



# AUTOMOTIVE SOLUTIONS

## Portfolio



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# INTRODUCTION



## Group History

Condumex began its operations in 1954 in the industrial sector of Grupo Carso companies. Grupo Carso focuses mainly on the automotive, telecommunications, industrial, banking, infrastructure, construction, commercial, mining, energy sectors; and is certified as a socially responsible company.

Grupo Condumex develops technological solutions for connectivity, security, and energy mobility systems that add value and confidence to its customers, with the design, development, manufacture, logistics, and sequential delivery of cables, electrical/electronic distribution systems, and embedded software development.

Condumex has the following certifications: ISO9001, TS16949, ISO14001, ISO27001, ISO IEC17025, ISO50001, ISO 45001, UL.

## Automotive connectivity

Condumex's automotive customers demand cable and harness products that meet the strictest specifications. That is why the company has developed clients' testing and validation protocols.

Due to the growing need for mobility systems to use technological applications of communication, data, and autonomous systems, the company has developed cables to meet these needs, such as: coaxial, HSD, USB, LVDS, Ethernet, HDMI, and fiber optic.

## Environment

Condumex has developed solutions to reduce its weight by 40% by using aluminum alloys in aluminum conductors in round conductors. In addition to the use of copper alloys for the reduction of gauges, all aligned to the reduction of CO<sub>2</sub> and contribute to the improvement of autonomy of electric vehicles. The company's solutions in the market are: **bi Flat & Round®**, **bi Flat & Flat®**, **bi Cap & Lug®**

## Energy

Condumex developed primary, battery, special (alloys), and irradiated cables for supplying electrical energy for vehicles. This is to comply with different international standards such as ISO6722 and LV112, which specify requirements for low and high voltage cables intended for use in road vehicle applications; J1128 for Low Voltage Primary Cable; J1127 for Low Voltage Battery Cable; JASO D611 for low-voltage cables.



# SPECIFICATIONS AND PRODUCT SAFETY

## Specifications

We comply with various international directives for the development of our cables, among the main ones are the following:

### **REACH (Registration, Evaluation, Authorization and Restriction of Chemicals)**

Regulation of the European Union that was adopted in order to improve the protection of human health and the environment against the risks derived from chemical substances and mixtures, and at the same time enhance the competitiveness of the EU chemical industry. It also promotes alternative methods for assessing the hazard of substances, in order to reduce the number of animal tests.

### **RoHS (Restriction of Hazardous Substances)**

It is an EU Directive that restricts the use of 6 hazardous materials in the manufacture of various types of electrical and electronic equipment. It is part of a series of EU directives on environmental matters and is closely related to the WEEE Directive (Waste Electrical and Electronic Equipment).

### **Directive 2000/53/EC**

It establishes measures destined, as a priority, to the prevention of waste from vehicles and, additionally, to the reuse, recycling and other forms of valorization of the vehicles at the end of their useful life and their components, to reduce waste disposal and improve the effectiveness of environmental protection for all economic agents involved in the life cycle of vehicles and, more specifically, those directly involved in the treatment of vehicles at the end of their useful life.

## **Product Safety:**

All technically feasible and reasonable measures are taken at the organizational level for product safety, such as.

- a) Identification by the organization of statutory and regulatory product-safety performance.
- b) Customer notification of requirements in item a)
- c) Special approvals for design FMEA
- d) Identification of product safety-related characteristics
- e) Identification and controls of product safety-related characteristics and at the point of manufacture.
- f) Special approval of control plans and process FMEAs.
- g) Defined responsibilities, the definition of the escalation process, and flow of information, including top management and customer notification.
- h) Training identified by the organization or customer for personnel involved in product-safety related products and associated manufacturing processes.
- i) Changes of product or process shall be approved prior to implementation, including evaluation of potential effects on product-safety from process and product changes.
- j) Transfer of requirements with regard to product safety throughout the supply chain, including customer-designated sources.
- k) Product traceability by manufactured lot (at a minimum) throughout the supply chain.
- l) Lessons learned from new product introduction.

NOTE: Special approval is an additional authorization by the function (typically the customer) is responsible for approving such documents with safety-related content.

## COAXIAL CABLE RG-316



### Description:

- Solid copper conductor
- Solid polyethylene insulated
- Laminated aluminium foil (AP) + tinned copper braid
- Polyethylene jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FCA PF-10745
- GM coax cables

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800326-49	0.46±1%	1.50±0.08	38	90 min	2.79±0.10	Black	12	4000	-40 to + 85

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance (Ω)	DC inner conductor resistance Ω/Km	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	106 max	105 max	<1.5	66 min

Frequency (MHz)	Attenuation max(dB/100m)
200	33.76
900	74.48
1400	94.18
1800	107.89
2300	123.54

## COAXIAL CABLE RG-174LL



### Description:

- Solid copper conductor
- Solid polyethylene insulated
- Laminated aluminium foil (APA) + tinned copper braid
- Polyethylene jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FCA PF-10745

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800289-49	0.45±1%	1.58±0.08	38	85 min	2.86±0.13	Black	12	4000	-40 to + 85

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±2	115 max	105.6 max	<1.5	66 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	24.11	1200	84.72
200	33.02	1500	95.58
400	47.32	2000	111.76
700	63.81	2400	122.89
1000	77	3000	138.3

## COAXIAL CABLE RG-174LL



### Description:

- Solid copper clad steel conductor
- Solid polypropylene insulated
- Laminated aluminium foil (AP) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- ISO 19642
- GM coax cables

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800348-49	0.46±2%	1.52±0.05	38	90 min	2.80±0.10	Black	14	4000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±2	270 max	105 max	<1.3	66 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	24.29	1500	97.37
200	33.75	1800	107.35
400	48.43	2000	113.80
700	65.24	2500	128.83
1000	78.62	3000	143.06

## COAXIAL CABLE RG-174LL



### Description:

- Stranded copper clad steel conductor
- Solid polypropylene insulated
- Tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- VW75206-1
- LV 213-1
- ISO 19642

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800330-49	7 x 0.46±1%	1.50±0.05	38	86 min	2.80±0.10	Black	13	2000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	300 max	98 max	<1.22	66 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
50	18.55	1500	117.17
100	27.10	2000	138.15
400	57.08	3000	175.04
800	82.69	5600	264.31
1000	93.42	6000	278.31

## COAXIAL CABLE RG-174LL



### Description:

- Stranded copper clad steel conductor
- Solid polypropylene insulated
- Laminated aluminium foil (APA) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- ISO 19642
- GM coax cables
- VW N 108 223
- LV 213-1
- VW75206-1

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800349-49	7 x 0.46±2%	1.52±0.05	38	80 min	2.80±0.10	Black	13	4000	-40 to +105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	300 max	105 max	<1.3	66 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	27.53	2500	142.94
500	61.35	3000	158.32
1000	87.94	4000	187.84
1500	108.5	5000	215.98
2000	126.56	6000	243.28

## COAXIAL CABLE RG-174LL



### Description:

- Stranded copper conductor
- Solid polypropylene insulated
- Laminated aluminium foil (APA) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FCA PF-10745
- GM coax cables

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800320-49	7 x 0.53±2%	1.57±0.08	38	90 min	2.67±0.13	Black	14	4000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	96 max	105 max	<1.5	66 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	23.9	2500	128.41
500	53.53	3000	142.87
1000	77.59	4000	167.64
1500	96.38	5000	191.91
2000	112.85	6000	214.52

## COAXIAL CABLE RTK031



### Description:

- Stranded copper conductor
- Foamed polypropylene insulated
- Laminated aluminium foil (APA) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WIFI.

### Specifications:

- VW75206-1
- FORD FSB479-18812-A
- LV 213-1
- ISO 19642
- GM coax cables

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800279	7 x 0.78±4%	2.10±0.10	38	90 min	3.3±0.10	Black	19	4000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	52 max	88.5 max	1-3000MHz<1.30 3000-6000 MHz<1.50	75 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	17.93	2500	91.98
500	39.56	3000	102.03
1000	56.64	4000	120.09
1500	70.05	5600	149.59
2000	81.48	6000	157.56

## COAXIAL CABLE RTKO31-HT



### Description:

- Stranded copper conductor
- Foamed polypropylene insulated
- Copper foil (CP) + tinned copper braid
- PVC jackett

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FORD FSB479-18812-A

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800379	7 x 0.78±4%	2.10±0.10	38	90 min	3.3±0.10	Black	20	4000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±2	49 max	88.5 max	<1.3	75 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	15.91	2500	86.03
500	35.9	3000	96.17
1000	51.67	4000	114.9
1500	64.35	5000	133.34
2000	75.61	6000	152.63

## COAXIAL CABLE RTKO44



### Description:

- Solid copper conductor
- Foamed polypropylene insulated
- Laminated aluminium foil (APA) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FORD FSB479-18812-A
- LV 213-1
- ISO 19642
- VW75206-1
- GM coax cables

### Certifications:

- ISO-9001 quality system.
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800479	0.86±1%	2.40±0.05	38	90 min	3.50±0.10	Black	22	2000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±2	31 max	90 max	<1.3	78 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	14.4	2500	72.2
500	30.9	3000	80.5
1000	44.2	4000	98.2
1500	54.7	5000	110.5
2000	64	6000	124.4

## COAXIAL CABLE RTKO44-HT



### Description:

- Solid copper conductor
- Foamed polypropylene insulated
- Copper foil (CP) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FORD FSB479-18812-A
- ISO 19642

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800480-49	0.86±1%	2.40±0.05	38	90 min	3.50±0.10	Black	23	2000	-40 to + 105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±2	31 max	85 max	<1.3	80 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	13.5	2500	71.6
500	30.2	3000	79.8
1000	43.3	4000	95
1500	53.9	5000	108.8
2000	63.3	6000	124.1

## COAXIAL CABLE RG-58LL



### Description:

- Solid copper conductor
- Foamed polyethylene insulated
- Laminated aluminium foil (APA) + tinned copper braid
- Polyethylene jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FCA PF-10745
- FORD FSB479-18812-A
- GM coax cables

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800315-49	1.024±1%	2.95±0.08	34	85 min	4.95±0.13	Black	34	1524	-40 to +85

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	21 max	88.6 max	<1.3	78 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	11.21	2600	58.57
500	24.63	3000	63.21
1000	35.49	3400	67.43
1600	45.29	3600	69.43
2000	51.02	6000	92.06

## COAXIAL CABLE RG-58LL-HT



### Description:

- Solid copper conductor
- Foamed polypropylene insulated
- Copper foil (CP) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FORD FSB479-18812-A

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800337-49	1.024±1%	2.95±0.08	34	85 min	4.95±0.13	Black	40	1524	-40 to +105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±2	23 max	88.6 max	<1.3	75 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	10.83	2500	60.45
500	25.26	3000	67.49
1000	36.27	4000	80.66
1500	45.29	5000	93.47
2000	53.05	6000	106.28

## COAXIAL CABLE RG-58LL



### Description:

- Solid copper conductor
- Foamed polypropylene insulated
- Laminated aluminium foil (AP) + tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FCA PF-10745
- GM coax cables
- FORD FSB479-18812-A
- VW75206-1
- LV 213-1
- ISO 19642

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800361-49	1.024±1%	2.95±0.08	36	85 min	4.95±0.13	Black	35	1524	-40 to +105

\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance (Ω)	DC inner conductor resistance Ω/Km	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	21 max	88.6 max	Upto 1000 MHz<1.22 1000 to 6000 MHz<1.45	78 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	11.21	2600	58.57
500	24.63	3000	63.21
1000	35.49	3400	67.43
1600	45.29	3600	69.43
2000	51.02	6000	92.06

## COAXIAL CABLE RG-58LL



### Description:

- Stranded copper conductor
- Foamed polypropylene insulated
- Laminated aluminium foil (APA)+ tinned copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- GM coax cables
- ISO 19642

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800362-49	1.08±5%	2.95±0.05	36	90 min	4.90±0.10	Black	37	1524	-40 to +105

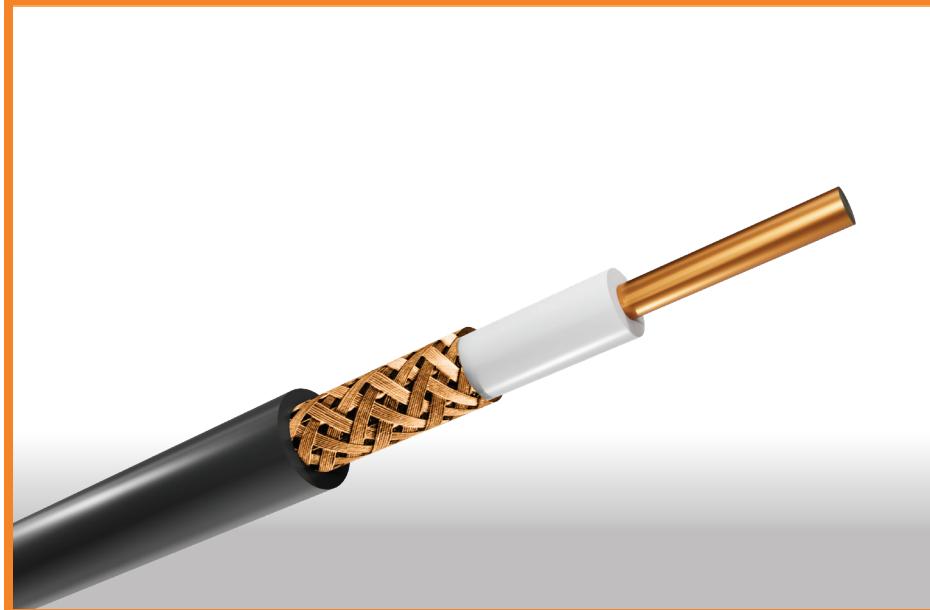
\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance (Ω)	DC inner conductor resistance Ω/Km	Capacitance (pF/m)	VSWR	Velocity of propagation %
50±3	26 max	88.6 max	Upto 1000MHz<1.22 1000 to 6000 MHz<1.43	78 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
100	11.1	2500	61.8
500	24.46	3000	69.78
1000	35.9	4000	86.68
1500	45.17	5000	107.24
2000	53.62	6000	129.53

## COAXIAL CABLE RG-59



### Description:

- Solid copper clad steel conductor
- Solid polyethylene insulated
- Bare copper braid
- PVC jacket

### Application:

- Receptor radio AM /FM, satellite audio & video, GPS navigator, cellular, WiFi.

### Specifications:

- FCA PF-10745

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor diameter (mm)	Insulation diameter (mm)	Diameter of braid wire (AWG)	Coverage %	Overall diameter (mm)	Color	Net weight (Kg/km)	Packing length (m)	Operating temperature (°C)
800316-49	0.57±1%	3.71±0.10	36	93 min	6.15±0.12	Black	50	914	-40 to +85

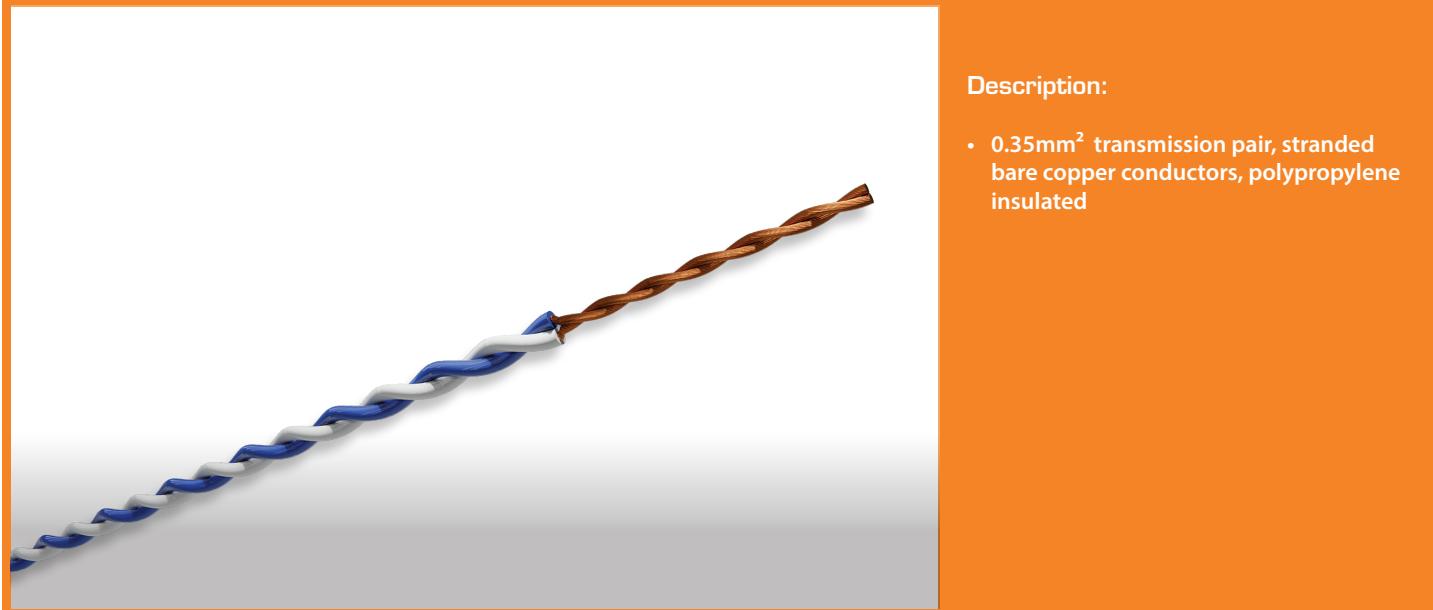
\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Characteristic impedance ( $\Omega$ )	DC inner conductor resistance $\Omega/\text{Km}$	Capacitance (pF/m)	VSWR	Velocity of propagation %
75±3	164 max	68.9 max	<1.5	66 min

Frequency (MHz)	Attenuation max(dB/100m)	Frequency (MHz)	Attenuation max(dB/100m)
1	1.29	200	16.4
5	2.41	400	23.67
10	3.53	700	32.16
50	7.98	900	36.91
100	11.44	1000	39.05

## CAN FD automotive cables

CAN FD CABLE 1x2/0.35 mm<sup>2</sup>**Description:**

- 0.35mm<sup>2</sup> transmission pair, stranded bare copper conductors, polypropylene insulated

**Application:**

- CAN FD connections cable por car applications.

**Specifications:**

- LV213
- VW75205

**Certifications:**

- ISO-9001 quality system
- IATF 16949

**Cable characteristics**

Product code	Conductor cross section (mm <sup>2</sup> )	Insulation diameter (mm)	Insulation color chart	Net weight (Kg/km)	Nominal packing length (m)	Operating temperature (°C)
659125	0.35	1.52±0.02	As customer request	11.1	1000	-40 to 125

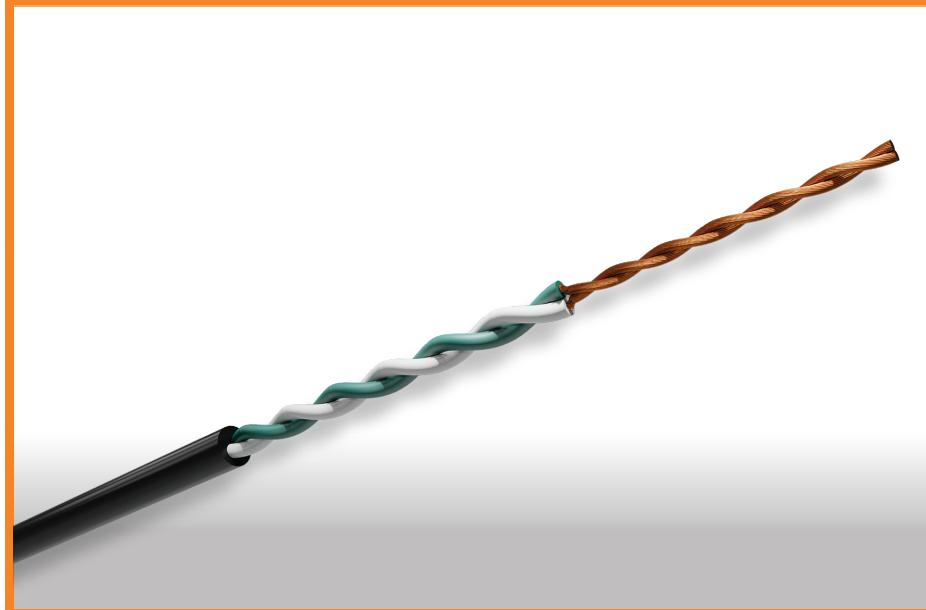
\*Nominal values, subject to manufacturing tolerance.

**Electrical characteristics @ 20°C**

Characteristic impedance (Ω)	Delay (max) ns/m	Frequency (MHz)	Attenuation max (dB)	Frequency (MHz)	Attenuation max (dB)
120	5.5	4	0.06	40	0.21

## J-UTP ethernet automotive cables

### J-UTP ETHERNET CABLE 1x2/0.35 mm<sup>2</sup>



#### Description:

- One transmission pair, 0.35mm<sup>2</sup> stranded bare copper conductors, crosslinked polyethylene insulated
- Integral crosslinked polyethylene jacket

#### Application:

- Automotive ethernet applications.

#### Specifications:

- ISO 19642
- SAE J3117
- BroadR-Reach OPEN Alliance

#### Certifications:

- ISO-9001 quality system
- IATF 16949

#### Cable characteristics

Product code	Conductor cross section (mm <sup>2</sup> )	Insulation diameter (mm)	Insulation color chart	Overall diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (m)	Operating temperature (°C)
659116	0.35	1.40±0.02	As customer request	3.66±0.1	Black	12.7	2000	-40 to 125

\*Nominal values, subject to manufacturing tolerance.

