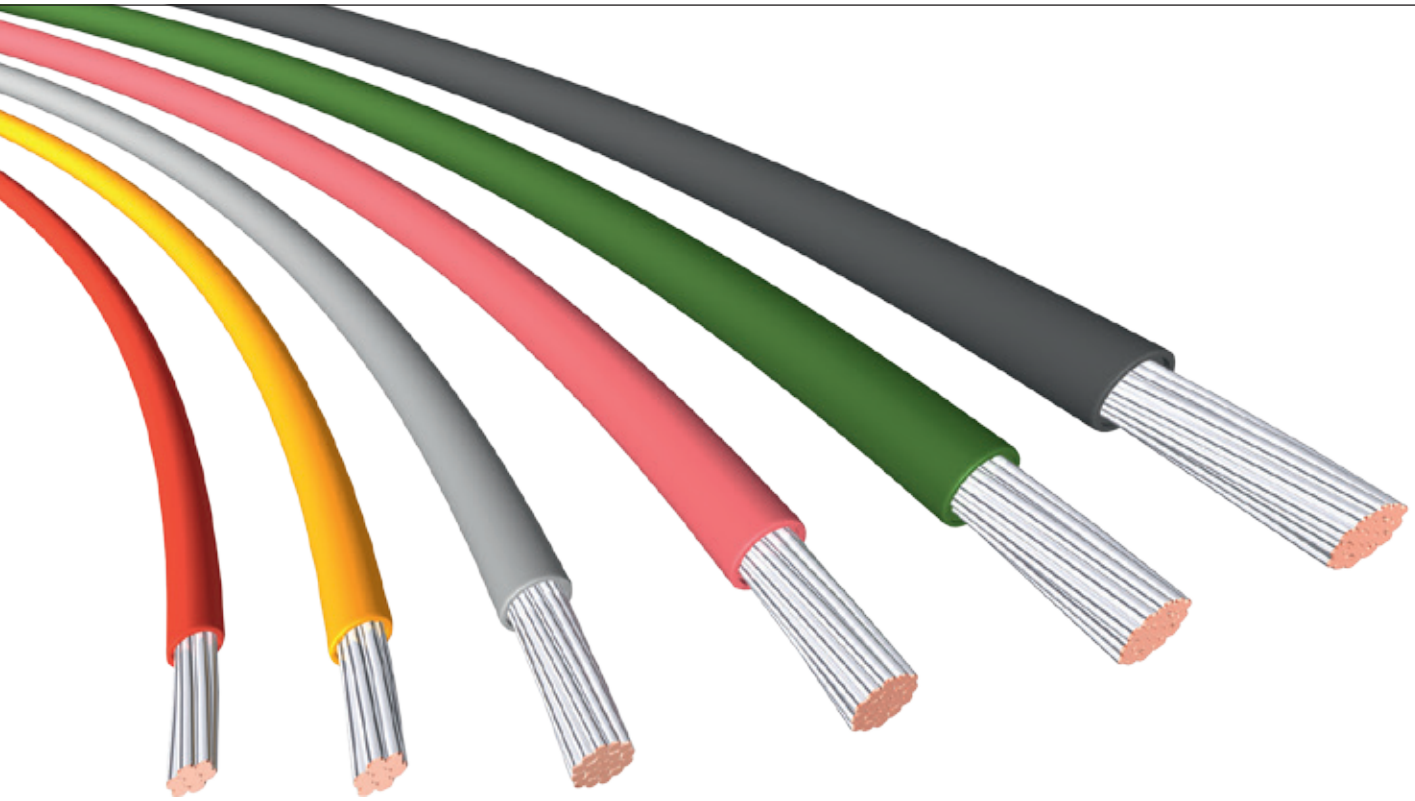
Operating temperature range
in accordance with ISO 6722
–40 °C to +200 °C/3,000 h

Silicone-aluminium cables FLAL2G 10 mm² to 120 mm² (Standard cross-sections)

Conductor					Core
cross-section	(finely stranded)	Diameter	cross-section	Resistance at 20 °C	Diameter
	(nom.) (max.)	(max.)	(min.)	(max.)	
[mm²]	[mm]	[mm]	[mm²]	[mΩ/m]	[mm]
10	50 x 0.52	4.5	9.5	3.03	6.5 (– 0.6)
16	78 x 0.52	5.8	14.9	1.93	8.3 (– 0.6)
25	122 x 0.52	7.2	23.2	1.24	10.0 (– 0.6)
35	172 x 0.52	8.5	32.7	0.878	11.0 (– 0.7)
50	247 x 0.52	10.5	46.9	0.613	13.2 (– 0.8)
70	351 x 0.52	12.5	66.4	0.432	15.1 (– 0.8)
95	463 x 0.52	14.8	88.0	0.327	17.4 (– 1.0)
120	304 x 0.72	16.5	113.0	0.255	19.5 (– 1.0)

Silicone-aluminium cables FLAL2G 12 mm² to 85 mm² (Intermediate cross-sections)

Conductor					Core
cross-section	(finely stranded)	Diameter	cross-section	Resistance at 20 °C	Diameter
	(nom.) (max.)	(max.)	(min.)	(max.)	
[mm²]	[mm]	[mm]	[mm²]	[mΩ/m]	[mm]
12	60 x 0.52	5.4	11.3	2.53	7.2 (– 0.6)
20	95 x 0.52	6.9	18.1	1.59	8.7 (– 0.6)
30	141 x 0.52	8.3	26.6	1.08	10.4 (– 0.7)
40	193 x 0.52	9.6	36.5	0.788	11.9 (– 0.7)
60	289 x 0.52	11.6	54.7	0.525	14.2 (– 0.8)
85	420 x 0.52	13.6	78.7	0.365	16.2 (– 1.0)



ETFE- and FEP-insulated automotive wires

Application: Engine compartment and gearbox

Single wires for engine and gearbox wiring

Operating temperature range in accordance with ISO 6722

–40 °C to +175 °C/3,000 h for ETFE-cables
–40 °C to +200 °C/3,000 h for FEP-cables

High-temperature – automotive wires

ETFE-cables FLR7Y 0.22 mm² to 6.0 mm²
FEP-cables FLR6Y 0.22 mm² to 6.0 mm²

cross-section	Conductor design		Insulation wall thickness	Outer diameter	Conductor resistance	
	Type A (nom.) (max.)	Type B (nom.) (max.)	(min.)		bare (max.)	tinned max.)
[mm²]	[mm]	[mm]	[mm]	[mm]	[mΩ/m]	[mΩ/m]
0.22	7 x 0.21	–	0.20	1.2 (– 0.1)	84.4	86.5
0.35	7 x 0.26	–		1.3 (– 0.1)	54.4	55.5
	–	12 x 0.21		1.4 (– 0.2)		
0.5	19 x 0.19	16 x 0.21	0.22	1.6 (– 0.2)	37.1	38.2
0.75	19 x 0.23	24 x 0.21	0.24	1.9 (– 0.2)	24.7	25.4
1.0	19 x 0.26	32 x 0.21		2.1 (– 0.2)	18.5	19.1
1.5	19 x 0.32	30 x 0.26		2.4 (– 0.2)	12.7	13.0
2.5	19 x 0.41	50 x 0.26	0.28	3.0 (– 0.3)	7.60	7.82
4.0	–	56 x 0.31	0.32	3.7 (– 0.3)	4.71	4.85
6.0	–	84 x 0.31		4.3 (– 0.3)	3.14	3.23

High-temperature sheathed cables for engine compartment and gear box

Application: Engine compartment and gearbox

Control and sensor cables for engine and gearbox wiring

Operating temperature range in accordance with ISO 6722

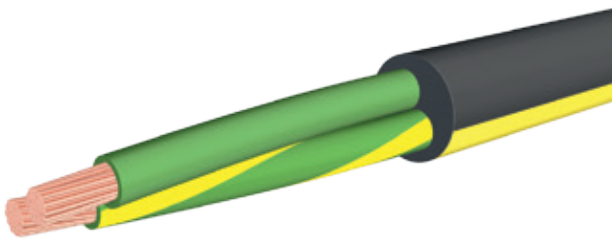
–40°C to +150 °C/3,000 h

High-temperature sheathed cables

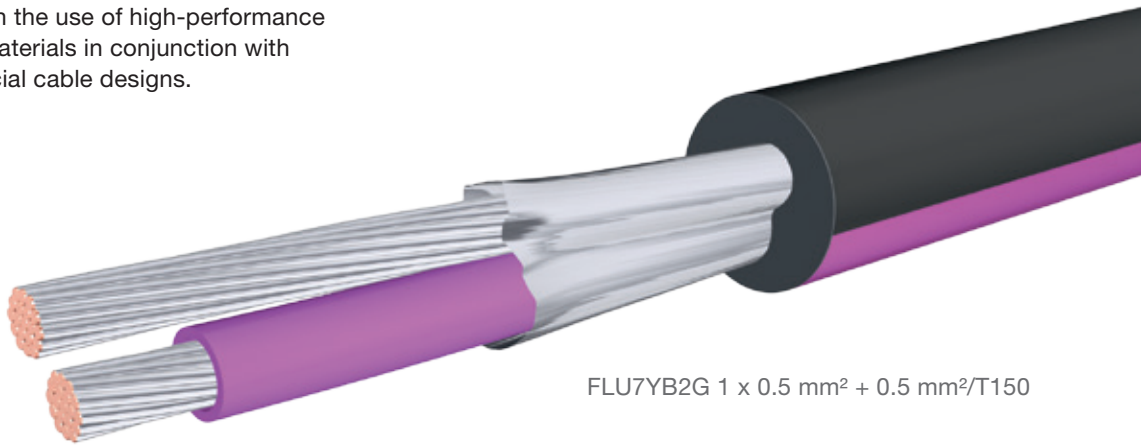
High-temperature sheathed cables are used in areas of the vehicle which expose them to continuous operating temperatures of +150 °C and over. These wires are generally installed in the engine compartment, e.g. wiring harnesses installed directly on top of the engine block.

Automotive applications such as crankshaft speed (rpm) sensor, knock sensor and sensor cables for high-peformance fuel injection engines necessitate the use of screened control and sensor cables.

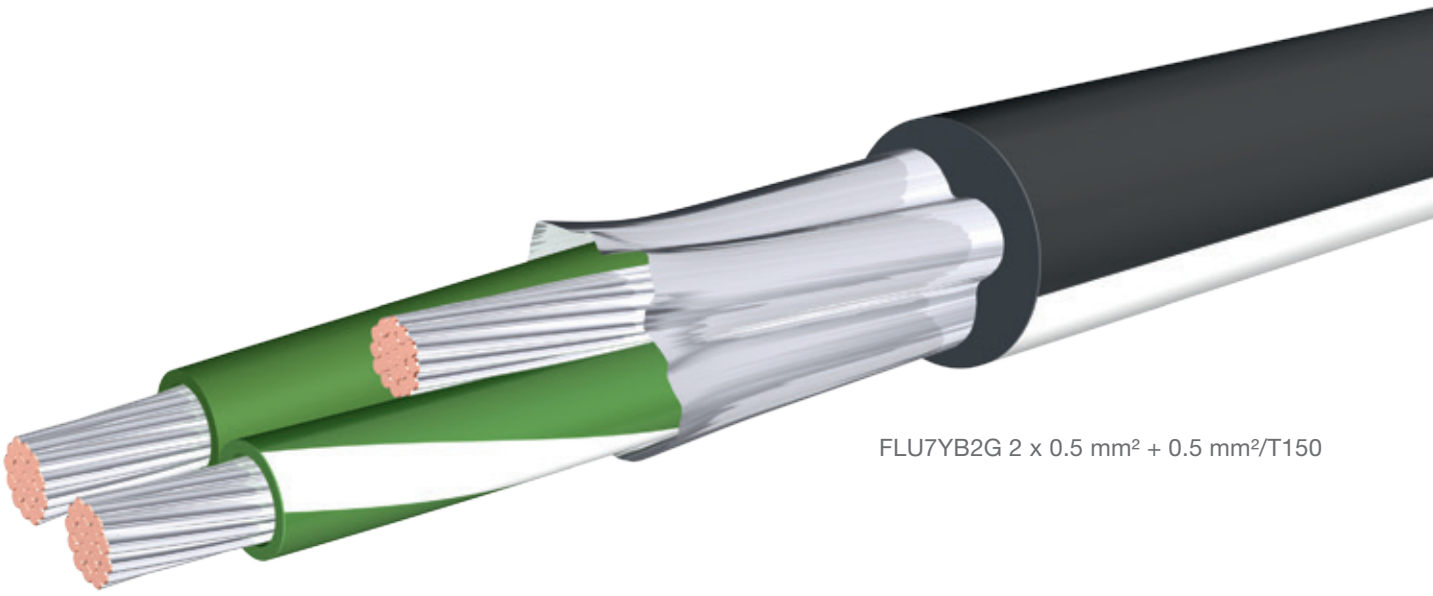
The increase of modern engine controls and automatic gear transmission have driven up demand for cables. The stringent requirements of automotive customers can be fulfilled only through the use of high-performance insulation and sheathing materials in conjunction with application orientated special cable designs.



