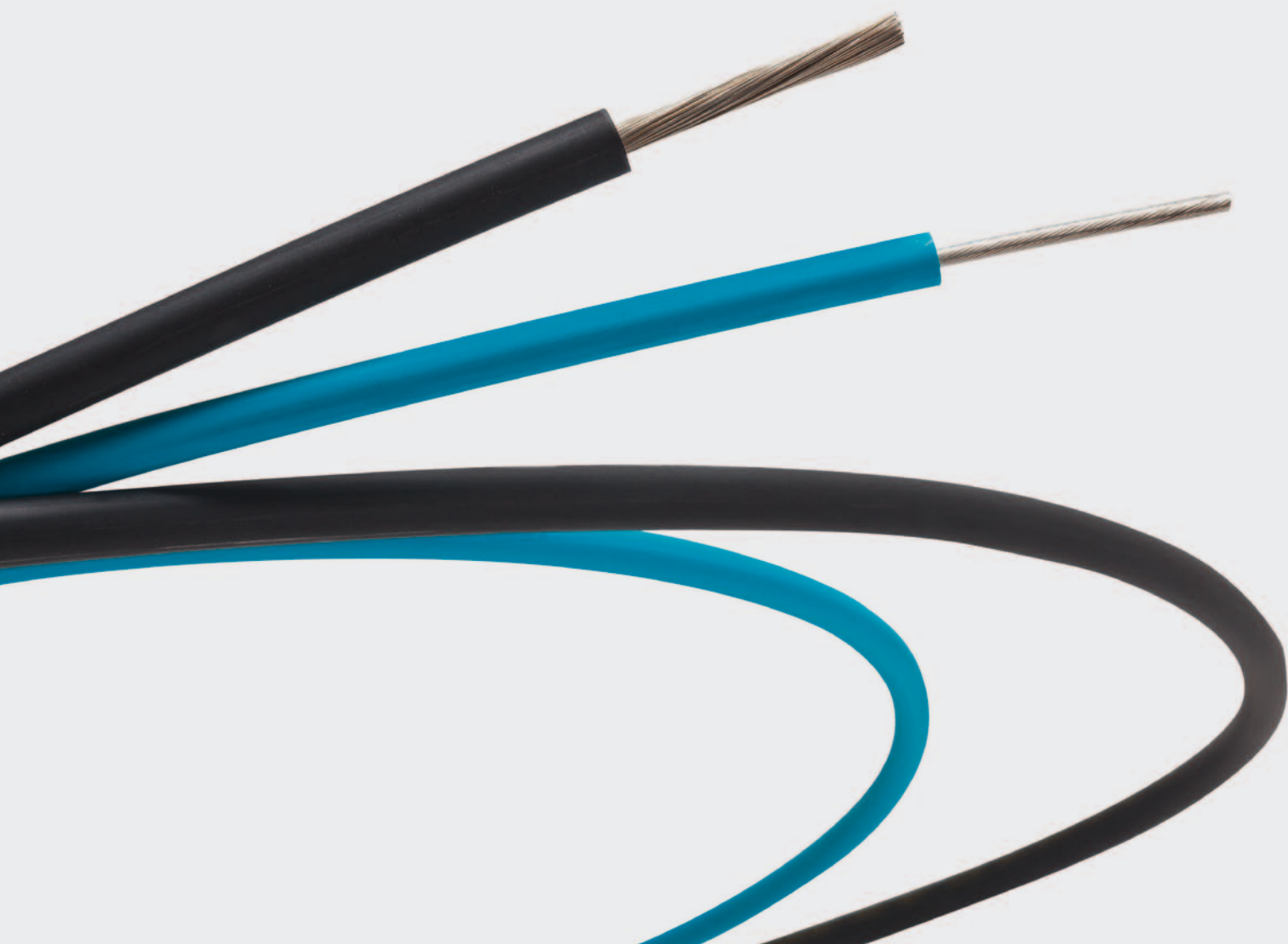


Wires and cables for industrial applications

Edition 2015/09



RADOX® – for harsh environment





Your partner for connectivity solutions

The HUBER+SUHNER Group is a leading international manufacturer of electrical and optical interconnectivity components and systems. Our main markets are communication, transport and industry. Under one roof, we combine technological capabilities in the three core fields of Radio Frequency, Fiber Optics and Low Frequency.

RADOX®, the registered HUBER+SUHNER trademark, is synonymous with high-grade wire and cable products developed and produced in-house. RADOX electron-beam crosslinked insulating and jacketing materials, possess the special properties required for developing and manufacturing technically superior products. Its high temperature resistant, flame retardant, reduced wall thickness and easy process ability make it the ideal insulating material for wires and cables in industrial applications.

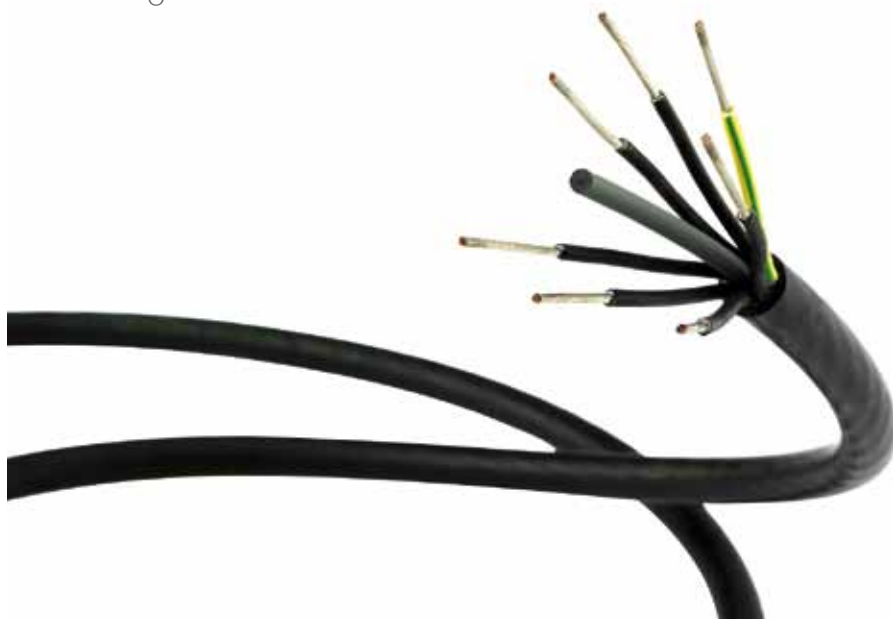
Wires and cables for industrial applications

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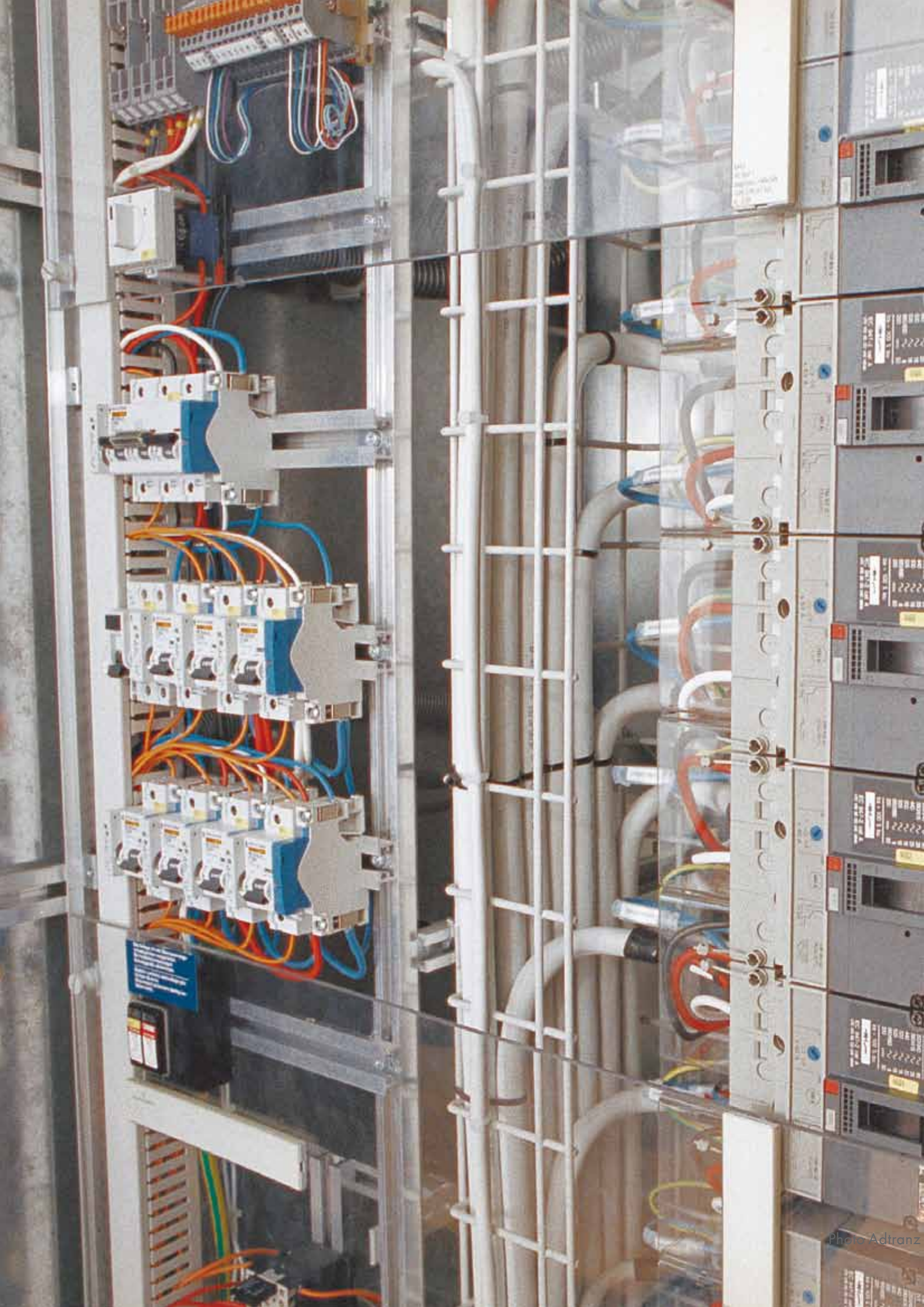
RADOX® by HUBER+SUHNER –
for the toughest conditions



RADOX, the registered HUBER+SUHNER trademark, is synonymous with high-grade WIRE+CABLE products developed and produced in-house. RADOX insulating and jacketing material, which are predominantly electron-beam crosslinked, possess the special properties required for developing and manufacturing technically superior products.

We can also provide customer specific solutions.

All our cables fully comply with the European directives 76/769/EEG, 2003/11/EG, 2000/53/EG, 2003/53/EG and 2011/65/EU (RoHS).



Single core/multi core cables for power and signal transmission in industrial applications



Electronic control systems automatically control processes, transmit data and govern motions such as swivelling and conveying etc. The reliability and uptime of such highly automated, complex technical systems is necessary to ensure the efficiency of state-of-the-art production processes. Trouble-free power supply must also be assured at all times. Our cables and system solutions are therefore applied precisely in areas where dependability is a top priority and outstanding heat resistance, high power handling capacity, ruggedness and compact design are a must.

Multi core cables, single core cables and system solutions

- RADOX® multi core and single core cables
- RADOX® UL cables

RADOX multi core and single core cables have a high power handling capacity and heat resistance. They have been specifically designed for the construction of high performance, compact and lightweight equipment.

- Outstanding heat resistance
- High power handling capacity
- Ruggedness and compact design
- High flexibility
- Easy processing

See table overview on pages 22 and 23.



Single core/multi core cables for power and signal transmission in automation applications



The field of industrial automation has extremely rigorous demands on the performance and quality of the cables used. A cable will achieve top performance only if it offers absolute flexibility and a long service life. In addition, these products must satisfy highly specific customer requirements. Our modular system is the ideal solution for responding to such needs.

Top quality cables for industrial automation applications with a long service life

- RADOX® multi core and single core cables, screened and unscreened
- Hybrid cables
- RADOX data cable for Ethernet and CAN-BUS

Our single core and multi core cables are distinguished by their thin insulation walls and their tight bending radius. The hybrid cables offer a multifunctional solution in a single cable.

- Thin insulation walls
- Tight bending radii
- High flexibility
- Abrasion resistance
- High current carrying capacity
- Long service life

See table overview on pages 22 and 23.



Single core/multi core cables for power and signal transmission in coil winding applications



RADOX® 155 are flexible single core and multi core cables offering excellent resistance to heat, hot pressure and aging. The electronically crosslinked insulation offers high mechanical ruggedness. It will not melt and is resistant to most media as well as insulating varnishes and impregnating resins. Brief exposure to heat up to +280 °C will not have any lasting effect.