#### Electrical characteristics @ 20°C

Characteristic impedance (Ω)	Frequency (MHz)	Attenuation max (dB/m)	Frequency (MHz)	Return Loss (dB)	Frequency (MHz)	Conversion Loss (dB)
100±10	1	0.09	1.00	20.00	1.00	46.00
	10	0.24	20.00	20.00	50.00	46.00
	33	0.46	66.00	14.80	200.00	34.00
	66	0.68				

\*Maximum length of SCC = 10m

## J-UTP ethernet automotive cables

### J-UTP CuMg ETHERNET CABLE 1x2/0.13 mm<sup>2</sup>



#### Description:

- One transmission pair, 0.13mm<sup>2</sup> stranded CuMg conductors, polypropylene insulated
- PET tape separator
- Integral polypropylene jacket

#### Application:

- Automotive ethernet applications.

#### Specifications:

- LV213
- VW75206
- VW60306

#### Certifications:

- ISO-9001 quality system
- IATF 16949

#### Cable characteristics

Product code	Conductor cross section (mm <sup>2</sup> )	Insulation diameter (mm)	Insulation color chart	Overall diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (m)	Operating temperature (°C)
659124	0.13	1.0-0.2	As customer request	3.35-0.3	Black	9.6	500	-40 to 105

\*Nominal values, subject to manufacturing tolerance.

#### Electrical characteristics @ 20°C

Characteristic impedance (Ω)	Frequency (MHz)	Attenuation max (dB/m)	Frequency (MHz)	Attenuation max (dB/m)
100±10	1	0.06	33	0.31
	10	0.16	66	0.45

## FlexRay automotive cables

**FLEXRAY CABLE 1x2/0.35mm<sup>2</sup>****Description:**

- One transmission pair, 0.35mm<sup>2</sup> stranded tinned copper conductors, foamed polypropylene insulated
- PET tape separator
- Integral PVC flame retardant extruded jacket

**Application:**

- Automotive FlexRay applications.

**Specifications:**

- LV213
- VW75206
- VW60306
- Daimler H35/1

**Certifications:**

- ISO-9001 quality system
- IATF 16949

**Cable characteristics**

Product code	Conductor cross section (mm <sup>2</sup> )	Insulation diameter (mm)	Insulation color chart	Overall diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (m)	Operating temperature (°C)
659110	0.35	1.33±0.01	As customer request	4.00±0.1	Black	21.5	2000	-40 to 105

\*Nominal values, subject to manufacturing tolerance.

**Electrical characteristics @ 20°C**

Characteristic impedance (Ω)	Frequency (MHz)	Attenuation max(dB/km)	Frequency (MHz)	Attenuation max(dB/km)	Frequency (MHz)	Attenuation max(dB/km)
100±10	5	82	15	195	25	290
	10	140	20	245	30	500

## LVDS automotive cables

## LVDS CABLE 1x2/28AWG



## Description:

- One aluminized tape shielded transmission pair, 28 AWG stranded tinned copper conductors, polyethylene insulated
- Aluminized polyester tape + tinned copper drain wire + tinned copper wire braiding, 85% coverage as general shield
- Integral PVC flame retardant jacket

## Application:

- Multicore LVDS connections cable por car applications.

## Specifications:

- LV213
- TIA / EIA-644

## Certifications:

- ISO-9001 quality system
- IATF 16949

## Cable characteristics

Product code	Conductor gauge (AWG)	Insulation diameter (mm)	Overall Diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (m)	Operating temperature (°C)
657201	28(7x36)	1.10±0.05	4.00±0.15	Blue	17.2	500	-40 to 85

\*Nominal values, subject to manufacturing tolerance.

## Electrical characteristics @ 20°C

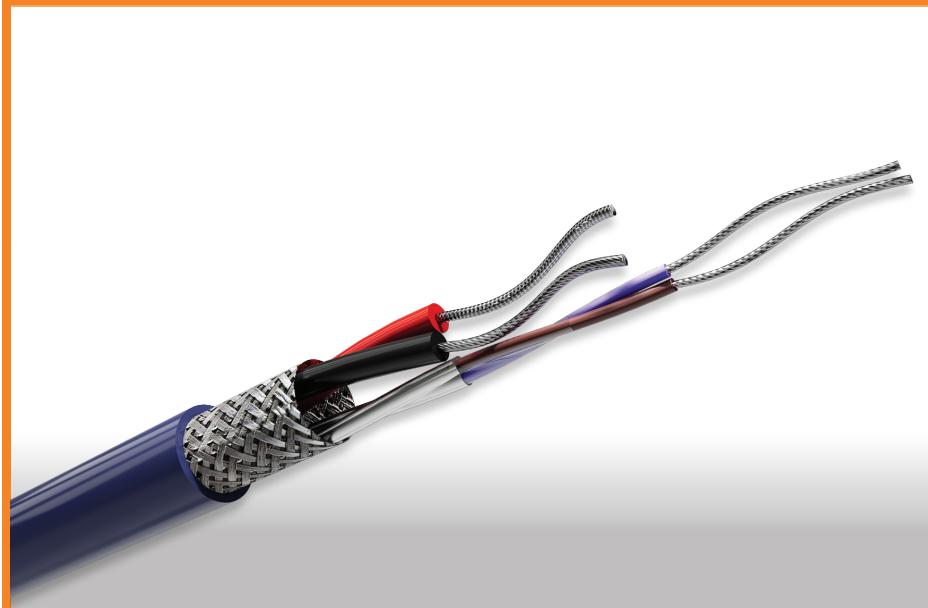
Characteristic impedance ( $\Omega$ )	Delay (max) ns/m	Propagation delay skew (max) ps/m
100±11.5	5.3	20

Frequency (MHz)	Attenuation max(dB/cable)	Frequency (GHz)	Attenuation max(dB/m)	Frequency (GHz)	Attenuation max(dB/m)
0.01	0.26	0.08	0.41	0.60	1.06
0.02	0.30	0.09	0.43	0.70	1.14
0.03	0.33	0.10	0.44	0.80	1.22
0.04	0.36	0.20	0.60	0.90	1.30
0.05	0.37	0.30	0.71	1.00	1.40
0.06	0.39	0.40	0.84	1.50	1.80
0.07	0.40	0.50	0.96	3.00	2.70

Maximum Differential Insertion Loss (SDD21): At 5 m length should be tested according to EIA-364-101 before and after USCAR 30 environmental tests.

## USB 2.0 automotive cables

## USB 2.0 4-WIRE CABLE 1x2/26AWG + 2/20AWG

**Description:**

Composite cable consisting of:

- One aluminized tape shielded transmission pair, 26 AWG stranded tinned copper conductors, crosslinked polyethylene insulated
- Two power conductors, 20AWG stranded tinned copper conductors, crosslinked polyethylene insulated
- Tinned copper wire braiding, 85% coverage
- Integral PVC flame retardant jacket

**Application:**

- USB Multicore cable
- Host connection cable for car application.

**Specifications:**

- USB 2.0
- JASO D618

**Certifications:**

- ISO-9001 quality system
- IATF 16949

**Cable characteristics**

Product code	Conductor gauge (AWG)		Insulation diameter (mm)		Overall diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (m)	Operating temperature (°C)
	Transmission	Power	Transmission	Power					
660312	26 (7x34)	20(21x33)	1.15±0.05	1.65±0.05	5.47±0.17	Black	52.9	300	-40 to 85

\*Nominal values, subject to manufacturing tolerance.

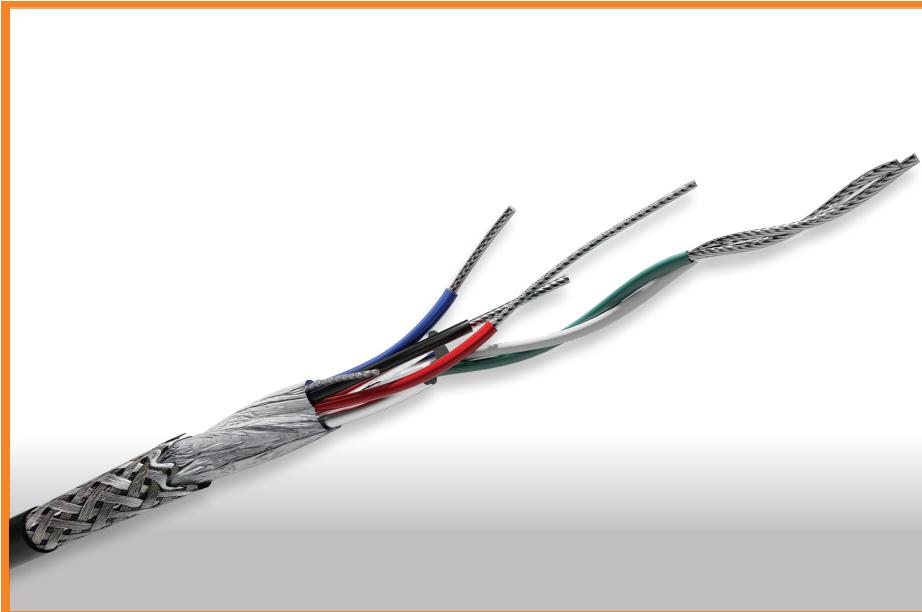
**Electrical characteristics @ 20°C**

Characteristic impedance ( $\Omega$ )	Delay (max) ns/m	Propagation delay skew (max) ps/m
90±10	5.2	20

Frequency (MHz)	Attenuation max(dB/m)	Frequency (MHz)	Attenuation Max(dB/m)	Frequency (MHz)	Attenuation max(dB/m)
0.512	0.026	12	0.140	200	0.488
0.772	0.031	24	0.226	250	0.521
1	0.040	48	0.273	400	0.771
4	0.079	96	0.365	500	0.836
8	0.113	100	0.373	900	1.362

## USB 2.0 automotive cables

## USB 2.0 5-WIRE CABLE 1X2/28AWG + 2/20AWG + 1/28 AWG

**Description:**

Composite cable consisting of:

- One aluminized tape shielded transmission pair, 28 AWG stranded tinned copper conductors, polyethylene insulated
- Two power conductors, 20AWG stranded tinned copper conductors, PVC insulated
- One signal conductor, 28 AWG stranded tinned copper conductor, polyethylene insulated
- Aluminized polyester tape + tinned copper drain wire + tinned copper wire braiding, 85% coverage as general shield
- Integral PVC flame retardant jacket

**Application:**

- USB Multicore cable
- Host connection cable for car application.

**Specifications:**

- USB 2.0

**Certifications:**

- ISO-9001 quality system
- IATF 16949

**Cable characteristics**

Product code	Conductor gauge (AWG)			Insulation diameter (mm)		Overall Diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (ft)	Operating temperature (°C)
	Transmission/ Signal	Power	Drain	Transmission/ Signal	Power					
662636	28(7x36)	24(7x32)	28(7x36)	0.90±0.04	1.00±0.05	4.7±0.15	Black (matte)	33.6	500	-40 to 105

\*Nominal values, subject to manufacturing tolerance.

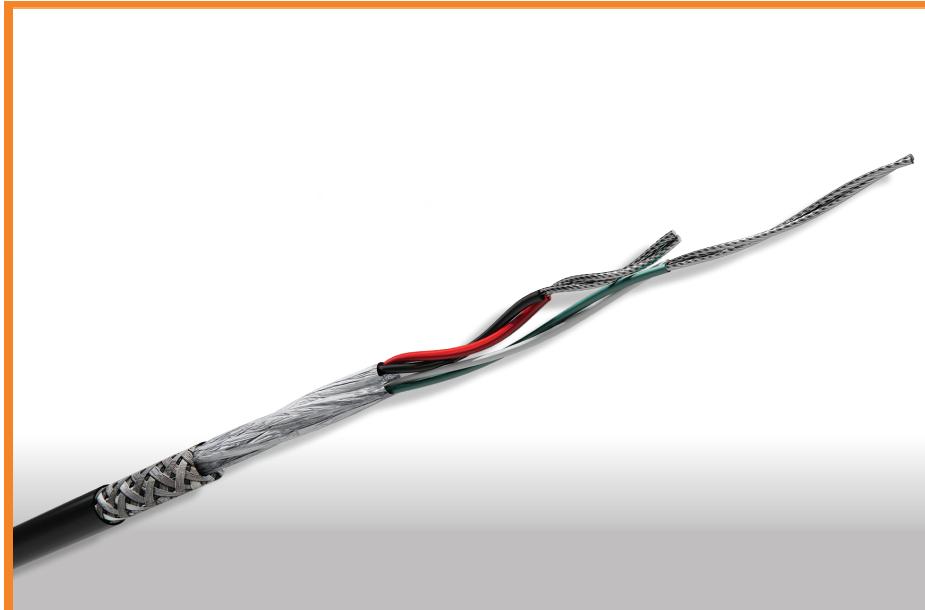
**Electrical characteristics @ 20°C**

Characteristic impedance (Ω)	Delay (max) ns/m	Propagation delay skew(max) ps/3m
90±10	5.15	75

Frequency (MHz)	Attenuation Max(dB)	Frequency (MHz)	Attenuation Max(dB)	Frequency (MHz)	Attenuation Max(dB)
0.512	0.3	8	0.9	96	2.5
0.772	0.35	12	1	200	3.2
1	0.4	24	1.3	400	5.8
4	0.6	48	1.75		

## USB 2.0 automotive cables

## USB 2.0 4-WIRE CABLE 1X2/28AWG + 2/24AWG

**Description:**

Composite cable consisting of:

- One transmission pair, 28 AWG stranded tinned copper conductors, polypropylene insulated
- Two power conductors, 24AWG stranded tinned copper conductors, SR-PVC insulated
- Aluminized polyester tape + tinned copper drain wire + tinned copper wire braiding, 85% coverage as general shield
- Integral PVC flame retardant Jacket

**Application:**

- USB Multicore cable.
- Host connection cable for car application.

**Specifications:**

- USB 2.0

**Certifications:**

- ISO-9001 quality system
- IATF 16949

**Cable characteristics**

Product code	Conductor gauge (AWG)			Insulation diameter (mm)		Overall Diameter (mm)	Color	Net weight (Kg/km)	Nominal packing length (ft)	Operating temperature (°C)
	Transmission	Power	Drain	Transmission	Power					
662636	28(7x36)	24(7x32)	28(7x36)	0.90±0.04	1.00±0.05	4.7±0.15	Black (matte)	33.6	1500	-40 to 105

\*Nominal values, subject to manufacturing tolerance.

**Electrical characteristics @ 20°C**

Characteristic impedance (Ω)	Delay (max) ns/m	Propagation delay skew (max) ps/m
90±13.5	5.2	100

Frequency (MHz)	Attenuation Max(dB/cable)	Frequency (MHz)	Attenuation Max(dB/cable)	Frequency (MHz)	Attenuation Max(dB/cable)
1	0.20	12	0.76	96	1.90
4	0.39	24	0.95	200	3.20
8	0.57	48	1.35	400	5.80

Maximum cable length: 3m

Shielded power cables with improved heat resistance

## AUTOMOTIVE CABLE FHLALR2GCB2G



### Description:

- Conductor: EN AW-1370 [Al99.7], aluminum, DIN EN 573-3
- Insulation: silicon rubber (SIR) -40 °C to 180 °C, 3000 h
- Screening braid: tinned copper max. 0.21 mm covering 85%
- Foiled shielding: ALU- PET foil covering min. 20%
- Sheath: silicon rubber (SIR) -40 °C to 180 °C, 3000 h

### Application:

- Power cable for hybrid vehicles powertrain.

### Maximum voltage operation:

- 600 V AC /1000 V DC

### Thermal range:

- -40 °C to 180 °C 3,000 hr.

### Specification:

- VW 75210-2
- ISO 6722
- VW 60306

### Dimensional

VW DWG.	Type	Conductor				Insulation		Shielding	Sheath			
		Number of cores x cross section	Number of individual wires	Diameter max. Of individual wires	Resistance 20°C max.	Minimum wall thickness	Outside diameter		Resistance 20°C max.	Minimum wall thickness		
		mm <sup>2</sup>	mm	mm	Ω/km	mm	Min-max mm	Ω/km	mm	Min-max mm		
N 107 827	FHLALR2GCB2G	1x16	78 (± 5%)	0,51	1,93	0,52	6,5	7,0	8,4	0,70	9,6	10,2
N 107 828	FHLALR2GCB2G	1x25	122 (± 5%)	0,51	1,23	0,64	8,2	8,8	4,0	0,75	11,6	12,2
N 107 829	FHLALR2GCB2G	1x35	172 (± 5%)	0,51	0,873	0,64	10,5	9,6	3,0	0,80	13,8	14,4
N 107 830	FHLALR2GCB2G	1x40	193 (± 5%)	0,51	0,784	0,71	10,4	11,1	3,0	0,80	14,4	15,0
N 107 831	FHLALR2GCB2G	1x50	247 (± 5%)	0,51	0,610	0,71	11,5	12,2	3,0	0,80	15,2	15,8

## Shielded power cables with improved heat resistance

## AUTOMOTIVE CABLE FHLR2GCB2G

**Description:**

- Conductor: Cu -ETP 1 according to DIN EN 13602
- Insulation: silicon rubber (SIR) -40 °C to 180 °C
- Braiding shielding: tinned copper, max. 0.21 mm, covering min. 85%
- Foiled shielding: ALU- PET foil metal side in contact to screen overload min. 20%
- Sheath: silicon rubber (SIR) -40 °C to 180 °C

**Application:**

- Power cable for hybrid vehicles powertrain.

**Maximum voltage operation:**

- 600 V AC / 1000 V DC

**Thermal range:**

- -40 °C to 180 °C 3,000 hr.

**Specification:**

- VW 75210-2
- VW 60306
- ISO 6722

**Dimensional**

VW DWG.	Type	Conductor				Insulation		Shielding	Sheath			
		Number of cores x cross section	Number of individual wires	Diameter max. Of individual wires	Resistance 20°C max.	Minimum wall thickness	Outside diameter		Resistance 20°C max.	Minimum wall thickness		
		mm <sup>2</sup>	mm	mm	Ω/km	mm	Min-max mm	m Ω/m	mm	Min-max mm		
N 107 755	FHLR2GCB2G	1x16	512 (± 5%)	0,21	1,16	0,52	6,6	7,2	8,4	0,70	9,6	10,2
N 107 776	FHLR2GCB2G	1x25	790 (± 5%)	0,21	0,743	0,64	8,2	8,8	5,1	0,75	11,6	12,2
N 107 777	FHLR2GCB2G	1x35	1070 (± 5%)	0,21	0,527	0,64	9,8	10,5	4,4	0,80	13,8	14,4
N 107 756	FHLR2GCB2G	1x50	1600 (± 5%)	0,21	0,368	0,71	11,5	12,2	3,8	0,80	15,2	15,8
N 108 485	FHLR2GCB2G	1x70	2175 (± 5%)	0,21	0,259	0,80	13,0	14,4	3,2	0,80	17,4	18,2
N 108 338	FHLR2GCB2G	1x95	3000 (± 5%)	0,21	0,196	0,90	15,8	17,2	2,2	0,92	20,1	20,9

## Unshielded power cables with improved heat resistance

## AUTOMOTIVE CABLE FHL2G

**Description:**

- Conductor: Cu -ETP 1 according to DIN EN 13602, stranded bare copper
- Insulation: silicon rubber (SIR) -40 °C to 180 °C, 3000 h

**Application:**

- Power cable for hybrid vehicles powertrain.

**Maximum voltage operation:**

- 600 V AC /1000 V DC

**Thermal range:**

- -40 °C to 180 °C 3,000 hr.

**Specification:**

- VW 75210-1
- ISO 6722
- N108557
- N108174
- N108558
- N108559
- N108560

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Insulation			
		Number of individual wires mm	Strand diameter (mm)	Conductor resistance at 20°C (mΩ/m)	Wall thickness (mm)	Outside cable diameter (mm)		
			Max	Max		Min	Max	
FHL2G	10.00	320	0.21	1.82	0.80	5.90	6.50	
FHL2G	16.00	512	0.21	1.16	0.80	7.70	8.30	
FHL2G	25.00	790	0.21	0.743	1.04	9.40	10.00	
FHL2G	53.00	1070	0.21	0.527	1.04	10.30	11.00	
FHL2G	50.00	1600	0.21	0.368	1.20	12.40	13.20	
FHL2G	70.00	2175	0.21	0.259	1.20	14.30	15.10	
FHL2G	95.00	3000	0.21	0.196	1.28	16.40	17.40	

High voltage unshielded cable

## AUTOMOTIVE CABLE FHLR2G2G



### Description:

- Conductor: Cu -ETP 1 according to DIN EN 13602, stranded bare copper
- Insulation: silicon rubber (SIR) -40 °C to 180 °C
- Stranding: lay length 100 +/-10 mm
- Sheath: silicon rubber (SIR) -40 °C to 180 °C

### Application:

- Unshielded cable for motor vehicle

### Maximum voltage operation:

- 600 V AC / 1000 V DC

### Thermal range:

- -40 °C to 180 °C 3,000 hr.