FLU7Y2G 2 x 0.5 mm²/T150



FLU7YB2G 1 x 0.5 mm² + 0.5 mm²/T150

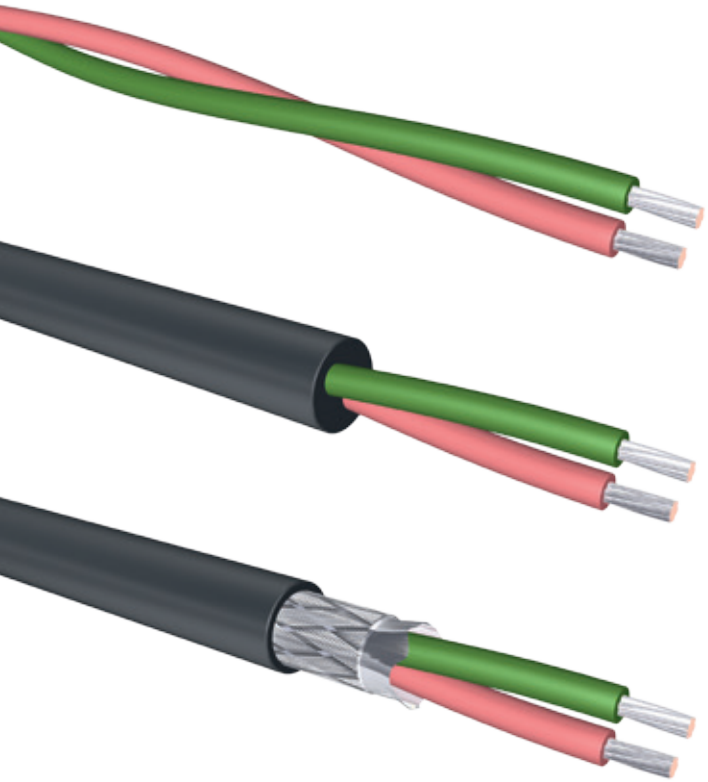


FLU7YB2G 2 x 0.5 mm² + 0.5 mm²/T150

High-speed data transmission in vehicles

Application:
Passenger and engine compartment

Applications such as FlexRay,
USB, LVDS, GVIF, eMOST, Ethernet



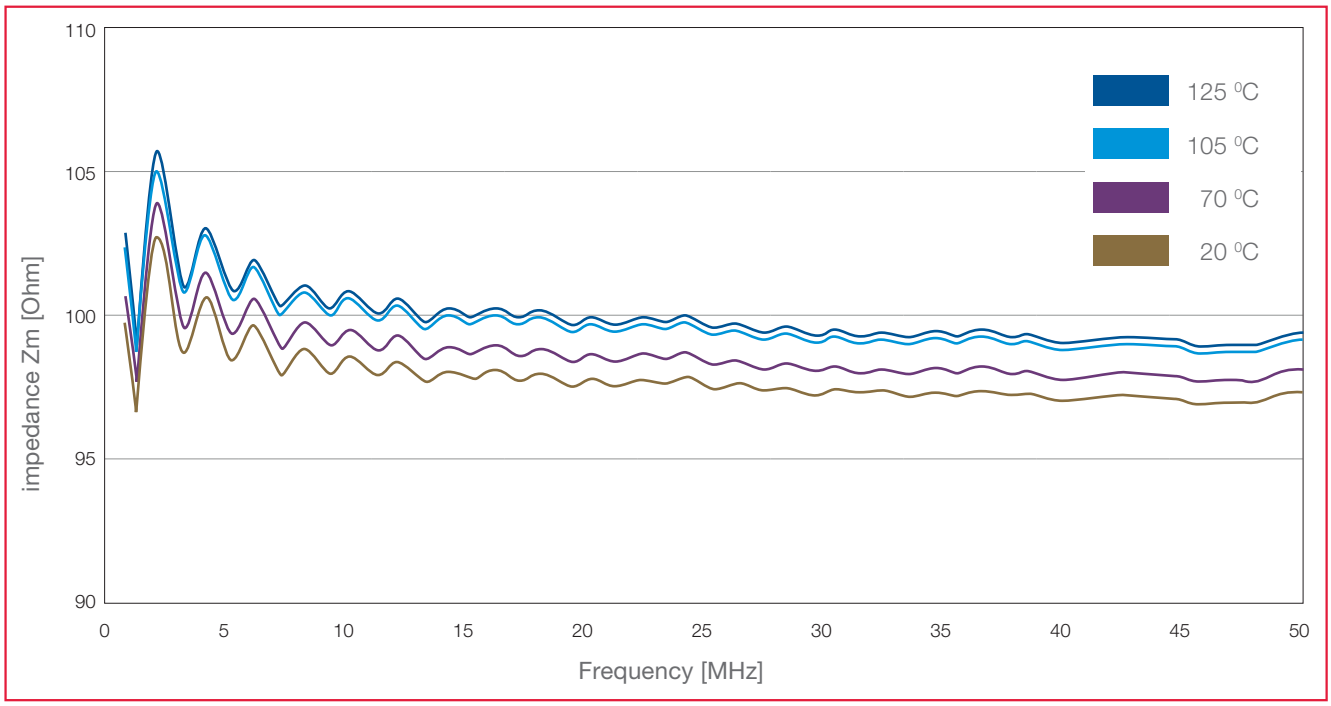
High-speed data transmission in vehicles (HSD)

Modern data transmission in vehicles necessitates special cables which are adapted to automotive requirements and optimised for data transmission. Standard home and office solutions have their limitations as a result of strong EMC interference affecting the vehicle's electrical system.

Specially modified insulation and sheathing materials are required for high reliability throughout the vehicle's entire lifespan. In particular, the insulation materials of our data transmission lines were designed specifically for the thermal requirements of road vehicles. Thermal dependencies of data transmission characteristics can be reduced to a minimum. The diagram shows by way of example the dependence of the characteristic impedance on the ambient temperature of a symmetrical data cable.

The Coroplast data transmission cables offer users a high level of functional reliability across the full operating temperature ranges.

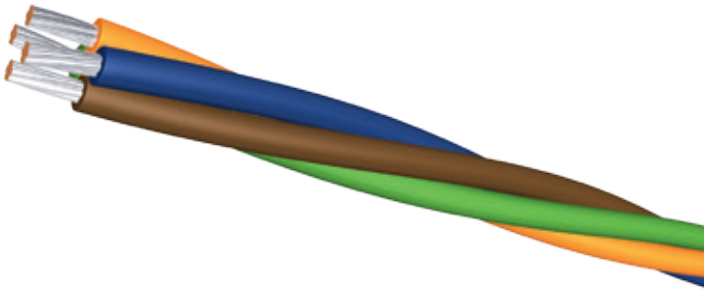
Diagram: Dependence of impedance on ambient temperature

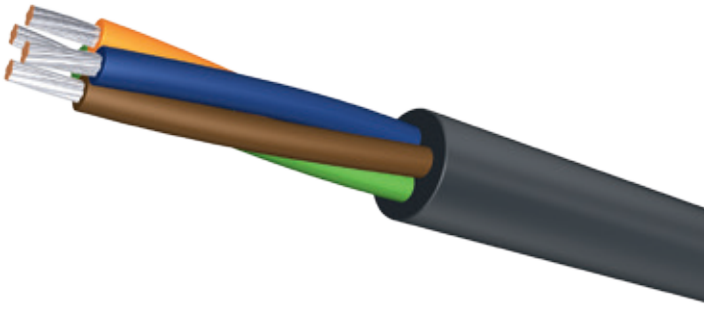


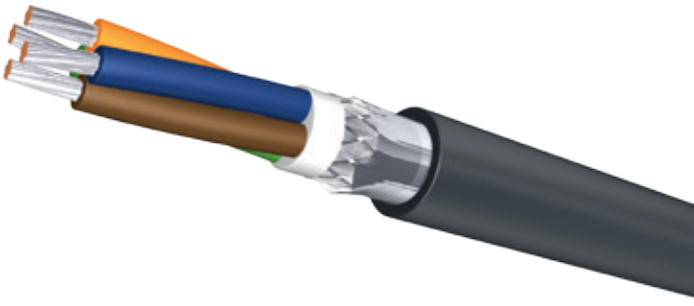
The vehicle-friendly development of quad cables, which have proven their efficiency over decades, reduces signal frequency differences in the individual voice circuits. Compared with the multi-twisted pair cables, quad designs more effectively meet the higher bending requirements in tailgate or moving screen applications.

The internet found its way into road vehicles long ago. Application-suitable Ethernet solutions ensure the systems are efficiently supplied with the required ranges.

The assembly-friendly connections of the symmetrical data cables for audio and video transmission are also suitable for your system.







Sheathed cables for infotainment applications

Application: Passenger compartment

Connector cable for telematics, CD changer
and hands-free systems

Special cables for on-board infotainment applications

Demand for modern on-board infotainment systems is increasing continually. Electrical signals are constantly transmitted from point to point, i.e. control, audio and video information is transported via electrically conductive media for modern in-vehicle sound, video, DVD, telecommunication and online connections. Customer and system-specific cable designs are necessary for these applications.

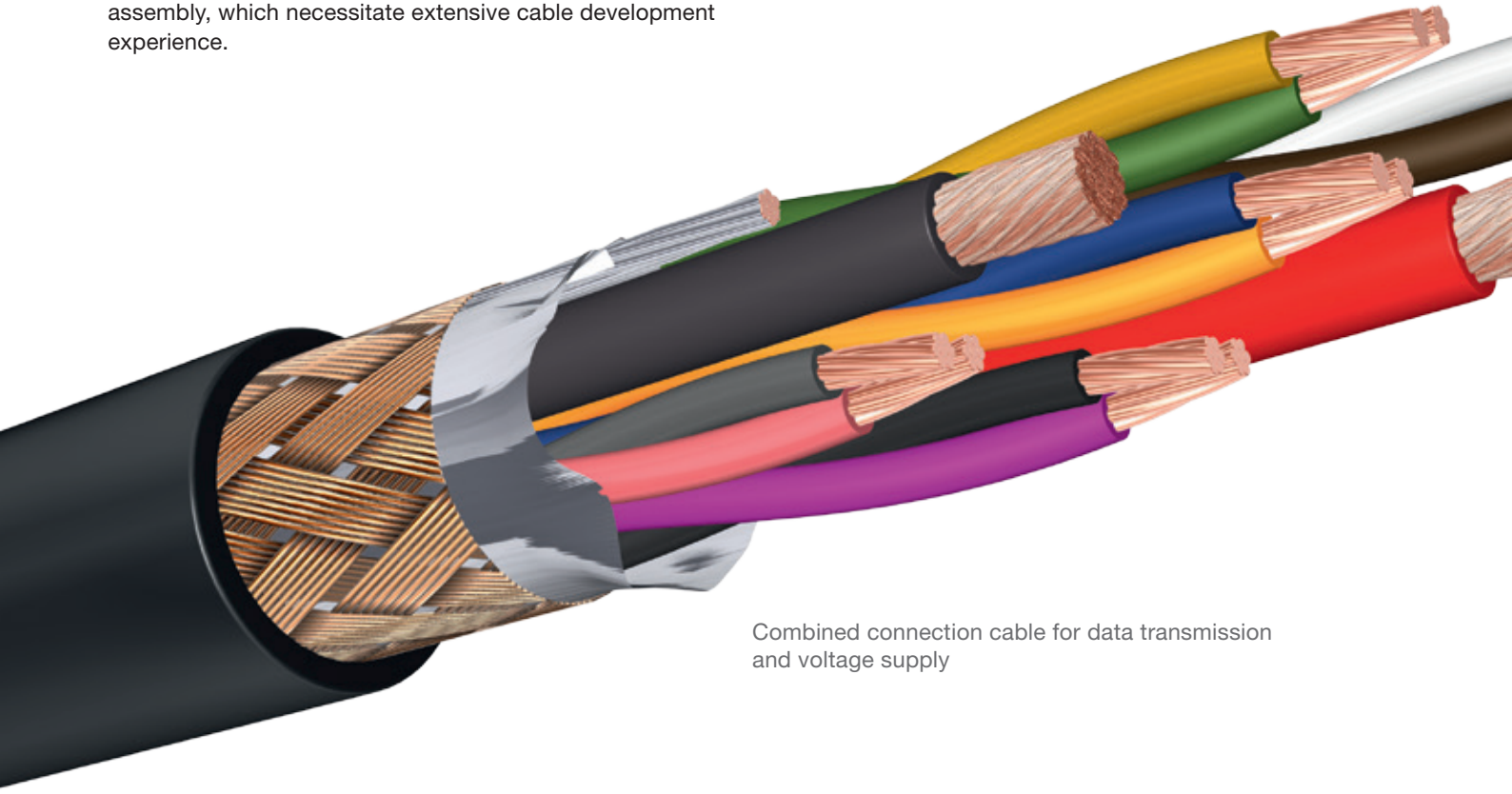
Video and audio signals have to be transmitted with very low attenuation and cross-talk has to be effectively prevented. High-frequency harmonics from the signal and power supply cables have to be prevented from interfering with the voice circuits.

There are also customer specific requirements with respect to automated and competitively priced cable assembly, which necessitate extensive cable development experience.

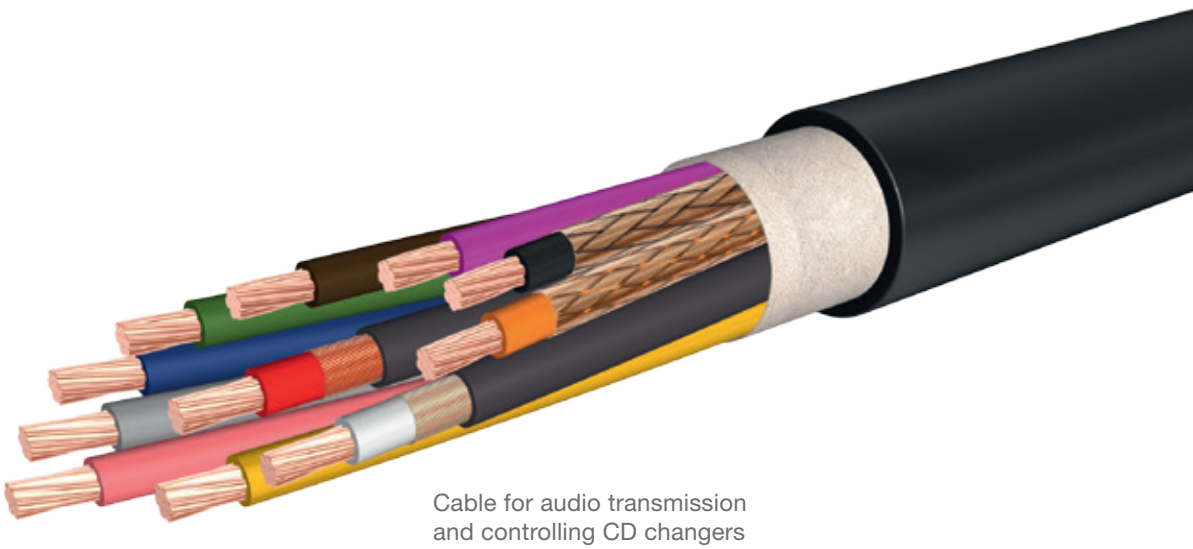
Many alternative design and screening methods, such as low-cost foil screens with drain wires that are coated in conductive materials or high-frequency attenuating polymers for specific low-pass applications, are available to our cable developers.

Our extensive design experience gained in diverse customer development projects helps us to meet your requirements. Please contact us.

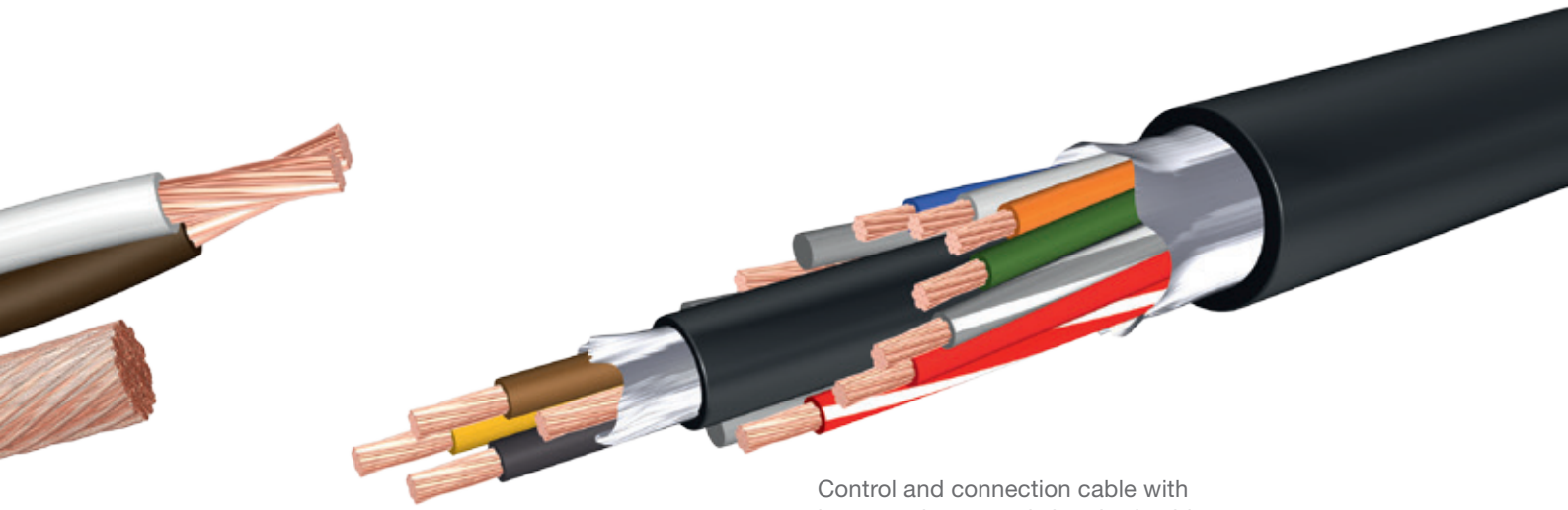
Coroplast – your development partner.