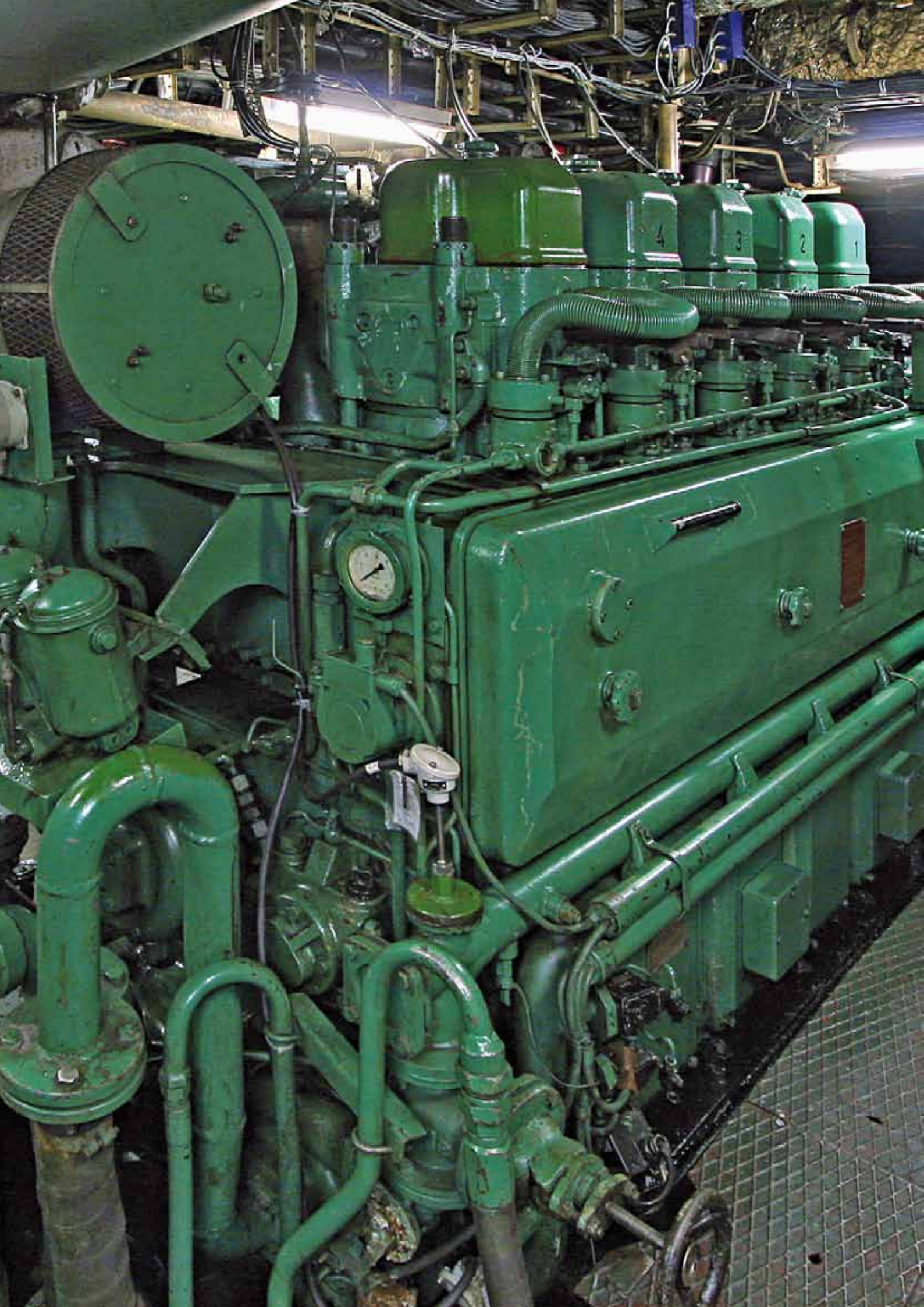
You will find more detailed information and the description of additional products for the coil winding products industry in the «RADOX wires and cables for the coil winding industry» catalogue, item no. 84022718.

Flexible single core cables and wires for coil winding products

- RADOX 155, wires and flexible cables
- RADOX UL and KDJ cables
- High temperature data cable for Ethernet and CAN-BUS

These transmission lines offer high power handling capacity and heat resistance. They require little space and therefore allow the construction of high performance yet compact and light weight equipment.

See table overview on pages 22 and 23.



Single core and multi core cables for power and signal transmission in marine applications



Our RADOX® insulation material for cables was developed with special applications in mind which require high reliability even under adverse environmental conditions. It offers excellent resistance to heat and chemicals as well as to electrical and mechanical stressing. Our single core and multi core cable solutions for marine applications are suitable for stationary as well as mobile uses. They have small diameters, standardised dimensions and require only a short time to install.

Marine cables with GL, DNV and BV approvals

- RADOX 125 IEC marine transmission line
- RADOX MFH control, data and power transmission lines for marine applications
- Data cable for Ethernet and CAN-BUS with marine approval
- SHF 2 mud jacket according to NEK 606

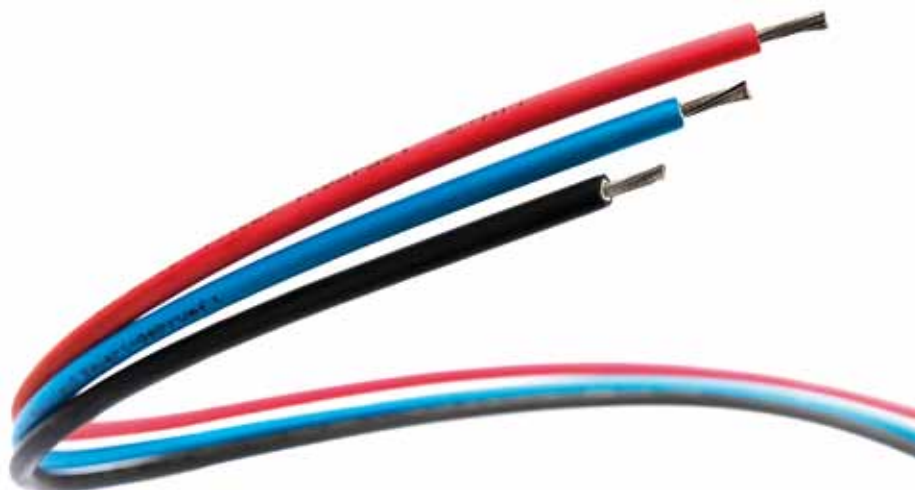
These cable types are particularly distinguished by their resistance to fuels and lubricants, alkalis and acids.

- Light-weight, space saving hybrid solutions meeting the most rigorous demands
- Highly abrasion resistant single cores for corrugated copper cables
- Customised, multifunctional system cables
- Versatile cable and element combinations
- High temperature data bus for marine applications

See table overview on pages 22 and 23.



Single core and multi core cables for power and signal transmission in solar applications



RADOX® solar cables are extremely rugged and abrasion resistant and are capable of withstanding extreme mechanical stressing. Their high temperature and excellent weather-proof ensure a long service life of the cable. Thanks to the technology and high precision of RADOX products, these outstanding characteristics are achieved also with small diameters.

Solar cables with TÜV and UL approval

- RADOX solar cable single and multiple core/screened
- RADOX SMART

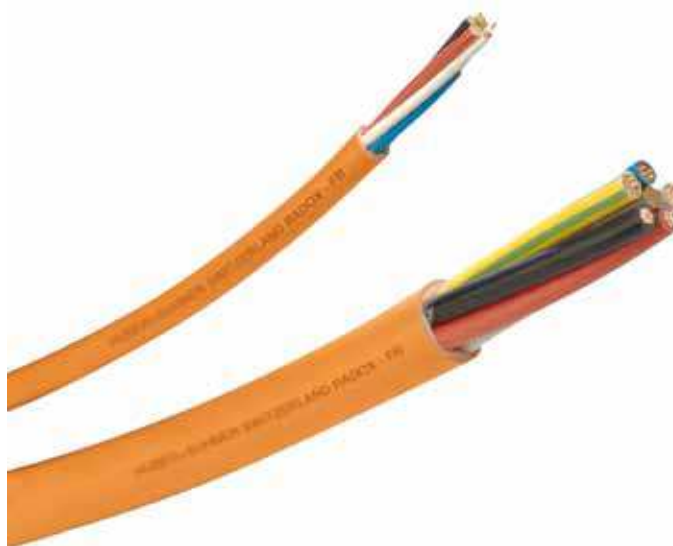
RADOX solar cables are flexible single core and multi core cables that have been specially designed for the wiring of solar systems.

- Range of application -40 to $+120$ °C
- Short circuit strength up to $+250$ °C
- RADOX electronic crosslinked materials will neither melt nor flow even when exposed to high temperatures
- High UV, ozone and hydrolysis resistance
- Excellent mechanical ruggedness and resistance to water, oils and chemicals
- Proven of many years of field application worldwide
- TÜV and UL approvals

See table overview on pages 22 and 23.



Single core and multi core cables for power and signal transmission in safety applications



Installations in buildings and systems with a high person density or high property value – computer centres, hospitals, high-rise buildings, airports, railway stations, public buildings, museums, railway and road tunnels – require high grade cables designed to the necessary standards.

These cable families are distinguished by their precisely defined characteristics and the fact that they will maintain their functions in case of fires. They comply with the major international standards.

High grade cables fulfilling various international fire protection regulations

- RADOX® FR AUS

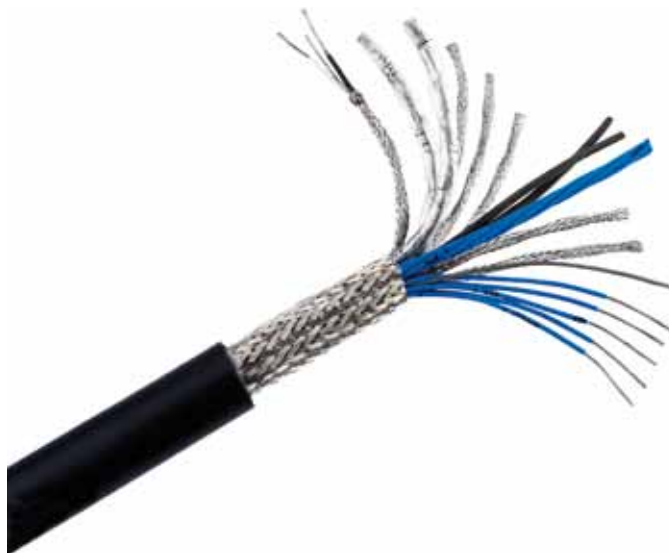
Our safety cables have been designed for service in adverse and humid environments.

- Maintenance of functions in case of fire
- Application in rough and humid environments
- High flexibility
- Approved by major international standardisation bodies
- Customised cables

See table overview on pages 22 and 23.



Single core/multi core cables for power and signal transmission in defence applications



HUBER+SUHNER develops and produces high grade solutions that are suitable for the most extreme environmental conditions. They can be installed in very tight spaces and will satisfy even the most stringent demands.

HUBER+SUHNER is the professional partner in the development and production of system solutions which incorporate all our knowledge and engineering expertise.

Unpredictable conditions, fulfilment of extreme environmental and operating requirements while meeting top quality standards.

- RADOX® single core and multi core cables
- VG transmission lines
- Hybrid cables
- Various MIL styles
- MIL-CAT data cable for harsh environment

RADOX single core and multi core cables have been developed and are produced for high grade defence solutions.

- Wide temperature range
- Stationary as well as mobile applications
- Small overall diameter
- Flexible and rugged
- Light-weight and space saving solutions
- Chemical and mechanical resistance

See table overview on pages 22 and 23.