### Specification:

- VW 75210-1

### Dimensional

VW DWG.	Type	Conductor				Insulation			Sheath		
		Nr. cores x cross section	Nr. individual wires	D max. individual wires	Resist. 20°C max.	Min. wall thickness	Outside Diameter		Minimum wall thickness	Outside Diamete	
		Min	mm	mm	Ω/km	mm	Min-max mm		mm	Min-max mm	
N 108 570	FHLR2G2G	3x6	84 (± 5%)	0,31	3,3	0,28	4,0	4,3	0,90	11,2	11,8
N 108 555	FHLR2G2G	4x6	84 (± 5%)	0,31	3,3	0,28	4,0	4,3	0,90	12,4	13,0
N 108 556	FHLR2G2G	5x6	84 (± 5%)	0,31	3,3	0,28	4,0	4,3	0,90	13,7	14,3

Shielded power cables with improved heat resistance

## AUTOMOTIVE CABLE FHLR2G2GCB2G



### Description:

- Conductor: Cu -ETP 1 according to DIN EN 13602, stranded bare copper
- Insulation: silicon rubber (SIR) -40 °C to 180 °C, 3000 h
- Inner sheath: silicon rubber (SIR) -40 °C to 180 °C, 3000 h
- Braiding screen: tinned copper, max. 0.21 mm, optical covering min.: 85%
- Foiled shielding: ALU- PET foil, metal side in contact to screen overload min. 20%
- Sheath: silicon rubber (SIR) -40 °C to 180 °C, 3000 h

### Application:

- Power cable for hybrid vehicles powertrain

### Maximum voltage operation:

- 60 V CD (25 V AC)

### Thermal range:

- -40 °C to 180 °C 3,000 hr.

### Specification:

- VW 75210-2
- ISO 6722
- VW60306

### Dimensional

VW DWG.	Type	Conductor				Insulation		Inner sheath		Shielding	Sheath	
		Nr. cores x cross section	Nr. individual wires	D max. individual wires	Resist. 20°C max.	Min. wall thick.	Outside Diam.	Outside Diam.	Min. wall thick.	Resistance 20°C max	Minimum wall thick.	Outside diam.
		mm2	mm	mm	Ω/km	mm	Min-max mm	Min-max mm	mm	Ω/km	mm	Min-max mm
N 107 839	FHLR2G2GCB2G	3x2,5	50 (± 5%)	0,26	7,8	0,24	3,0	2,7	7,0	7,4	0,38	7,8
N 107 755	FHLR2G2GCB2G	2x4	56 (± 5%)	0,31	4,8	0,28	3,4	3,7	7,9	8,3	0,38	7,3
N 108 073	FHLR2G2GCB2G	3x4	56 (± 5%)	0,31	4,8	0,28	3,4	3,7	8,5	8,9	0,38	5,0
N 108 074	FHLR2G2GCB2G	4x4	56 (± 5%)	0,31	4,8	0,28	3,4	3,7	9,4	9,8	0,38	4,0
N 108 041	FHLR2G2GCB2G	2x6	84 (± 5%)	0,31	3,2	0,28	4,0	4,3	9,3	9,7	0,38	5,0
N 108 062	FHLR2G2GCB2G	3x6	84 (± 5%)	0,31	3,2	0,28	4,0	4,3	10,0	10,5	0,38	3,0
N 108 778	FHLR2G2GCB2G	4x6	84 (± 5%)	0,31	3,2	0,28	4,0	4,3	10,9	11,4	0,38	3,8
N 108 166	FHLR2G2GCB2G	5x6	84 (± 5%)	0,31	3,2	0,28	4,0	4,3	13,0	13,5	0,38	3,8
											0,90	15,7
											0,90	16,3

## Automotive copper tin alloy primary low voltage cable

### AUTOMOTIVE CABLE FLCuSn03RY



#### Description:

- Conductor: copper tin alloy (CuSn03) ASTM B 105 & DIN CN/TS 13388
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thin wall

#### Application:

- Automotive harness.

#### Maximum voltage operation:

- 60 V CD (25 V AC)

#### Thermal range:

- -40 °C to 105 °C 3,000 hr.

#### Specification:

- GMW 15626
- VW 60306-4
- MBN LV-112-1
- ISO 6722-1

#### Approvals:

- GMW 15626
- VW 60306-4
- MBN LV-112-1

#### Characteristics copper tin alloy

TYPE	Electrical conductivity	Tensile strength	Elongation at break
CuSn	72%, IACS	> 620 N/mm <sup>2</sup>	> 1%

-The values are for reference.

#### Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20 °C	Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Min	Max	Min	Max
FLCuSn03RY-A	0.13	7	0.166	0.139	0.48	25	142.8	170.0	0.20	0.95

## Automotive copper magnesium alloy primary low voltage cable

### AUTOMOTIVE CABLE FLCuMgO2RY



#### Description:

- Conductor: copper magnesium alloy (CuMgO2) ASTM B 105
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thin wall

#### Application:

- Automotive harness.

#### Maximum voltage operation:

- 60 V CD (25 V AC)

#### Thermal range:

- 40 °C to 105 °C 3,000 hr.

#### Specification:

- GMW 15626
- ES BR33 1A348 AA
- VW 60306-4
- ISO 6722-1

#### Approvals:

- GMW 15626
- ES BR33 1A348 AA
- VW 60306-4

#### Characteristics copper magnesium alloy

TYPE	Electrical conductivity	Tensile strength	Elongation at break
CuMg	75%, IACS	> 670 N/mm <sup>2</sup>	> 1%

- The values are for reference.

#### Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable			
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20 °C	Wall thickness (mm)	Outside cable diameter (mm)		
				Max	Min	Max	Max	Min	Max		
FLCuMgO2RY-A	0.13	7	0.159	0.134	0.48	25	142.8	170.0	0.20	0.95	1.05

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE FLALY-BATTERY

**Description:**

- Conductor: bare aluminum
- Type EN AW-1370 (EAI99, 7)
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thick wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- VW 60306-2
- LV 112-2

**Approvals:**

- VW 60306-2

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)		Wall thickness (mm)	Outside cable diameter (mm)		
				Max	Min	Max	Min	Max	Min	Min	Max
FLALRY-B	60	280	0.52	46.9	10.4	0.486	0.525	0.90	12.65	13.15	
FLALRY-B	85	400	0.52	54.7	13.2	0.338	0.365	1.26	15.10	16.30	
FLALRY-B	120	568	0.52	113.0	15.0	0.236	0.255	1.38	17.60	18.65	

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE FLALYW-BATTERY

**Description:**

- Conductor: bare aluminum
- Type EN AW-1370 (EAI99, 7)
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thick wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- LV 112-2

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Cable			
		Number of strands	Strand diameter (mm)	Conductor resistance at 20 °C	Wall thickness (mm)	Outside cable diameter (mm)		
			Max	Max		Min	Min	Max
FLALYW	42.00	192	0.51	0.74	1.04	10.90	11.90	

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE FLALRY-BATTERY

**Description:**

- Conductor: bare aluminum Type EN AW-1370 (EAI99, 7)
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- VW 60306-2
- LV 112-2

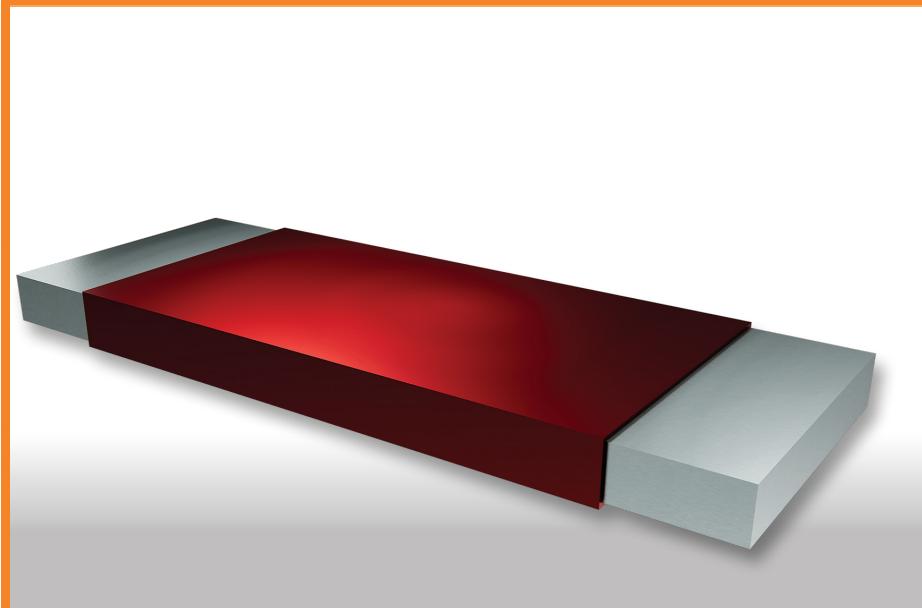
**Approvals:**

- VW 60306-2

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)		Wall thickness (mm)	Outside cable diameter (mm)		
				Max	Min	Max	Min	Max	Min	Max	
FLALRY-B	10.0	50	0.52	9.74	4.5	2.810	3.030	0.50	5.40	5.80	
FLALRY-B	16.0	78	0.52	14.9	5.5	1.790	1.930	0.54	6.50	7.00	
FLALRY-B	35.00	172	0.52	32.7	8.3	0.813	0.878	0.66	9.80	10.40	
FLALRY-B	40.00	193	0.52	36.5	8.6	0.730	0.788	0.72	10.40	11.10	
FLALRY-B	50.00	247	0.52	46.9	9.8	0.568	0.613	0.74	11.50	12.20	
FLALRY-B	85.00	280	0.52	54.7	10.4	0.486	0.525	0.8	12.50	13.30	
FLALRY-B	120.00	568	0.52	11.3	15.4	0.236	0.255	1.77	17.60	18.80	

## ALUMINUM BUS BAR



### Description:

- Aluminum alloy (Al 99.7%) conductor
- PVC insulated

### Application:

- Battery busbar.

### Specifications:

- VW 8W0.971.253
- VW 8W0.971.253.A

### Certifications:

- ISO-9001 quality system
- IATF 16949

### Cable characteristics

Product code	Conductor width (mm)	Conductor height (mm)	Insulation width (mm)	Insulation height (mm)	Net weight (Kg/km)	Color	Packing length (m)	Operating temperature (°C)
520060-69	20±0.15	2.85±0.15	22.40±0.20	5.30±0.20	257	Red	2000	-40 to + 105
520120-69	30±0.15	3.70±0.10	32.80±0.20	6.60±0.20	472			

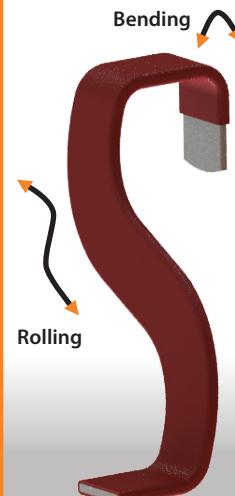
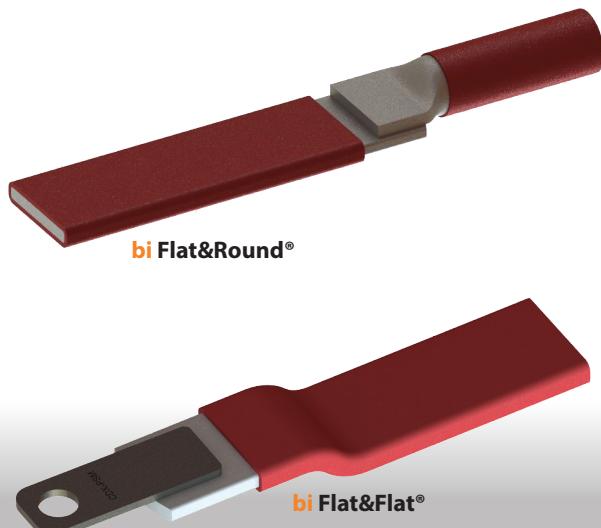
\*Nominal values, subject to manufacturing tolerance.

### Electrical characteristics

Product code	Conductor resistance (Ω)
520060-69	0.53 max
520120-69	0.27 max

## Automotive battery cable subassembly

## ALUMINUM BATTERY SUBASSEMBLY FLAT CABLE (BUS BAR)

**Description:**

- Conductor: aluminum alloy 1370
- Insulation: PVC -40 °C to 105 °C
- Wall thickness: thin wall
- Terminal: C26000
- Surface protection: Ni
- Sealing: heat shrink tube

**Application:**

- Automotive battery harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- 40 °C to 105 °C

**Specification:**

- DIN EN 573-3
- ISO 4527
- DIN 2.0265

**Process:**

- Ultrasonic welding for:
  - Bimetallic flat cable-terminal
  - Flat cable-round cable

Rolling and bending for flat cable (bus bar)

**Trademarks:**

- bi Flat&Round®**
- bi Flat&Flat®**
- bi Cap&Lug®**

**Flat cable (bus bar) – round cable**

Round cable size mm <sup>2</sup>	Flat cable size mm <sup>2</sup>	
	60	120
25	•	
60	•	•
85	•	•
120		•

**Flat cable (bus bar) – terminal**

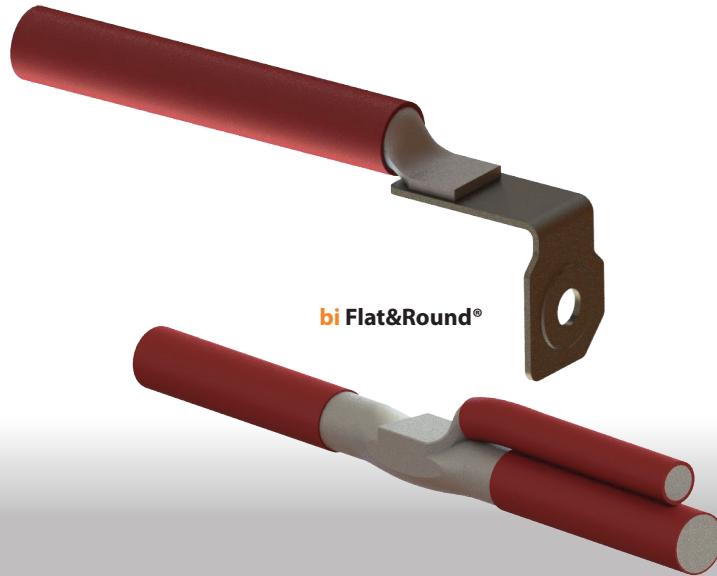
Flat cable size mm <sup>2</sup>	Terminal thickness mm	Surface protection µm
60	2.5	6
120	2.5	6

**Flat cable (bus bar)**

Flat cable size mm <sup>2</sup>	Minimum bending radius mm	Minimum rolling radius µm
60	10	50
120	10	50

## Automotive battery cable subassembly

## ALUMINUM BATTERY SUBASSEMBLY ROUND CABLE



## Description:

- Conductor: Aluminum alloy 1370
- Insulation: PVC -40 °C to 105 °C
- Wall thickness: thin wall
- Terminal: C26000
- Surface protection: Ni
- Sealing: heat shrink tube

## Application:

- Automotive battery harness.

## Maximum voltage operation:

- 60 V CD (25 V AC)

## Thermal range:

- -40 °C to 105 °C

## Specification:

- DIN EN 573-3
- ISO 4527
- DIN 2.0265

## Process:

- Ultrasonic welding for:
- Bimetallic cable-terminal
  - Cable-cable (splice)

## Trademarks:

- bi Flat&Round®
- bi Flat&Flat®
- bi Cap&Lug®

## Splice combinations

Cable size mm <sup>2</sup>	Cable size mm <sup>2</sup>			
	25	60	85	120
25	•	•	•	•
60	•	•	•	•
85	•	•	•	
120	•	•		

## Cable-Terminal

Cable size mm <sup>2</sup>	Terminal thickness mm	Surface protection µm
25	1.6	6
60	2.5	6
85	2.5	6
120	4	6

## Automotive and motorcycle primary low voltage

## AUTOMOTIVE AND MOTORCYCLE CABLE CIVUS

**Description:**

- Conductor: conductor of the wire shall be right-hand stranded (S-stranded) and round-compacted annealed copper wires which conform to JIS C 3102 (Annealed copper wires for electrical purposes) as specified in exhibit table Any splices (joints) shall not be allowed in the conductor
- Insulation: lead-free heat resistant insulation acc. to JASO D609, JASO D611 and ISO 6722
- Example for order identification: cable CIVUS ultra-thin wall

**Application:**

- Wires used in low voltage circuits for automobiles (vehicles and motorcycles).

**Maximum voltage operation:**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +85 °C

**Specification:**

- JIS C 3102
- JASO D609
- JASO D611
- ISO 6722

**Approvals:**

- Honda
- Nissan
- Renault
- Toyota

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
							Max	Max	Min
CIVUS	0.35	7	0.27	0.343	0.70	54.40	0.17	1.06	1.20
CIVUS	0.50	7	0.32	0.494	0.85	37.10	0.17	1.21	1.40
CIVUS	0.75	11	0.31	0.726	1.00	24.70	0.17	1.36	1.60
CIVUS	1.00	16	0.30	0.985	1.20	18.50	0.17	1.56	1.75
CIVUS	1.25	16	0.33	1.247	1.40	14.90	0.17	1.76	2.00

**Grades:**

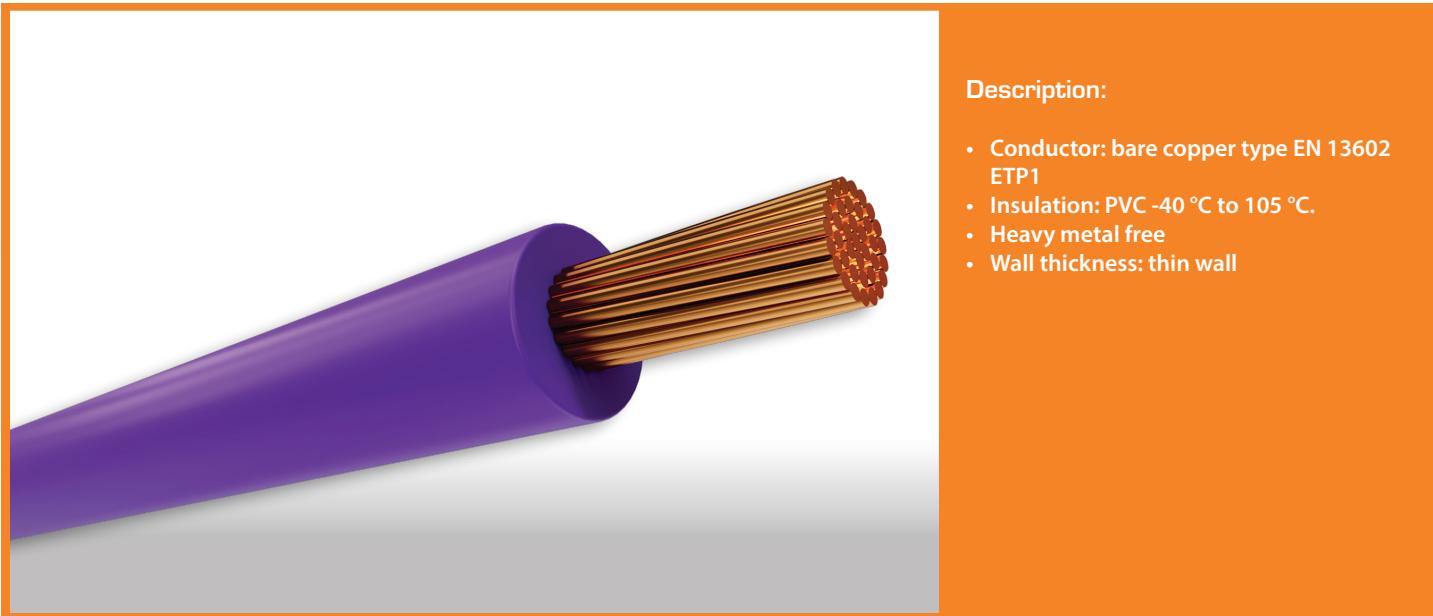
These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE FLRY

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 105 °C.
- Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- MS 90034
- VW 60306-1
- MBN LV 112-1
- LV 112-1
- GS 95007-1-1
- ISO 6722-1

**Approvals:**

- GMW 15626
- ES-AU5T-1A348-AA
- MS 90034
- VW 60306-1
- MBN LV 112-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Min	Max	Max	Min	Max	Min	Min	Max
FLRY-A	0.35	7	0.27	0.317	0.9	33	50.00	54.40	0.20	1.20	1.30
FLRY-A	0.50	19	0.19	0.465	1.1	50	34.10	37.10	0.22	1.40	1.60
FLRY-A	0.75	19	0.24	0.698	1.3	50	22.70	24.70	0.24	1.70	1.90
FLRY-A	1.00	19	0.27	0.932	1.5	50	17.00	18.50	0.24	1.90	2.10
FLRY-A	1.50	19	0.33	1.36	1.8	50	11.70	12.70	0.24	2.20	2.40
FLRY-A	2.00	19	0.38	1.83	2.2	50	8.66	9.42	0.28	2.50	2.80