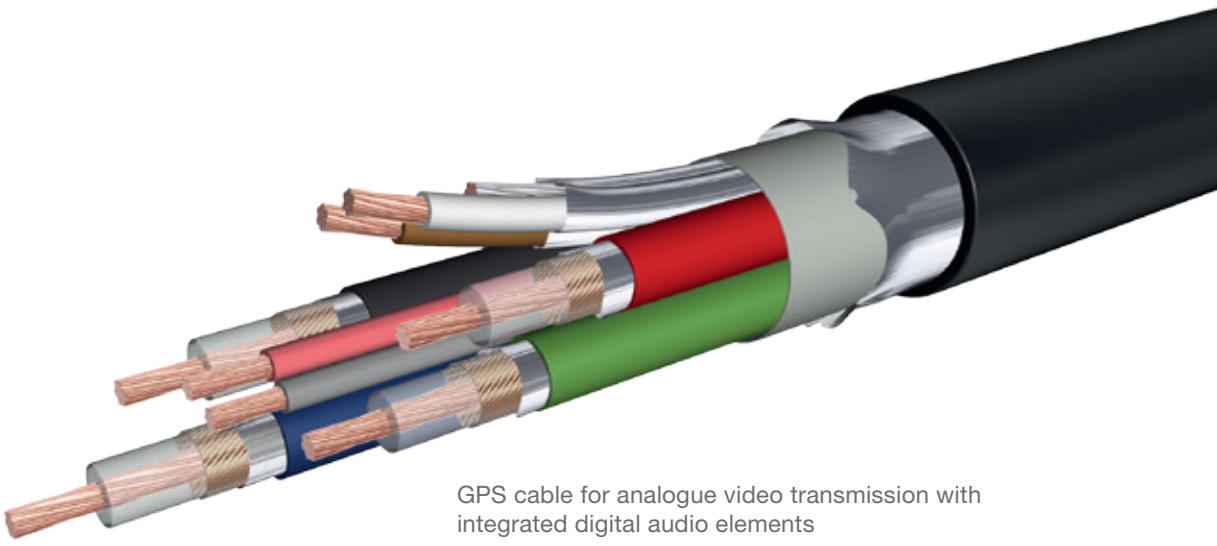
Combined connection cable for data transmission and voltage supply



Cable for audio transmission
and controlling CD changers



Control and connection cable with
integrated screened sheathed cable
for data transmission



GPS cable for analogue video transmission with
integrated digital audio elements

E-mobility

Special cables for electric vehicles

Silicone-insulated single-core high-voltage automotive cables, screened – copper

Application: Connection of HV batteries and electric motors

Cable construction in accordance with LV 216-2, ISO 6722 and ISO 14572

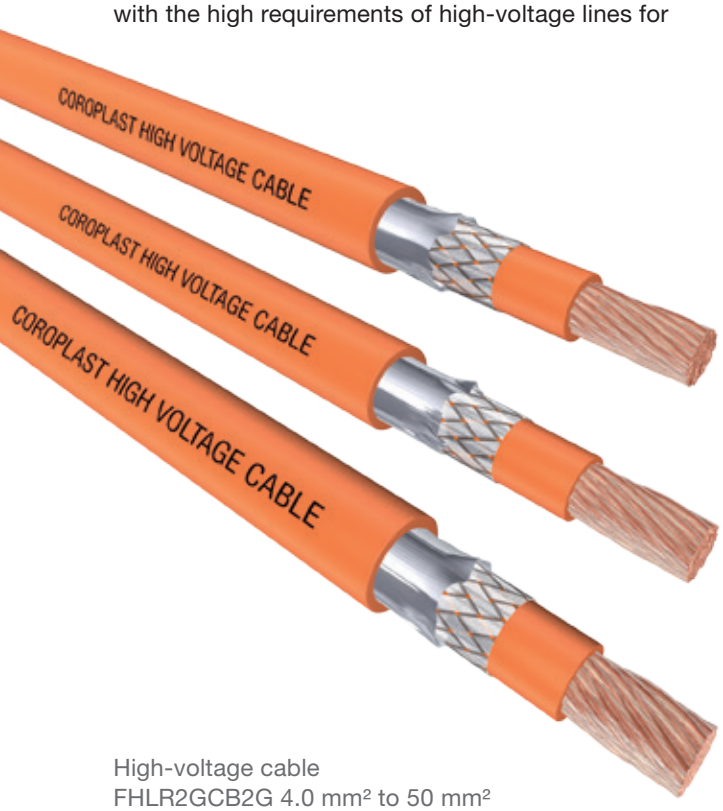
Construction of HV wiring systems
for hybrid and electric vehicles

Operating temperature range in accordance with ISO 6722

–40 °C to +180 °C/3,000 h
–40 °C to +205 °C/240 h

Single-core, screened automotive cables for high-voltage harnesses

After several years of research development work we succeeded in developing insulation materials that comply with the high requirements of high-voltage lines for road vehicles. Operating voltages of up to 600 Volt AC / 1,000 Volt DC are possible using the Coroplast silicone high-voltage lines.



High-voltage cable
FHLR2GCB2G 4.0 mm² to 50 mm²

Prototype cables for testing the future voltage class of 1,000 volts AC / 1,500 volts DC are available. The normative recognition of this voltage class is proactively supported by our company. The very good flexibility of Coroplast high-voltage cables is obtained through the simultaneously finely stranded and compact conductor constructions. Double screens with braided wires and metal foils are used because of the high EMC requirements. The current standards and specifications of the OEM (inter alia LV 216) are the basis for this design. Customer-specific details such as extruded longitudinal strips can also be incorporated. You can find a detailed overview of structural data of Coroplast high-voltage cables on the following page.

Optimised sizing of cable cross-sections

Coroplast HV cables are able to permanently withstand temperatures above 180 °C when energised. The higher-quality insulation material used by Coroplast enables wire cross-sections to be optimised.

The increased conductor temperature due to the permanent current load can be handled by using silicone materials. Coroplast is capable of calculating the conductor heating dependent on the operational ambient temperatures and the current loads for an optimised sizing of the nominal conductor cross-sections. So-called derating-simulations are used to select the optimal cross-section, cutting costs, reducing weight and saving space.
Using the threshold value curves shown as examples on pages 45 to 48, the maximum permitted current load in the steady-state current supply condition can be identified depending on the ambient temperature. We can implement further derating simulations on short-time loads or defined current time profiles for you on request.
Please contact us.

High-voltage automotive cables 600 V AC / 1,000 V DC – single-core, screened

Conductor material: copper

Layout tables in accordance with LV 216-2

Silicone – high-voltage cables FHLR2GCB2G 1.5 mm² to 120 mm² (Standard cross-sections)

	Conductor				Core	Screen	Sheathing
cross-section	finely stranded (nom.) (max.)	extra finely stranded (nom.) (max.)	diameter (max.)	resistance at 20 °C (max.)	diameter	wire diameter (max.)	diameter
[mm²]	[mm]	[mm]	[mm]	[mΩ/m]	[mm]	[mm]	[mm]
1.5	19 x 0.32	/	1.7	12.7	2.4 (– 0.2)	0.11	4.0 (– 0.5)
2.5	50 x 0.26	/	2.2	7.60	3.0 (– 0.3)		4.7 (– 0.5)
4.0	56 x 0.31	120 x 0.21	2.8	4.71	3.7 (– 0.3)	0.16	5.8 (– 0.5)
6.0	84 x 0.31	183 x 0.21	3.4	3.14	4.3 (– 0.3)		6.5 (– 0.5)
10	80 x 0.41	320 x 0.21	4.5	1.82	6.0 (– 0.6)		8.8 (– 0.6)
16	126 x 0.41	512 x 0.21	5.8	1.16	7.2 (– 0.6)		10.2 (– 0.6)
25	196 x 0.41	790 x 0.21	7.2	0.743	8.7 (– 0.6)	0.21	12.2 (– 0.6)
35	276 x 0.41	1,070 x 0.21	8.5	0.527	10.4 (– 0.7)		14.4 (– 0.6)
50	396 x 0.41	1,600 x 0.21	10.5	0.368	12.2 (– 0.7)		15.8 (– 0.6)
60	462 x 0.41	1,850 x 0.21	11.6	0.315	13.3 (– 1.2)		16.9 (– 0.6)
70	360 x 0.51	2,175 x 0.21	12.5	0.259	14.4 (– 1.4)		18.2 (– 0.8)
95	475 x 0.51	3,000 x 0.21	14.8	0.196	17.2 (– 1.4)	0.26	20.9 (– 0.8)
120	608 x 0.51	3,700 x 0.21	16.5	0.153	19.0 (– 1.4)		23.0 (– 0.8)

Silicone – high-voltage cables FHLR2GCB2G 2.0 mm² to 85 mm² (Intermediate cross-sections)

	Conductor				Core	Screen	Sheathing
cross–section	finely stranded (nom.) (max.)	extra finely stranded (nom.) (max.)	diameter (max.)	resistance at 20 °C (max.)	diameter	wire diameter (max.)	diameter
[mm²]	[mm]	[mm]	[mm]	[mΩ/m]	[mm]	[mm]	[mm]
2.0	19 x 0.38	/	2.0	9.4	2.8 (– 0.3)	0.11	4.5 (– 0.5)
3.0	44 x 0.31	/	2.4	6.15	3.4 (– 0.3)		5.3 (– 0.5)
5.0	70 x 0.31	145 x 0.21	3.1	3.94	4.2 (– 0.3)	0.16	6.5 (– 0.5)
8.0	62 x 0.41	240 x 0.21	4.3	2.38	5.0 (– 0.3)		8.0 (– 0.5)
12	96 x 0.41	380 x 0.21	5.4	1.52	6.5 (– 0.6)		9.5 (– 0.6)
20	152 x 0.41	610 x 0.21	6.9	0.96	7.8 (– 0.6)		11.0 (– 0.6)
30	224 x 0.41	900 x 0.21	8.3	0.647	9.6 (– 0.7)	0.21	13.4 (– 0.6)
40	308 x 0.41	1,200 x 0.21	9.6	0.473	11.1 (– 0.7)		15.0 (– 0.6)
60	462 x 0.41	1,850 x 0.21	11.6	0.315	13.3 (– 1.2)		16.9 (– 0.6)
85	430 x 0.51	2,700 x 0.21	13.6	0.219	15.8 (– 1.4)	0.26	19.8 (– 0.8)

Silicone-insulated single-core high-voltage automotive cables, screened – aluminium

Application: Connection of HV batteries and electric motors

Cable construction in accordance with LV 216-2, ISO 6722 and ISO 14572

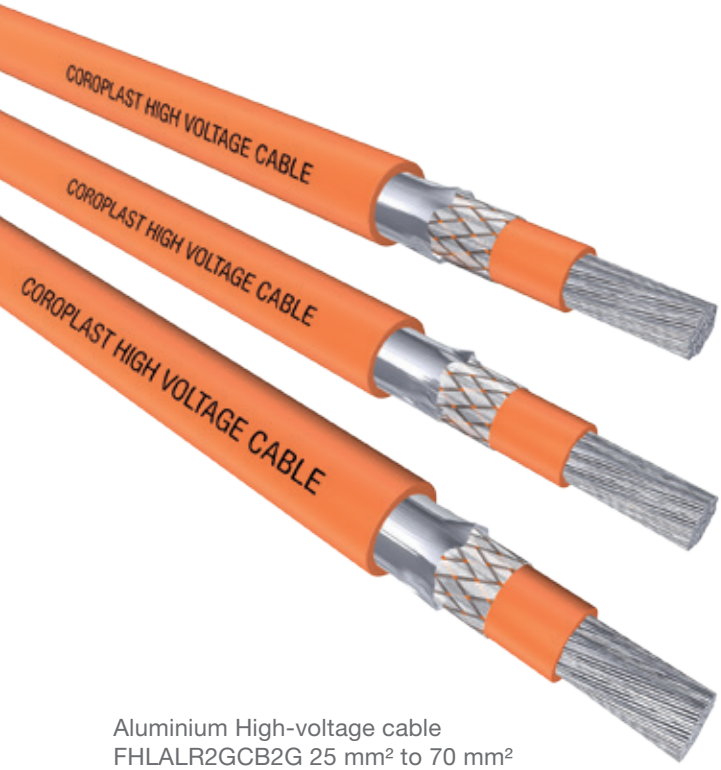
Construction of HV wiring systems for hybrid and electric vehicles

Operating temperature range in accordance with ISO 6722

–40 °C to +180 °C/3,000 h
–40 °C to +205 °C/240 h

Single-core, screened aluminium automotive cables for high-voltage harnesses

Aluminium as an electric conductor material is approximately three times lighter than the electric conductor material copper. The weight saved as a result of this gives reason for the entry of aluminium into the vehicle wiring system. Taking into account the higher electrical resistance of conductors compared to copper, larger aluminium conductor cross-sections need to be built in than copper cross-sections. The multi-layer designs of the screened high-voltage cables relativise the effective weight-saving potential. Due to the relatively low specific tensile strength of aluminium, the individual wires of the aluminium conductor are manufactured with a larger diameter compared to copper. As a result, the cable flexibility of the aluminium high-voltage cables is lower than that of copper high-voltage cables.



Aluminium High-voltage cable
FHLALR2GCB2G 25 mm² to 70 mm²

Under the prerequisite of a contacting of the aluminium high-voltage cables specially developed for aluminium, this type of high-voltage cables can be used in wiring systems for road vehicles.

Apart from the electric conductor material aluminium, the Coroplast aluminium high-voltage cables do not differ from copper high-voltage cables. You can find the silicone insulation and sheathed materials – tried-and-tested in practice for many years – with unchanged qualities in the Coroplast aluminium high-voltage cables. Independently of the conductor materials, all cable geometries of the copper high-voltage cables were adopted. Due to this modular system, existing connector housing and contacting geometries can be adopted for the Coroplast aluminium high-voltage cables.

Optimised design of aluminium conductor cross-sections

Due to the lower specific electric conductivity compared to copper, larger conductor cross-sections must be taken into account for aluminium high-voltage cables. The slightly larger cable diameters and the resulting greater heat radiation surface partly compensate for the aluminium-specific disadvantage. The current supply potential of the aluminium high-voltage cables can be recognised in the group of threshold value curves shown on page 47 as an example. If you would like us to calculate further derating curves in the steady-state current supply condition or in time-dynamic current load profile for you, in order to select optimised conductor cross-sections, please contact us.