Preferred fields of application

Cable type	Industry	
RADOX® 125 flexible single core	Page 26	
RADOX® 125 RW, reduced wall thickness	Page 28	
RADOX® 125 IEC marine single core		
RADOX® 155 flexible single core	Page 32	
RADOX® 155 S high resistance to oil	Page 34	
KDJ-11, flexible single core	Page 36	
RADOX® 125 multi core cables, screened and unscreened	Page 38	
RADOX® 155 multi core cables, screened and unscreened	Page 42	
RADOX® UL/CSA flexible single core	Page 48	
RADOX® UL/CSA multi core cables, screened and unscreened	Page 56	
System cables	Page 66	
MIL and VG 95218 div. types		
RADOX® MFH	Page 96	
Hybrid cables	Page 98	
RADOX® Solar single core cables		
RADOX® FR		

	Automation	Coil winding (catalogue no. 84022718)	Marine	Solar (catalogue no. 84017606)	Safety	Defence
					Page 26	
			Page 30			
		Page 32				
					Page 38	
		Page 48				
	Page 66					Page 66
	Page 74					Page 74
			Page 96			Page 96
	Page 98				Page 98	Page 98
				Page 102		
					Page 108	



RADOX® 125, RADOX® 155, KDJ-11

Flexible single cores, multi core cables

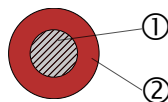
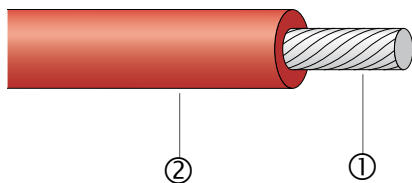
RADOX 125, flexible single core	26
RADOX 125 RW, reduced wall thickness	28
RADOX 125 IEC marine single core	30
RADOX 155, flexible single core	32
RADOX 155 S, high resistance to oil	34
RADOX KDJ-11, flexible single core	36
RADOX 125, multi core cable	38
RADOX 125, multi core cable, screened	40
RADOX 155, multi core cable	42
RADOX 155, multi core cable, screened	44

RADOX® 125,
RADOX® 155, KDJ-11

All our cables fully comply with the European directives 76/769/EWG, 2003/11/EG, 2000/53/EG, 2003/53/EG and 2011/65/EU (RoHS).

RADOX® 125

Flexible single core



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Halogen free
- Flexible, easy to strip and process
- High resistance to thermal pressure
- High abrasion resistance
- Oil-resistant

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, white goods and lighting fixtures.

Composition of cable

- ① Conductor
- ② Insulation

Core colours

stranded tin plated copper, acc. to EN 60228, class 5
RADOX 125
extruded and electron beam crosslinked polyolefin copolymer
various, on request

Technical data

Voltage rating U_0/U	$\leq 0.50 \text{ mm}^2$	450/750 V AC
Test voltage	$\leq 0.50 \text{ mm}^2$	2500 V AC
Voltage rating U_0/U	$> 0.50 \text{ mm}^2$	600/1000 V AC
Test voltage	$> 0.50 \text{ mm}^2$	3500 V AC
Temperature range		-40 up to +125 °C

The cables are in conformity with:

Halogen free compound	fulfilled	EN 50363
Corrosivity of combustion gases	$\text{pH} \geq 4.3$, $\sigma \leq 10 \text{ } \mu\text{S/mm}$	EN 50267-2-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1
Content of fluorine	$\text{HF} \leq 0.1 \%$	EN 60684-2, # 45.2

RADOX® 125

Flexible single core

Extract from our delivery programme

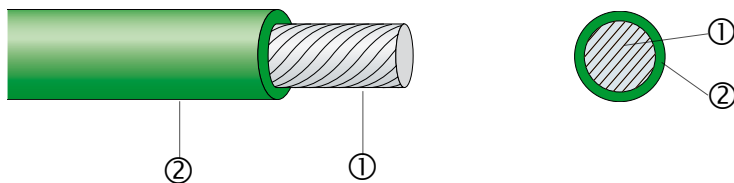
Cross section	Conductor			Core	Weight	Bending radius
nom. mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m	min.
0.25	19 × 0.13	0.6	85.9	1.45 ± 0.05	0.4	3 × dia.
0.34	19 × 0.16	0.8	52.1	1.60 ± 0.10	0.5	3 × dia.
0.50	19 × 0.18	0.9	40.1	1.70 ± 0.10	0.7	3 × dia.
0.75	24 × 0.20	1.15	26.7	2.20 ± 0.10	1.1	3 × dia.
1.0	32 × 0.20	1.3	20.0	2.60 ± 0.10	1.5	3 × dia.
1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	1.9	3 × dia.
2.5	48 × 0.25	2.05	8.21	3.50 ± 0.10	3.0	3 × dia.
4.0	56 × 0.30	2.6	5.09	4.15 ± 0.15	4.6	3 × dia.
6.0	82 × 0.30	3.4	3.39	4.95 ± 0.15	6.7	3 × dia.
10	78 × 0.40	4.4	1.95	6.15 ± 0.15	11	3 × dia.
16	119 × 0.40	5.4	1.24	7.35 ± 0.15	16.5	3 × dia.
25	182 × 0.40	6.7	0.795	8.9 ± 0.2	25	3 × dia.
35	266 × 0.40	7.9	0.565	10.3 ± 0.2	34.9	3 × dia.
50	378 × 0.40	9.4	0.393	12.1 ± 0.25	50	3 × dia.
70	348 × 0.50	11.5	0.277	14.4 ± 0.25	70.8	3 × dia.
95	444 × 0.50	12.9	0.210	16.0 ± 0.3	89	4 × dia.
120	570 × 0.50	15.1	0.164	18.6 ± 0.3	116	4 × dia.
150	722 × 0.50	17.0	0.132	20.5 ± 0.3	145	4 × dia.
185	874 × 0.50	18.5	0.108	22.2 ± 0.3	173	4 × dia.
240	1147 × 0.50	21.3	0.0817	25.4 ± 0.3	225	4 × dia.

Various colours on request.

RADOX® 125,
RADOX® 155, KDJ-11

RADOX® 125 RW

Flexible single core – reduced wall thickness



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Halogen free
- Flexible, easy to strip and process
- High resistance to heat pressure
- High abrasion resistance
- Reduced wall thickness
- Soldering resistant

Application

Protected and fixed installation inside electrical equipment.

Composition of cable

- ① Conductor
- ② Insulation

Core colours

stranded tin plated copper, acc. to EN 60228, class 5
RADOX 125
extruded and electron beam crosslinked polyolefin copolymer
various, on request

Technical data

Voltage rating U_0/U
Test voltage
Temperature range
Min. bending radius

(UL rating)

300/500 V AC
2500 V AC
-40 up to +125 °C
3 × core-dia.

The cables are in conformity with:

Halogen free compound
Corrosivity of combustion gases
Amount of halogen acid gas
Content of fluorine

fulfilled
 $\text{pH} \geq 4.3$, $\sigma \leq 10 \mu\text{S}/\text{mm}$
 $\text{HCl} + \text{HBr} \leq 0.5 \%$
 $\text{HF} \leq 0.1 \%$

EN 50363
EN 50267-2-2
EN 50267-2-1
EN 60684-2, # 45.2

RADOX® 125 RW

Flexible single core – reduced wall thickness

Extract from our delivery programme

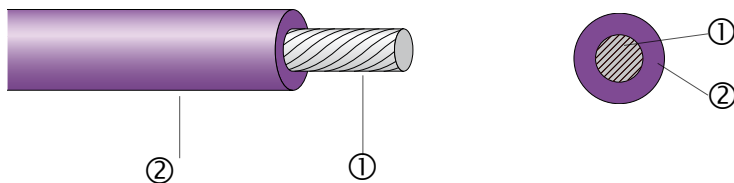
Cross section	Conductor			Core	Weight
nom. mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m
0.34	19 × 0.16	0.77	53.1	1.25 + 0.05	0.41
0.50	19 × 0.18	0.9	40.1	1.40 + 0.05	0.56
0.75	19 × 0.23	1.1	26.7	1.65 + 0.05	0.83
1.0	9 × 0.25	1.25	21.5	1.75 + 0.05	1.00

Various colours on request.

RADOX® 125,
RADOX® 155, KDJ-11

RADOX® 125 IEC

Marine single core



- Excellent high and low temperature and ozone resistance
- Halogen free
- Flame retardant
- High abrasion resistance
- Soldering resistant
- Low smoke
- Easy to strip and process
- Flexible
- Electron beam crosslinked insulation

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of general power devices, lighting and switchboards.

Composition of cable

- ① Conductor
- ② Insulation

Core colours

stranded tin plated copper, acc. to EN 60228, class 5

RADOX 125

extruded and electron beam crosslinked polyolefin copolymer
various, on request

Technical data

Voltage rating U_0/U	600/1000 V AC
Test voltage	3500 V AC
Temperature range	-25 up to +110 °C
Temperature range IEC 60092	+90 °C
Short circuit temperature IEC 60092	+250 °C
Min. bending radius	$\varnothing < 12 \text{ mm}$ 3 × core-dia. $\varnothing > 12 \text{ mm}$ 4 × core-dia.

Approvals

DET NORSKE VERITAS (DNV)

Classification of ships and mobile offshore units, IEC 60092-353, IEC 60332-3-22 cat. A, IEC 61034-2, IEC 60754-2 (cross section 1.5 – 300 mm²)

BUREAU VERITAS (BV)

Classification of steel ships, IEC 60092-353, IEC 60332-3-22 cat. A, IEC 61034-2, IEC 60754-2 (cross section 1.5 – 300 mm²)

RADOX® 125 IEC

Marine single core

The cables are in conformity with:

Fire protection in ships	fulfilled	IEC 60092
Vertical flame spread	$50 < L \leq 540$ mm	IEC 60332-1-2
Vertical flame spread, bunched	$L \leq 2.5$ m	IEC 60332-3-22
Smoke density	$T \geq 60$ %	IEC 61034-2
Corrosivity of combustion gases	$pH \geq 4.3$, $C \leq 10$ mS/mm	IEC 60754-2
Amount of halogen acid gas	$HCl + HBr \leq 0.5$ %	IEC 60754-1

RADOX® 125,
RADOX® 155, KDJ-11

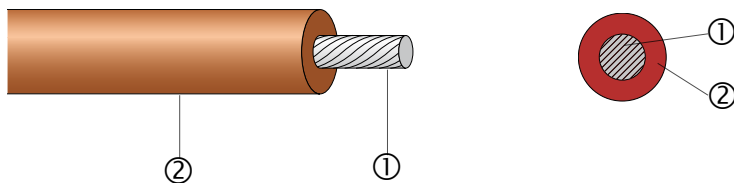
Extract from our delivery programme

Cross section	Conductor			Core	Weight
nom. mm ²	nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m
0.5	19 × 0.18	0.95	40.1	2.40 ± 0.10	1.1
0.75	24 × 0.20	1.2	26.7	2.65 ± 0.10	1.3
1.0	32 × 0.20	1.3	20.0	2.80 ± 0.10	1.6
1.5	30 × 0.25	1.6	13.7	3.05 ± 0.10	2.2
2.5	48 × 0.25	2.1	8.21	3.55 ± 0.10	3.1
4.0	56 × 0.30	2.6	5.09	4.20 ± 0.15	4.8
6.0	81 × 0.30	3.4	3.39	4.85 ± 0.15	6.5
10	78 × 0.40	4.4	1.95	5.85 ± 0.15	11.0
16	119 × 0.40	5.4	1.24	6.95 ± 0.15	16.3
25	182 × 0.40	6.7	0.795	8.70 ± 0.20	24.4
35	266 × 0.40	7.9	0.565	9.90 ± 0.20	34.3
50	378 × 0.40	9.4	0.393	11.6 ± 0.20	50.2
70	348 × 0.50	11.5	0.277	14.0 ± 0.25	68.8
95	444 × 0.50	12.9	0.210	15.4 ± 0.25	87.9
120	551 × 0.50	14.8	0.164	17.8 ± 0.30	109
150	722 × 0.50	17.0	0.132	20.0 ± 0.30	140
185	874 × 0.50	18.5	0.108	22.0 ± 0.30	170
240	1147 × 0.50	21.3	0.0817	25.0 ± 0.30	226
300	1443 × 0.50	23.9	0.0654	27.8 ± 0.30	276

Various colours on request.

RADOX® 155

Flexible single core



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Easy to process
- High resistance to heat pressure
- High abrasion resistance
- Soldering resistant
- Flexible
- Resistant to impregnation resins and varnishes

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, magnets and transformers.