## Automotive primary low voltage cable

**AUTOMOTIVE CABLE FLRY**

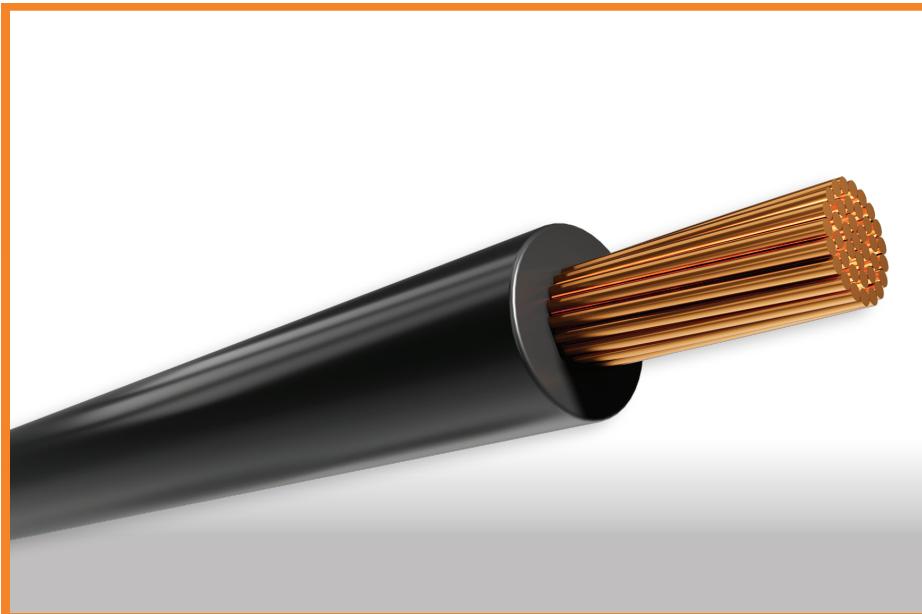
## Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	Min
		Max	Min	Max	Max	Min	Max	Min	Min	Max	Max
FLRY-B	0.35	12	0.21	0.332	0.9	33	50.00	54.40	0.20	1.20	1.30
FLRY-B	0.50	16	0.21	0.465	1	50	34.10	37.10	0.22	1.40	1.60
FLRY-B	0.75	24	0.21	0.698	1.2	50	22.70	24.70	0.24	1.70	1.90
FLRY-B	1.00	32	0.21	0.932	1.4	50	17.00	18.50	0.24	1.90	2.10
FLRY-B	1.50	30	0.26	1.36	1.7	50	11.70	12.70	0.24	2.20	2.40
FLRY-B	2.50	50	0.26	2.27	2.2	50	6.99	7.60	0.28	2.50	2.80
FLRY-B	3.00	44	0.31	2.8	2.4	76	5.66	6.15	0.32	3.10	3.40
FLRY-B	4.00	56	0.31	3.66	2.8	76	4.33	4.71	0.32	3.40	3.70
FLRY-B	5.00	65	0.33	4.38	3.1	76	3.62	3.94	0.32	3.90	4.20
FLRY-B	6.00	84	0.31	5.49	3.4	76	2.89	3.14	0.32	4.00	4.30
FLRY-B	8.00	50	0.46	7.24	4.3	76	2.19	2.38	0.32	4.60	5.00

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	Min
		Max	Min	Max	Max	Min	Max	Min	Min	Max	Max
FLRY-S	0.35	7	0.27	0.332	0.9	33	50.00	54.40	0.20	1.20	1.30
FLRY-S	0.50	19	0.19	0.465	1.00	50	34.10	37.10	0.22	1.40	1.60
FLRY-S	0.75	19	0.24	0.698	1.2	50	22.70	24.70	0.24	1.70	1.90
FLRY-S	1.00	19	0.27	0.932	1.4	50	17.00	18.50	0.24	1.90	2.10
FLRY-S	1.50	19	0.33	1.36	1.7	50	11.70	12.70	0.24	2.20	2.40
FLRY-S	2.00	19	0.38	1.83	2.2	50	8.66	9.42	0.28	2.50	2.80
FLRY-S	2.50	37	0.30	2.27	2.2	50	6.99	7.60	0.28	2.50	2.80
FLRY-S	3.00	44	0.31	2.8	2.4	76	5.66	6.15	0.32	3.10	3.40
FLRY-S	4.00	56	0.31	3.66	2.8	76	4.33	4.71	0.32	3.40	3.70
FLRY-S	5.00	70	0.31	4.38	3.1	76	3.62	3.94	0.32	3.90	4.20
FLRY-S	6.00	84	0.31	5.49	3.4	76	2.89	3.14	0.32	4.00	4.30

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE FLRY-BATTERY

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 105 °C.
- Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- MS 90034
- VW 60306-1
- MBN LV 112-1
- LV 112-1
- ISO 6722-1

**Approvals:**

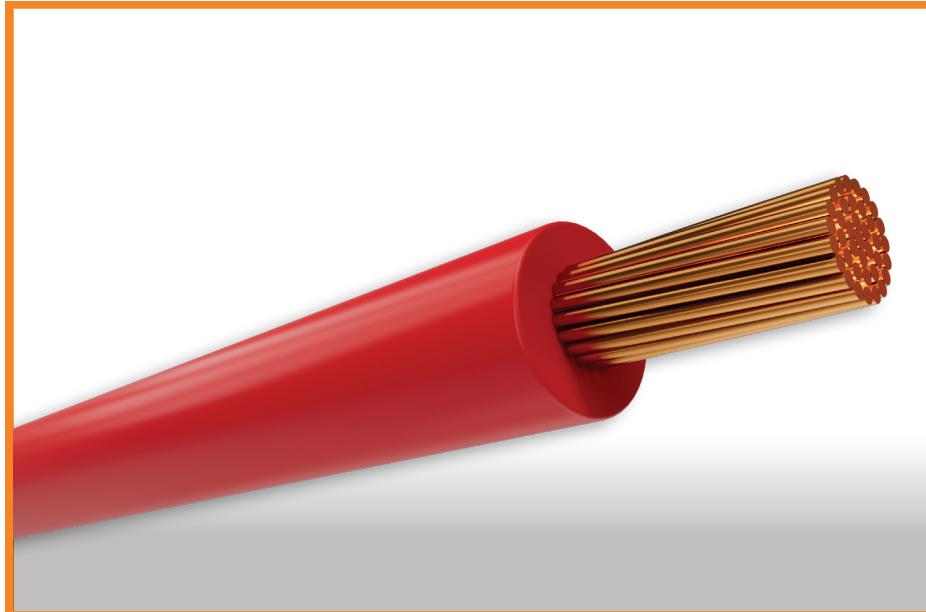
- GMW 15626
- ES-AU5T-1A348-AA
- MS 90034
- VW 60306-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Min	Max	Min	Max	Min	Min	Max
FLRY-B	10.00	80	0.41	9.47	4.50	1.680	1.820	0.60	5.30	6.00
FLRY-B	12.00	96	0.41	11.30	5.40	1.400	1.520	0.60	5.80	6.50
FLRY-B	16.00	126	0.41	14.90	6.30	1.070	1.160	0.65	6.40	7.20
FLRY-B	20.00	152	0.41	18.10	6.90	0.870	0.955	0.65	7.00	7.80
FLRY-B	25.00	196	0.41	23.20	7.80	0.688	0.743	0.65	7.90	8.70
FLRY-B	30.00	224	0.41	26.60	8.30	0.595	0.647	0.80	8.70	9.60
FLRY-B	35.00	276	0.41	32.70	9.00	0.489	0.527	0.80	9.40	10.40

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE FLY

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thick wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- ISO 6722-1

**Approvals:**

- GMW 15626
- ES-AU5T-1A348-AA

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Min	Max	Min	Max
FLY-A	0.50	19	0.19	0.465	1.10	34.10	37.10	0.48	2.00	2.30
FLY-A	0.75	19	0.24	0.698	1.30	22.70	24.70	0.48	2.20	2.50
FLY-A	1.00	19	0.27	0.932	1.50	17.00	18.50	0.48	2.40	2.70
FLY-A	1.50	19	0.33	1.360	1.80	11.70	12.70	0.48	2.70	3.00
FLY-A	2.00	19	0.38	1.830	2.00	8.66	9.42	0.48	3.00	3.30

## Automotive primary low voltage cable

**AUTOMOTIVE CABLE FLY**

## Dimensional

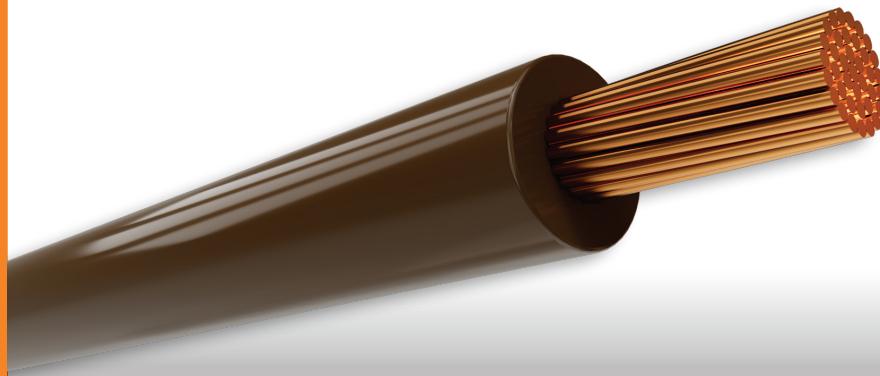
TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor	Conductor	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				area (mm <sup>2</sup> )	diameter (mm)	Max	Min	Max	Min	Max
FLY-B	2.50	50	0.26	2.27	2.20	6.99	7.60	0.56	3.30	3.60
FLY-B	3.00	44	0.31	2.80	2.40	5.66	6.15	0.56	3.80	4.10
FLY-B	4.00	56	0.31	3.66	2.80	4.33	4.71	0.64	4.00	4.40
FLY-B	5.00	65	0.33	4.38	3.10	3.62	3.94	0.64	4.50	4.90
FLY-B	6.00	84	0.31	5.49	3.40	2.89	3.14	0.64	4.60	5.00
FLY-B	8.00	62	0.41	7.24	4.30	2.19	2.38	0.64	5.00	5.90

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE FLY-BATTERY

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thick wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 105 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- MBN LV 112-1
- VW 60306-1
- MS 90034
- LV 112-1
- ISO 6722-1

**Approvals:**

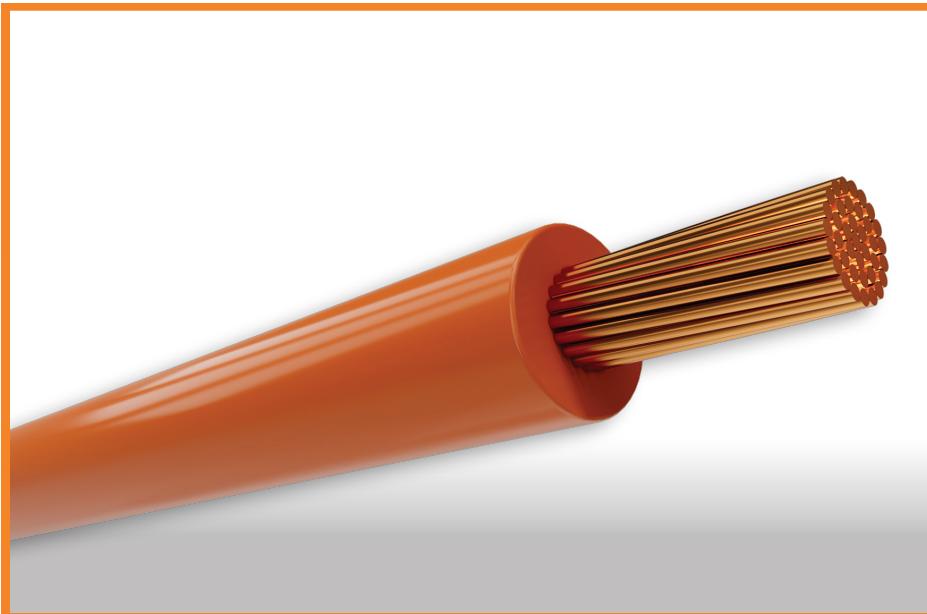
- GMW 15626
- ES-AU5T-1A348-AA
- MBN LV 112-1
- VW 60306-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Min	Max	Min	Max
FLY-B	10.00	80	0.41	9.47	4.50	1.680	1.820	0.80	5.90	6.50
FLY-B	12.00	96	0.41	11.30	5.40	1.400	1.520	0.80	6.60	7.40
FLY-B	16.00	126	0.41	14.90	5.80	1.070	1.160	0.80	7.70	8.30
FLY-B	20.00	152	0.41	18.10	6.90	0.870	0.955	0.88	8.10	9.10
FLY-B	25.00	196	0.41	23.20	7.20	0.688	0.743	1.04	9.40	10.40
FLY-B	30.00	224	0.41	26.60	8.30	0.595	0.647	1.04	9.70	10.90
FLY-B	35.00	276	0.41	32.70	8.50	0.489	0.527	1.04	9.60	11.60

## Automotive battery low voltage cable

## AUTOMOTIVE CABLE FLYW-BATTERY

**Description:**

- Conductor: Cu-ETP1 - A019/A020 – P acc. to EN 13602
- Insulation: PVC -40 °C to 105 °C
- Heavy metal free
- Wall thickness: thick wall
- Example for order identification: cable flyw

**Application:**

- Automotive harness.

**Maximun voltage operation**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +105 °C 3000 h

**Specification:**

- VW 60306
- GMW 15626
- LV 112
- ISO 19642-2

**Approvals:**

- Volkswagen
- General Motors
- Mercedes-Benz
- Daimler Chrysler

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
							Max	Min	Max
FLYW	10.00	80	0.410	10.562	4.50	1.82	0.80	5.90	6.50
FLYW	16.00	126	0.410	16.635	5.50	1.16	0.80	7.80	8.30
FLYW	25.00	196	0.410	25.877	7.00	0.743	1.04	9.70	10.40
FLYW	35.00	276	0.410	36.439	8.30	0.527	1.00	11.10	11.60
FLYW	50.00	396	0.410	52.282	9.80	0.368	1.20	12.90	13.50

**Grades:**

These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE FLR2X

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 125 °C
- Heavy metal free
- Halogen free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

-40 °C to 125 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- MS 90034

**Approvals:**

- GMW 15626
- ES-AU5T-1A348-AA
- MS 90034

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable			
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist Length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLR2X-A	0.35	7	0.27	0.317	0.9	33	50.00	54.40	0.20	1.20	1.30
FLR2X-A	0.50	19	0.19	0.465	1.1	50	34.10	37.10	0.22	1.40	1.60
FLR2X-A	0.75	19	0.24	0.698	1.3	50	22.70	24.70	0.24	1.70	1.90
FLR2X-A	1.00	19	0.27	0.932	1.5	50	17.00	18.50	0.24	1.90	2.10
FLR2X-A	1.50	19	0.33	1.36	1.8	50	11.70	12.70	0.24	2.20	2.40
FLR2X-A	2.00	19	0.38	1.83	2.2	50	8.66	9.42	0.28	2.50	2.80

## Automotive primary low voltage cable

**AUTOMOTIVE CABLE FLR2X**

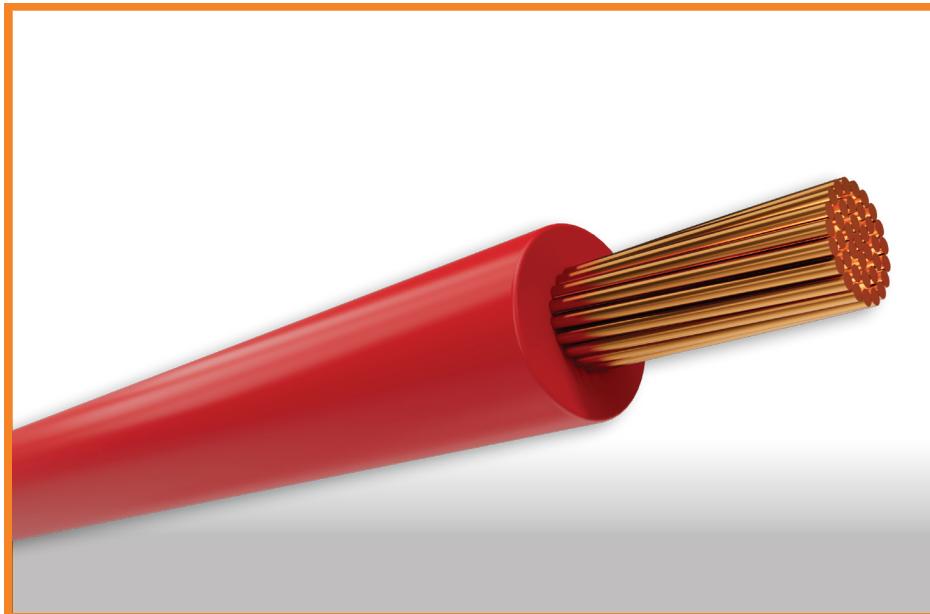
## Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist Length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLR2X-B	2.50	50	0.26	2.27	2.2	50	6.99	7.60	0.28	2.50	2.80
FLR2X-B	3.00	44	0.31	2.8	2.4	76	5.66	6.15	0.32	3.10	3.40
FLR2X-B	4.00	56	0.31	3.66	2.8	76	4.33	4.71	0.32	3.40	3.70
FLR2X-B	5.00	65	0.33	4.38	3.1	76	3.62	3.94	0.32	3.90	4.20
FLR2X-B	6.00	84	0.31	5.49	3.4	76	2.89	3.14	0.32	4.00	4.30

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist Length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLRY-S	2.50	37	0.30	2.27	2.2	50	6.99	7.60	0.28	2.50	2.80
FLRY-S	3.00	44	0.31	2.8	2.4	76	5.66	6.15	0.32	3.10	3.40
FLRY-S	4.00	56	0.31	3.66	2.8	76	4.33	4.71	0.32	3.40	3.70
FLRY-S	5.00	70	0.31	4.38	3.1	76	3.62	3.94	0.32	3.90	4.20
FLRY-S	6.00	84	0.31	5.49	3.4	76	2.89	3.14	0.32	4.00	4.30

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE FLR2X-BATTERY

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 125 °C
- Heavy metal free
- Halogen free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 125 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- ISO 6722-1

**Approvals:**

- GMW 15626
- ES-AU5T-1A348-AA

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20°C (mΩ/m)	Wall thickness (mm)	Outside cable diameter (mm)	Min	Max
FLR2X-B	10.00	80	0.41	9.47	4.50	1.680	1.820	0.60	5.30	6.00

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE FL2X



## Description:

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 125 °C
- Heavy metal free
- Halogen free
- Wall thickness: thick wall

## Application:

- Automotive harness.

## Maximum voltage operation:

- 60 V CD (25 V AC)

## Thermal range:

- -40 °C to 125 °C 3,000 hr.

## Specification:

- GMW 15626
- ISO 6722-1

## Approvals:

- GMW 15626

## Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20°C (mΩ/m)	Wall thickness (mm)	Outside cable diameter (mm)	Min	Max
FL2X-A	0.50	19	0.19	0.465	1.10	34.10	37.10	0.48	2.00	2.30
FL2X-A	0.75	19	0.24	0.698	1.30	22.70	24.70	0.48	2.20	2.50
FL2X-A	1.00	19	0.27	0.932	1.50	17.00	18.50	0.48	2.40	2.70
FL2X-A	1.50	19	0.33	1.360	1.80	11.70	12.70	0.48	2.70	3.00
FL2X-A	2.00	19	0.38	1.830	2.00	8.66	9.42	0.48	3.00	3.30

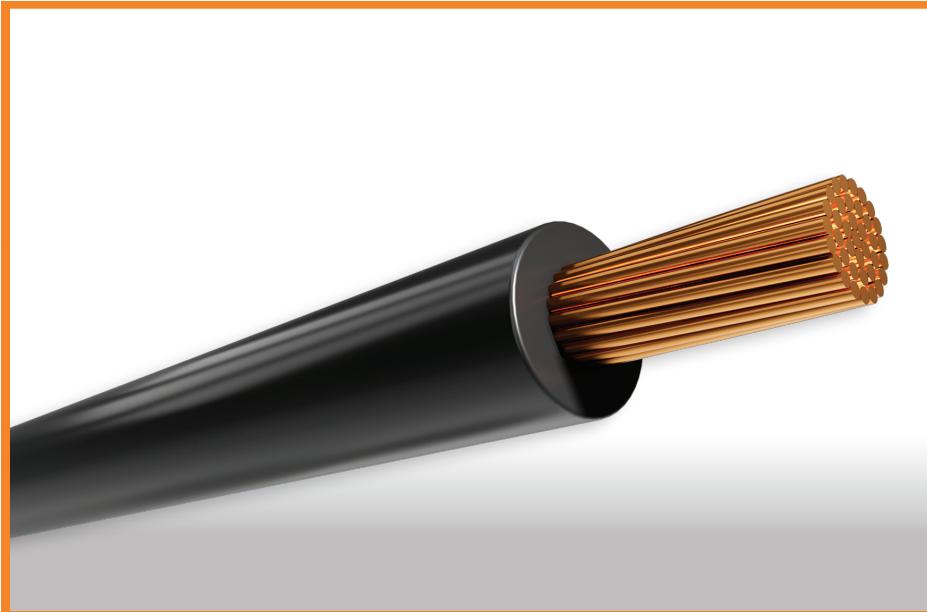
## Automotive primary low voltage cable

**AUTOMOTIVE CABLE FL2X**

## Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor				Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20°C (mΩ/m)		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Min	Max	Min	Max
FL2X-B	2.50	50	0.26	2.27	2.20	6.99	7.60	0.56	3.30	3.60
FL2X-B	3.00	44	0.31	2.80	2.40	5.66	6.15	0.56	3.80	4.10
FL2X-B	4.00	56	0.31	3.66	2.80	4.33	4.71	0.64	4.00	4.40
FL2X-B	5.00	65	0.33	4.38	3.10	3.62	3.94	0.64	4.50	4.90
FL2X-B	6.00	84	0.31	5.49	3.40	2.89	3.14	0.64	4.60	5.00
FL2X-B	8.00	62	0.41	7.24	4.30	2.19	2.38	0.64	5.00	5.90

## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FLR31Y****Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: TPE -40 °C to 125 °C Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive Harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 125 °C 3,000 hr.