High-voltage automotive cables 600 V AC / 1,000 V DC – single-core, screened

Conductor material: aluminium

Layout tables in accordance with LV 216-2

Silicone – high-voltage cables FHLALR2GCB2G 10 mm² to 160 mm² (Standard cross-sections)

Conductor				Core	Screen	Sheathing
cross-section	finely stranded (nom.) (max.)	diameter (max.)	resistance at 20 °C (max.)	diameter	wire diameter (max.)	diameter
[mm²]	[mm]	[mm]	[mΩ/m]	[mm]	[mm]	[mm]
10	50 x 0.52	4.5	3.03	6.0 (– 0.6)	0.16	8.8 (– 0.6)
16	78 x 0.52	5.8	1.93	7.2 (– 0.6)		10.2 (– 0.6)
25	122 x 0.52	7.2	1.24	8.7 (– 0.6)	0.21	12.2 (– 0.6)
35	172 x 0.52	8.5	0.878	10.4 (– 0.7)		14.4 (– 0.6)
50	247 x 0.52	10.5	0.613	12.2 (– 0.7)		15.8 (– 0.6)
60	289 x 0.52	11.6	0.525	13.3 (– 1.2)		16.9 (– 0.6)
70	351 x 0.52	12.5	0.432	14.4 (– 1.4)		18.2 (– 0.8)
95	463 x 0.52	14.8	0.327	17.2 (– 1.4)	0.26	20.9 (– 0.8)
120	304 x 0.72	16.5	0.255	19.0 (– 1.4)		23.0 (– 0.8)

Silicone – high-voltage cables FHLALR2GCB2G 12 mm² to 85 mm² (Intermediate cross-sections)

Conductor				Core	Screen	Sheathing
cross-section	finely stranded (nom.) (max.)	diameter (max.)	resistance at 20 °C (max.)	diameter	wire diameter (max.)	diameter
[mm²]	[mm]	[mm]	[mΩ/m]	[mm]	[mm]	[mm]
12	60 x 0.52	5.4	2.53	6.5 (– 0.6)	0.16	9.5 (– 0.6)
20	95 x 0.52	6.9	1.59	7.8 (– 0.6)		11.0 (– 0.6)
30	141 x 0.52	8.3	1.08	9.6 (– 0.7)	0.21	13.4 (– 0.6)
40	193 x 0.52	9.6	0.788	11.1 (– 0.7)		15.0 (– 0.6)
60	289 x 0.52	11.6	0.525	13.3 (– 1.2)		16.9 (– 0.6)
85	420 x 0.52	13.6	0.365	15.8 (– 1.4)	0.26	19.8 (– 0.8)

Silicone-insulated multi-core high-voltage automotive cables, screened – copper

Application: HV additional drive systems and charging devices

Cable construction in accordance with LV 216-2, ISO 6722 and ISO 14572

Construction of HV wiring systems for hybrid and electric vehicles

Operating temperature range in accordance with ISO 6722

–40 °C to +180 °C/3,000 h
–40 °C to +205 °C/240 h

Multi-core, screened automotive cables for high-voltage harnesses

Multi-core, screened high-voltage sheathed cables are already being used today by different OEMs for the connection of HV aggregates. This includes, for example, air conditioning compressors, PTC auxiliary heaters and the vehicle-internal connection of the charging socket to the charger aggregate.

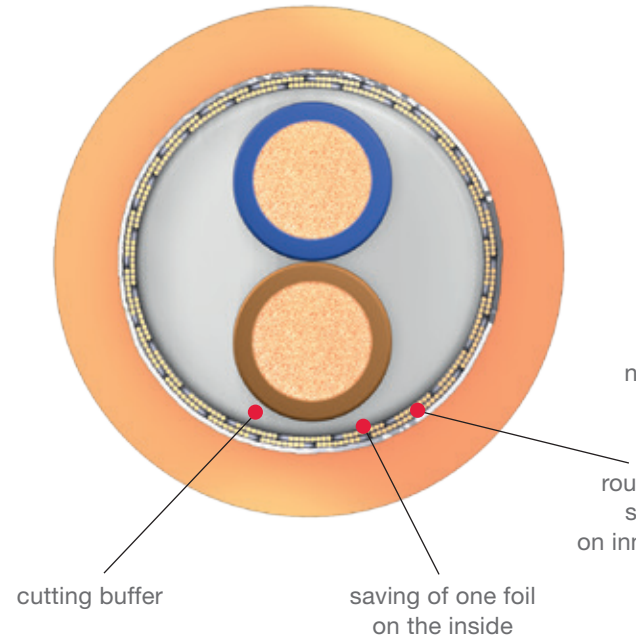
Coroplast cables feature extraordinary flexibility. The cores can be combined in a broad variety of ways. You can find a detailed overview of the structural data of Coroplast high-voltage cables on the following page. Cables can also be made to customer specifications.

High-voltage cable, multi-core, screened FHLR2GCB2G

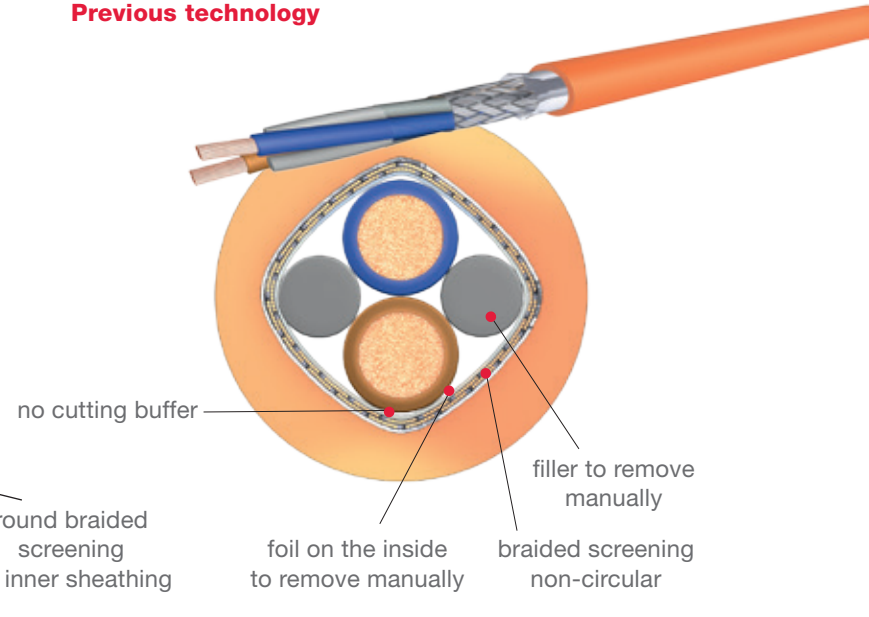
Processing high-voltage cables

Through continuous development of HV sheathed cables, our customers place a high degree of importance on processability. The latest generation of multi-core, screened sheathed cables provide a filling layer on the core stranding for a circular construction. Thus the wire screening can be separated with rotative cutting systems in a process-safe manner without the danger of injuring the actual core insulation. Furthermore, the time-consuming process of removing the filling elements and the separation can be avoided.
All cables of the HV product family are characterised by a distinct roundness which makes processing easier.

Latest technology



Previous technology



High-voltage automotive cables 600 V AC / 1,000 V DC – multi-core, screened

Conductor material: Copper

Layout tables in accordance with LV 216-2

Silicone – high-voltage cables FHLR2GCB2G 2 x 1.5 mm² to 5 x 6.0 mm²
(Standard cross-sections)

		Conductor		Core	Inner sheathing	Screen	Sheathing
number	cross-section	structure (nom.) (max.)	resistance at 20 °C (max.)	diameter	diameter	(max.)	diameter
	[mm²]	[mm]	[mΩ/m]	[mm]	[mm]	[mm]	[mm]
2 x	1.5	19 x 0.32	13.2	2.4 (– 0.2)	5.8 (– 0.4)	0.16	8.5 (– 0.6)
3 x					6.2 (– 0.4)		9.1 (– 0.6)
4 x					6.8 (– 0.4)		9.7 (– 0.6)
5 x					7.4 (– 0.4)		10.3 (– 0.6)
2 x	2.5	50 x 0.26	7.8	3.0 (– 0.3)	6.9 (– 0.4)	0.16	9.9 (– 0.6)
3 x					7.4 (– 0.4)		10.4 (– 0.6)
4 x					8.1 (– 0.4)		11.1 (– 0.6)
5 x					8.9 (– 0.4)		12.1 (– 0.6)
2 x	4.0	56 x 0.31	4.8	3.7 (– 0.3)	8.3 (– 0.4)	0.16	11.3 (– 0.5)
3 x					8.9 (– 0.4)		12.1 (– 0.5)
4 x					9.8 (– 0.4)	0.21	13.3 (– 0.5)
5 x					11.0 (– 0.5)		14.5 (– 0.5)
2 x	6.0	84 x 0.31	3.2	4.3 (– 0.3)	9.7 (– 0.4)	0.16	12.8 (– 0.5)
3 x					10.5 (– 0.5)	0.21	14.1 (– 0.5)
4 x					11.4 (– 0.5)		15.1 (– 0.5)
5 x					12.6 (– 0.5)		16.3 (– 0.5)

Silicone-insulated single-core high-voltage automotive cables, unscreened – copper and aluminium

Application: HV aggregates,
charging devices and internal battery cabling

Cable construction in accordance with
LV 216-1 and ISO 6722

Construction of HV wiring systems for hybrid
and electric vehicles

Operating temperature range
in accordance with ISO 6722

–40 °C to +200 °C/3,000 h
–40 °C to +225 °C/240 h

The unscreened high-voltage cables complement the Coroplast high-voltage cables product family. Wherever high-voltage cables are housed in metallically enclosed spaces, such as in the internal high-voltage batteries, the high-voltage cables do not need to be screened, subject to proof of EMC suitability.

As in the case of the screened Coroplast high-voltage cables, the electric conductor materials of copper and aluminium can be chosen between, in accordance with our modular system. The cable geometries remain cross-section-dependent. The tried-and-tested, electrically safe, mechanically highly stable and flexibility-promoting silicone insulation material continues to be a guarantee of the functionality of the Coroplast high-voltage cables across the entire vehicle lifespan.

You can find detailed information on the design of these cables on the following pages of this brochure.
A first impression of the current load ratings of the unscreened high-voltage cables can be gained from the threshold value curves in the technical section.

High-voltage automotive cables
600 V AC / 1,000 V DC – single-core, unscreened

Conductor material: Copper

Layout tables in accordance with LV 216-1

Silicone – high-voltage cables FHL2G 0.35 mm² to 120 mm²
(Standard cross-sections)

	Conductor				Core
cross-section	finely stranded (nom.) (max.)	extra finely stranded (nom.) (max.)	diameter (max.)	resistance at 20 °C (max.)	diameter
[mm²]	[mm]	[mm]	[mm]	[mΩ/m]	[mm]
0.35	12 x 0.21	45 x 0.11	0.9	52.0	2.1 (– 0.3)
0.5	16 x 0.21	64 x 0.11	1.1	37.1	2.3 (– 0.3)
0.75	24 x 0.21	96 x 0.11	1.3	24.7	2.5 (– 0.3)
1.0	32 x 0.21	126 x 0.11	1.5	18.5	2.7 (– 0.3)
1.5	30 x 0.26	192 x 0.11	1.8	12.7	3.0 (– 0.3)
2.5	50 x 0.26	320 x 0.11	2.2	7.6	3.6 (– 0.3)
4.0	56 x 0.31	120 x 0.21	2.8	4.7	4.4 (– 0.4)
6.0	84 x 0.31	183 x 0.21	3.4	3.1	5.0 (– 0.4)
10	80 x 0.41	320 x 0.21	4.5	1.82	6.5 (– 0.6)
16	126 x 0.41	512 x 0.21	5.8	1.16	8.3 (– 0.6)
25	196 x 0.41	790 x 0.21	7.2	0.743	10.0 (– 0.6)
35	276 x 0.41	1,070 x 0.21	8.5	0.527	11.0 (– 0.7)
50	396 x 0.41	1,600 x 0.21	10.5	0.368	13.2 (– 0.8)
70	360 x 0.51	2,175 x 0.21	12.5	0.259	15.1 (– 0.8)
95	475 x 0.51	3,000 x 0.21	14.8	0.196	17.4 (– 1.0)
120	608 x 0.51	3,700 x 0.21	16.5	0.153	19.5 (– 1.0)

Silicone – high-voltage cables FHL2G 2.0 mm² to 85 mm²
(Intermediate cross-sections)

	Conductor				Core
cross-section	finely stranded	extra finely stranded	diameter	resistance at 20 °C	diameter
	(nom.) (max.)	(nom.) (max.)	(max.)	(max.)	
[mm²]	[mm]	[mm]	[mm]	[mΩ/m]	[mm]
2.0	40 x 0.26	246 x 0.11	2.0	9.4	3.3 (– 0.3)
3.0	44 x 0.31	246 x 0.11	2.4	6.2	4.1 (– 0.3)
5.0	70 x 0.31	145 x 0.21	3.1	3.9	4.9 (– 0.4)
8.0	62 x 0.31	240 x 0.21	4.3	2.4	5.6 (– 0.6)
12	96 x 0.41	380 x 0.21	5.4	1.52	7.2 (– 0.6)
20	152 x 0.41	610 x 0.21	6.9	0.955	8.7 (– 0.6)
30	224 x 0.41	900 x 0.21	8.3	0.647	10.4 (– 0.7)
40	308 x 0.41	1,200 x 0.21	9.6	0.473	11.9 (– 0.7)
60	462 x 0.41	1,850 x 0.21	11.6	0.315	14.2 (– 0.8)
85	430 x 0.51	2,700 x 0.21	13.6	0.218	16.2 (– 1.0)

High-voltage automotive cables
600 V AC / 1,000 V DC – single-core, unscreened

Conductor material: Aluminium

Layout tables in accordance with LV 216-1

Silicone – high-voltage cables FHLAL2G 10 mm² to 120 mm²
(Standard cross-sections)

	Conductor			Core
cross-section	finely stranded	diameter	resistance at 20 °C	diameter
	(nom.) (max.)	(max.)	(max.)	
[mm²]	[mm]	[mm]	[mΩ/m]	[mm]
10	50 x 0.52	4.5	3.03	6.5 (– 0.6)
16	78 x 0.52	5.8	1.93	8.3 (– 0.6)
25	122 x 0.52	7.2	1.24	10.0 (– 0.6)
35	172 x 0.52	8.5	0.878	11.0 (– 0.7)
50	247 x 0.52	10.5	0.613	13.2 (– 0.8)
70	351 x 0.52	12.5	0.432	15.1 (– 0.8)
95	463 x 0.52	14.8	0.327	17.4 (– 1.0)
120	304 x 0.72	16.5	0.255	19.5 (– 1.0)

Silicone – high-voltage cables FHLAL2G 12 mm² to 85 mm²
(Intermediate cross-sections)

	Conductor			Core
cross-section	finely stranded	diameter	resistance at 20 °C	diameter
	(nom.) (max.)	(max.)	(max.)	
[mm²]	[mm]	[mm]	[mΩ/m]	[mm]
12	60 x 0.52	5.4	2.53	7.2 (– 0.6)
20	95 x 0.52	6.9	1.59	8.7 (– 0.6)
30	141 x 0.52	8.3	1.08	10.4 (– 0.7)
40	193 x 0.52	9.6	0.788	11.9 (– 0.7)
60	289 x 0.52	11.6	0.525	14.2 (– 0.8)
85	420 x 0.52	13.6	0.365	16.2 (– 1.0)

Silicone-insulated multi-core high-voltage automotive cables, unscreened – copper