Composition of cable

- ① Conductor
- ② Insulation

Core colours

stranded tin plated copper, acc. to EN 60228, class 5

RADOX 155

extruded and electron beam crosslinked polyolefin copolymer
various, on request

Technical data

Voltage rating U_0/U	$\leq 0.50 \text{ mm}^2$	450/750 V AC
Test voltage	$\leq 0.50 \text{ mm}^2$	2500 V AC
Voltage rating U_0/U	$> 0.50 \text{ mm}^2$	600/1000 V AC
Test voltage	$> 0.50 \text{ mm}^2$	3500 V AC
Temperature range		-55 up to +155 °C

RADOX® 155

Flexible single core

Extract from our delivery programme

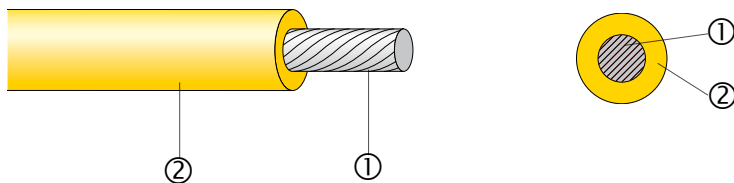
Cross section	Conductor			Core	Weight	Bending radius
nom. mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m	min.
0.25	19 × 0.13	0.6	86.0	1.45 ± 0.05	0.4	3 × dia.
0.34	19 × 0.16	0.8	53.1	1.60 ± 0.10	0.5	3 × dia.
0.50	19 × 0.18	0.9	40.1	1.71 ± 0.10	0.7	3 × dia.
0.75	24 × 0.20	1.15	26.7	2.25 ± 0.10	1.1	3 × dia.
1.0	32 × 0.20	1.3	20.0	2.50 ± 0.10	1.5	3 × dia.
1.5	30 × 0.25	1.55	13.7	2.85 ± 0.10	1.9	3 × dia.
2.5	48 × 0.25	2.05	8.21	3.50 ± 0.10	3.0	3 × dia.
4.0	56 × 0.30	2.6	5.09	4.20 ± 0.15	4.5	3 × dia.
6.0	82 × 0.30	3.0	3.39	5.0 ± 0.15	6.5	3 × dia.
10	78 × 0.40	3.9	1.95	6.4 ± 0.15	11	3 × dia.
16	119 × 0.40	5.4	1.24	7.6 ± 0.15	16.5	3 × dia.
25	182 × 0.40	6.7	0.795	9.2 ± 0.2	25	3 × dia.
35	266 × 0.40	7.9	0.565	10.7 ± 0.3	36.3	3 × dia.
50	378 × 0.40	9.4	0.393	12.3 ± 0.3	50	4 × dia.
70	348 × 0.50	11.5	0.277	14.6 ± 0.3	68	4 × dia.
95	444 × 0.50	13.0	0.210	16.4 ± 0.3	89	4 × dia.
120	570 × 0.50	15.4	0.164	18.5 ± 0.3	110	4 × dia.
150	722 × 0.50	17.0	0.132	20.8 ± 0.3	142	4 × dia.
185	874 × 0.50	18.5	0.108	22.7 ± 0.3	171	4 × dia.
240	1147 × 0.50	21.3	0.0817	26.1 ± 0.4	225	4 × dia.

Various colours on request.

RADOX® 125,
RADOX® 155, KDJ-11

RADOX® 155 S

Flexible single core – high oil resistance



- Excellent high and low temperature and ozone resistance
- Weatherproof
- High resistance to heat pressure
- High abrasion resistance
- Easy to strip and process
- Resistant to hydrolysis, oil and fuels
- Resistant to impregnation resins and varnishes

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, magnets and transformers.

Composition of cable

- ① Conductor
- ② Insulation

Core colours

stranded tin plated copper, acc. to EN 60228, class 5

RADOX 155 S

extruded electron beam crosslinked polyolefin copolymer
various, on request

Technical data

Voltage rating U_0/U

Test voltage

Voltage rating U_0/U

Test voltage

Temperature range

Min. bending radius

$\leq 0.50 \text{ mm}^2$

$\leq 0.50 \text{ mm}^2$

$> 0.50 \text{ mm}^2$

$> 0.50 \text{ mm}^2$

450/750 V AC

2500 V AC

600/1000 V AC

3500 V AC

–55 up to +155 °C

3 x core-dia.

RADOX® 155 S

Flexible single core – high oil resistance

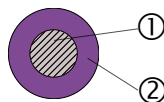
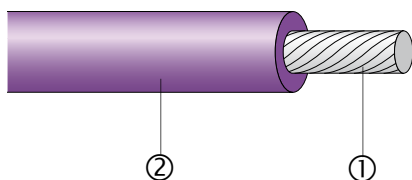
Extract from our delivery programme

Cross section	Conductor			Core	Weight
nom. mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m
0.50	19 × 0.18	0.9	40.1	1.70 ± 0.10	0.7
0.75	24 × 0.20	1.15	26.7	2.20 ± 0.10	1.1
1.0	32 × 0.20	1.3	20.0	2.60 ± 0.10	1.5
1.5	30 × 0.25	1.55	13.7	2.70 ± 0.10	1.9
2.5	48 × 0.25	2.05	8.21	3.50 ± 0.10	3.0
4.0	56 × 0.25	2.6	5.09	4.15 ± 0.15	4.5
6.0	81 × 0.25	3.4	3.39	5.20 ± 0.15	6.6

Various colours on request.

RADOX® KDJ-11

Flexible single core



- Resistant to solvents, oils, fuels, alkaline solutions, acids and hydrolysis
- Weatherproof
- Impermeable to vapour
- Compact design
- Mechanical robustness in aggressive environment at high and low temperatures

Application

- Wiring of equipment for heating and refrigeration units, chemical plants, wet or humid rooms and rooms with high ambient temperatures.
- Compatible to moulding compounds.
- Transformer in oil, class H motors.

Composition of cable

① Conductor	stranded bare copper, acc. to EN 60228, class 5
② Insulation	FEP
Core colours	various, on request

Technical data

Voltage rating U_0/U	0.50 and 1.0 mm ² 1.50 up to 25 mm ²	300/500 V AC 450/750 V AC
Test voltage		2500 V AC
Max. conductor temperature	(continuous)	+180 °C
Short circuit temperature	(max. 5 s)	+250 °C
Min. operating temperature	fixed	-100 °C
	flexing	-55 °C
Min. bending radius	fixed	3 × core-dia.
	flexing	5 × core-dia.

RADOX® KDJ-11

Flexible single core

Extract from our delivery programme

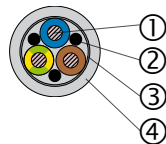
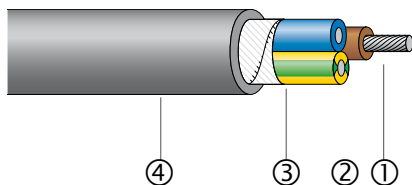
Cross section	Conductor			Core	Weight
nom. mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m
0.50	19 × 0.18	0.91	37.1	1.85	0.8
0.75	24 × 0.20	1.16	24.7	2.10	1.2
1.0	32 × 0.20	1.33	18.5	2.30	1.4
1.5	19 × 0.32	1.63	12.6	2.60	2.0
2.5	50 × 0.25	1.98	7.58	3.20	3.0
4.0	56 × 0.30	2.50	4.70	3.80	4.3
6.0	84 × 0.30	2.98	3.14	4.90	6.8
10	80 × 0.40	3.94	1.87	5.50	11.1

Various colours on request.

RADOX® 125,
RADOX® 155, KDJ-11

RADOX® 125

Multi core cable



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Halogen free
- Flame retardant
- Soldering resistant
- Flexible
- In case of fire no corrosive gases and low smoke emission
- Easy to strip

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Core:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX 125
Core colours	extruded and electron beam crosslinked polyolefin copolymer
	2 up to 5 core acc. to CENELEC HD 308 (see page 127)
	6 core and more: black numbered with yellow/green earthing
② Fillers (optional)	RADOX 125
③ Separator	plastic tape
④ Sheath	RADOX 125M:
	extruded and electron beam crosslinked polyolefin copolymer
Colour	black

Technical data

Voltage rating U_0/U	$\leq 16 \times 0.50 \text{ mm}^2$	450/750 V AC
Test voltage	$\leq 16 \times 0.50 \text{ mm}^2$	2500 V AC
Voltage rating U_0/U	$> 16 \times 0.50 \text{ mm}^2$	600/1000 V AC
Test voltage	$> 16 \times 0.50 \text{ mm}^2$	3500 V AC
Temperature range	fixed	-40 up to +125 °C
Min. operating temperature	flexing	-25 °C
Max. conductor temperature	at short circuit (max. 5 s)	+280 °C
Min. bending radius	fixed	3 × cable-dia.
	flexing	5 × cable-dia.

The cables are in conformity with:

Halogen free compound	fulfilled	EN 50363
Corrosivity of combustion gases	$\text{pH} \geq 4.3$, $\sigma \leq 10 \text{ } \mu\text{S/mm}$	EN 50267-2-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1
Content of fluorine	$\text{HF} \leq 0.1 \%$	EN 60684-2, # 45.2

RADOX® 125

Multi core cable

Extract from our delivery programme

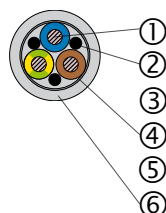
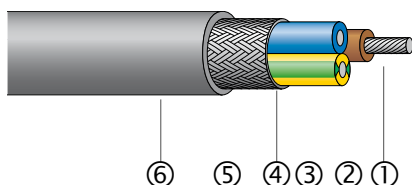
Cross section	Conductor			Core	Cable	Weight
$n \times \text{mm}^2$	Construction nom. $n \times \text{mm dia.}$	Dia. max. mm	R_{20} IEC 60228 max. Ω/km	Dia. mm	Dia. mm	nom. kg/100 m
4 × 0.25	19 × 0.12	0.61	88.5	1.45 ± 0.05	5.4 ± 0.3	4.0
4 × 0.5	19 × 0.18	0.9	40.1	1.7 ± 0.10	6.1 ± 0.3	6.5
2 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	6.6 ± 0.3	6.3
3 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	7.3 ± 0.3	7.9
4 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	7.7 ± 0.3	8.8
5 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	8.6 ± 0.3	10.9
2 × 1.0	32 × 0.20	1.3	20.0	2.6 ± 0.10	7.5 ± 0.3	7.4
3 × 1.0	32 × 0.20	1.3	20.0	2.6 ± 0.10	7.9 ± 0.3	9.1
2 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	7.8 ± 0.3	8.6
3 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	8.3 ± 0.3	11.0
4 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	9.2 ± 0.3	13.6
5 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	10.4 ± 0.4	16.8
7 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	12.3 ± 0.4	23.6
2 × 2.5	50 × 0.25	2.05	8.21	3.50 ± 0.10	9.1 ± 0.3	13.0
3 × 2.5	50 × 0.25	2.05	8.21	3.50 ± 0.10	10.1 ± 0.4	16.6
4 × 2.5	50 × 0.25	2.05	8.21	3.50 ± 0.10	11.3 ± 0.4	20.9
5 × 2.5	50 × 0.25	2.05	8.21	3.50 ± 0.10	12.4 ± 0.4	24.9
4 × 4.0	56 × 0.30	2.6	5.09	4.15 ± 0.15	13.0 ± 0.4	29.8
5 × 4.0	56 × 0.30	2.6	5.09	4.15 ± 0.15	14.6 ± 0.4	36.7
4 × 10	78 × 0.40	4.4	1.95	6.15 ± 0.15	19.0 ± 0.5	78.2
5 × 10	78 × 0.40	4.4	1.95	6.15 ± 0.15	21.4 ± 0.5	83.3

Other cross sections on request.

RADOX® 125,
RADOX® 155, KDJ-11

RADOX® 125

Multi core cable – screened



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Halogen free
- Flame retardant
- Soldering resistant
- Flexible
- In case of fire no corrosive gases and low smoke emission
- Easy to strip

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Core:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX 125
Core colours	extruded and electron beam crosslinked polyolefin copolymer 2 up to 5 core acc. to CENELEC HD 308 (see page 127) 6 core and more: black numbered with yellow/green earthing other colours on request
② Fillers (optional)	RADOX 125
③ Separator (optional)	plastic tape
④ Screen	copper braid, optical coverage: $\geq 85\%$
⑤ Separator (optional)	plastic tape
⑥ Sheath	RADOX 125M
Colour	extruded and electron beam crosslinked polyolefin copolymer black

Technical data

Voltage rating U_0/U	$\leq 16 \times 0.50 \text{ mm}^2$	450/750 V AC
Test voltage	$\leq 16 \times 0.50 \text{ mm}^2$	2500 V AC
Voltage rating U_0/U	$> 16 \times 0.50 \text{ mm}^2$	600/1000 V AC
Test voltage	$> 16 \times 0.50 \text{ mm}^2$	3500 V AC
Temperature range	fixed	-40 up to +125 °C
Min. operating temperature	flexing	-25 °C
Max. conductor temperature	at short circuit (max. 5 s)	+280 °C
Min. bending radius	fixed	4 x cable-dia.
	flexing	5 x cable-dia.