**Specification:**

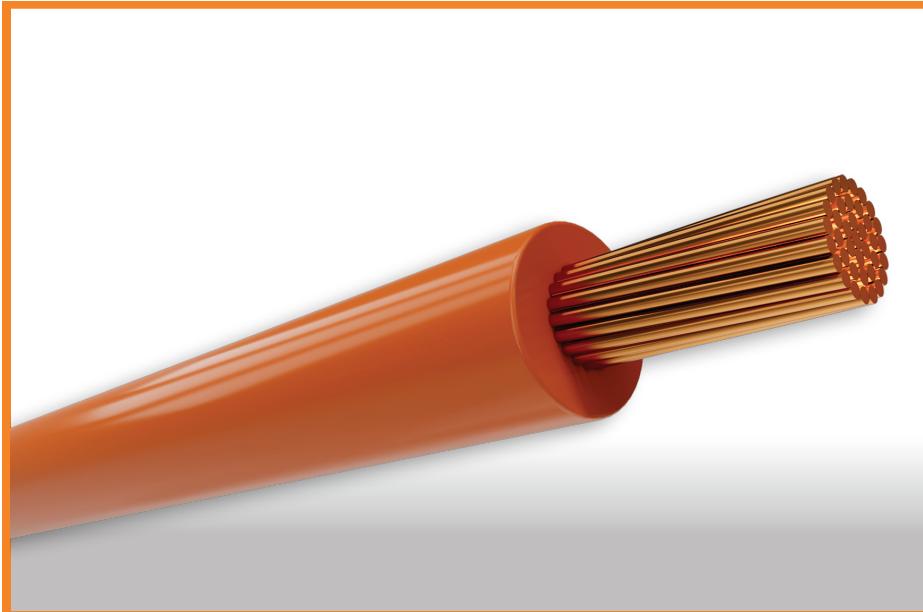
- LV 112-1
- VW 60306-1
- ISO 6722

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Cable	
		Number of strands	Strand diameter (mm)	Conductor resistance at 20°C (mΩ/m)	Wall thickness (mm)	Outside cable diameter (mm)
			Max	Max	Min	Max
FLR31Y	0.35	7	0.26	54.40	0.20	1.30
FLR31Y	0.50	19	0.18	37.10	0.22	1.60
FLR31Y	0.75	24	0.2	24.70	0.24	1.90
FLR31Y	1.00	32	0.21	18.50	0.24	2.10
FLR31Y	2.50	78	0.21	7.60	0.28	3.00

## Automotive primary low voltage

## AUTOMOTIVE CABLE FLR9Y

**Description:**

- Conductor: ISO 19642-3, soft or annealed copper wire - ASTM B3 or EN 13602
- Insulation: polypropylene (PP) heat resistant insulation acc. to MS 90034-01 and ISO 19642-02
- Example for order identification: cable FLR9Y

**Application:**

- Wires used in low voltage circuits for automobiles (vehicles).

**Maximum voltage operation:**

- 30V AC, 60V DC.

**Temperature:**

- -40 °C to +125 °C 3000 hr.

**Specification:**

- MS 90034-01
- MS 90034-02
- MS 90034-03
- ISO 19642-2
- ISO 19642-3

**Approvals:**

- Stellantis

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
		Max		Max	Max	Min	Min	Max	
FLR9Y	0.35	7	0.270	0.400	0.90	54.40	0.20	1.20	1.40
FLR9Y	0.50	16	0.210	0.554	1.10	37.10	0.22	1.40	1.60
FLR9Y	0.75	24	0.210	0.831	1.30	24.70	0.24	1.70	1.90
FLR9Y	1.00	32	0.210	1.108	1.50	18.50	0.24	1.90	2.10
FLR9Y	1.50	30	0.260	1.592	1.80	12.70	0.24	2.20	2.40
FLR9Y	2.50	50	0.260	2.654	2.20	7.60	0.28	2.70	3.00
FLR9Y	4.00	56	0.310	4.226	2.80	4.71	0.32	3.40	3.70
FLR9Y	6.00	84	0.310	6.340	3.40	3.14	0.32	4.00	4.30

**Grades:**

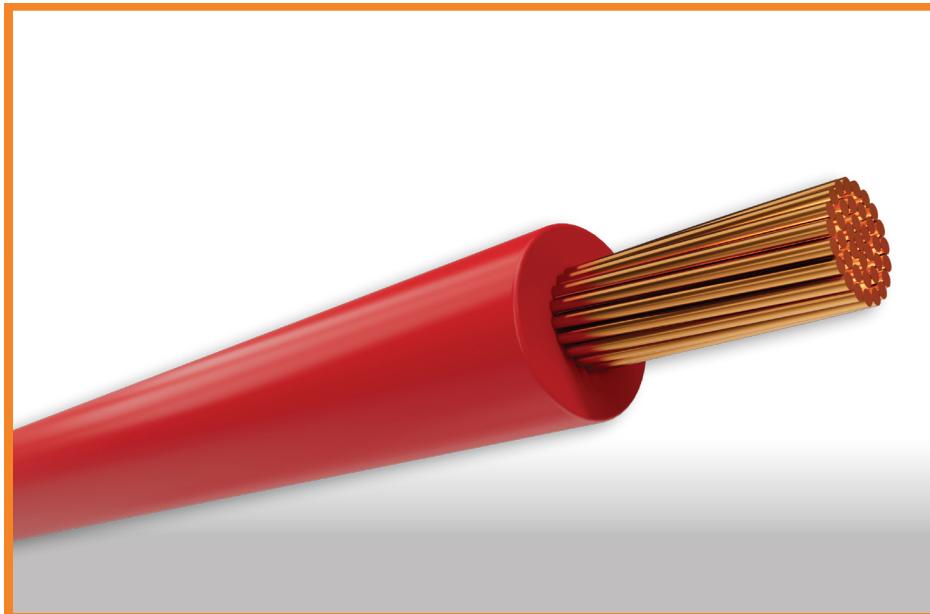
These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE FLR91X

**Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40 °C to 150 °C
- Heavy metal free
- Halogen free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 150 °C 3,000 hr.

**Specification:**

- GMW 15626
- ES-AU5T-1A348-AA
- ISO 6722-1

**Approvals:**

- GMW 15626
- ES-AU5T-1A348-AA

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLR91X-A	0.35	7	0.27	0.317	0.90	33	50.00	54.40	0.20	1.20	1.30
FLR91X-A	0.50	19	0.19	0.465	1.10	50	34.10	37.10	0.22	1.40	1.60
FLR91X-A	0.75	19	0.24	0.698	1.30	50	22.70	24.70	0.24	1.70	1.90
FLR91X-A	1.00	19	0.27	0.932	1.50	50	17.00	18.50	0.24	1.90	2.10
FLR91X-A	1.50	19	0.33	1.36	1.80	50	11.70	12.70	0.24	2.20	2.40
FLR91X-A	2.00	19	0.38	1.83	2.20	50	8.66	9.42	0.28	2.50	2.80

## Automotive primary low voltage cable

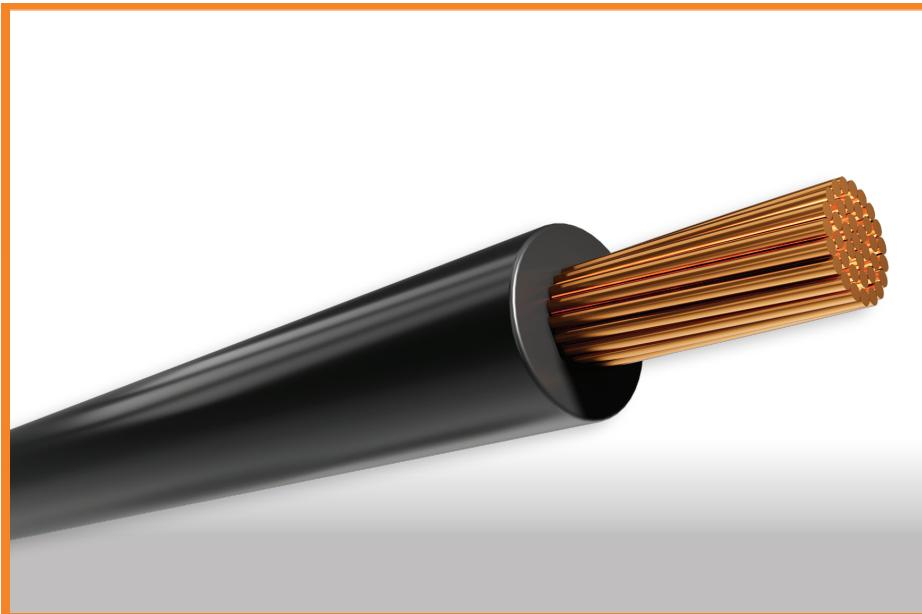
**AUTOMOTIVE CABLE FLR91X**

## Dimensional

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLR91X-B	2.50	50	0.26	2.27	2.20	50	6.99	7.60	0.28	2.50	2.80
FLR91X-B	3.00	44	0.31	2.8	2.40	76	5.66	6.15	0.32	3.10	3.40
FLR91X-B	4.00	56	0.31	3.66	2.80	76	4.33	4.71	0.32	3.40	3.70
FLR91X-B	5.00	65	0.33	4.38	3.10	76	3.62	3.94	0.32	3.90	4.20
FLR91X-B	6.00	84	0.31	4.49	3.40	76	2.89	3.14	0.32	4.00	4.30

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLR91X-S	2.50	37	0.30	2.27	2.20	50	6.99	7.60	0.28	2.50	2.80
FLR91X-S	5.00	70	0.31	2.8	2.40	76	5.66	6.15	0.32	3.10	3.40

## Automotive primary low voltage cable

**AUTOMOTIVE CABLE FLR13Y-ANTIFOG****Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: TPE -40 °C to 150 °C.
- Heavy metal free
- Wall thickness: thin wall.

**Application:**

- Automotive Harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 150 °C 3,000 hr.

**Specification:**

- ISO 6722-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor					Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Twist length (mm)	Conductor resistance at 20°C		Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Min	Max	Max	Min	Max	Min	Max
FLR13Y-A	0.35	7	0.27	0.317	0.90	33	50.00	54.40	0.20	1.20	1.30
FLR13Y-A	0.50	19	0.19	0.465	1.10	50	34.10	37.10	0.22	1.40	1.60
FLR13Y-A	0.75	19	0.24	0.698	1.30	50	22.70	24.70	0.24	1.70	1.90
FLR13Y-A	1.00	19	0.27	0.932	1.50	50	17.00	18.50	0.24	1.90	2.10
FLR13Y-A	1.50	19	0.33	1.36	1.80	50	11.70	12.70	0.24	2.20	2.40
FLR13Y-B	2.50	50	0.26	2.27	2.20	50	6.99	7.60	0.28	2.50	2.80

## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FLR7Y****Description:**

- Conductor: tinned copper type EN 13602 Cu-ETP-A017/018-C
- Insulation: ETFE -40 °C to 175 °C (ethylene tetrafluoroethylene)
- Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 175 °C 3,000 hr.

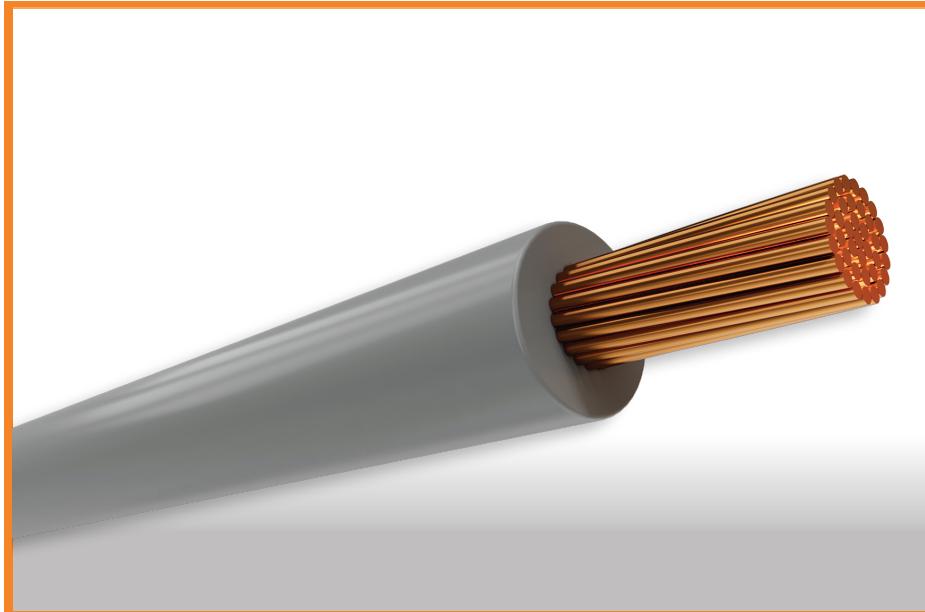
**Specification:**

- LV 112-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Cable		
		Number individual wires mm	Strand diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Max	Min	Min	Max
FLR7Y	0.35	7	0.27	55.50	0.20	1.20	1.40
FLR7Y	0.50	19	0.19	38.20	0.22	1.40	1.60
FLR7Y	2.00	37	0.26	9.69	0.28	2.50	2.80

## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FLR2G****Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: silicon rubber (SIR) -40 °C to 200 °C
- Heavy metal free

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 200 °C 3,000 hr.

**Specification:**

- LV 112-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Cable		
		Number individual wires mm	Strand diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
FLR2G	6.00	84	0.31	3.14	0.32	4.00	4.3
FLR2G	6.00	182	0.21	3.14	0.32	4.00	4.3
FLR2G	10.00	80	0.41	1.82	0.48	5.40	5.8
FLR2G	10.00	318	0.21	1.82	0.48	5.40	5.8
FLR2G	16.00	126	0.41	1.16	0.52	6.50	7.0
FLR2G	16.00	504	0.21	1.16	0.52	6.50	7.0
FLR2G	25.00	196	0.41	0.743	0.52	8.20	8.7
FLR2G	25.00	784	0.21	0.743	0.52	8.20	8.8

## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FLR2G**

## Dimensional

TYPE	Section mm <sup>2</sup>	Conductor			Cable		
		Number individual wires mm	Strand diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Max	Min	Min	Max
FLR2G	35.00	276	0.41	0.527	0.64	9.80	10.4
FLR2G	35.00	1106	0.21	0.527	0.64	9.80	10.5
FLR2G	50.00	396	0.41	0.368	0.72	11.50	122.0
FLR2G	50.00	1582	0.21	0.368	0.72	11.80	12.6
FLR2G	70.00	360	0.51	0.259	0.80	13.50	14.4
FLR2G	70.00	2240	0.21	0.259	0.80	14.00	14.9

## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FL2G****Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: silicon rubber (SIR) -40 °C to 180 °C
- Heavy metal free

**Application:**

- Automotive Harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 180 °C 3,000 hr.

**Specification:**

- LV 112-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Cable		
		Number individual wires mm	Strand diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Max	Min	Min	Max
FL2G	6.00	84	0.31	3.14	0.64	4.40	5.00
FL2G	6.00	182	0.21	3.14	0.64	4.40	5.00
FL2G	10.00	80	0.41	1.82	0.80	5.90	6.50
FL2G	10.00	318	0.21	1.82	0.80	5.90	6.50
FL2G	16.00	126	0.41	1.16	0.80	7.40	8.30
FL2G	16.00	504	0.21	1.16	0.80	7.40	8.30
FL2G	25.00	196	0.41	0.74	1.04	9.20	10.40
FL2G	25.00	784	0.21	0.74	1.04	9.20	10.40
FL2G	35.00	276	0.41	0.53	1.04	10.10	11.60
FL2G	35.00	1106	0.21	0.53	1.04	10.10	11.60

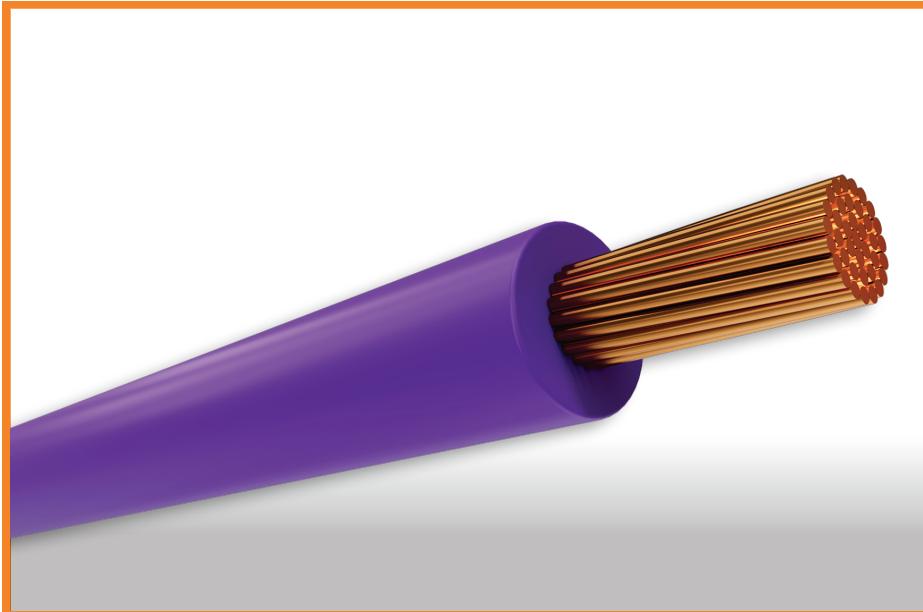
## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FL2G**

## Dimensional

TYPE	Section mm <sup>2</sup>	Conductor			Cable		
		Number individual wires mm	Strand diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Max	Min	Min	Max
FL2G	35.00	1106	0.21	0.53	1.04	10.10	11.60
FL2G	50.00	396	0.41	0.37	1.20	12.00	13.50
FL2G	50.00	1582	0.21	0.37	1.20	12.00	13.50
FL2G	70.00	360	0.51	0.26	1.20	14.00	15.50
FL2G	70.00	2240	0.21	0.26	1.20	14.00	15.50

## Automotive single conductor cable low voltage

**AUTOMOTIVE CABLE FLR6Y****Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: FEP (tetrafluoroethylene/hexafluoropropylene)
- Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive harness.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 200 °C 3,000 hr.

**Specification:**

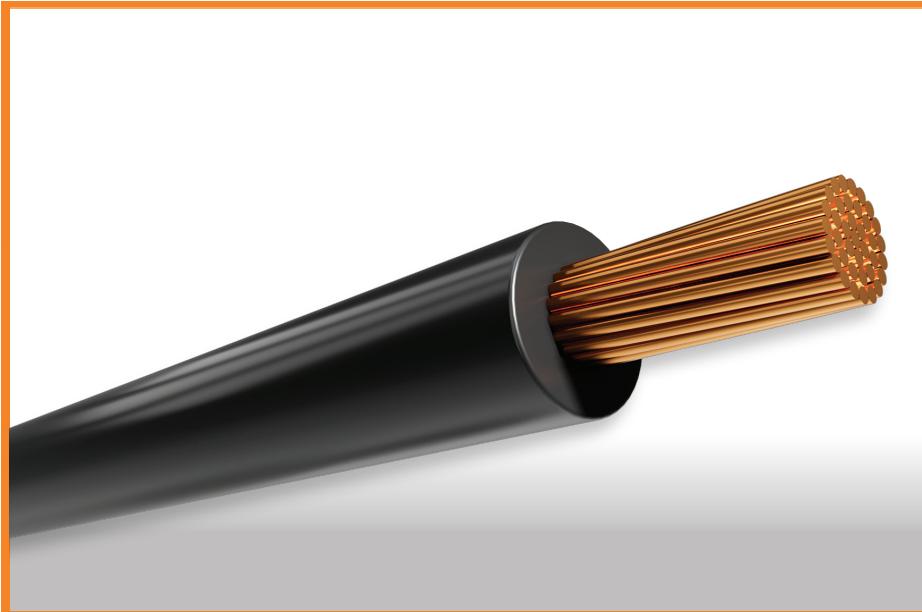
- ISO 6722
- LV 112-1

**Dimensional**

TYPE	Section mm <sup>2</sup>	Conductor			Cable		
		Number individual wires mm	Strand diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
			Max	Max	Min	Min	Max
FLR6Y	0.35	7	0.26	52.00	0.20	1.10	1.30
FLR6Y	0.50	19	0.19	37.10	0.22	1.40	1.60
FLR6Y	0.75	19	0.23	24.70	0.24	1.70	1.90
FLR6Y	1.00	19	0.26	18.50	0.24	1.90	2.10
FLR6Y	1.50	30	0.26	12.70	0.24	2.20	2.40
FLR6Y	1.50	19	0.32	12.70	0.28	2.20	2.40
FLR6Y	2.50	37	0.31	7.60	0.28	2.70	3.00
FLR6Y	2.50	19	0.41	7.60	0.28	2.70	3.00
FLR6Y	2.50	50	0.26	7.60	0.28	2.70	3.00

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE TWP

**Description:**

- Conductor: bare copper type ASTM B49
- Insulation: PVC -40 °C to 80 °C
- Heavy metal free
- Wall thickness: wall thickness

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 80 °C 1,500 hr.

**Specification:**

- SAE J 1128

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm <sup>2</sup> )	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
TWP	22	0.345	7	0.28	0.40	1.70
TWP	20	0.543	7	0.28	0.40	1.90
TWP	18	0.778	19	0.28	0.40	2.20
TWP	16	1.183	19	0.28	0.40	2.40
TWP	14	1.875	19	0.28	0.40	2.70
TWP	12	2.955	19	0.32	0.46	3.30
TWP	10	4.734	19	0.35	0.50	4.00
TWP	8	7.504	37	0.39	0.55	4.90

## Automotive primary low voltage cable

**AUTOMOTIVE CABLE GPT****Description:**

- Conductor: bare copper type ASTM B49
- Insulation: PVC -40 °C to 80 °C
- Heavy metal free
- Wall thickness: general purpose

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 80 °C 1,500 hr.