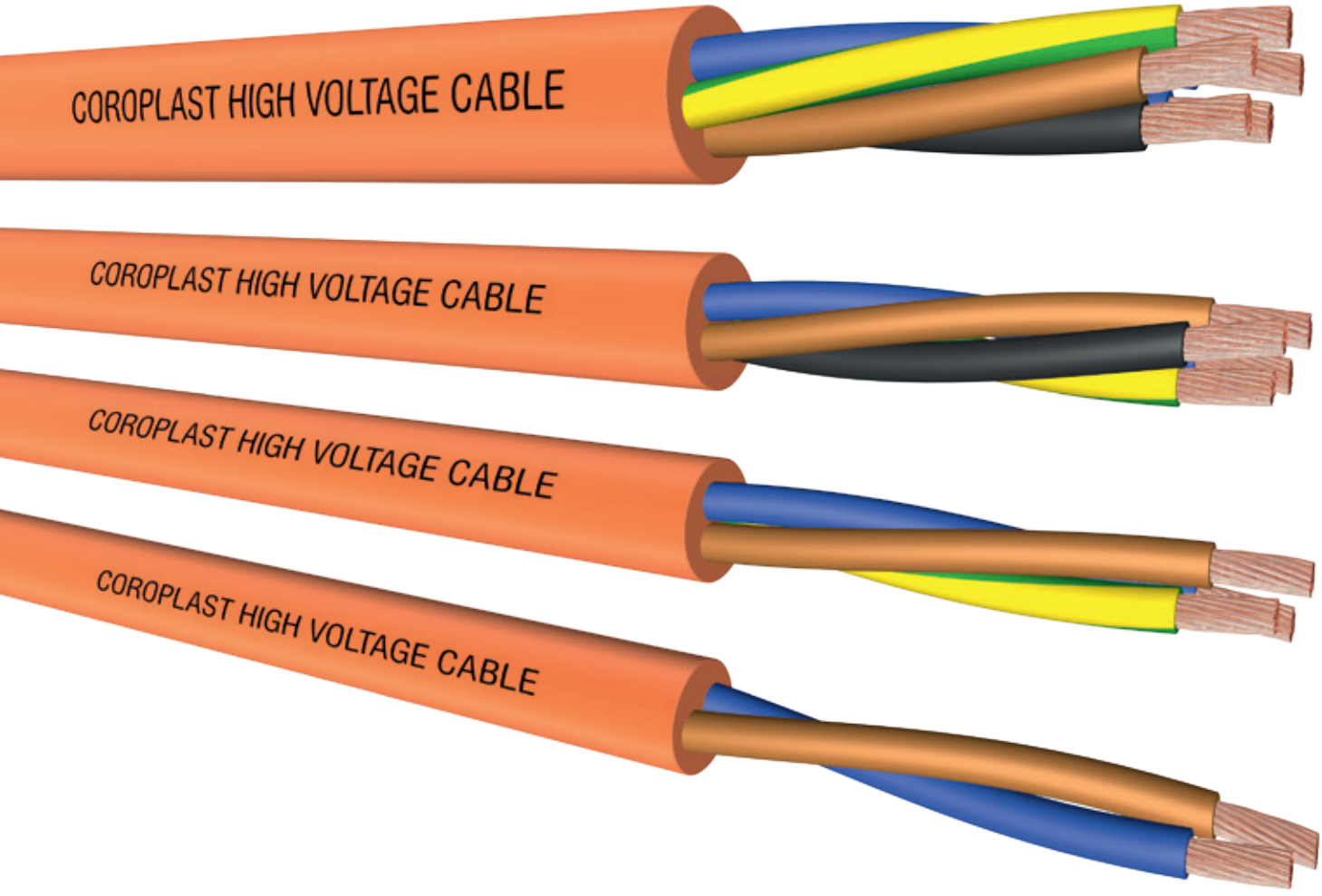
Application: HV aggregates, charging devices and internal battery cabling

Cable construction in accordance with LV 216-1

Construction of HV wiring systems for hybrid and electric vehicles

Operating temperature range in accordance with ISO 6722

–40 °C to +180 °C/3,000 h
–40 °C to +205 °C/240 h



If required and upon proof of EMC suitability, unscreened high-voltage cables can be used as single-core cables in the so-called powertrain or as multi-core connection cables for vehicle-internal 230 volt plugs or other aggregates. The multi-core Coroplast high-voltage cables impress with their usability in the smallest construction spaces. Even in the event of extremely small bending radiuses, the original function of electrical safety remains in the vehicle across its entire lifespan.

On the following page you can find a comprehensive overview of the structural geometries of all available multi-core unscreened sheathed cables, in line with the requirements of the general OEM LV 216-1 standard.

High-voltage automotive cables 600 V AC / 1,000 V DC – multi-core, unscreened

Conductor material: Copper

Layout tables in accordance with LV 216-1

Silicone – high-voltage cables FHLR2G2G 1 x 0.5 mm² to 5 x 6.0 mm²

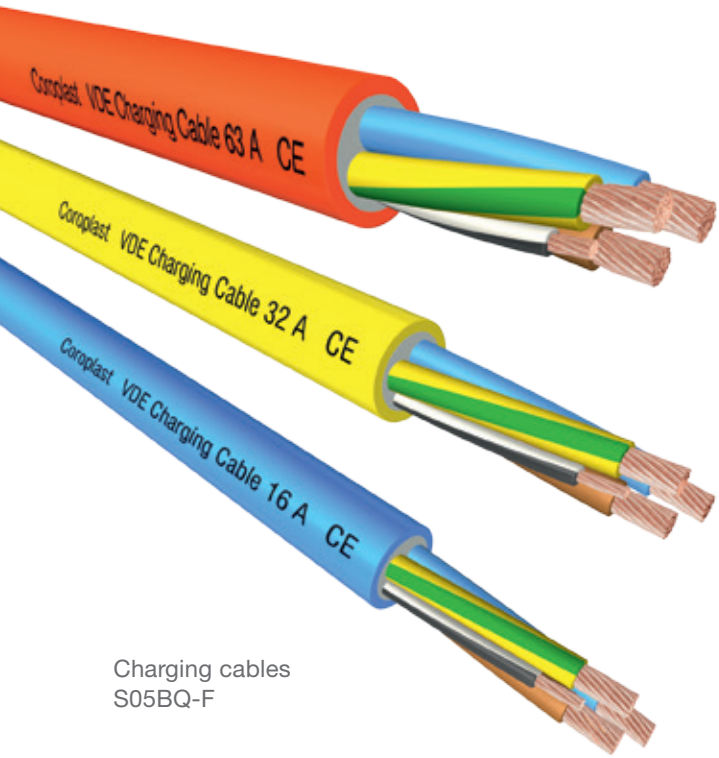
		Conductor		Core	Sheathing
number	cross–section	structure (nom.) (max.)	resistance at 20 °C (max.)	diameter	diameter
	[mm²]	[mm]	[mΩ/m]	[mm]	[mm]
1 x	0.5	19 x 0.19	38.2	1.6 (– 0.2)	3.0 (– 0.4)
2 x					4.6 (– 0.4)
3 x					5.0 (– 0.4)
4 x					5.4 (– 0.4)
5 x					6.0 (– 0.4)
1 x	0.75	19 x 0.23	25.6	1.9 (– 0.2)	3.4 (– 0.4)
2 x					5.4 (– 0.4)
3 x					5.9 (– 0.4)
4 x					6.4 (– 0.4)
5 x					7.0 (– 0.6)
1 x	1.0	19 x 0.26	18.9	2.1 (– 0.2)	3.6 (– 0.4)
2 x					6.0 (– 0.4)
3 x					6.4 (– 0.4)
4 x					7.0 (– 0.6)
5 x					7.7 (– 0.6)
1 x	1.5	19 x 0.32	13.3	2.4 (– 0.2)	3.9 (– 0.4)
2 x					6.6 (– 0.4)
3 x					7.1 (– 0.6)
4 x					7.8 (– 0.6)
5 x					8.5 (– 0.6)
1 x	2.5	50 x 0.26	8.1	3.0 (– 0.3)	4.5 (– 0.4)
2 x					8.0 (– 0.6)
3 x					8.5 (– 0.6)
4 x					9.5 (– 0.6)
5 x					10.5 (– 0.6)
1 x	4.0	56 x 0.31	5.2	3.7 (– 0.3)	5.2 (– 0.4)
2 x					9.7 (– 0.6)
3 x					10.3 (– 0.6)
4 x					11.3 (– 0.6)
5 x					12.5 (– 0.6)
1 x	6.0	84 x 0.31	3.3	4.3 (– 0.3)	6.0 (– 0.6)
2 x					11.0 (– 0.6)
3 x					11.8 (– 0.6)
4 x					13.0 (– 0.6)
5 x					14.3 (– 0.6)

Charging cables in accordance with DIN

Application: Charging HV batteries of electric and hybrid vehicles

Cable construction in accordance with DIN EN 50525

Connection cables for 1-phase and 3-phase AC charging



Charging cables
S05BQ-F

VDE charging cables

These PUR sheathed cables are essential for the connection between an external current supply and the battery in the road vehicle. The cables fulfil extremely high requirements with regard to mechanical stability and electrical safety. The cables with the tried-and-tested PUR sheathed material are designed for raw everyday use. In addition to the special power cores for current supply, so-called pilot cores ensure communication between road vehicle and charging electronics. In accordance with the usual automotive requirements, the cable versions are extremely flexible and possess good resistance to microbes and chemicals. The cables are flame-retardant, in accordance with DIN EN 60332-1-2. In addition to standard qualities, special versions with tin-plated copper wires or for specific applications such as cable spoolers or spiral cables can also be produced upon consultation. These cables are constructed on the basis of DIN EN 50525-2-21 (VDE 0285-525-2-21). The charging cables have VDE approval: Certificate of conformity with factory surveillance – Reg. No. 8491 and 8492.

Structure table of a few selected charging cables

Charging cables S05BQ-F with 1 to 3 pilot core(s) 0.5 mm²
Operating voltage Uo / U (max.) 300/500V

	Conductor			Core	Sheathing
number	cross-section	resistance at 20 °C		diameter	diameter
		bare	tinned		
	[mm²]	[mΩ/m]	[mΩ/m]	[mm]	
	(nom.)	(max.)	(max.)	(nom.)	[mm]
Pilot core(s)	0.5	39.0	40.1	1.75	/
3 x	1.5	13.3	13.7	3.1	9.3 (± 0.3)
3 x	2.5	7.98	8.21	3.8	10.5 (± 0.4)
5 x	2.5	7.98	8.21	3.8	13.0 (± 0.4)
3 x	6	3.3	3.39	5.0	13.9 (± 0.4)
5 x	6	3.3	3.39	5.0	17.1 (± 0.5)

Charging cables in accordance with UL/CSA

Application: Charging HV batteries of electric and hybrid vehicles

Cable construction in accordance with UL and CSA

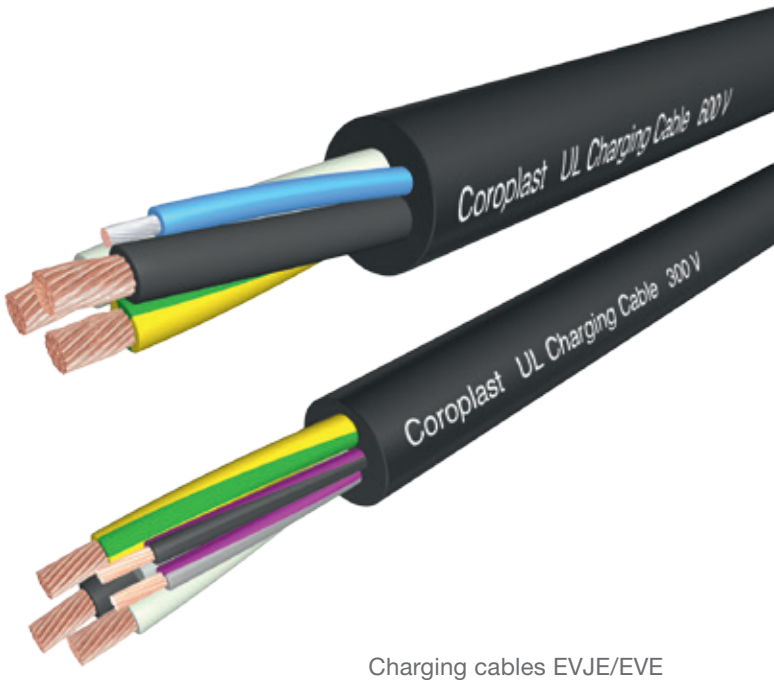
Connection cables for AC charging

UL/CSA charging cables

These UL-approved TPE sheathed cables are used in the United States of America. Here, too, there are so-called pilot cores for communication between road vehicle and charging electronics, in addition to power cores. The flame-retardant cables are designed for a maximum permanent temperature of 105 °C. These cables are constructed in accordance with UL62 and CSA C22.2 No. 49-10.

In addition to the EVJE cables for a maximum operating voltage of up to 300 volts AC, there are the EVE cables for a maximum operating voltage of up to 600 volts AC.

In accordance with CULUS, the approvals are listed under UL file No. E359003.



Charging cables EVJE/EVE

	Conductor		Core	Sheathing
number	cross-section AWG no. (nom.)	cross-section [mm²] (nom.)	diameter [mm] (nom.)	diameter [mm]
Pilot core	20	0.519	2.8	/
Pilot core	18	0.824	2.9	/
Power core	14	2.08	3.6	/
EVJE				
3x14+20 AWG				10.2
3x14+18 AWG				10.2

	AWG no. (nom.)	[mm²] (nom.)	[mm] (nom.)	[mm] (nom.)
Pilot core	20	0.519	2.8	/
Pilot core	18	0.824	2.9	/
Power core	10	5.26	5.5	/
EVE				
3x10+20 AWG				17.2
3x10+18 AWG				17.2