The cables are in conformity with:

Halogen free compound	fulfilled	EN 50363
Corrosivity of combustion gases	$\text{pH} \geq 4.3$, $\sigma \leq 10 \text{ } \mu\text{S/mm}$	EN 50267-2-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5\%$	EN 50267-2-1
Content of fluorine	$\text{HF} \leq 0.1\%$	EN 60684-2, # 45.2

RADOX® 125

Multi core cable – screened

Extract from our delivery programme

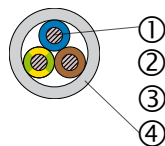
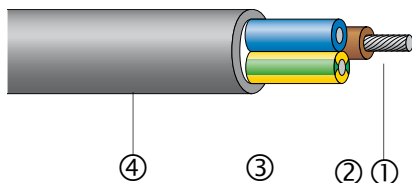
Cross section	Conductor			Core	Screen	Cable	Weight
n × mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Dia. mm	Dia. mm	nom. kg/100 m
4 × 0.25	19 × 0.13	0.6	85.9	1.45 ± 0.05	4.1	5.9 ± 0.3	5.2
2 × 0.5	19 × 0.18	0.9	40.1	1.7 ± 0.10	4.0	5.9 ± 0.3	5.7
4 × 0.5	19 × 0.18	0.9	40.1	1.7 ± 0.10	4.8	6.8 ± 0.3	8.0
2 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	4.9	6.9 ± 0.3	7.4
3 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	5.5	7.6 ± 0.3	9.7
4 × 0.75	24 × 0.20	1.15	26.7	2.2 ± 0.10	6.2	8.4 ± 0.3	11.7
2 × 1.0	32 × 0.20	1.3	20.0	2.6 ± 0.10	5.9	7.9 ± 0.3	10.6
3 × 1.0	32 × 0.20	1.3	20.0	2.6 ± 0.10	6.3	8.7 ± 0.3	12.7
4 × 1.0	32 × 0.20	1.3	20.0	2.6 ± 0.10	7.0	9.3 ± 0.3	14.4
3 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	6.5	8.7 ± 0.3	13.2
4 × 1.5	30 × 0.25	1.55	13.7	2.73 ± 0.10	7.6	10.0 ± 0.4	17.5
4 × 2.5	50 × 0.25	2.05	8.21	3.50 ± 0.10	9.8	12.4 ± 0.4	26.8
5 × 2.5	50 × 0.25	2.05	8.21	3.50 ± 0.10	10.4	13.1 ± 0.4	30.9

Other cross sections on request.

RADOX® 125,
RADOX® 155, KDJ-11

RADOX® 155

Multi core cable



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- Soldering resistant
- Flexible
- Easy to strip

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Core:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX 155 extruded and electron beam crosslinked polyolefin copolymer
Core colours	2 up to 5 core acc. to CENELEC HD 308 (see page 127) 6 core and more: black numbered with yellow/green earthing other colours on request
② Fillers (optional)	RADOX 125
③ Separator (optional)	plastic tape
④ Sheath	RADOX 155 extruded and electron beam crosslinked polyolefin copolymer
Colour	black

Technical data

Voltage rating U_0/U	$\leq 16 \times 0.50 \text{ mm}^2$	450/750 V AC
Test voltage	$\leq 16 \times 0.50 \text{ mm}^2$	2500 V AC
Voltage rating U_0/U	$> 16 \times 0.50 \text{ mm}^2$	600/1000 V AC
Test voltage	$> 16 \times 0.50 \text{ mm}^2$	3500 V AC
Temperature range	fixed	-55 up to +155 °C
Min. operating temperature	flexible	-40 °C
Max. conductor temperature	at short circuit (max. 5 s)	+280 °C
Min. bending radius	fixed	3 × cable-dia.
	flexible	5 × cable-dia.

RADOX® 155

Multi core cable

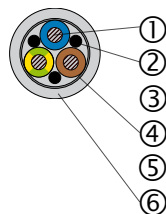
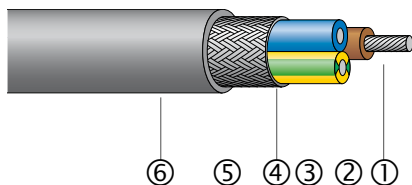
Extract from our delivery programme

Cross section	Conductor			Core	Cable	Weight
$n \times \text{mm}^2$	Construction nom. $n \times \text{mm dia.}$	Dia. max. mm	R_{20} IEC 60228 max. Ω/km	Dia. mm	Dia. mm	nom. kg/100 m
4×0.25	19×0.13	0.6	85.9	1.45 ± 0.05	5.4 ± 0.3	3.3
3×0.34	19×0.15	0.75	57.2	1.55 ± 0.10	5.1 ± 0.3	3.4
2×0.50	19×0.18	0.9	40.1	1.7 ± 0.10	5.2 ± 0.3	3.3
3×0.50	19×0.18	0.9	40.1	1.7 ± 0.10	5.6 ± 0.3	4.0
8×0.50	19×0.18	0.9	40.1	1.7 ± 0.10	8.75 ± 0.3	10.0
16×0.50	19×0.18	0.9	40.1	1.7 ± 0.10	10.4 ± 0.4	18.5
3×0.75	24×0.20	1.15	26.7	2.2 ± 0.10	6.7 ± 0.3	5.9
4×0.75	24×0.20	1.15	26.7	2.2 ± 0.10	7.5 ± 0.3	7.2
2×1.0	32×0.20	1.3	20.0	2.6 ± 0.10	7.0 ± 0.3	6.1
3×1.0	32×0.20	1.3	20.0	2.6 ± 0.10	7.6 ± 0.3	7.7
2×1.5	30×0.25	1.55	13.7	2.7 ± 0.10	7.5 ± 0.3	6.6
3×1.5	30×0.25	1.55	13.7	2.7 ± 0.10	7.9 ± 0.3	9.2
4×1.5	30×0.25	1.55	13.7	2.7 ± 0.10	8.8 ± 0.3	11.7
5×1.5	30×0.25	1.55	13.7	2.7 ± 0.10	10.1 ± 0.4	15.0
3×2.5	50×0.25	2.05	8.21	3.35 ± 0.10	9.9 ± 0.3	14.6
4×2.5	50×0.25	2.05	8.21	3.35 ± 0.10	11.0 ± 0.4	18.6
5×2.5	50×0.25	2.05	8.21	3.35 ± 0.10	11.9 ± 0.4	22.3

Other cross sections on request.

RADOX® 155

Multi core cable – screened



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- Soldering resistant
- Flexible
- Easy to strip

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Core:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX 155 extruded and electron beam crosslinked polyolefin copolymer
Core colours	2 up to 5 core acc. to CENELEC HD 308 (see page 127) 6 core and more: black numbered with yellow/green earthing other colours on request
② Fillers (optional)	RADOX 125
③ Separator (optional)	plastic tape
④ Screen	copper braid, optical coverage: $\geq 85\%$
⑤ Separator (optional)	plastic tape
⑥ Sheath	RADOX 155 extruded and electron beam crosslinked polyolefin copolymer
Colour	black

Technical data

Voltage rating U_0/U	$< 0.75 \text{ mm}^2$	450/750 V AC
Test voltage	$< 0.75 \text{ mm}^2$	2500 V AC
Voltage rating U_0/U	$\geq 0.75 \text{ mm}^2$	600/1000 V AC
Test voltage	$\geq 0.75 \text{ mm}^2$	3500 V AC
Temperature range	fixed	-55 up to $+155$ °C
Min. operating temperature	flexible	-40 °C
Max. conductor temperature	at short circuit (max. 5 s)	$+280$ °C
Min. bending radius	fixed	$4 \times$ cable-dia.
	flexible	$5 \times$ cable-dia.

Fire tests

Flame propagation:

Vertical of a single cable
Vertical of bunched cables

EN 50265-2-1, IEC 60332-1
DIN EN 50266-2-5

category D

RADOX® 155

Multi core cable – screened

Extract from our delivery programme

Cross section	Conductor			Core	Screen	Cable	Weight
n × mm ²	Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Dia. mm	Dia. mm	nom. kg/100 m
2 × 0.25	19 × 0.12	0.61	88.5	1.45 ± 0.05	3.35	5.1 ± 0.3	3.43
6 × 0.25	19 × 0.12	0.61	88.5	1.45 ± 0.05	5.07	6.95 ± 0.15	6.71
4 × 2 × 0.25	19 × 0.12	0.61	88.5	1.45 ± 0.05	11.2	14.0 ± 0.4	27.7
4 × 0.5	19 × 0.18	0.9	40.1	1.71 ± 0.10	5.55	7.6 ± 0.15	7.62
16 × 0.5	19 × 0.18	0.9	40.1	1.71 ± 0.10	9.0	11.6 ± 0.4	20.3
3 G 1.5	30 × 0.25	1.61	13.3	2.73 ± 0.10	6.6	8.7 ± 0.3	11.6
10 G 1.5	30 × 0.25	1.61	13.3	2.73 ± 0.10	11.9	14.7 ± 0.4	33.2
26 G 1.5	30 × 0.25	1.61	13.3	2.73 ± 0.10	18.0	22.0 ± 0.5	74.1
8 G 2.5	50 × 0.25	2.06	8.6	3.5 ± 0.10	14.5	17.9 ± 0.5	49.8
9 G 2.5	50 × 0.25	2.06	8.6	3.5 ± 0.10	15.1	18.6 ± 0.5	51.8

Other cross sections on request.

RADOX® 125,
RADOX® 155, KDJ-11



RADOX® UL/CSA

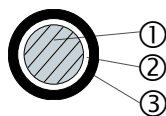
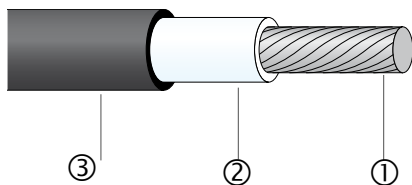
Flexible single cores, multi core cables and wires UL recognised

RADOX UL 1385/CSA AWM I A/B flexible single core, 600 V	48
RADOX UL 3266/CSA AWM I A/B flexible single core, 300 V	50
RADOX UL 3271/CSA AWM I A/B flexible single core, 600 V	52
RADOX UL 3289/CSA CL 1503 flexible single core, 600 V	54
RADOX UL 4486/CSA AWM I/II A/B multi core cables, 300 V	56
RADOX UL 4486/CSA AWM I/II A/B multi core cables, screened, 300 V	58
RADOX UL 4486/CSA AWM I/II A/B multi core cables, 600 V	60
RADOX UL 4486/CSA AWM I/II A/B multi core cables, screened, 600 V	62

All our cables fully comply with the European directives
76/769/EEG, 2003/11/EEG, 2000/53/EEG, 2003/53/EEG
and 2011/65/EU (RoHS).

RADOX® UL1385 / CSA AWM I A/B

Flexible single core



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- High resistance to heat pressure
- High abrasion resistance
- Highly resistant to hydrolysis
- Resistant to impregnation resins and varnishes
- Easy to process
- Soldering resistant insulation
- Flexible

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, magnets and transformers.

Composition of cable

- ① Conductor
- ② Insulation 1
- ③ Insulation 2
- Core colours

stranded tin plated copper, acc. to EN 60228, class 5
electron beam crosslinked polyalcen
electron beam crosslinked polyvinylidenfluorid (PVDF)
various, on request

Technical data

Voltage rating
Operating temperature
Min. temperature
Min. bending radius

600 V AC
+125 °C
-65 °C
3 × core-dia.

Approvals

UL AWM 1385
CSA AWM I A/B

125 °C, no voltage rating
125 °C, 300 V, FT1, FT2

RADOX® UL1385 / CSA AWM I A/B

Flexible single core

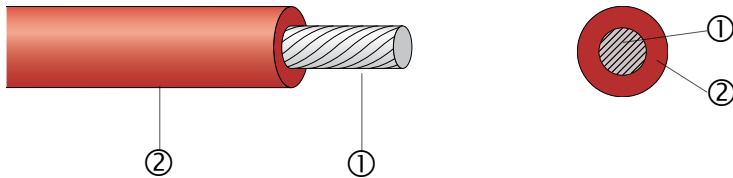
Extract from our delivery programme

Cross section		Conductor			Core	Weight
nom.		Construction nom.	Dia. max.	R_{20}	Dia.	nom.
AWG	mm ²	n × mm dia.	mm	MIL-W-81044/12 max. Ω/km	mm	kg/100 m
28	0.09	7 × 0.13	0.40	239	0.77 ± 0.05	0.13
26	0.15	19 × 0.10	0.51	150	0.87 ± 0.05	0.19
24	0.25	19 × 0.13	0.61	94.2	1.02 ± 0.05	0.30
22	0.38	19 × 0.16	0.77	59.4	1.18 ± 0.05	0.43
20	0.60	19 × 0.20	0.99	36.7	1.40 ± 0.05	0.65
18	0.93	19 × 0.25	1.23	23.2	1.66 ± 0.05	0.95
16	1.25	19 × 0.29	1.40	15.8	1.83 ± 0.05	1.30

Various colours on request.

RADOX® UL 3266 / CSA AWM I A/B

Flexible single core



- Excellent high and low temperature and ozone resistance
- Weatherproof
- High abrasion resistance
- Resistant to impregnation resins and varnishes
- Easy to process
- Soldering resistant
- Flexible

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, magnets and transformers.

Composition of cable

① Conductor	stranded tin plated copper, acc. to EN 60228, class 5
② Insulation	RADOX
Core colours	extruded and electron beam crosslinked polyolefin copolymer various, on request

Technical data

Voltage rating U_o / U	300 V AC
Test voltage	2000 V AC
Operating temperature	+125 °C
Max. conductor temperature	at short circuit (max. 5 s) +280 °C
Min. operating temperature	flexing -25 °C
Min. bending radius	fixed -40 °C 3 × core-dia.