**Specification:**

- SAE J 1128

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm²)	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
GTP	20	0.543	7	0.41	0.58	2.40
GTP	18	0.778	19	0.41	0.58	2.50
GTP	16	1.183	19	0.41	0.58	2.90
GTP	14	1.875	19	0.41	0.58	3.20
GTP	12	2.955	19	0.46	0.66	3.80
GTP	10	4.734	19	0.55	0.79	4.70
GTP	8	7.504	37	0.66	0.94	6.00

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE HDT

**Description:**

- Conductor: bare copper type ASTM B49.
- Insulation: PVC -40 °C to 80 °C.
- Heavy metal free.
- Wall thickness: heavy wall.

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 80 °C 1,500 hr.

**Specification:**

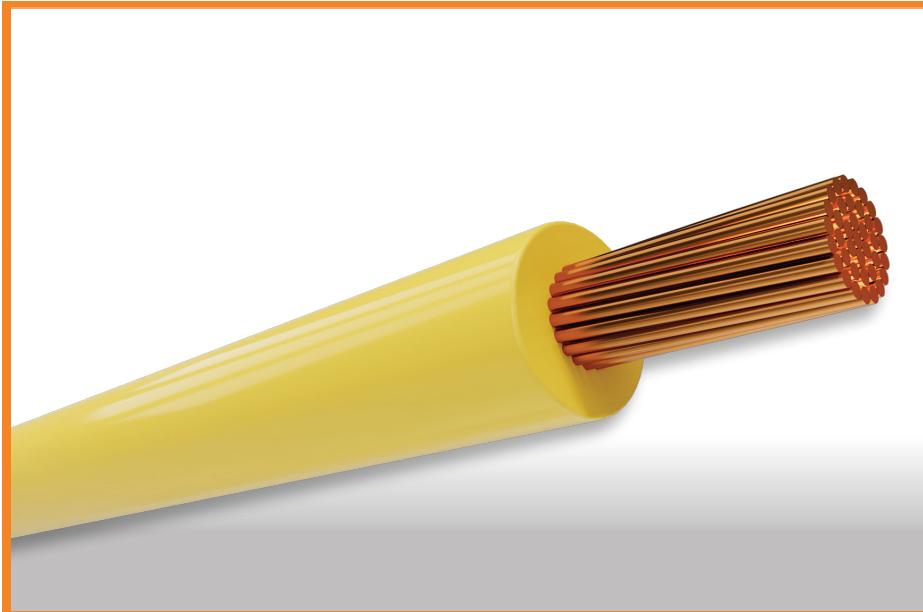
- SAE J 1128

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm <sup>2</sup> )	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
HDT	20	0.543	7	0.64	0.91	3.10
HDT	18	0.778	19	0.66	0.94	3.40
HDT	16	1.183	19	0.71	1.02	3.70
HDT	14	1.875	19	0.73	1.04	4.20
HDT	12	2.955	19	0.82	1.17	5.10
HDT	10	4.734	19	0.82	1.17	5.70
HDT	8	7.504	37	0.98	1.40	7.00

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE STT

**Description:**

- Conductor: bare copper type ASTM B49
- Insulation: PVC -40 °C to 80 °C
- Heavy metal free
- Wall thickness: thin wall

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 80 °C 1,500 hr.

**Specification:**

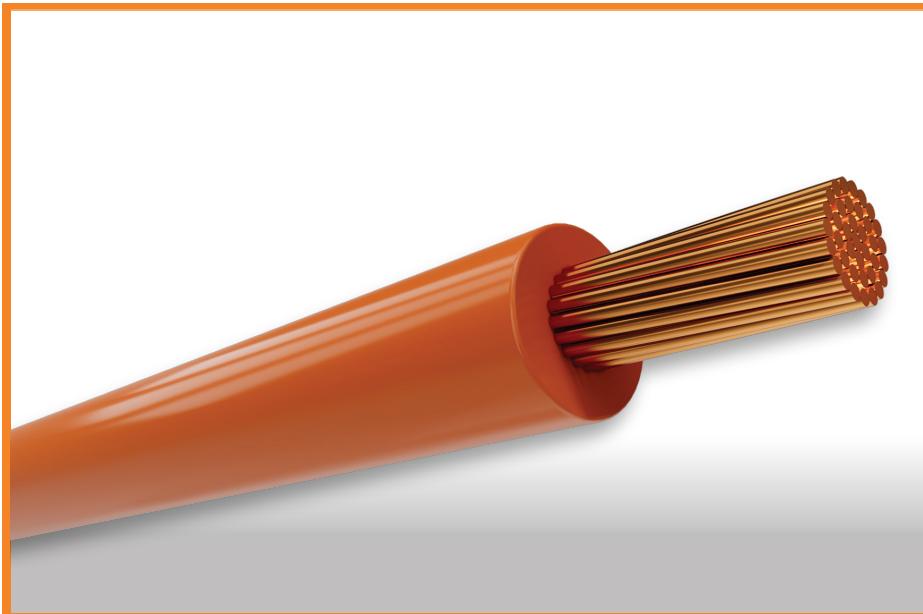
- SAE J 1127

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm <sup>2</sup> )	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
STT	6	12.43	75	0.76	1.09	7.80
STT	4	18.93	113	0.78	1.12	9.50
STT	2	31.64	193	0.78	1.12	11.00
STT	1	39.41	299	0.78	1.12	12.00

## Automotive battery cable low voltage

## AUTOMOTIVE CABLE SGT

**Description:**

- Conductor: bare copper type ASTM B49
- Insulation: PVC -40 °C to 80 °C
- Heavy metal free
- Wall thickness: general purpose

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 80 °C 1,500 hr.

**Specification:**

- SAE J 1127

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm <sup>2</sup> )	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
SGT	6	12.43	75	1.06	1.52	8.60
SGT	4	18.93	113	1.16	1.65	10.50
SGT	2	31.64	193	1.16	1.65	12.00
SGT	1	39.41	299	1.16	1.65	13.00

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE TXL

**Description:**

- Conductor: bare copper type ASTM B49
- Insulation: XLPE -40 °C to 125 °C
- Heavy metal free
- Halogen free
- Wall thickness: thin wall

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 125 °C 1,500 hr.

**Specification:**

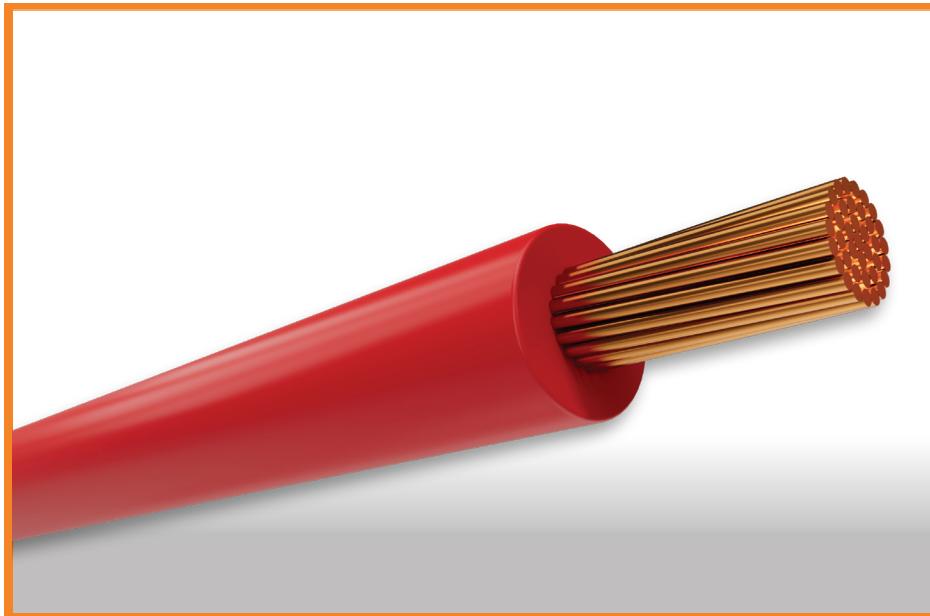
- SAE J 1128

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm <sup>2</sup> )	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
TXL	22	0.345	7	0.28	0.40	1.70
TXL	20	0.543	7	0.28	0.40	1.90
TXL	18	0.778	19	0.28	0.40	2.20
TXL	16	1.183	19	0.28	0.40	2.40
TXL	14	1.875	19	0.28	0.40	2.70
TXL	12	2.955	19	0.32	0.46	3.30
TXL	10	4.734	19	0.35	0.50	4.00
TXL	8	7.504	37	0.39	0.55	4.90

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE GXL

**Description:**

- Conductor: bare copper type ASTM B49
- Insulation: XLPE -40 °C to 125 °C
- Heavy metal free
- Halogen free
- Wall thickness: general purpose

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 125 °C 1,500 hr.

**Specification:**

- SAE J 1128

**Dimensional**

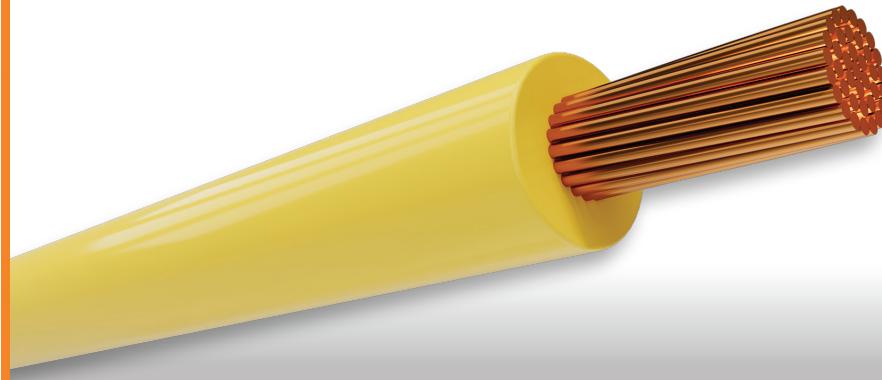
TYPE	AWG	Conductor		Cable		
		Conductor area (mm²)	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
GXL	20	0.543	7	0.41	0.58	2.40
GXL	18	0.778	19	0.41	0.58	2.50
GXL	16	1.183	19	0.41	0.58	2.90
GXL	14	1.875	19	0.41	0.58	3.20
GXL	12	2.955	19	0.46	0.66	3.80
GXL	10	4.734	19	0.55	0.79	4.70
GXL	8	7.504	37	0.66	0.94	6.00

## Automotive primary low voltage cable

## AUTOMOTIVE CABLE SXL

**Description:**

- Conductor: bare copper type ASTM B49
- Insulation: XLPE -40 °C to 125 °C
- Heavy metal free
- Halogen free
- Wall thickness: special purpose

**Application:**

- Automotive electrical circuits.

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40 °C to 125 °C 1,500 hr.

**Specification:**

- SAE J 1128

**Dimensional**

TYPE	AWG	Conductor		Cable		
		Conductor area (mm <sup>2</sup> )	Number of strands	Wall thickness (mm)	Wall thickness (mm)	Outside cable diameter (mm)
		Min		Min	Nom	Max
SXL	20	0.543	7	0.52	0.74	2.80
SXL	18	0.778	19	0.53	0.76	3.00
SXL	16	1.183	19	0.57	0.81	3.40
SXL	14	1.875	19	0.62	0.89	3.90
SXL	12	2.955	19	0.66	0.94	4.60
SXL	10	4.734	19	0.73	1.04	5.30
SXL	8	7.504	37	0.76	1.09	6.20

## Automotive and motorcycle primary low voltage

## AUTOMOTIVE AND MOTORCYCLE CABLE AV

**Description:**

- Conductor: Cu-ETP1 - A019/A020 – P acc. To JIS C3102 conductor acc. to JASO D611
- Insulation: lead-free heat resistant Insulation acc. to JASO D611 and JASO D609
- Example for order identification: cable AV

**Application:**

- Wires used in low voltage circuits for automobiles (vehicles and motorcycles).

**Maximum voltage operation:**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +80 °C

**Dimensional****Specification:**

- JIS C 3406
- JASO D609
- JASO D611

**Approvals:**

- Honda

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Min	Max
					Max	Max			
AV	0.50	20	0.188	0.508	1.00	36.70	0.48	2.08	2.40
AV	0.75	30	0.188	0.763	1.20	24.40	0.48	2.28	2.60
AV	1.25	50	0.188	1.272	1.50	14.70	0.48	2.58	2.90
AV	2.00	37	0.270	1.964	1.90	9.50	0.48	2.88	3.40
AV	3.00	41	0.330	3.297	1.80	5.59	0.56	3.66	4.10
AV	5.00	65	0.330	5.227	2.40	3.52	0.56	4.44	4.90
AV	8.00	50	0.460	7.952	3.70	2.32	0.72	5.32	5.80
AV	10.00	63	0.460	10.019	4.50	1.84	0.80	6.30	6.90
AV	15.00	84	0.460	13.359	5.40	1.38	0.88	7.38	8.00

**Grades:**

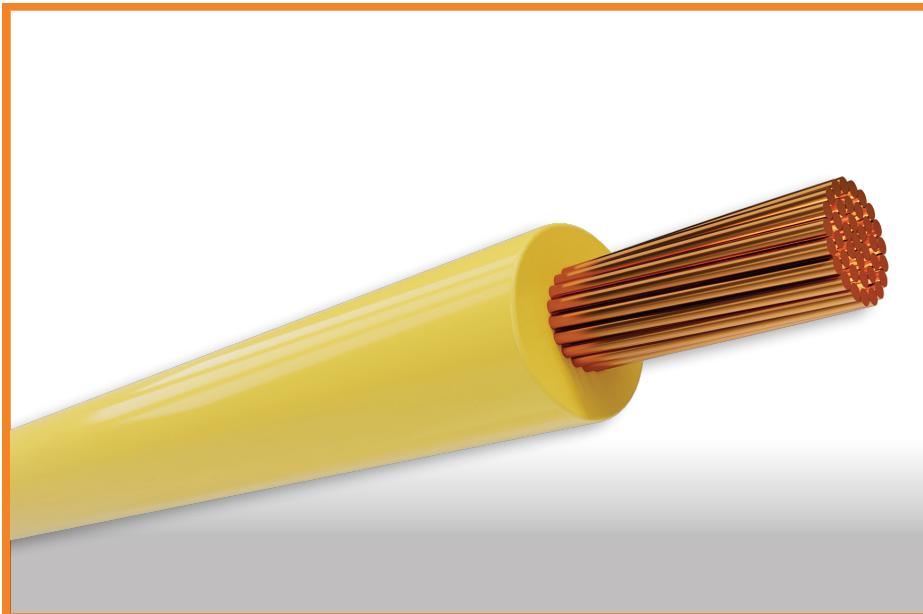
These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Automotive and motorcycle primary low voltage

## AUTOMOTIVE AND MOTORCYCLE CABLE AVS

**Description:**

- Conductor: Cu-ETP1 - A019/A020 – P acc. to JIS C3102 conductor acc. to JASO D611
- Insulation: lead-free heat resistant Insulation acc. to JASO D611 and JASO D618
- Example for order identification: cable AVS

**Application:**

- Wires used in low voltage circuits for automobiles (vehicles and motorcycles).

**Maximum voltage operation:**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +80 °C

**Specification:**

- JIS C3102
- JASO D609
- JASO D611
- JASO D618

**Approvals:**

- Honda

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
				Max	Max	Max	Min	Standard	Max
AV	3.00	41	0.330	3.297	2.40	5.59	0.40	3.60	3.80
AV	5.00	65	0.330	5.228	3.00	3.52	0.48	4.40	4.60

**Grades:**

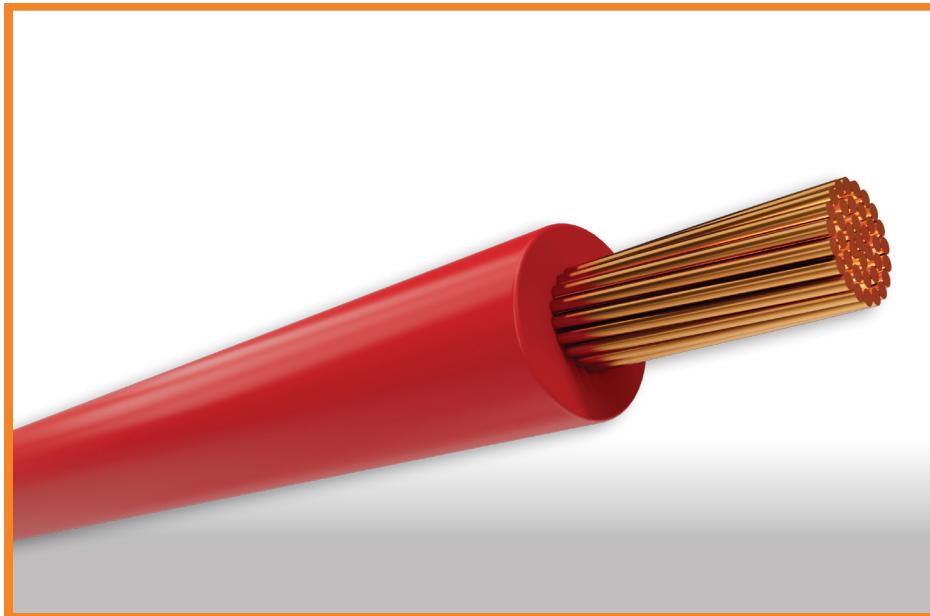
These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Automotive and motorcycle primary low voltage

## AUTOMOTIVE AND MOTORCYCLE CABLE AVSS

**Description:**

- Conductor: Cu-ETP1 - A019/A020 – P acc. to JIS C3102 conductor acc. to JASO D611
- Insulation: lead-free heat resistant Insulation acc. to JASO D611 and JASO D618
- Example for order identification: cable AVSS

**Application:**

- Automotive and motorcycles harness.

**Maximum voltage operation:**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +80°C

**Specification:**

- JIS C3102
- JASO D609
- JASO D611
- JASO D618

**Approvals:**

- Honda
- Hyundai
- Toyota

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
					Max	Max		Standard	Max
AVSS	0.30	7	0.270	0.371	0.80	50.20	0.26	1.34	1.50
AVSS	0.50	7	0.330	0.562	1.00	32.70	0.26	1.54	1.70
AVSS	0.85	19	0.248	0.859	1.20	21.70	0.26	1.74	1.90
AVSS	1.25	19	0.300	1.255	1.50	14.90	0.26	2.04	2.20
AVSS	2.00	37	0.270	1.964	1.80	9.50	0.34	2.52	2.70

**Grades:**

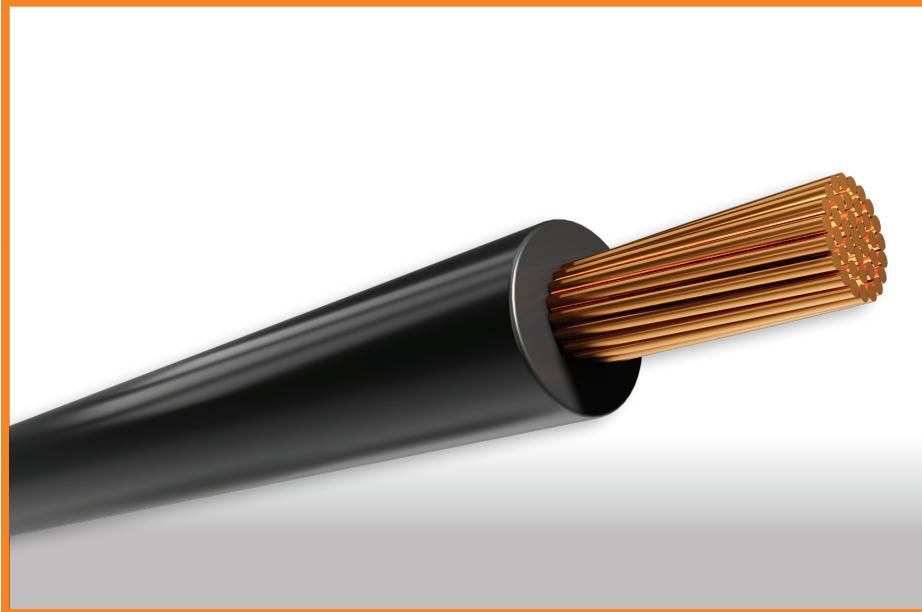
These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Motorcycle primary low voltage

## MOTORCYCLE CABLE AVSSB

**Description:**

- Conductor: Cu-ETP1 - A019/A020 – P acc. to JIS C3102 conductor acc. to JASO D611
- Insulation: lead-free heat resistant Insulation acc. to JASO D611 and JASO D618
- Example for order identification: cable AVSSB

**Application:**

- Wires used in low voltage circuits for automobiles (mainly motorcycles).