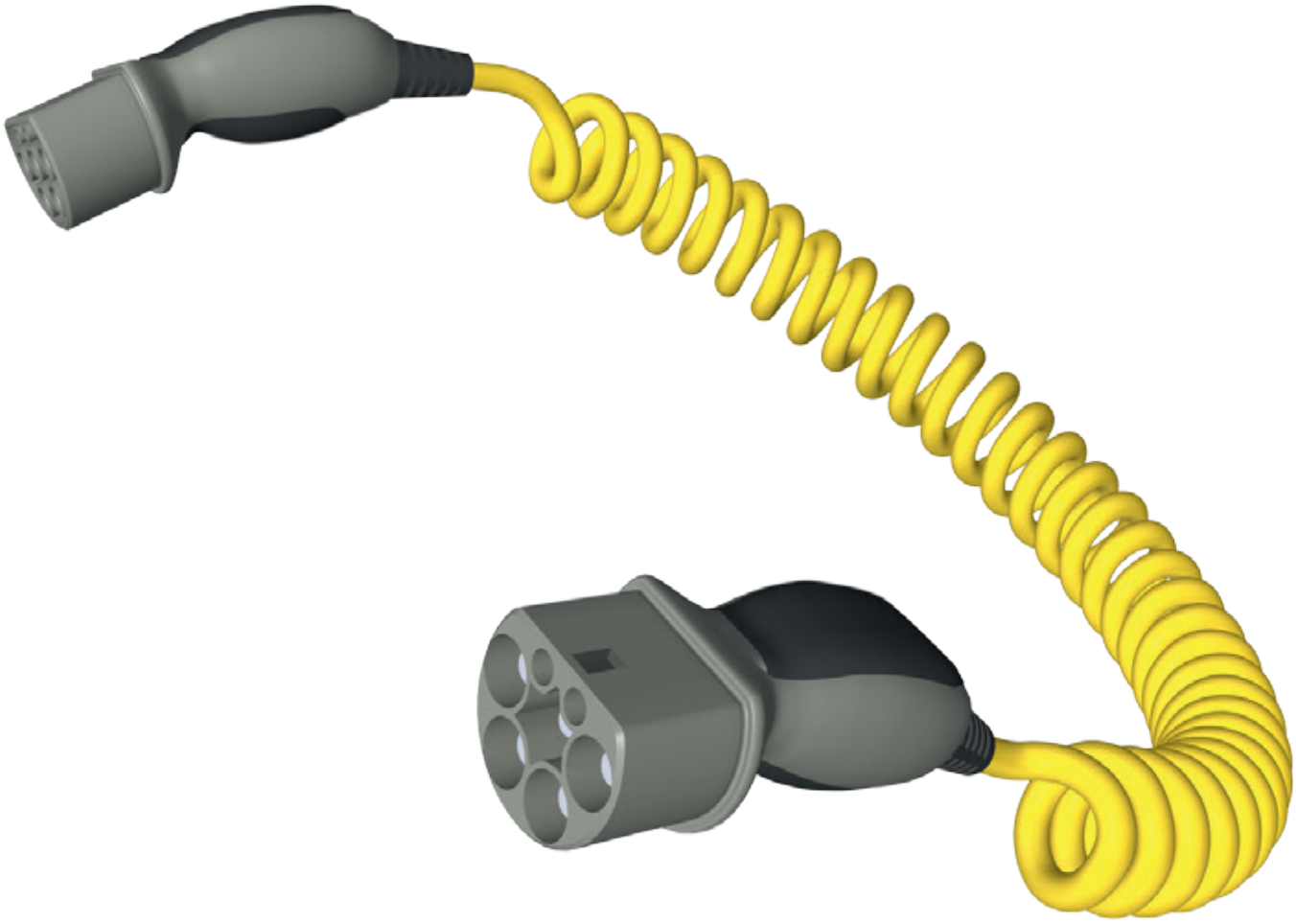
Spiral cables

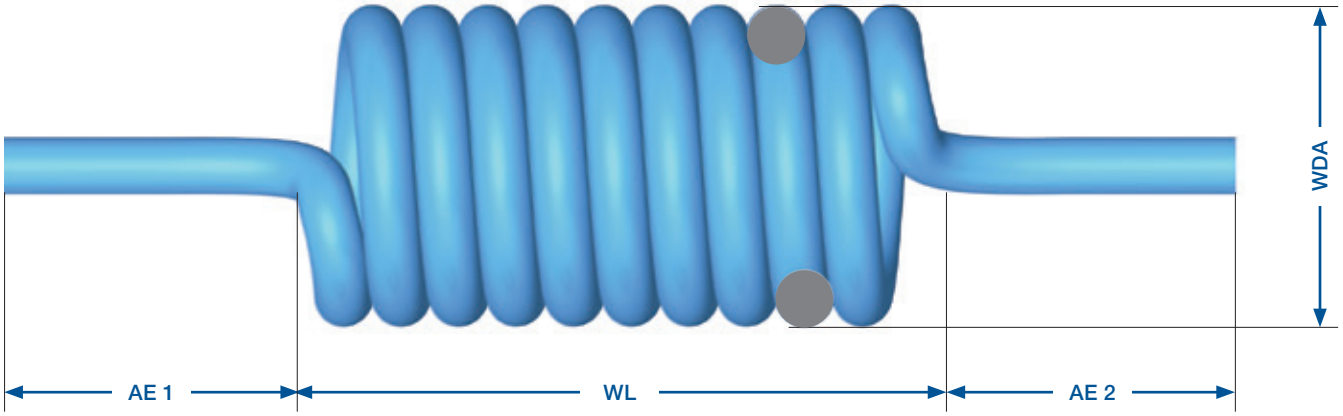
Application: Charging of HV batteries
of electric and hybrid vehicles

Spiral cables

We have implemented the requirement of OEM to create charging cables in a spiral construction. The use of coiled cables results in numerous advantages for the user. The cables cannot be dragged across the floor and thus do not get dirty. For the user, this is a strong argument for coiled charging cables. Due to the special design features, several 10,000 extension cycles can be presented without any problem. Coiled charging cables prevent accidents. While straight cables constitute tripping hazards, an expandable coiled cable prevents falls and can also be easily noticed by passers-by.
Coroplast will gladly advise you on the optimal designs of the spiral leads in accordance with your requirements.

The graphic of an exemplary coil corpus should make communication for coordinating the optimum coil parameters easier for you.



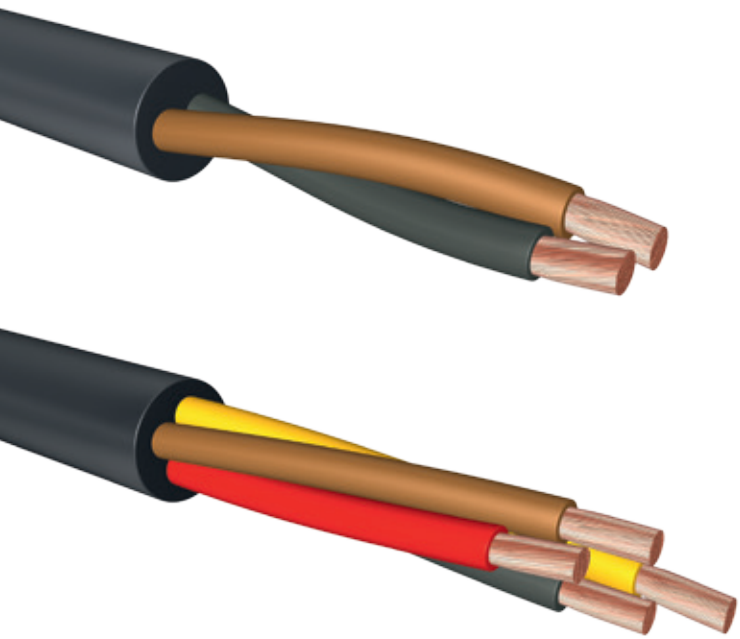


Charging cable, coiled
Coil configuration

	WL	AE 1	AE 2	WDA	NL
Coil body length in mm					
Length 1st connection end in mm					
Length 2nd connection end in mm					
Outer diameter of the coil in mm					
Usable extended length in mm					

PUR-sheathed cables for e-bikes and pedelecs

Application: To charge batteries



Cable construction in accordance with ISO 6722 and ISO 14572

Robust sheathed cables for the entire cabling of high-quality e-bikes and pedelecs

Special cables for e-bikes

Coroplast uses its experience in the production of sheathed cables for new applications in electric scooters, electric bicycles and pedelecs.

Coroplast cables can be constructed in accordance with your individual wishes and they can assume the power transfer for the drive as well as the data transfer for the control. Furthermore, Coroplast provides the connection cables for charging the battery.

Multi-core cables for e-bikes
operating voltages max. 60 volts in accordance with ISO 6722

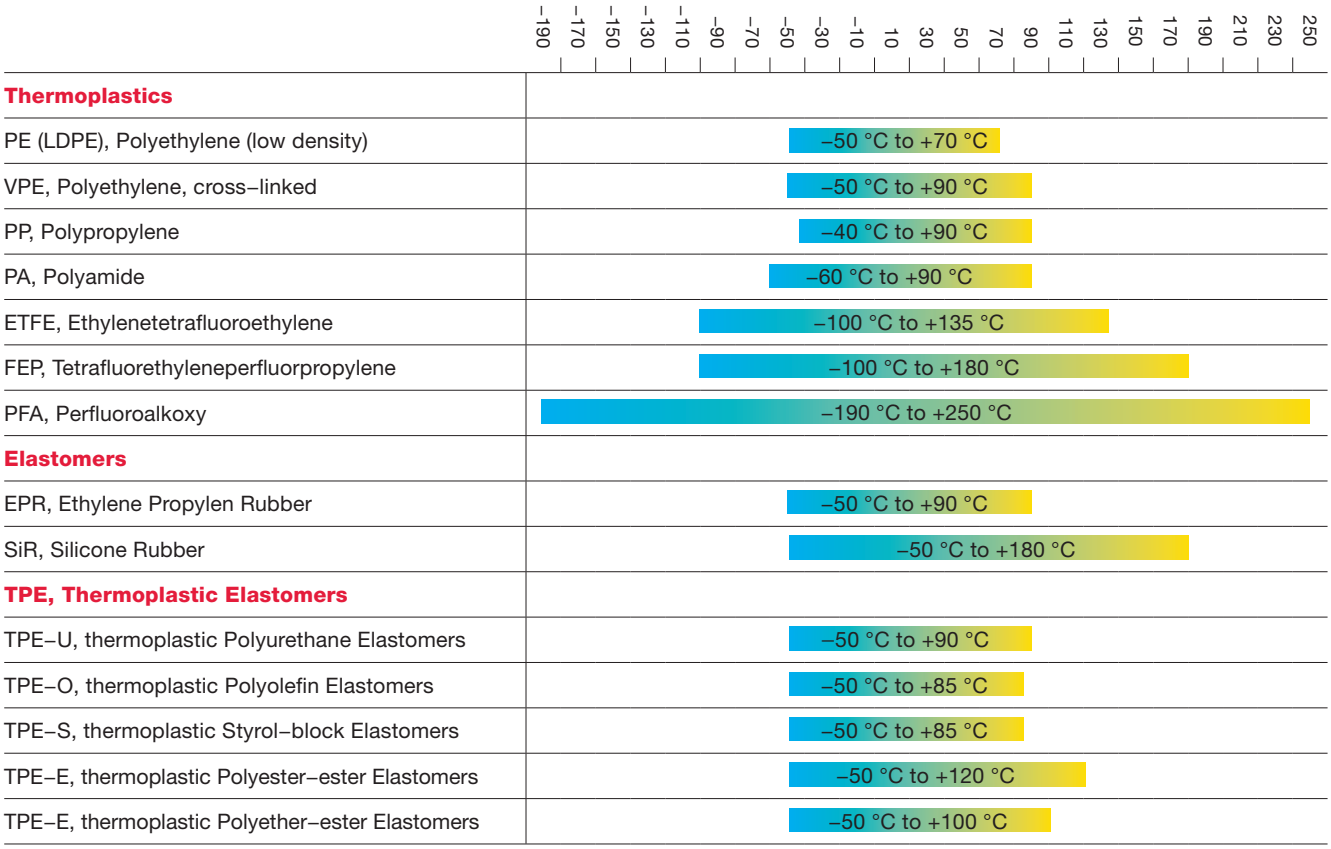
		Conductor		Core	Sheathing
	number	nominal cross–section	resistance (max.)	diameter (max.)	diameter
		[mm²]	[mΩ/m]	[mm]	[mm]
sensor, control and data cables	4 x	0.35	53.7	1.3 (– 0.1)	4.6 (– 0.4)
	5 x				5.0 (– 0.4)
	2 x	0.5	38.2	1.6 (– 0.2)	4.3 (–0.4)
	3 x				4.8 (– 0.4)
power cables	4 x	1.5	13.2	2.4 (– 0.2)	7.5 (– 0.6)
	5 x				8.2 (– 0.6)
	2 x	2.5	7.8	3.0 (– 0.3)	8.3 (– 0.6)
	3 x				8.6 (– 0.6)
multifunctional cables	2 pair	0.14	141	1.2 (– 0.1)	8.3 (– 0.6)
	2 x	2.50	7.8	3.0 (– 0.3)	
	2 pair	0.35	53.7	1.2 (– 0.1)	9.3 (– 0.6)
	2 x	2.50	7.8	3.0 (– 0.3)	

Insulation and sheathing materials for electrical automotive cables

Classification in operating temperature ranges.
Possibilities of use in vehicle

Tempera-ture class	Operating temperature		Material designation			Place of installation and use in vehicles Standard applications Special uses possible upon consultation
	Long-term use (3,000 h) [°C]	Short-term use (240 h) [°C]				
A	–40 to +85	to +110	2Y	PE	Polyethylene	Use only in technically justified special cases
B	–40 to +100	to +125	4Y	PA	Polyamide	Core insulation for fuel sender unit cables
			9Y	PP	Polypropylene	Dielectric for data transmission cables
C	–40 to +125	to +150	9Y	PP	Coroflex TT3	Core insulation engine compartment cabling
			11Y	PUR	Polyurethan	Sheathing material engine compartment and axle cabling
			31Y	TPE	Thermoplastic elastomers	Core insulation engine compartment and axle cabling
D	–40 to +150	to +175	7Y	ETFE	Ethylene tetrafluoroethylene	Core insulation engine compartment and gearbox cabling
			31Y	TPE	Thermoplastic elastomers	Core insulation headlight cabling
			11Y	PUR	Polyurethan (Polyester-PUR)	Sheathing material engine compartment cabling
E	–40 to +175	to +200	6Y	FEP	Tetrafluorethylene-perfluorpropylene	Core insulation engine compartment and gearbox cabling
			2G	SiR	Silicone rubber	Core and sheathing material engine compartment, battery and HV cables (flexible)
F	–40 to +200	to +225	6Y	FEP	Tetrafluorethylene-perfluorpropylene	Core insulation engine compartment and gearbox cabling
			2G	SiR	Silicone rubber	Core and sheathing material engine compartment, battery and generator
G	–40 to +225	to +250	51Y	PFA	Perfluoroalkoxy	Core insulation engine compartment and gearbox cabling
H	–40 to +250	to +275				Core insulation lambda probe cable

Continuous operation temperature ranges in accordance with VDE



Derating of electric cables

Definition of derating

Derating describes the correlation between the temperature of an electrical unit and its power loss. In the case of electric cables, this means that a cable heats up upon current load due to the physical properties of the conductor material and its electric conductivity decreases. In other words, the electrical resistance of a metallic cable rises in higher temperatures. This results in a higher power loss when electric current flows.

How much energy is absorbed and emitted by the electric cable in the form of heat depends on its structure, material properties and the conditions of its environment.