Standards

Appliance wiring material	CSA C22.2 no. 210.2	AWM I A/B 125 °C 300 V
Appliance wiring material	UL 758	style 3266

Approvals

UL	Underwriters Laboratories	file no. E63322
CSA	Canadian Standards Association	report no. 69581

The cables pass the following fire tests:

Vertical flame spread FT2	$L \leq 100 \text{ mm}$	CSA C22.2 no. 0.3 # 4.11.2
Horizontal flame spread, Appliance-wire	$V \leq 25 \text{ mm/Min.}$	UL 1581 # 1090

RADOX® UL 3266 / CSA AWM I A/B

Flexible single core

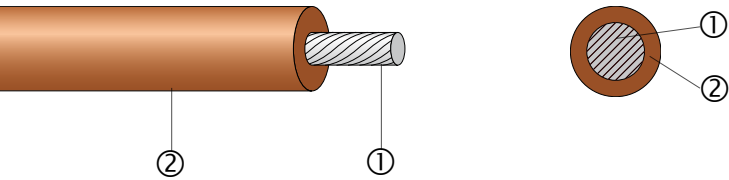
Extract from our delivery programme

Cross section		Conductor		Core	Weight
nom.		Construction n × mm dia.	Dia. max. mm	Dia. mm	nom. kg/100 m
AWG	mm ²				
26	0.15	19 × 0.10	0.51	1.32 ± 0.05	0.32
24	0.25	19 × 0.13	0.61	1.45 ± 0.05	0.41
22	0.38	19 × 0.16	0.77	1.65 ± 0.10	0.53
20	0.62	19 × 0.20	0.99	1.85 ± 0.10	0.83
18	0.96	19 × 0.25	1.23	2.10 ± 0.10	1.13
(16)	1.5	19 × 0.31	1.52	2.41 ± 0.10	1.65
14	2.1	19 × 0.37	1.86	2.72 ± 0.10	2.33
12	3.3	37 × 0.35	2.35	3.21 ± 0.10	3.53
10	5.26	37 × 0.44	3.02	3.88 ± 0.10	5.61

Various colours on request.

RADOX® UL 3271 / CSA AWM I A/B

Flexible single core



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- High resistance to heat pressure
- High abrasion resistance
- Easy to process
- Soldering resistant
- Flexible

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, magnets and transformers.

Composition of cable

① Conductor	stranded tin plated copper, acc. to EN 60228, class 5
② Insulation	RADOX extruded and electron beam crosslinked polyolefin copolymer
Core colours	various, on request

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Operating temperature	+125 °C
Max. conductor temperature	at short circuit (max. 5 s) +280 °C
Min. operating temperature	flexing -25 °C fixed -40 °C

Standards

Appliance wiring material	CSA C22.2 no. 210.2	AWM I A/B 125 °C 600 V FT2
Appliance wiring material	UL 758	style 3271

Approvals

UL Underwriters Laboratories		file no. E63322
CSA	Canadian Standards Association	certificate no.1418425

RADOX® UL 3271 / CSA AWM I A/B

Flexible single core

The cables pass the following fire tests:

Vertical flame spread FT1

Horizontal flame spread FT2

Vertical flame spread

Horizontal flame spread,

Appliance-wire

Vertical flame spread, VW-1

$L \leq 250 \text{ mm}$, $t \leq 60 \text{ s}$

$L \leq 100 \text{ mm}$

$50 < L \leq 540 \text{ mm}$

$V \leq 25 \text{ mm/Min.}$

$L \leq 250 \text{ mm}$, $t \leq 60 \text{ s}$

CSA C22.2 no. 0.3 # 4.11.1

CSA C22.2 no. 0.3 # 4.11.2

EN 60332-1-2, IEC 60332-1-2

UL 1581 # 1090

UL 1581 # 1080

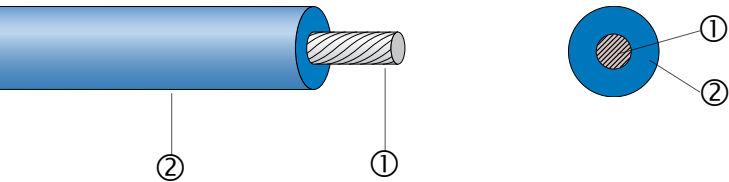
Extract from our delivery programme

Cross section		Conductor			Core	Weight	Bending radius
nom.		Construction nom. $n \times \text{mm dia.}$	Dia. max. mm	R_{20} IEC 60228 max. Ω/km	Dia. mm	nom. kg/100 m	min.
AWG	mm ²						
24	(0.25)	19×0.13	0.61	84.2	2.22 ± 0.10	0.72	$3 \times \text{dia.}$
22	(0.38)	19×0.16	0.77	52.1	2.40 ± 0.10	0.92	$3 \times \text{dia.}$
20	(0.62)	19×0.20	0.99	31.8	2.60 ± 0.10	1.2	$3 \times \text{dia.}$
18	(0.96)	19×0.25	1.23	20.2	2.85 ± 0.10	1.6	$3 \times \text{dia.}$
(16)	1.5	19×0.31	1.52	12.9	3.20 ± 0.10	2.1	$3 \times \text{dia.}$
14	(2.1)	19×0.37	1.86	8.8	3.50 ± 0.10	2.9	$3 \times \text{dia.}$
12	(3.3)	37×0.35	2.35	5.53	4.0 ± 0.15	4.2	$3 \times \text{dia.}$
10	(5.26)	37×0.44	3.02	3.34	4.7 ± 0.15	6.4	$3 \times \text{dia.}$
(8)	10	80×0.40	4.3	1.91	6.4 ± 0.15	12.1	$3 \times \text{dia.}$
(6)	16	119×0.40	5.4	1.22	8.6 ± 0.2	18.8	$3 \times \text{dia.}$
(4)	25	182×0.40	6.7	0.795	9.9 ± 0.2	26.8	$3 \times \text{dia.}$
(2)	35	266×0.40	7.9	0.554	11.1 ± 0.2	36.4	$3 \times \text{dia.}$
(1)	50	378×0.40	9.4	0.385	13.7 ± 0.25	54.3	$4 \times \text{dia.}$
(2/0)	70	348×0.50	11.5	0.271	15.8 ± 0.25	72.3	$4 \times \text{dia.}$
(3/0)	95	444×0.50	13.0	0.206	17.4 ± 0.3	95.5	$4 \times \text{dia.}$
(4/0)	120	551×0.50	15.1	0.164	19.3 ± 0.3	116	$4 \times \text{dia.}$
	150	722×0.50	17.0	0.132	22.2 ± 0.3	150	$4 \times \text{dia.}$

Various colours on request.

RADOX® UL 3289/CSA CL 1503

Flexible single core



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- High resistance to heat pressure
- High abrasion resistance
- Easy to process
- Soldering resistant
- Flexible
- Resistant to impregnation resins and varnishes

Application

Protected and fixed installation inside electrical equipment, especially suitable for the connection of motor windings, switchboards, magnets and transformers.

Composition of cable

① Conductor	stranded tin plated copper, acc. to EN 60228, class 5
② Insulation	RADOX 155 extruded and electron beam crosslinked polyolefin copolymer
Core colours	various, on request

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Operating temperature	+150 °C
Max. conductor temperature	at short circuit (max. 5 s) +280 °C
Min. operating temperature	flexing -40 °C fixed -55 °C

Standards

Appliance wiring material	CSA	CL 1503
Appliance wiring material	UL 758	style 3289

Approvals

UL	Underwriters Laboratories	file no. E63322
CSA	Canadian Standards Association	certificate no. 039507

RADOX® UL 3289/CSA CL 1503

Flexible single core

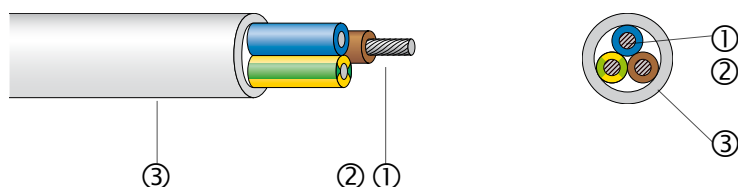
Extract from our delivery programme

Cross section		Conductor		Core	Weight	Bending radius
nom.		Construction nom.	Dia. max.	Dia.	nom.	min.
AWG	mm ²	n × mm dia.	mm	mm	kg/100 m	
26	0.149	19 × 0.10	0.51	2.13 ± 0.10	0.55	3 × dia.
24	0.205	19 × 0.13	0.61	2.27 ± 0.10	0.66	3 × dia.
22	0.324	19 × 0.16	0.79	2.40 ± 0.10	0.79	3 × dia.
20	0.519	19 × 0.20	0.99	2.61 ± 0.10	1.1	3 × dia.
18	0.823	19 × 0.25	1.23	2.85 ± 0.10	1.5	3 × dia.
(16)	1.50	19 × 0.31	1.55	3.20 ± 0.10	2.1	3 × dia.
14	2.08	19 × 0.37	1.86	3.50 ± 0.10	2.7	3 × dia.
12	3.31	37 × 0.34	2.35	4.00 ± 0.15	4.0	3 × dia.
10	5.26	37 × 0.43	3.02	4.68 ± 0.15	6.1	3 × dia.
(8)	10	80 × 0.40	3.94	6.40 ± 0.15	11.7	3 × dia.
(6)	16	119 × 0.40	5.4	8.90 ± 0.2	18.4	3 × dia.
(4)	25	182 × 0.40	6.7	10.2 ± 0.2	25.8	3 × dia.
(2)	35	266 × 0.40	7.9	11.4 ± 0.2	36.5	3 × dia.
(1)	50	378 × 0.40	9.4	14.0 ± 0.25	54.3	4 × dia.
(2/0)	70	348 × 0.50	11.5	16.1 ± 0.3	71.3	4 × dia.
(3/0)	95	444 × 0.50	12.9	17.6 ± 0.3	93.6	4 × dia.
(4/0)	120	551 × 0.50	14.8	19.3 ± 0.3	113	4 × dia.

Various colours on request.

RADOX® UL4486 / CSA AWM I/II A/B

Multi core cable – 300 V



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Easy to strip and process
- Flame retardant
- In case of fire no corrosive gases and low smoke emission
- Flexible

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Cores:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX
Core colours	various, on request
② Fillers (optional)	RADOX
③ Sheath	RADOX 125M
Colour	grey

Technical data

Voltage rating	300 V AC
Test voltage	2000 V AC
Operating temperature	+125 °C
Max. conductor temperature	at short circuit (max. 5 s) +280 °C
Min. operating temperature	flexing -25 °C
	fixed -40 °C
Min. bending radius	5 × cable-dia.

Standards

Appliance wiring material	CSA C22.2 no. 210.2	AWM I/II A/B 125 °C 300 V FT1
Appliance wiring material	UL 758	style 4486

RADOX® UL4486 / CSA AWM I/II A/B

Multi core cable – 300 V

Fire tests

Flame propagation:

Vertical flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.1	FT1
Horizontal flame propagation	CSA C22.2 no. 0.3 cl. 4.11.2	FT2
Vertical flame spread, single cable	EN 50265-2-1, IEC 60332-1	
Vertical flame spread, bunched cables	EN 50266-2-4, IEC 60332-3-24	category C

Flame propagation:

Horizontal flame propagation of an appliance wire	UL 1581 sec. 1090	
Vertical flame spread, single cable	UL 1581 sec. 1061	
Vertical flame spread, single cable	UL 1581 sec. 1080	VW-1

Approvals

CSA certificate	1241318
UL file	E63322

Extract from our delivery programme

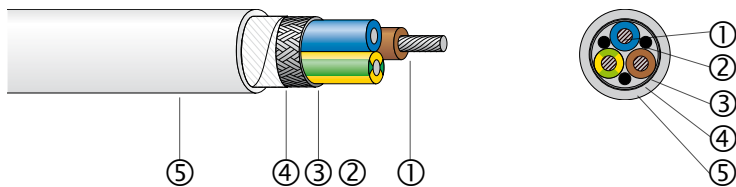
Cross section	Conductor		Core		Cable
nom. n × (G) AWG	Construction nom. n × mm dia.	R ₂₀ IEC 60228 max. Ω/km	Dia. nom. mm	Colours*	Dia. nom. mm
2 × 20	19 × 0.20	32.6	1.85	BU, BN	5.5 ± 0.3
2 × 18	19 × 0.25	21.3	2.10	BU, BN	6.0 ± 0.3
2 × 12	37 × 0.34	5.67	3.21	BU, BN	8.3 ± 0.3
4 × 14	19 × 0.37	9.02	2.72	BU, BN, BK, GY	8.5 ± 0.3

* Abbreviations for core colours see page 126.