**Maximum voltage operation:**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +80 °

**Specification:**

- JIS C3102
- JASO D609
- JASO D611
- JASO D618

**Approvals:**

- Honda
- Yamaha

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
								Max	Min
AVSSB	0.50	20	0.188	0.508	1.00	36.70	0.28	1.63	1.80
AVSSB	0.75	30	0.188	0.763	1.20	24.40	0.28	1.83	2.00
AVSSB	1.25	50	0.188	1.273	1.50	14.70	0.32	2.22	2.40

**Grades:**

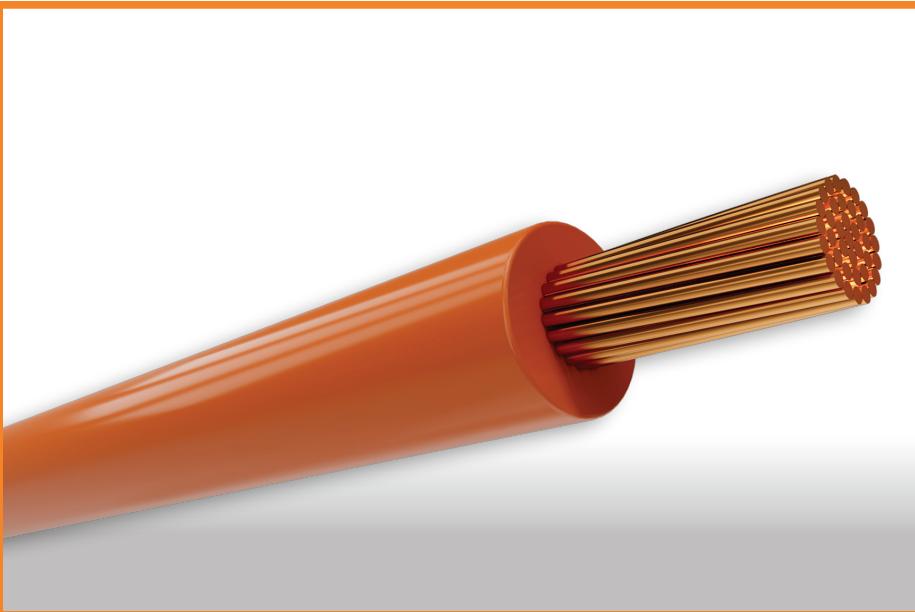
These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Automotive and motorcycle primary low voltage

## AUTOMOTIVE AND MOTORCYCLE CABLE AVSSH

**Description:**

- Conductor: Cu-ETP1 - A019/A020 – P acc. to JIS C3102 conductor acc. to JASO D611
- Insulation: lead-free heat resistant Insulation acc. to JASO D608 and JASO D611
- Example for order identification: cable AVSSH

**Application:**

- Wires used in low voltage circuits requiring heat resistance (100 °C) such as automobiles (vehicles and motorcycles).

**Maximum voltage operation:**

- 30V AC, 60V DC

**Temperature:**

- -40 °C to +100 °C

**Specification:**

- JIS C3102
- JASO D608
- JASO D609
- JASO D611

**Approvals:**

- Honda

**Dimensional**

TYPE	Section mm <sup>2</sup>	Strand		Conductor			Cable		
		Number of strands	Strand diameter (mm)	Conductor area (mm <sup>2</sup> )	Conductor diameter (mm)	Conductor resistance at 20 °C (mΩ / m)	Wall thickness (mm)	Outside cable diameter (mm)	
					Max	Max		Min	Max
AVSSH	0.50	19	0.190	0.538	1.00	34.6	0.24	1.54	1.70
AVSSH	0.75	19	0.230	0.789	1.20	23.6	0.24	1.74	1.90
AVSSH	1.25	37	0.210	1.282	1.50	14.6	0.24	2.04	2.20

**Grades:**

These data are approximate and are subject to manufacturing tolerances.

For constructions other than those indicated, please consult our technical assistance department.

The product is out of stock. The second manufacturing standard can be delivered in different sections.

## Multiple-cores automotive cable

## AUTOMOTIVE CABLE FLR31Y11Y 2 x 0.5A



## Description:

- Conductor: Cu-ETP acc. to EN 13602
- Insulation: TPE-S -40 °C to 110 °C  
Heavy metal free
- Sheath: TPE-U ISO 14572; talc powdered

## Application:

- Connection of components such as sensor.

## Maximum voltage operation:

- 60 V CD (25 V AC)

## Thermal range:

- -40°C to 110°C      3,000 hr.

## Specification:

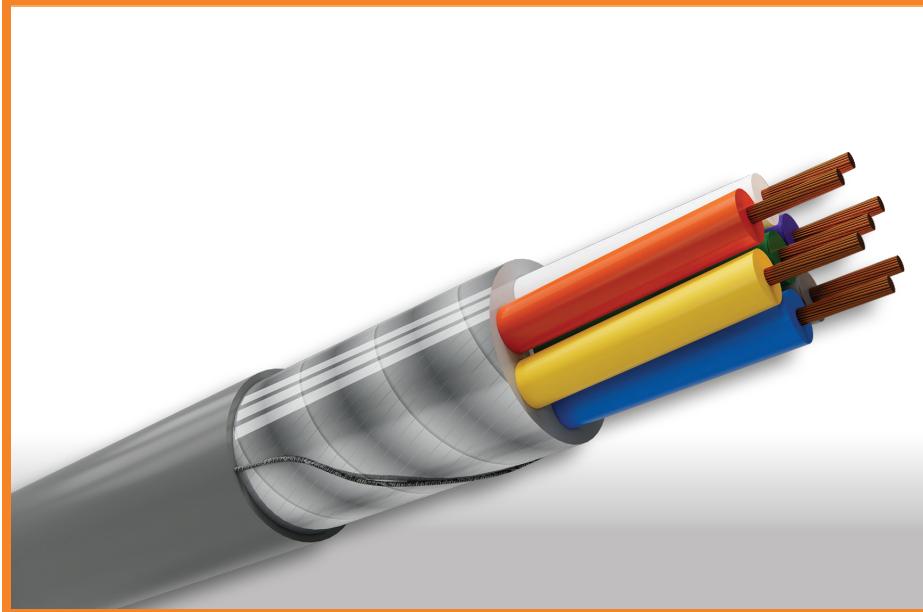
- ES-157T-2C011-AA

## Dimensional

TYPE	Conductor				Insulation			Twists per meter (1twist=360°)	Sheath			Cable
	Cross section	Number of individual wires	Diameter individual wires (mm)	Conductor resistance at 20°C (mΩ/m)	Wall thickness (mm)	Outside cable diameter (mm)	Wall thickness (mm)		Wall thickness (mm)	Outside cable diameter (mm)	Bending radius	
		Min	Max	Max	Min	Min	Max		Min	Max	Min	Min
FLR31Y11Y	2 x 0.50	19 x 0.19	0.90	37.40	0.22	1.40	1.50	45+-10	0.67	5.00	4.98	5.20

## Multicore shielded automotive cable

### AUTOMOTIVE CABLE FLRYB11Y



#### Description:

- Conductor: bare copper type EN 13602 ETP-A019-P
- Insulation: PVC -40 °C to 105 °C heavy metal free
- Earthing core: EN 13602- Cu-ETP-A019-P. drain wire according to DIN 72551, part 6 and VW 60306, covering: PVC conductive
- Screening: aluminium- backed PVC foil bonded with the sheath
- Sheath: hydrolysis resistant polyether polyurethane sheath acc to VW 60306-1 or customer specification

#### Application:

- Connection of components, switches and Modules

#### Maximum voltage operation:

- 60 V CD (25 V AC)

#### Thermal range:

- -40°C to 105 °C 3,000 hr.

#### Specification:

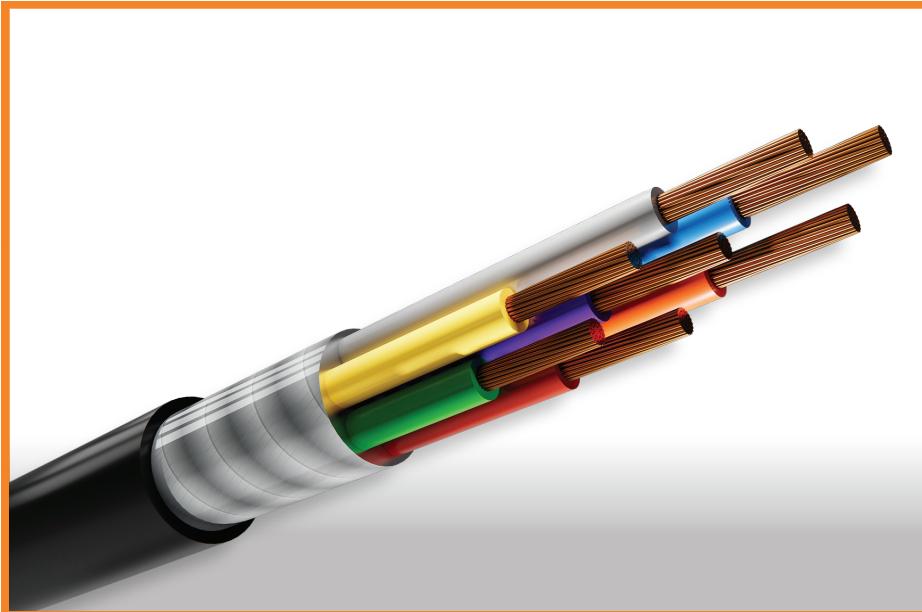
- VW 75209-2
- VW 60306-1
- VW N 101 946
- ISO 6722

#### Dimensional

Number of cores x nom. cross section+(ground wire) mm <sup>2</sup>	Number of single wires x max strand dia mm	R. 20°C max. Ω/km	Insulation wall thickness min. value mm	Conductor			Sheath	
				Nº strand x max. dia Ux mm	Drain wire Max resist. ohm/km	Wall thickness mm	Sheath wall thickness standard value mm	Outside diameter mm
1x0.35+(0.35)	7x0.26	52.0	0.25	7X0.26	52	0.25	0.5	4.1±0.2
2x0.35+(0.35)	7x0.26	52.0	0.25	7X0.26	52	0.25	0.6	4.3±0.2
3x0.35+(0.35)	7x0.26	52.0	0.25	7X0.26	52	0.25	0.6	4.6±0.2
4x0.35+(0.35)*	7x0.26	52.0	0.25	7X0.26	52	0.25	0.6	5.0±0.2
5x0.35+(0.35)	7x0.26	52.0	0.25	7X0.26	52	0.25	0.7	5.6±0.2

Multi-core low tension screened cable protected by jacket

## AUTOMOTIVE CABLE FLR31YB91Y



### Description:

- Conductor: bare copper Type EN 13602 ETP1
- Insulation: TPE 125 °C heavy metal free
- Drain wire: tinned copper, Cu-ETP 1 according DIN EN 13602
- Screen: aluminum baked PET foil, 100 % cover
- Wall thickness: thin wall

### Application:

- Automotive harness.

### Maximum voltage operation:

- 60 V CD (25 V AC)

### Thermal range:

- 125 °C 3,000 hr.

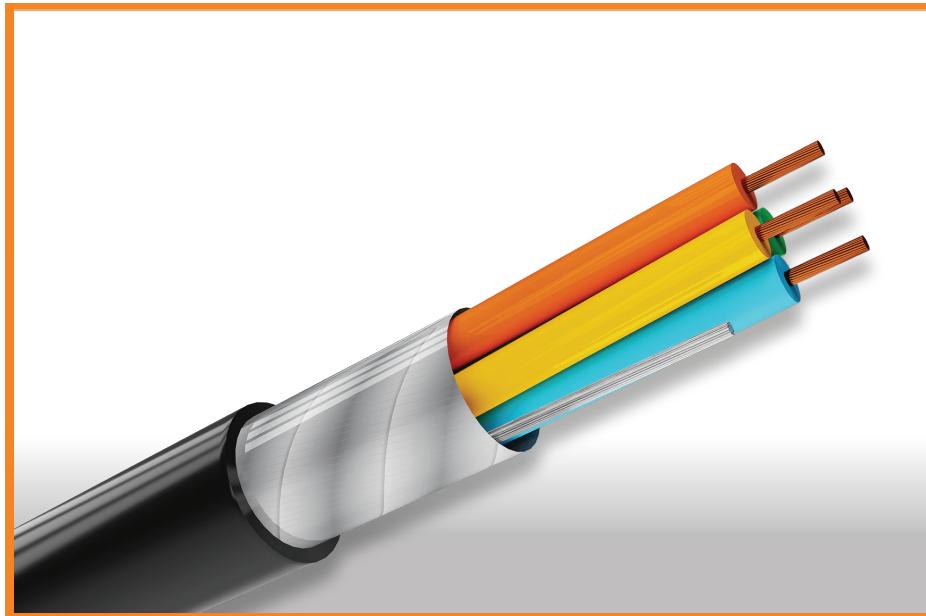
### Specification:

- ISO 6722

### Dimensional

TYPE	Section Nr. x mm <sup>2</sup>	Conductor			Wall thickness (mm)	Cable		Sheath	
		Number of individual wires	Diameter individual wires (mm)	Conductor resistance at 20°C (m Ω/m)		Min	Max	Min	Max
		Min	Max	Max		Min	Max	Nom	Max
FLR31YB91Y	6 X 1,0+0, 60Sn(2)	19	0.26	18.50	0.40	2.00	2.20	1.14	9.15
FLR31YB91Y	6 X 1,5+0, 60Sn(2)	30	0.26	12.70	0.40	2.20	2.40	1.14	9.80
FLR31YB91Y	8 X 0,75+0, 60Sn(1)	24	0.21	24.70	0.40	1.80	2.00	1.14	9.52
FLR31YB91Y	8 X 1,0+0, 60Sn(1)	19	0.26	18.50	0.40	2.00	2.20	1.14	9.90
FLR31YB91Y	8 X 1,5+0, 60Sn(1)	30	0.26	12.70	0.40	2.20	2.40	1.14	10.60

## Multiple-cores automotive cable

**AUTOMOTIVE CABLE FLRYBY 4 x 0.5A + 0.5 Sn****Description:**

- Conductor: bare copper type EN 13602 ETP1
- Insulation: PVC -40°C to +110°C heavy metal free
- Drain wire: tinned copper wire, Cu-ETP 1 according DIN EN 13602
- Screen: aluminized PVC foil
- Wall thickness: thin wall

**Application:**

- Connection of components

**Maximum voltage operation:**

- 60 V CD (25 V AC)

**Thermal range:**

- -40°C to +110°C 3,000 hr.

**Specification:**

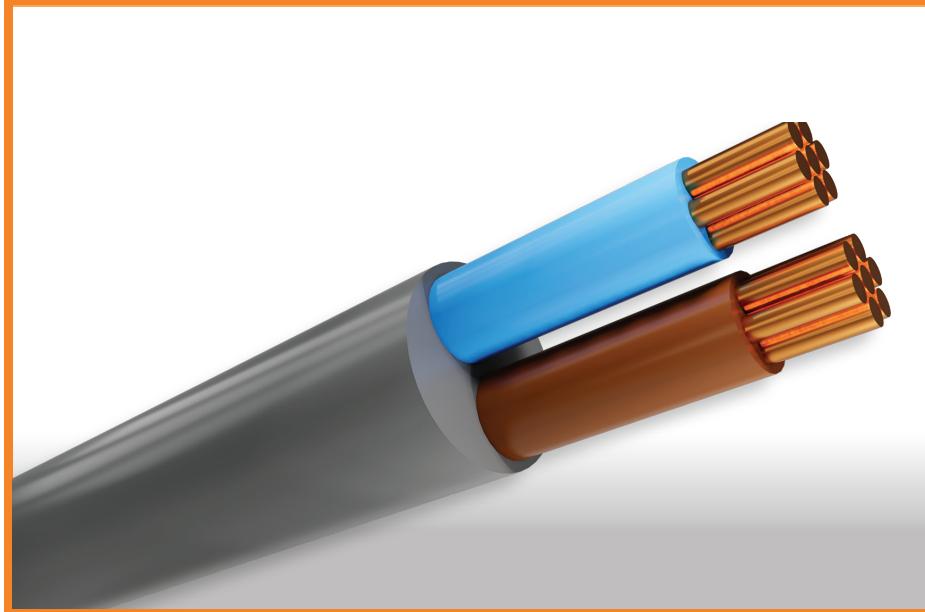
- CABLE MULTICORE PVC Jacket insulation M3344
- Conductors & insulation M3130
- Drain wire M3098

**Dimensional**

TYPE	Number of cores x cross section N x mm <sup>2</sup>	Conductor			Cable			Sheath	
		Number of individual wires	Diameter individual wires (mm)	Conductor resistance at 20°C (m Ω/m)	Wall thickness (mm)	Outside cable diameter (mm)		Wall thickness (mm)	Outside cable diameter (mm)
		Min	Max	Max	Min	Min	Max	Min	Max
FLRBYB	4 X 0.5	19	0.19	37.10	0.22	1.40	1.60	0.35	5.30

## Multiple-cores automotive cable

## AUTOMOTIVE CABLE FLRYYW 2 x 0.5A



## Description:

- Conductor: EN 13602- Cu-ETP-A019-P
- Insulation: PVC -40 °C to 105°C heavy metal free
- Sheath: PVC ISO 14572 class B
- Wall thickness: thin wall

## Application:

- Connection of components

## Maximum voltage operation:

- 60 V CD (25 V AC)

## Thermal range:

- -40 °C to 105°C      3,000 hr.

## Specification:

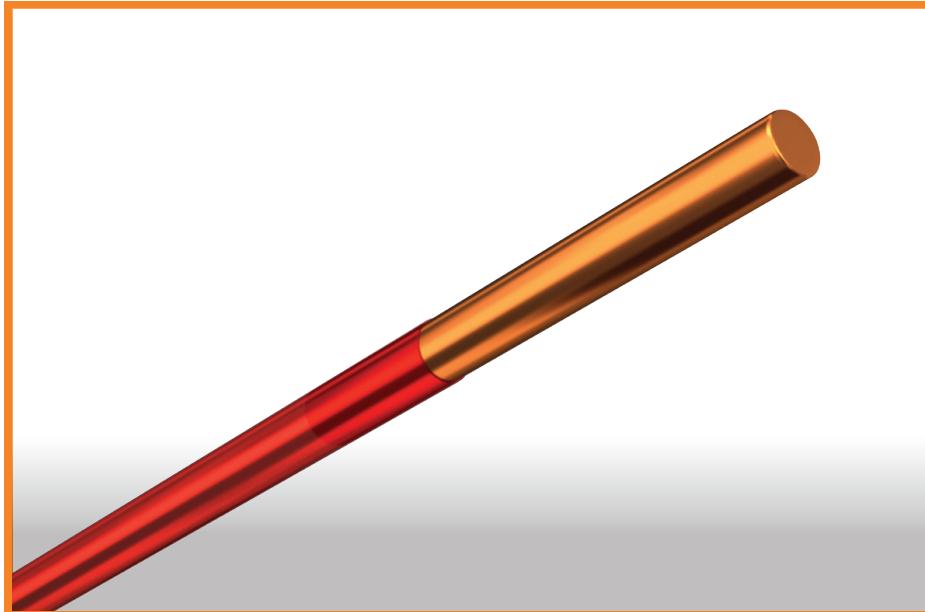
- VW75133
- N 901 987

## Dimensional

TYPE	Number of cores x cross section	Conductor			Cable			Sheath	
		Number of individual wires	Diameter individual wires (mm)	Conductor resistance at 20°C (m Ω/m)	Wall thickness (mm)	Outside cable diameter (mm)		Wall thickness (mm)	Outside cable diameter (mm)
		Min	Max	Max	Min	Min	Max	Min	Max
FLRYYW	2X 0.54	19	0.19	37.10	0.18	1.60	1.62	0.40	4.46

## Magnet Wire

### POLISOLDANEL™ NYLON 155 °C



#### Description:

- Round soft copper wire
- Modified polyurethane resin as base coat
- Polyamide resin as top coat

#### Application:

- Low voltage transformers
- Relays
- Electronic coils
- Encapsulated coils
- Ballast
- Home appliance motors

#### Features:

- Good resistance to solvents used on impregnating varnishes or encapsulating, hardener and bonding resins.
- Excellent windability
- Polisoldanel™ Nylon has a good balance between mechanical properties (abrasion resistance and flexibility) and fast soldering.

#### Special features:

- Coils produced with Polisoldanel™ Nylon should not be exposed to extreme humidity.
- Coils produced with Polisoldanel™ Nylon should not be exposed to overcharges.
- To get a good soldering performance, wire ends should be immersed in soldering fluxes before getting them into a soldering pot.

#### Standards:

This product may be designed according to any of the following standards:

- IEC 60317-21
- NEMA MW -1000: MW-80-C

Please contact our Technical Department if the requested product should fulfill a different standard from those shown.

#### Thermal class:

155 °C, class F

#### Colors:

- red (typical)
- green
- clear
- blue

#### Recommended soldering conditions:

- The following conditions are suggested to get good soldering results:

14 to 19 AWG: 430 °C, 10 seconds  
 20 to 23 AWG: 430 °C, 8 seconds  
 24 to 29 AWG: 390 °C, 6 seconds  
 30 to 36 AWG: 390 °C, 5 seconds  
 37 to 44 AWG: 390 °C, 4 seconds

#### Certification:

Product certified by Underwriters Laboratories Inc. Records are available on File E87331.

#### How to order:

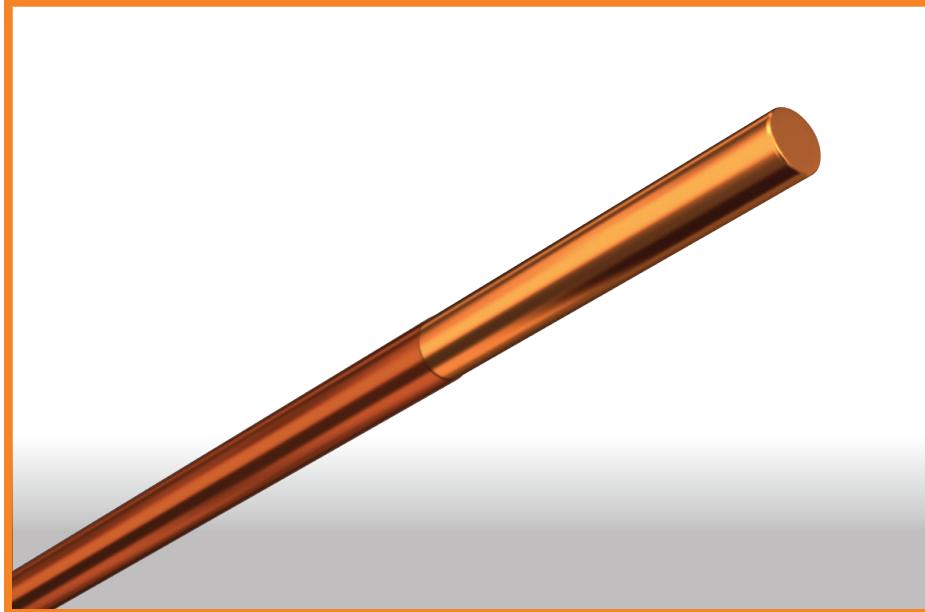
Polisoldanel™ Nylon magnet wire, round wire, gauge (AWG) or cross-section area ( $\text{mm}^2$ ), built (single or heavy), color, weight and package.