The temperature behaviour of an electric cable depends on many factors:

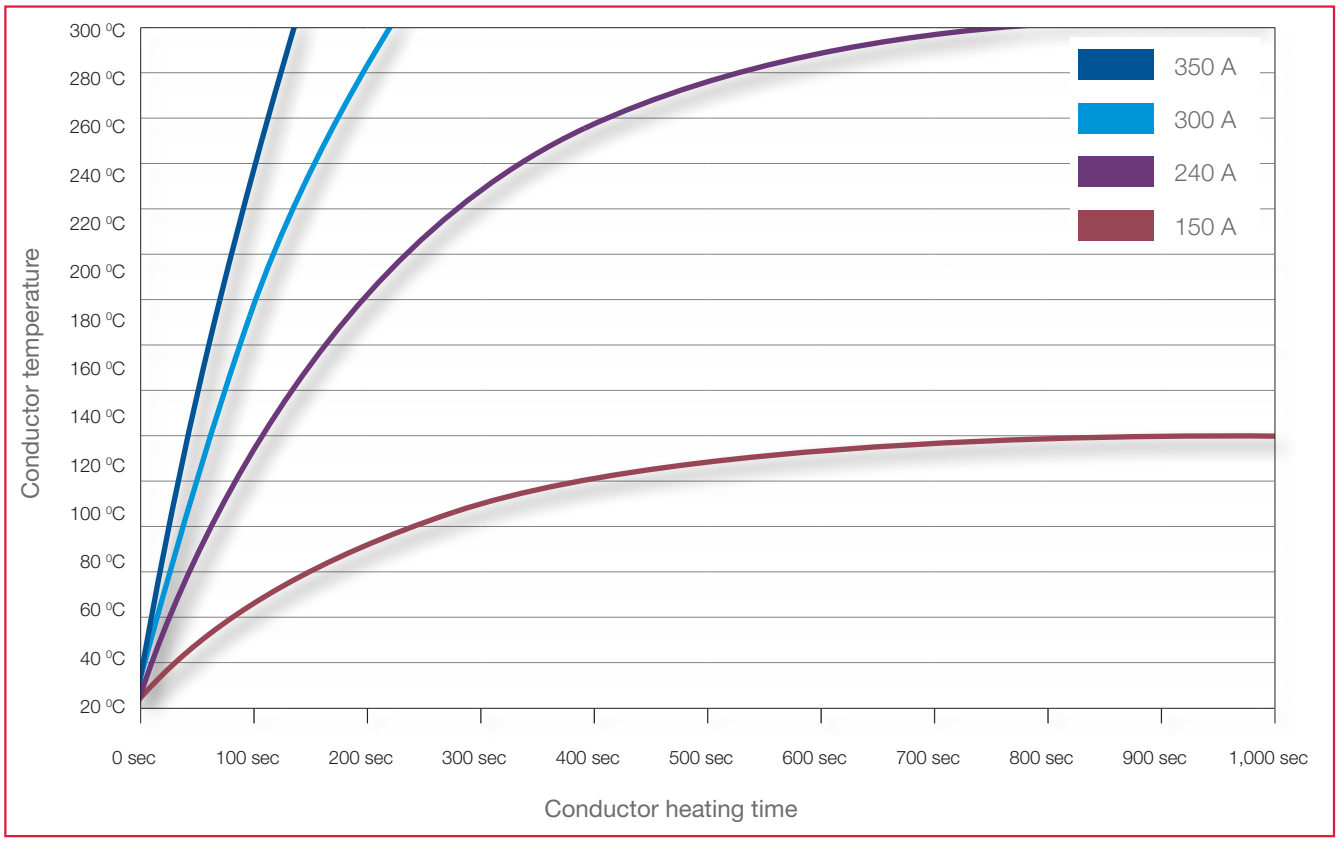
› conductor cross-section and conductor material
result = conductor resistance
› insulation materials
result = heat conductivity and capacity
› cable design
result = heat derivation and storage
› cable diameter
result = heat emission

The selection of an optimum electric conductor cross-section to required electric current supply ratio can always be considered a fundamental objective.

Dynamic transition state

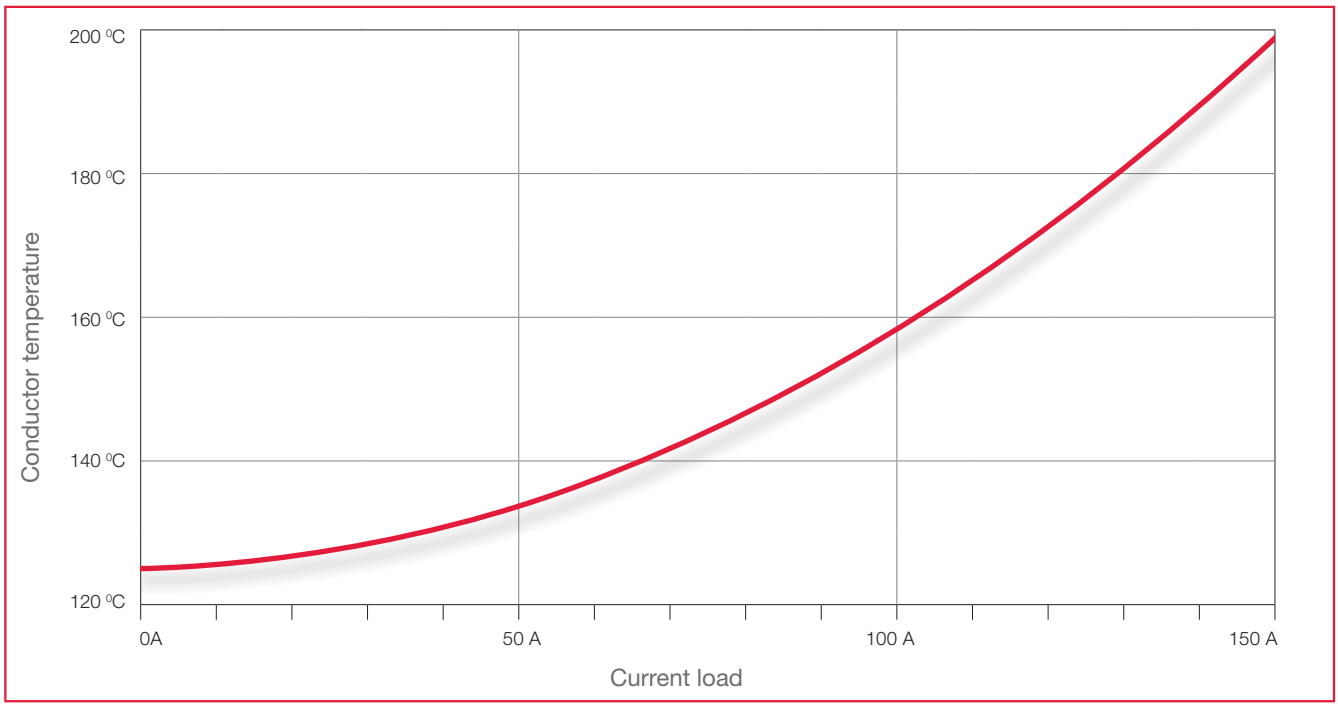
In electric current heating, a distinction is made between the dynamic transition state and the static condition. The static condition is considered to be reached when, after an abrupt rise in electric current supply, the final conductor temperature has been reached. The required time to reach 63% of the end temperature after an abrupt rise in current supply is adopted as the time required τ . After 5 x time constant τ , the static condition is considered to be reached.

The following chart shows the heating of an electric conductor dependent on the current supply time. Four current loads of differing levels were selected as examples.



Static or steady state

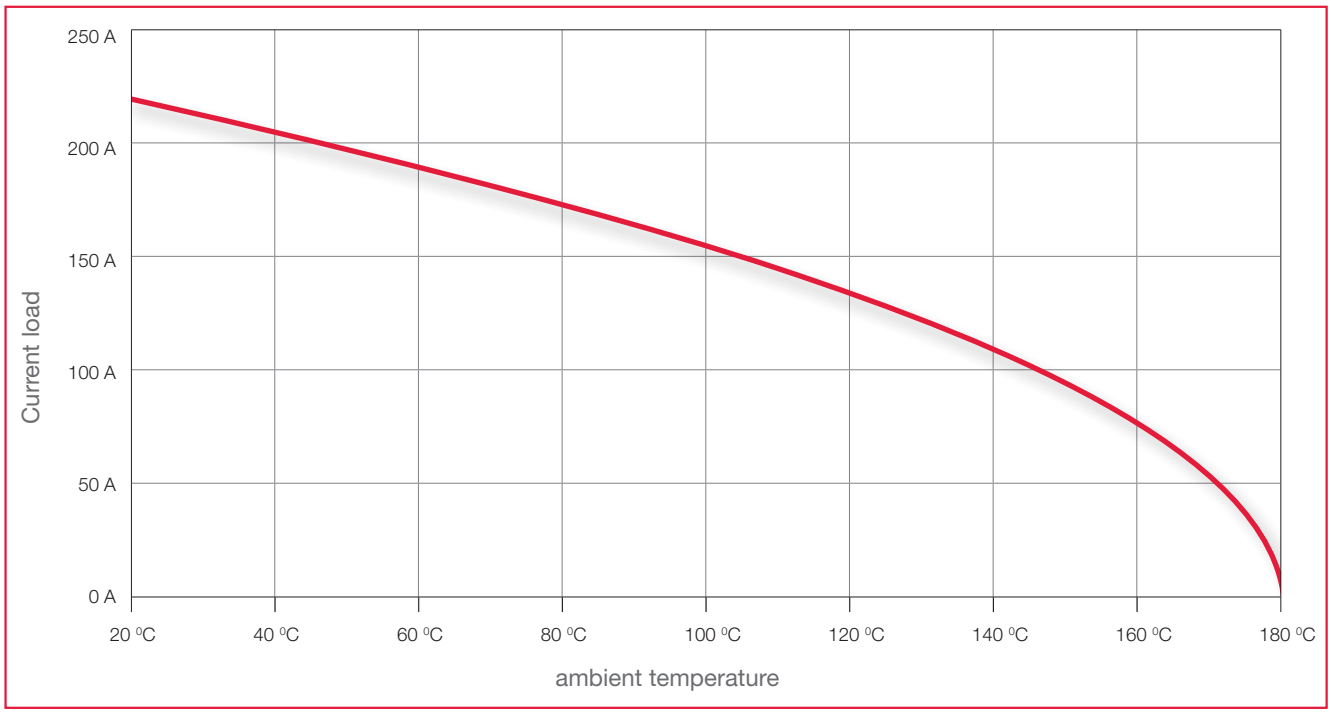
When the static state or steady state is reached after 5 x time constant τ , the resulting conductor temperature arises from the first approximation due to the height of the current load. An example of this static temperature behaviour is shown by the following chart.



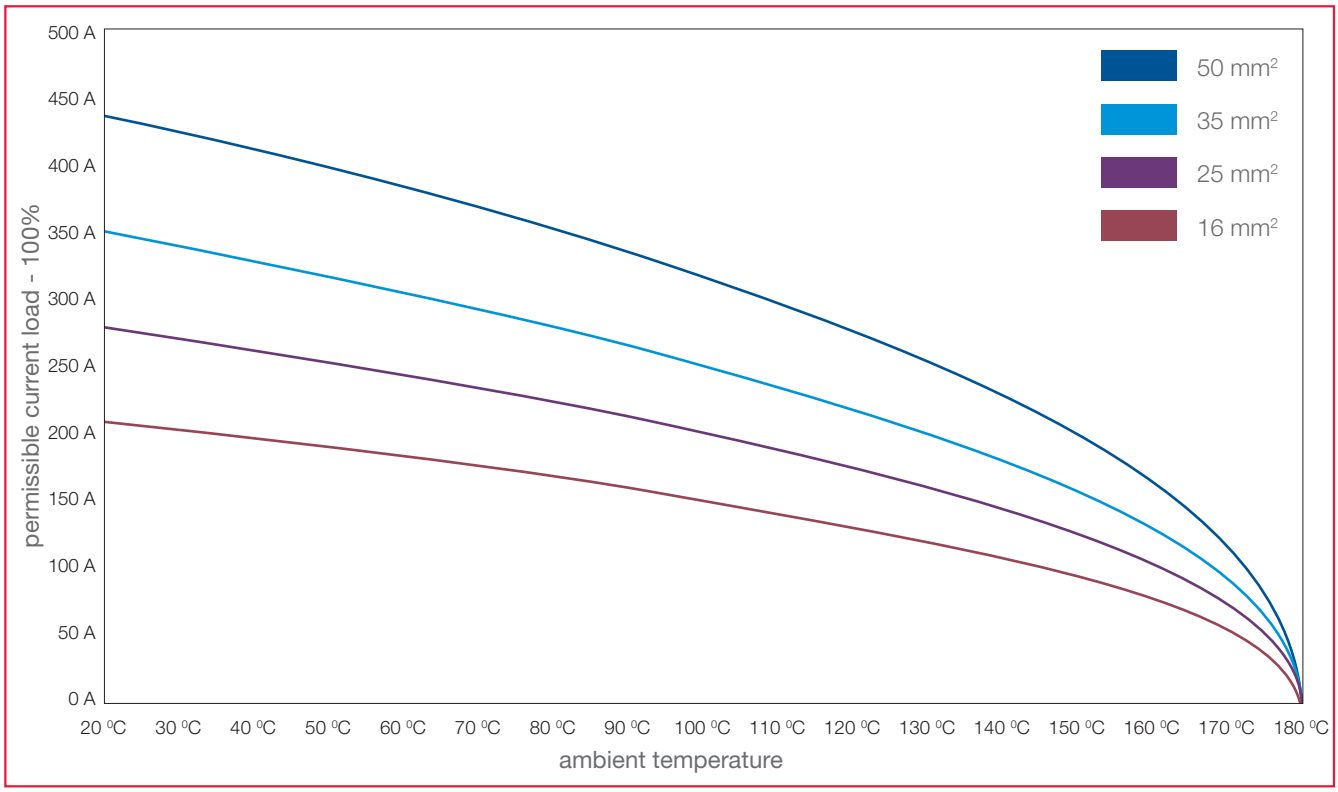
This type of derating curve can apply to only one environment temperature at a time.
The curve shown above starts with an environment temperature of +125 °C.

Derating of electric cables

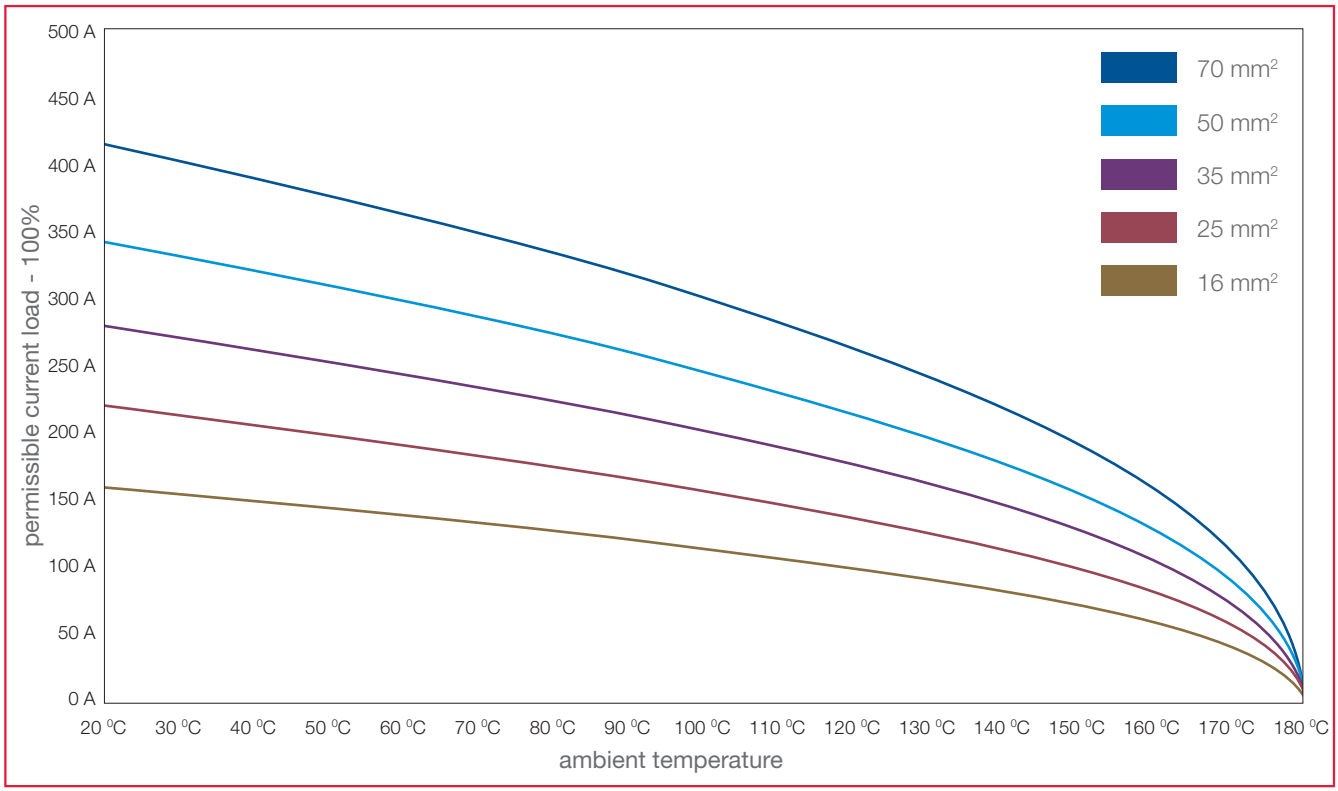
An alternative type of presentation of the steady condition is the threshold value curve. The permissible current load is shown dependent on the ambient temperature. In the following threshold curve, a permissible conductor temperature of +180 °C was chosen as an example.