Other cross sections on request.

RADOX® UL4486 / CSA AWM I/II A/B

Multi core cable – screened – 300 V



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Easy to strip and process
- Flame retardant
- In case of fire no corrosive gases and low smoke emission
- Flexible

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Cores:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX
Core colours	various, on request
② Fillers (optional)	RADOX
③ Screen	tin plated copper braid
④ Separator	plastic tape
⑤ Sheath	RADOX 125M
Colour	grey

Technical data

Voltage rating	300 V AC
Test voltage	2000 V AC
Operating temperature	+125 °C
Max. conductor temperature	at short circuit (max. 5 s) +280 °C
Min. operating temperature	flexing -25 °C
	fixed -40 °C
Min. bending radius	5 × cable-dia.

Standards

Appliance wiring material	CSA C22.2 no. 210.2	AWM I/II A/B 125 °C 300 V FT1
Appliance wiring material	UL 758	style 4486

RADOX® UL4486 / CSA AWM I/II A/B

Multi core cable – screened – 300 V

Fire tests

Flame propagation:

Vertical flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.1	FT1
Horizontal flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.2	FT2
Vertical flame spread, single cable	EN 50265-2-1, IEC 60332-1	
Vertical flame spread, bunched cables	EN 50266-2-4, IEC 60332-3-24	category C

Flame propagation:

Horizontal flame propagation of an appliance wire	UL 1581 sec. 1090	
Vertical flame spread, single cable	UL 1581 sec. 1061	
Vertical flame spread, single cable	UL 1581 sec. 1080	VW-1

Approvals

CSA certificate	1241318
UL file	E63322

Extract from our delivery programme

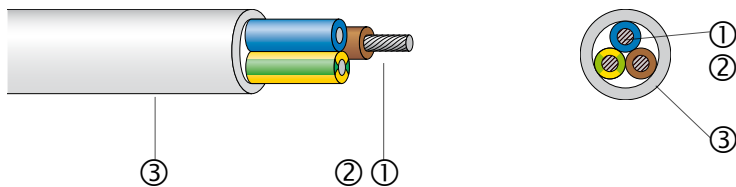
Cross section	Conductor		Core		Screen	Cable
nom. n × (G) AWG	Construc. nom. n × mm dia.	R ₂₀ IEC 60228 max. Ω/km	Dia. nom. mm	Colours*	Dia. nom. mm	Dia. nom. mm
2 × 18	19 × 0.25	21.3	2.10	BU, BN	4.6	6.6 ± 0.3
2 × 14	19 × 0.37	9.02	2.72	BU, BN	6.0	7.9 ± 0.3
3 G 20	19 × 0.20	32.6	1.85	BU, BN, GNYE	4.5	6.4 ± 0.3
3 × 14	19 × 0.37	9.02	2.72	BU, BN, BK	6.5	8.3 ± 0.3
4 G 18	19 × 0.25	21.3	2.10	BU, BN, BK, GNYE	5.7	7.6 ± 0.3
4 × 12	37 × 0.34	5.67	3.21	BU, BN, BK, GY	8.8	10.7 ± 0.4

* Abbreviations for core colours see page 126.

Other cross sections on request

RADOX® UL4486 / CSA AWM I/II A/B

Multi core cable – 600 V



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Easy to strip and process
- Flame retardant
- In case of fire no corrosive gases and low smoke emission
- Flexible

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Cores:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX
Core colours	diverse, on request
② Fillers (optional)	RADOX
③ Sheath	RADOX 125M
Colour	grey

Technical data

Voltage rating		600 V AC
Test voltage		2500 V AC
Operating temperature		+125 °C
Max. conductor temperature	at short circuit (max. 5 s)	+280 °C
Min. operating temperature	flexing	–25 °C
	fixed	–40 °C
Min. bending radius		5 × cable-dia.

Standards

Appliance wiring material	CSA C22.2 no. 210.2	AWM I/II A/B 125 °C 600 V FT1
Appliance wiring material	UL 758	style 4486

RADOX® UL4486 / CSA AWM I/II A/B

Multi core cable – 600 V

Fire tests

Flame propagation:

Vertical flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.1	FT1
Horizontal flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.2	FT2
Vertical flame spread, single cable	EN 50265-2-1, IEC 60332-1	
Vertical flame spread, bunched cables	EN 50266-2-4, IEC 60332-3-24	category C

Flame propagation:

Horizontal flame propagation of an appliance wire	UL 1581 sec. 1090	
Vertical flame spread, single cable	UL 1581 sec. 1061	
Vertical flame spread, single cable	UL 1581 sec. 1080	VW-1

Approvals

CSA certificate	1241318
UL file	E63322

Extract from our delivery programme

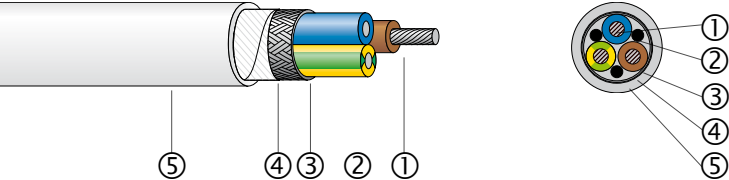
Cross section	Conductor		Core		Cable
nom. n × (G) AWG	Construction nom. n × mm dia.	R ₂₀ IEC 60228 max. Ω/km	Dia. nom. mm	Colours*	Dia. nom. mm
1 × 1	378 × 0.40	0.385	13.7	BK	16.5 ± 0.3
2 × 20	19 × 0.20	32.6	2.60	BU, BN	7.0 ± 0.3
3 G 20	19 × 0.20	32.6	2.60	BU, BN, GNYE	7.45 ± 0.3
3 × 14	19 × 0.37	9.02	3.50	BU, BN, BK	9.4 ± 0.3
4 G 12	37 × 0.34	5.67	4.00	BU, BN, BK, GNYE	11.7 ± 0.4

* Abbreviations for core colours see page 126.

Other cross sections on request.

RADOX® UL 4486/CSA AWM I/II A/B

Multi core cable – screened – 600 V



- Excellent high and low temperature and ozone resistance
- Weatherproof
- Easy to strip and process
- Flame retardant
- In case of fire no corrosive gases and low smoke emission
- Flexible

Application

Permanent installation indoor and outdoor for the connection of fixed and loose parts.

Composition of cable

① Cores:	
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Insulation	RADOX
Core colours	various, on request
② Fillers (optional)	RADOX
③ Screen	tin plated copper braid
④ Separator	plastic tape
⑤ Sheath	RADOX 125M
Colour	grey

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Operating temperature	+125 °C
Max. conductor temperature	at short circuit (max. 5 s) +280 °C
Min. operating temperature	flexing -25 °C
	fixed -40 °C
Min. bending radius	5 × cable-dia.

Standards

Appliance wiring material	CSA C22.2 no. 210.2	AWM I/II A/B 125 °C 600 V FT1
Appliance wiring material	UL 758	style 4486

RADOX® UL 4486/CSA AWM I/II A/B

Multi core cable – screened – 600 V

Fire tests

Flame propagation:

Vertical flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.1	FT1
Horizontal flame spread, single cable	CSA C22.2 no. 0.3 cl. 4.11.2	FT2
Vertical flame spread, single cable	EN 50265-2-1, IEC 60332-1	
Vertical flame spread, bunched cables	EN 50266-2-4, IEC 60332-3-24	category C

Flame propagation:

Horizontal flame propagation of an appliance wire	UL 1581 sec. 1090	
Vertical flame spread, single cable	UL 1581 sec. 1061	
Vertical flame spread, single cable	UL 1581 sec. 1080	VW-1

Approvals

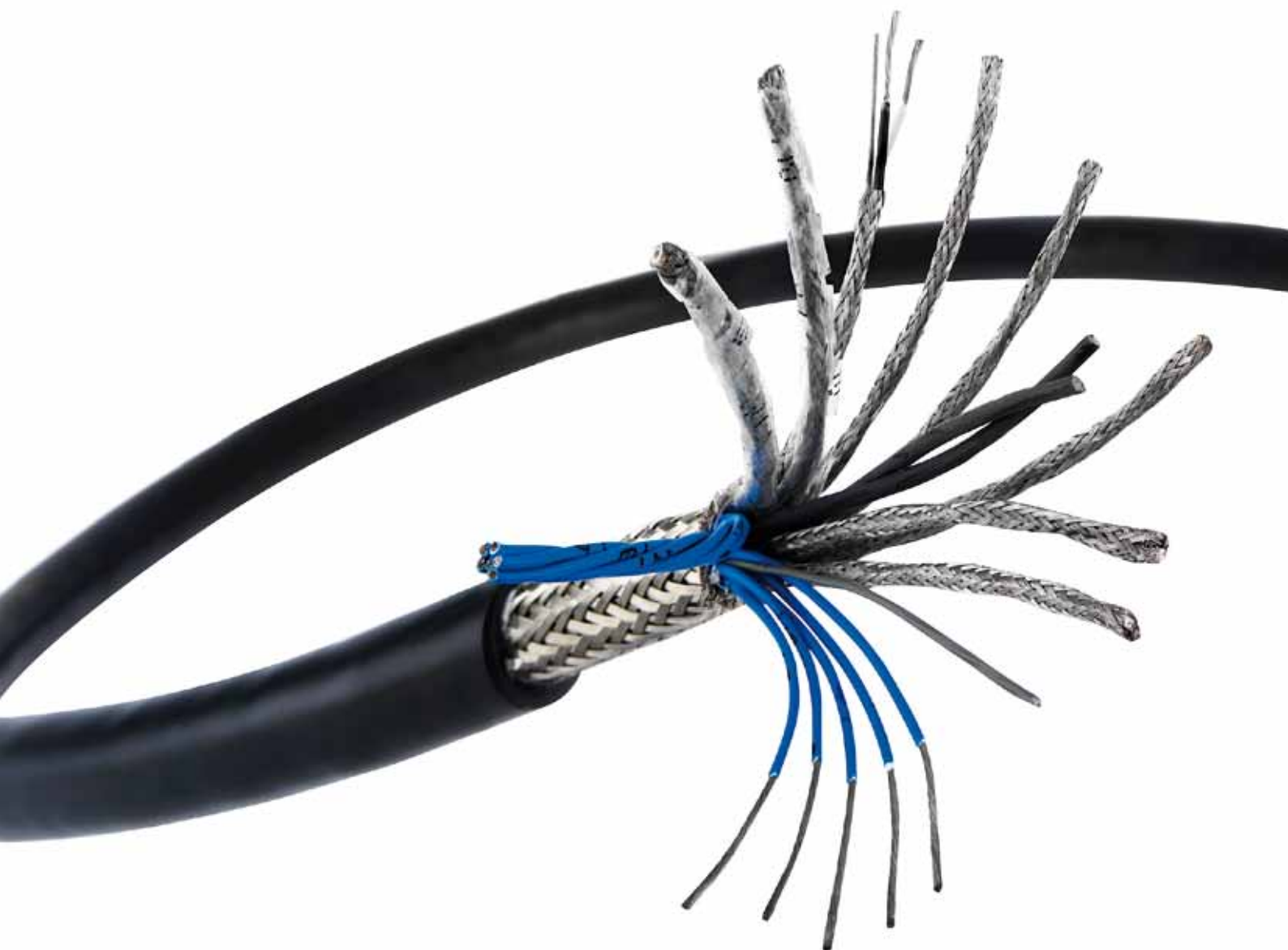
CSA certificate	1241318
UL file	E63322

Extract from our delivery programme

Cross section	Conductor		Core		Screen	Cable
nom. n × (G) AWG	Construct. nom. n × mm dia.	R ₂₀ IEC 60228 max. Ω/km	Dia. nom. mm	Colours*	Dia. nom. mm	Dia. mm
1 G 2*	266 × 0.40	0.554	11.1	GNYE	12.2	14.1 ± 0.3
1 × 3/0	444 × 0.50	0.206	17.3	BK	18.4	22.8 ± 0.3
2 × 14	19 × 0.37	9.02	3.50	BU, BN	7.7	9.6 ± 0.3
3 G 20	19 × 0.20	32.6	2.60	BU, BN, GNYE	6.2	8.1 ± 0.3
3 × 8	80 × 0.40	1.96	6.40	BK, YE num.	15.1	18.2 ± 0.5
4 × 22	19 × 0.16	54.7	2.4	WH num.	6.6	8.5 ± 0.3
4 G 16	19 × 0.31	13.7	3.10	BU, BN, BK, GNYE	8.7	10.7 ± 0.4
4 × 6	119 × 0.40	1.25	8.60	BU, BN, BK, GY	22.5	27.3 ± 0.6
5 × 18	19 × 0.25	21.3	2.85	BU, BN, BK, GY, BK	8.7	10.7 ± 0.4
12 G 14	19 × 0.37	9.02	3.50	BK, YE num., GNYE	15.7	18.8 ± 0.5

* Abbreviations for core colours see page 126.