## Magnet Wire

**POLISOLDANEL™ NYLON 155 °C****Round wire production range Polisoldanel™ Nylon**

Color	Build	Range AWG	Bare wire diameter			
			Minimum		Maximum	
			mm	in	mm	in
Red (typical) green and clear	Single	14-44	0.048	0.0019	1.643	0.0647
	Heavy	14-44	0.048	0.0019	1.643	0.0647
Blue	Heavy	14-44	0.048	0.0019	1.643	0.0647

These data may vary due to manufacturing tolerances.

**Magnet Wire****POLITERMANEL™ 180 °C****Description:**

- Round soft copper wire
- Insulation based on modified polyester resin

**Application:**

- Hermetic motors
- Dry-type transformers
- Coils
- Motors for portable tools

**Features:**

- Excellent thermal stability, excellent dielectric and mechanical performance.
- Politermanel™ is resistant to solvents, coolants and freon 22, 134-A, 141-B, 404-A, 407-C, 410-A and 507.

**Special features:**

- Do not use Politermanel™ for applications subject to excessive moisture conditions.
- Politermanel™ is not a solderable magnet wire.
- Politermanel™ shall not be used to build oil-type transformers.

**Standards:**

This product may be designed according to the following standard:

- IEC 60317-8
- NEMA MW-1000: MW 30-C
- NEMA MW-1000: MW 72-C

If compliance with a different specification is required, please contact our Technical Department.

**Thermal class:**

- 180 °C, class H

**Color:**

- clear (typical)

**Certification:**

Product certified by Underwriters Laboratories Inc. Records are available on File E87331.

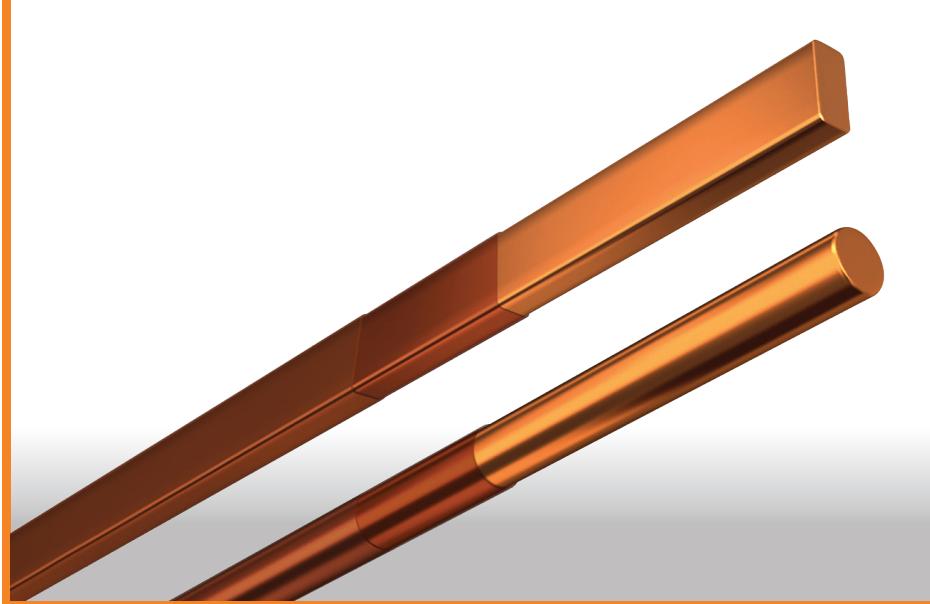
**How to order:**

Politermanel™ magnet wire, gauge (AWG) or crosssection area (mm<sup>2</sup>), color, weight and package.

Color	Construction	Gage AWG	Conductor diameter			
			Minimum		Maximum	
			mm	inch	mm	inch
Clear	Single	21-44	0.048	0.0019	0.732	0.0288
	Heavy	21-44	0.048	0.0019	0.732	0.0288

## Magnet Wire

### AMIDANEL™ 200 °C



#### Description:

- Round, square or rectangular soft copper wire
- Polyester imide resin as base coat
- Polyamideimide resin as top coat

#### Application:

- Open-type motors
- Enclosed motors
- Hermetic motors
- Dry-type transformers
- Automotive coils
- Ballast
- Motors for portable tools

#### Features:

- Excellent thermal stability, excellent dielectric and mechanical performance, very good chemical resistance to usual solvents and very good chemical resistance to coolants
- Mechanical performance has been improved on round larger gauge (4-10 AWG) and shaped wires to avoid damage during tough winding processes. Improved product trademark is Amidanel™ Premium.
- Amidanel™ is resistant to Freon 22 and environmental friendly freons as 134-A, 141-B, 404-A, 407-C, 410-A and 507.

#### Special features:

- Coils produced with Amidanel™ should not be exposed to extreme humidity.
- Amidanel™ is not a solderable product by immersion in soldering pot.

#### Standards:

This product may be designed according to any of the following standards:

- IEC 60317-13, NEMA MW 1000: MW 35-C and MW 73-C (round wire)
- IEC 60317-29 y NEMA MW 1000: MW 36-C (shaped wire) Please contact our Technical Department if the requested product should fulfill a different standard from those shown.

#### Thermal class:

200 °C, class N

#### Color:

- clear (typical)
- green
- blue

#### Certification:

Product certified by Underwriters Laboratories Inc. Records are available on File E87331.

#### How to order:

Amidanel™ magnet wire, round, square or rectangular wire, gauge (AWG) or crosssection area ( $\text{mm}^2$ ), or dimensions (thickness and width in case of rectangular wire), built (single or heavy), color, weight and package.

## Magnet Wire

### AMIDANEL™ 200 °C



#### Round wire production range Amidanel™

Color	Build	Range AWG	Bare wire diameter			
			Minimum		Maximum	
			mm	in	mm	in
Clear (typical)	Single	14-44	0.048	0.0019	1.643	0.0647
	Heavy	4-44	0.048	0.0019	5.227	0.2058
Clear (hermetic)	Heavy	14-30	0.251	0.0099	1.643	0.0647
Blue and green	Heavy	14-30	0.251	0.0099	1.643	0.0647

These data may vary due to manufacturing tolerances.



#### Shaped wire production range Amidanel™

	Dimensions			
	Minimum		Maximum	
	mm	in	mm	in
Bare thickness	1.0	0.040	5.2	0.204
Bare width	2.5	0.100	1.0	0.551

Maximum width/ thickness ratio <sup>(1)</sup>	Maximum cross-section area	
	mm <sup>2</sup>	in <sup>2</sup>
6	40.3	0.0625

(1) Width/thickness ratio has no units.

## Magnet Wire

### AMIDANEL™ 200 °C



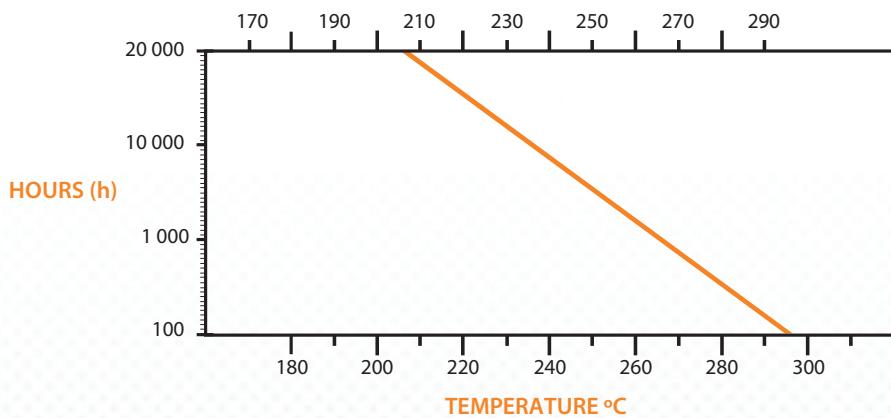
#### Typical performance \*

THERMAL PROPERTIES			MECHANICAL PROPERTIES		
Test	Requirement **	Results	Test	Requirement **	Results
Thermal endurance	Minimum 20 000 h @ 200 °C	219 °C	Adherence and flexibility	20% / 3d	No breaks
Thermoplastic flow	Minimum 300 °C	385 °C	Elongation	Minimum 32%	38%
Heat shock	20% / 3d / 220 °C	No breaks	Springback	Maximum 58°	54°
			Scrape resistance	Minimum average 1 150 g	1 500 g
			Static coefficient of friction	-----	0.100
			Dynamic coefficient of friction	-----	0.120

CHEMICAL PROPERTIES			ELECTRICAL PROPERTIES		
Test	Requirement**	Results	Test	Requirement **	Results
Solubility	Xilol, Xilol/Butyl Celosolve	Ok	Dielectric Breakdown	Minimum 5 700 V	9 300 V
Refrigerant (R-22) extraction	Not greater than 0.25% of weight of film insulation	0.05%	Dielectric Breakdown at rated temperature	Minimum 4 275 V	8 100 V
Dielectric Breakdown after R-22 conditioning	Minimum 5 700 V	8 700 V	Continuity	Maximum 5 discontinuities @ 1 500 V	Maximum 1 discontinuities
			Pin hole@ 12V	Maximum 2	0

NOTES: \* Typical performance for a Amidanel™ Heavy Build, 18 AWG

\*\* Standard used: NEMA MW-1000 MW35-C, MW73-C

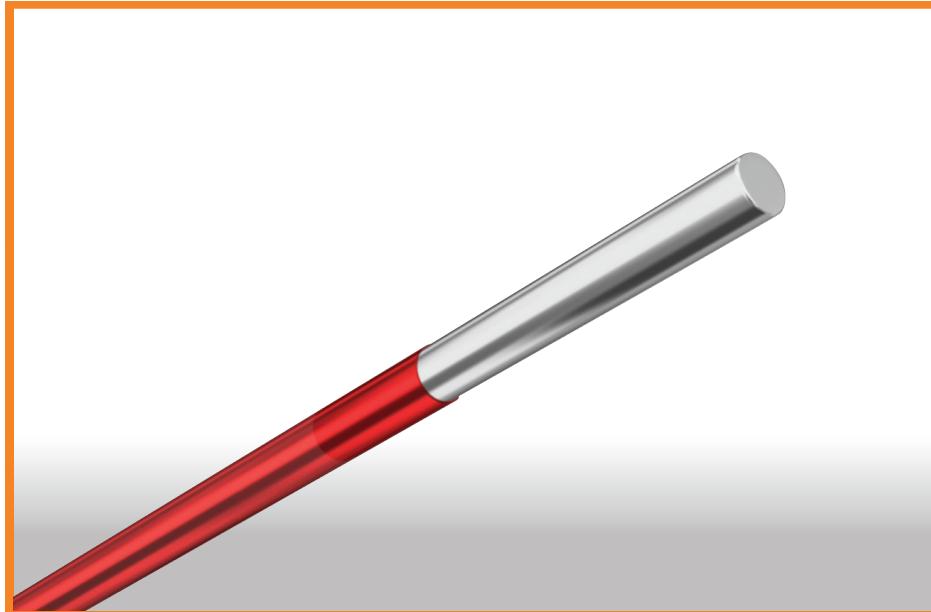
**Magnet Wire****AMIDANEL™ 200 °C****THERMAL CLASS**

The plot above shows thermal endurance performance for a Amidanel™ Magnet Wire, Heavy build, 18 AWG, tested according to ASTM D 2307. Plot was drawn using data obtained during test procedure until 5 000 h and extrapolated to 20 000 h.

Amidanel™ Magnet Wire fulfills thermal requirements to get thermal class 200°C.

## Magnet Wire

### POLISOLDANEL™ NYLON 155 °C



#### Description:

- Round soft aluminum wire
- Modified polyurethane resin as base coat
- Polyamide resin as top coat

#### Application:

- Low Ballast
- Small motors

#### Features:

- Aluminum magnet wire allows the production of economic coils due to the combination of a lower density (one third copper's) and a good electrical conductivity (61% IACS).
- Lower weight electrical equipments
- Good resistance to solvents used on impregnating varnishes or encapsulating, hardener and bonding resins.
- Excellent windability
- Polisoldanel™ Nylon has a good balance between mechanical properties (abrasion resistance and flexibility) and fast soldering.

#### Special features:

- Coils produced with Polisoldanel™ Nylon should not be exposed to extreme humidity.
- Coils produced with Polisoldanel™ Nylon should not be exposed to overcharges.
- To avoid conductor elongation during winding process, mechanical tension limits must be observed.

#### Standards:

This product may be designed according to any of the following standards:

- NEMA MW-1000: MW 80-A

Please contact our Technical Department if the requested product should fulfill a different standard from those shown.

#### Thermal class:

155 °C, class F

#### Colors:

- red (typical)
- green

#### Recommended soldering conditions:

- The following conditions are suggested to get good soldering results:

14-19 AWG: 430 °C, 10 seconds  
 20-23 AWG: 430 °C, 8 seconds  
 24-30 AWG: 390 °C, 6 seconds

#### Certification:

Product certified by Underwriters Laboratories Inc. Records are available on File E87331.

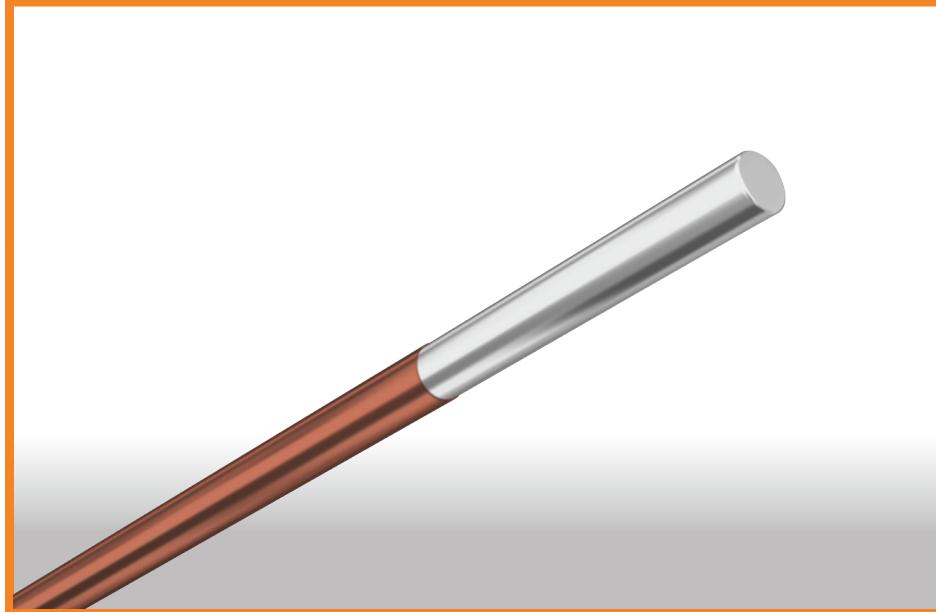
#### How to order:

Polisoldanel™ Nylon magnet wire, aluminum round wire, gauge (AWG) or cross-section area (mm<sup>2</sup>), built (single or heavy), color, weight and package.

**Magnet Wire****POLISOLDANEL™ NYLON 155 °C****Round wire production range Polisoldanel™ Nylon**

Color	Build	Range AWG	Bare wire diameter			
			Minimum		Maximum	
			mm	in	mm	in
Red and green	Single	14-30	0.251	0.0099	1.643	0.0647
	Heavy	14-30	0.251	0.0099	1.643	0.0647

These data may vary due to manufacturing tolerances.

**Magnet Wire****POLITERMANEL™ 180 °C****Description:**

- Round soft aluminum wire
- Insulation based on modified polyester resin

**Application:**

- Dry-type transformers
- Coils
- Motors for portable tools

**Features:**

- Aluminum magnet wire allows the production of economic coils due to the combination of a lower density (one third copper's) and a good electrical conductivity (61% IACS).
- Lower weight electrical equipments
- Excellent thermal stability and excellent dielectric.
- Politermanel™ is resistant to solvents.

**Special features:**

- Do not use Politermanel™ for applications subject to excessive moisture conditions.
- Politermanel™ is not a solderable magnet wire.
- Politermanel™ shall not be used to build oil-type transformers.

**Standards:**

This product may be designed according to the following standard:

- IEC 60317-8
- NEMA MW-1000: MW 30-C

If compliance with a different specification is required, please contact our Technical Department.

**Thermal class:**

180 °C, class H

**Color:**

- clear (typical)

**Certification:**

Product certified by Underwriters Laboratories Inc. Records are available on File E87331.

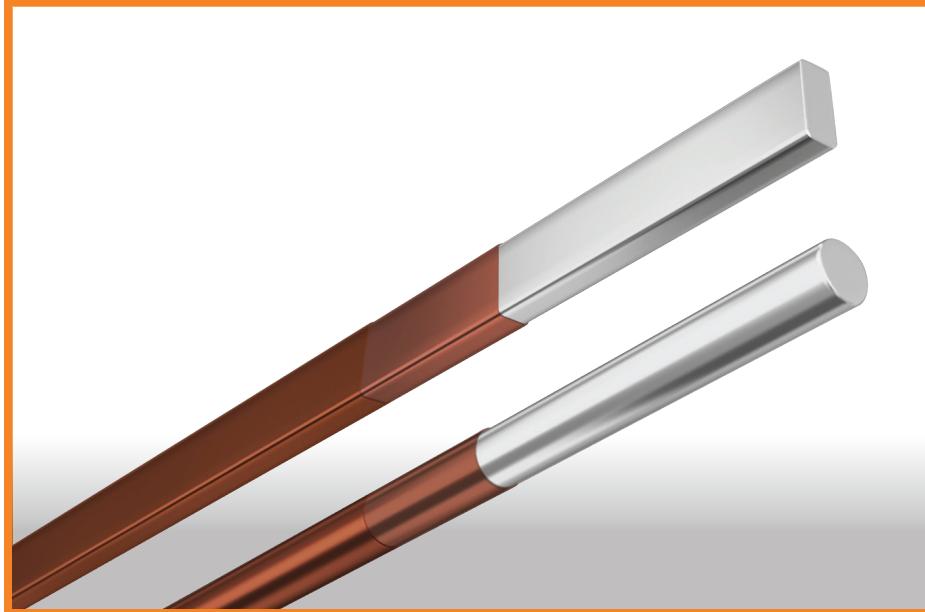
**How to order:**

Politermanel™ magnet wire, gauge (AWG) or crosssection area (mm<sup>2</sup>), color, weight and package

Color	Build	Range AWG	Conductor diameter			
			Minimum		Maximum	
			mm	inch	mm	inch
Clear	Heavy	10-30	0.251	0.0099	2.609	0.1027

## Magnet Wire

### AMIDANEL™ 220 °C



#### Description:

- Round, square or rectangular soft aluminum wire
- Modified polyester resin as base coat
- Polyamideimide resin as top coat

#### Application:

- Dry-type transformers
- Open-type motors
- Enclosed motors
- Hermetic motors
- Automotive coils
- Ballast
- Motors for portable tools

#### Features:

- Aluminum magnet wire allows the production of economic coils due to the combination of a lower density (one third copper's) and a good electrical conductivity (61% IACS).
- Lower weight electrical equipments
- Excellent thermal stability, excellent dielectric and mechanical performance, very good chemical resistance to usual solvents.

#### Special features:

- Coils produced with Amidanel™ Al should not be exposed to extreme humidity.
- Amidanel™ Al is not a solderable product by immersion in soldering pot.
- To avoid conductor elongation during winding process, mechanical tension limits must be observed.

#### Standards:

This product may be designed according to any of the following standards:

- NEMA MW 35-A (round wire)
- NEMA MW 36-A (shaped wire)

Please contact our Technical Department if the requested product should fulfill a different standard from those shown.

#### Thermal class:

220 °C, class R

#### Color:

- clear (typical)
- green
- blue

#### Certification:

Product certified by Underwriters Laboratories Inc. Records are available on File E87331.

#### How to order:

Amidanel™ magnet wire, round, square or rectangular wire, gauge (AWG) or crosssection area ( $\text{mm}^2$ ), or dimensions (thickness and width in case of rectangular wire), built (single or heavy), color, weight and package.

## Magnet Wire

**AMIDANEL™ 220 °C**



### Round wire production range Amidanel™ Al

Color	Build	Range AWG	Conductor diameter			
			Minimum		Maximum	
			mm	in	mm	in
Clear	Single	8-30	0.251	0.0099	3.297	0.1294
Clear	Heavy	3-30	0.251	0.0099	5.885	0.2317
Blue and green	Heavy	14-30	0.251	0.0099	1.643	0.0647



### Shaped wire production range Amidanel™ Al

	Dimensions			
	Minimum		Maximum	
	mm	in	mm	in
Bare thickness	1.0	0.040	7.32	0.289
Bare width	2.0	0.079	15.00	0.590

Maximum width/ thickness ratio	Maximum cross-section area	
	mm <sup>2</sup>	in <sup>2</sup>
6	55	0.0852

These data may vary due to manufacturing tolerances.

## CONTACT



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