Derating: Threshold value curves of screened copper high-voltage cables

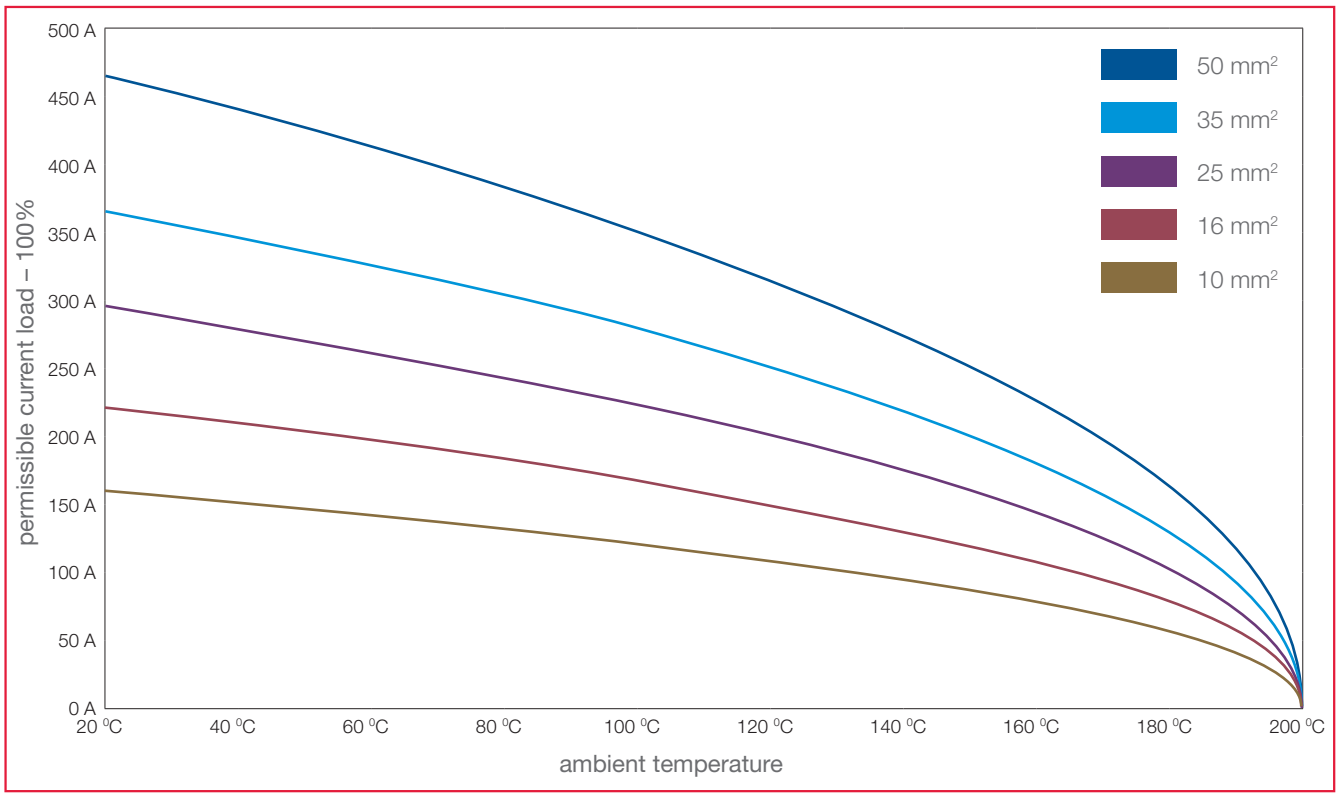


Derating: Threshold value curves of screened aluminium high-voltage cables

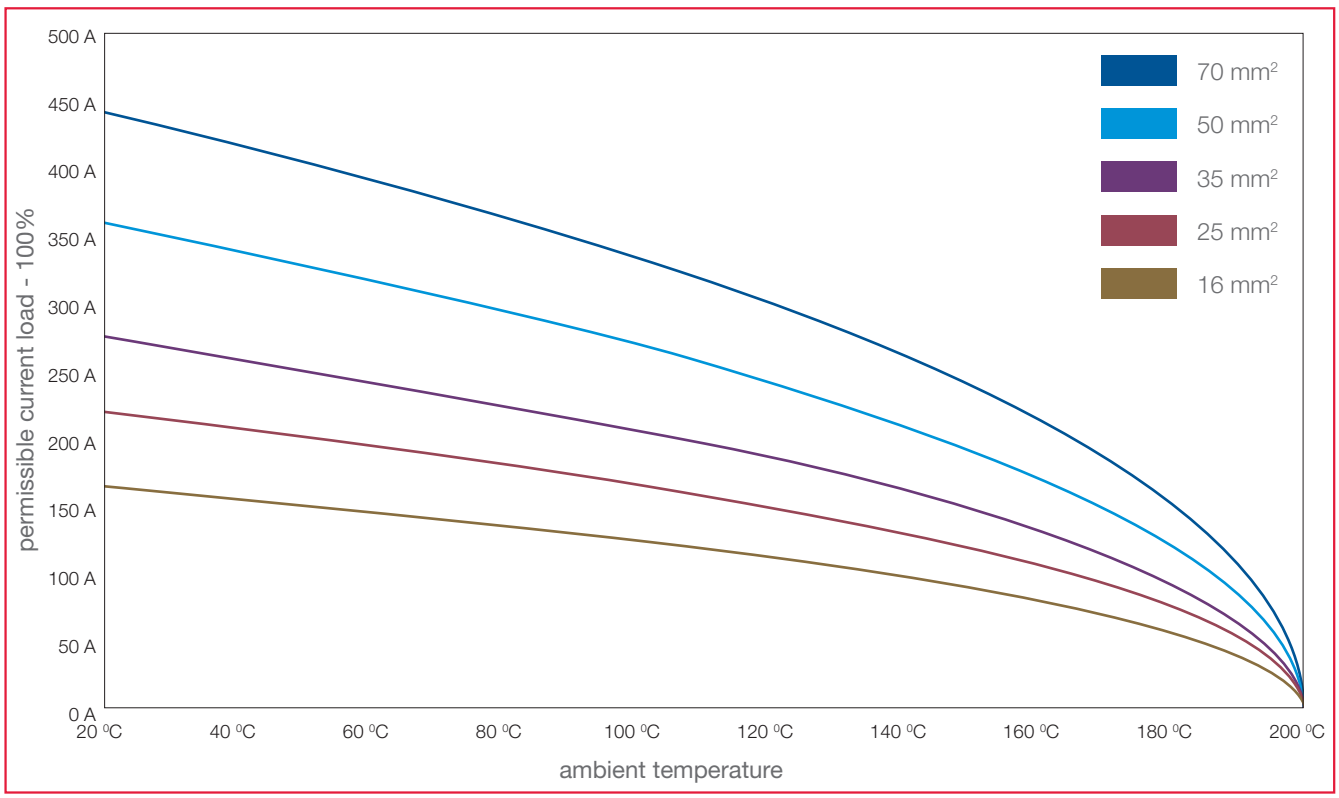


Technical tables on high-voltage automotive cables

Threshold value curves of unscreened copper high-voltage cables

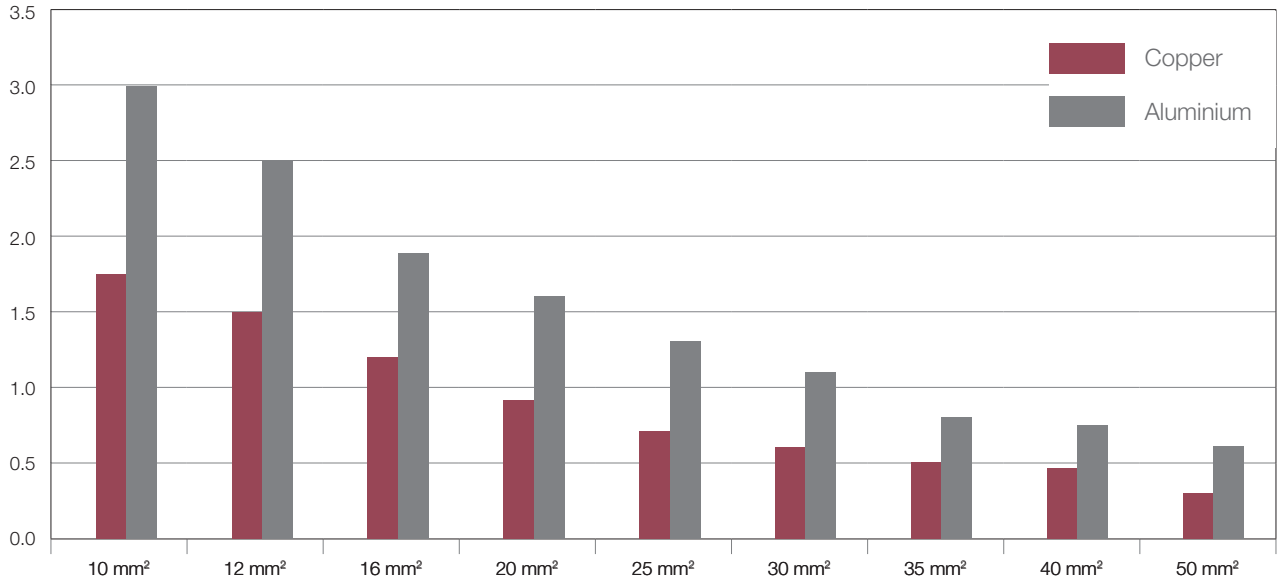


Derating: Threshold value curves of unscreened aluminium high-voltage cables



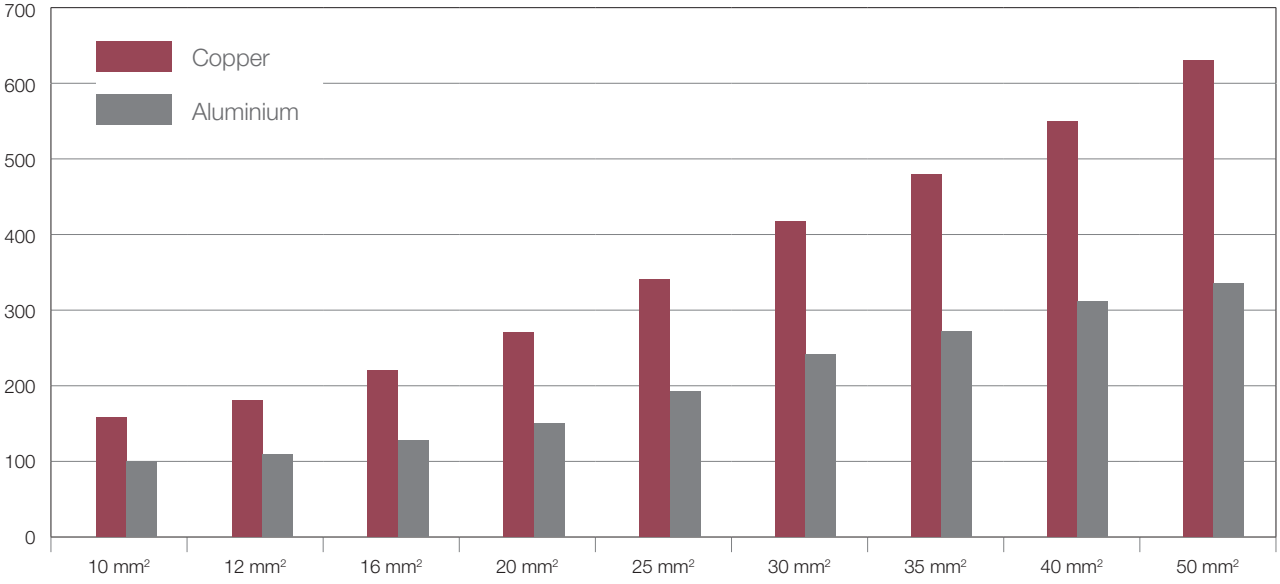
Comparison of electric conductor materials copper and aluminium

Conductor resistances in mΩ/m



Comparison of electric conductor materials copper and aluminium

Weight of high-voltage cables screened in g/m



Packaging units

Single cores and light sheathed cables

KP 400
Cable packet, height: 400 mm

AFS 800
Octagonal drum, height: 800 mm

CFS 800
Coroplast drum, height: 800 mm

Coroplast offers tailor-made packaging units depending on the type, form and weight of the cable and on the cable diameter. A number of choices are possible. Some examples of conventional and usually used units are as follows.

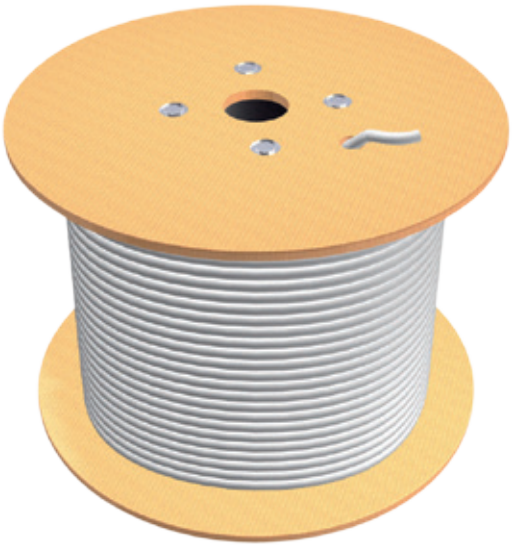
A real returnable packaging unit (multi-way) is the cable bundle. It is quick and easy to dismantle for return transport and refilling.

In addition to the Coroplast drum (barrel) as a returnable package (multi-way), the octagonal drum is suitable for carrying the same capacity as a one-way package. Both package units are available in 400 mm and 800 mm height.

Typical packaging units for the sheathed cables and heavy-weight battery and generator cables are the plywood and plastic reels. Both units are dismountable for return transport and can be reused.

Plywood reels are available in 600 mm and 800 mm diameter whereas the plastic reels from 270 mm up to 800 mm diameter suitably meet all requirements.

Sheathed cables and battery/generator cables



STR 800
Plywood reel, 800 mm

KTG 800
Plastic reel, 800 mm

Coroplast locations worldwide

Wires and Cables division – production sites:

Germany:	Wuppertal
China:	Kunshan
Poland:	Strzelce Opolskie

Adhesive Tapes and Cable Assemblies – production sites:

China:	Taicang, Mianyang
Mexiko:	Acámbaro
Poland:	Krapkowice, Dylaki
Tunisia:	El Kef, Hammamet
USA:	Rock Hill

For further information:
www.coroplast.de/en/company/locations-representatives/

Impressum

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