Other cross sections on request.



RADOX® system cables

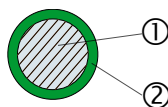
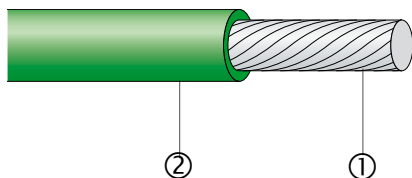
Single cores, single core cables, multi core cables and wires

MA 12 A1 system element	66
MA 12 E1, single core, screened	68
MA 12 E2, screened pair	70
MA 14 A1, single core	72
MIL 5932 A1, single core MIL 22759/32)	74
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VG single cores and cables	86
RADOX MFH, power and signal cables, multi core, screend and unscreend	96
Hybrid cables	98

All our cables fully comply with the European directives
76/769/EWG, 2003/11/EG, 2000/53/EG, 2003/53/EG
and 2011/65/EU (RoHS).

MA 12 A1

System element



- Halogen free
- Easy to process
- High media and abrasion resistance
- Excellent resistance to high and low temperatures
- Flame retardant
- High resistance to heat pressure

Application

Dry and protected, flexible and fixed installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

- ① Conductor
- ② Insulation
- Colours

stranded tin plated copper, acc. to MIL-W-29606 TCC
Multi A-12, extruded polyster
various, on request

Technical data

Voltage rating
Test voltage
Temperature range
Min. bending radius

600 V AC
3000 V AC
-40 up to +120 °C
3 × core-dia.

Fire tests

Flame propagation:

Vertical of a single cable

EN 50265-2-1, IEC 60332-1

Content of halogen acid gas

EN 50267-2-1, IEC 60754-1

0 mg/g

MA 12 A1

System element

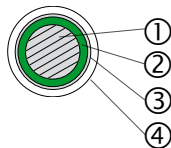
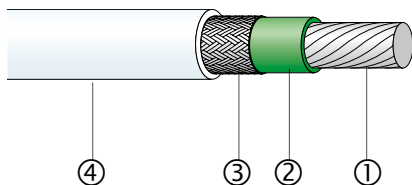
Extract from our delivery programme

Cross section		Conductor			Core	Weight
nom.		Construction nom. n × mm dia.	dia. max. mm	R ₂₀ MIL-W-81044/12 max. Ω/km	Dia. mm	nom. kg/100 m
AWG	mm ²					
28	0.09	7 × 0.13	0.40	225.0	0.76 ± 0.05	0.10
26	0.15	19 × 0.10	0.51	135.5	0.87 ± 0.05	0.17
24	0.25	19 × 0.13	0.61	85.96	1.02 ± 0.05	0.30
22	0.38	19 × 0.16	0.79	53.15	1.19 ± 0.05	0.43
20	0.60	19 × 0.20	0.99	32.42	1.40 ± 0.05	0.65
18	0.93	19 × 0.25	1.23	20.44	1.66 ± 0.05	0.95
16	1.25	19 × 0.29	1.40	15.78	1.83 ± 0.05	1.30
14	1.93	19 × 0.35	1.64	10.04	2.27 ± 0.08	1.86
12	2.97	37 × 0.32	2.24	6.63	2.75 ± 0.08	2.87
10	4.74	37 × 0.40	2.77	4.14	3.53 ± 0.1	4.76

Various colours on request.

MA 12 E1

Single core – screened



- Halogen free
- Easy to process
- High media and abrasion resistance
- Excellent resistance to high and low temperatures
- Flame retardant
- High resistance to heat pressure
- Constructions and dimensions acc. to NEMA WC 27500

Application

Dry and protected, flexible and fixed installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation	Multi A-12, extruded polyster
Core colours	white or blue
③ EMV screen	optimised
④ Sheath	Multi A-12 polyester
Colour	white

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	–40 up to +120 °C
Transfer impedance up to 30 MHz	250 m Ω/m
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1
Content of halogen acid gas	EN 50267-2-1, IEC 60754-1
	0 mg/g

MA 12 E1

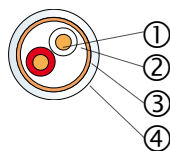
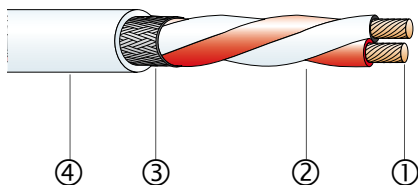
Single core – screened

Extract from our delivery programme

Cross section		Conductor			Core		Weight
nom.		Construction nom. n × mm dia.	max. dia. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Outer dia. mm	nom. kg/100 m
AWG	mm ²						
26	0.15	19 × 0.10	0.51	135.5	0.87 ± 0.05	1.65 ± 0.1	0.17
24	0.25	19 × 0.13	0.61	85.96	1.02 ± 0.05	1.90 ± 0.1	0.30
22	0.38	19 × 0.16	0.79	53.15	1.19 ± 0.05	2.05 ± 0.1	0.43
20	0.60	19 × 0.20	0.99	32.42	1.40 ± 0.05	2.30 ± 0.1	0.65
18	0.93	19 × 0.25	1.23	20.44	1.66 ± 0.05	2.50 ± 0.1	0.95
16	1.25	19 × 0.29	1.40	15.78	1.83 ± 0.05	2.70 ± 0.1	1.30
14	1.93	37 × 0.26	1.80	10.04	2.27 ± 0.08	3.15 ± 0.1	1.97
12	2.97	37 × 0.32	2.24	6.63	2.75 ± 0.08	3.60 ± 0.1	2.87

MA 12 E2

Screend pair



- Halogen free
- Easy to process
- High media and abrasion resistance
- Excellent resistance to high and low temperatures
- Flame retardant
- High resistance to heat pressure
- Constructions and dimensions acc. to NEMA WC 27500

Application

Dry and protected, flexible and fixed installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation	Multi A-12, extruded polyester
Core colours	white/blue, white/red, white/black, white/green
③ EMV screen	two cores twisted
④ Sheath	optimised
Colour	Multi A-12 polyester
	white

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	-40 up to +120 °C
Transfer impedance up to 30 MHz	250 m Ω/m
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1
Content of halogen acid gas	EN 50267-2-1, IEC 60754-1
	0 mg/g

MA 12 E2

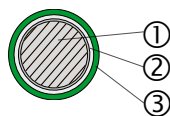
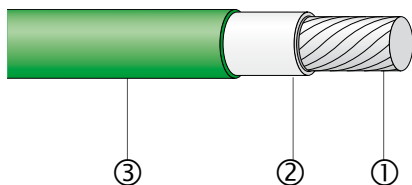
Screened pair

Extract from our delivery programme

Cross section		Conductor			Core		Weight
nom.		Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Outer dia. mm	nom. kg/100 m
AWG	mm ²						
2 × 26	0.15	19 × 0.10	0.51	138.5	0.87 ± 0.05	2.60 ± 0.1	0.94
2 × 24	0.25	19 × 0.13	0.61	87.9	1.02 ± 0.05	2.85 ± 0.1	1.33
2 × 22	0.38	19 × 0.16	0.79	54.4	1.19 ± 0.05	3.15 ± 0.1	1.71
2 × 20	0.60	19 × 0.20	0.99	33.2	1.40 ± 0.05	3.60 ± 0.1	2.14
2 × 18	0.93	19 × 0.25	1.23	20.9	1.66 ± 0.05	4.30 ± 0.1	3.38

MA 14 A1

Single core



- Halogen free
- Easy to process
- High media and abrasion resistance
- Excellent resistance to high and low temperatures
- Flame retardant
- High resistance to heat pressure
- Constructions and dimensions acc. to MIL-W-81044

Application

Protected, flexible and fixed installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper
② Insulation 1	high tech polymer
③ Insulation 2	aromatic polymer
Colours	various, on request

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	-40 up to +140 °C
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1
Content of halogen acid gas	EN 50267-2-1, IEC 60754-1
	0 mg/g

MA 14 A1

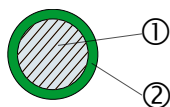
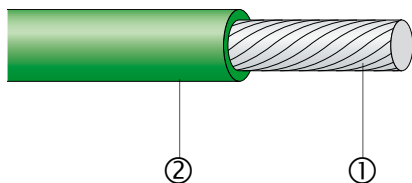
Single core

Extract from our delivery programme

Cross section		Conductor			Core	Weight
nom.		Construction nom.	Dia. max.	R ₂₀	Dia.	nom.
AWG	mm ²	n × mm dia.	mm	MIL-W-81044/12 max. Ω/km	mm	kg/100 m
26	(0.15)	19 × 0.10	0.51	135.5	0.87 ± 0.02	0.18
24	(0.25)	19 × 0.13	0.61	85.96	1.02 ± 0.02	0.30
22	(0.38)	19 × 0.16	0.77	53.15	1.18 ± 0.02	0.43
20	(0.60)	19 × 0.20	0.99	32.42	1.39 ± 0.02	0.65
18	(0.93)	19 × 0.25	1.23	20.44	1.67 ± 0.03	0.95
16	(1.25)	19 × 0.29	1.40	15.78	1.83 ± 0.03	1.30
14	(1.96)	37 × 0.26	1.74	10.8	2.29 ± 0.04	1.97
12	(2.97)	37 × 0.32	2.22	6.63	2.78 ± 0.04	2.87
-	0.50	19 × 0.18	0.91	40.1	1.30 ± 0.02	0.53
-	0.75	19 × 0.22	1.12	26.7	1.52 ± 0.03	0.79
-	1.00	19 × 0.25	1.23	20.0	1.67 ± 0.03	0.94
-	1.50	37 × 0.22	1.57	13.7	2.04 ± 0.04	1.48
-	2.50	37 × 0.29	1.97	8.21	2.54 ± 0.04	2.36

MIL 5932 A1

Single core



- Easy to process
- Resistant to oils, fuels, lubricants, alkaline solutions and acids
- Notch and abrasion resistant
- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- High resistance to heat pressure
- High media and abrasion resistance
- Constructions and dimensions acc. to MIL-W-22759

Application

Protected, flexible and fixed installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

- ① Conductor
- ② Insulation
- Colours

stranded tin plated copper, acc. to MIL-W-29606 TCC
ETFE-X, extruded fluorocarbon, electron beam crosslinked
various, on request

Technical data

Voltage rating
Test voltage
Temperature range
Min. bending radius

600 V AC
2500 V AC
-65 up to +150 °C
3 × core-dia.

Fire tests

Flame propagation:
Vertical of a single cable

EN 50265-2-1, IEC 60332-1

MIL 5932 A1

Single core

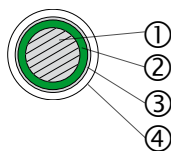
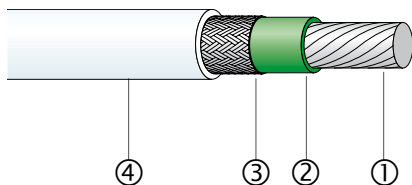
Extract from our delivery programme

Cross section		Conductor			Core	Weight
nom.		Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ MIL-W-81044/12 max. Ω/km	Dia. mm	nom. kg/100 m
AWG	mm ²					
26	0.15	19 × 0.10	0.51	133	0.81 ± 0.05	0.21
24	0.25	19 × 0.13	0.61	84.2	0.94 ± 0.05	0.30
22	0.38	19 × 0.16	0.77	52.1	1.09 ± 0.05	0.42
20	0.60	19 × 0.20	0.99	31.8	1.27 ± 0.05	0.64
18	0.93	19 × 0.25	1.23	20.2	1.52 ± 0.05	0.97
16	1.25	19 × 0.28	1.40	15.6	1.73 ± 0.05	1.25
14	1.93	19 × 0.36	1.73	10.04	2.16 ± 0.08	1.95
12	2.97	37 × 0.32	2.22	6.63	2.62 ± 0.08	2.95

Other cross sections on request.

MIL 5932 E1

Single core – screened



- Easy to process
- Resistant to oils, fuels, lubricants, alkaline solutions and acids
- Notch and abrasion resistant
- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- High resistance to heat pressure
- High media and abrasion resistance
- Constructions and dimensions acc. to MIL-W-22759

Application

Protected, flexible and fixed installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation	ETFE-X, extruded fluorocarbon, electron beam crosslinked
Core colours	various, on request
③ EMV screen	optimised
④ Sheath	ETFE-X, extruded fluorocarbon, electron beam crosslinked
Colour	white

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	–55 up to +150 °C
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1

MIL 5932 E1

Single core – screened

Extract from our delivery programme

Cross section		Conductor			Core	Cable	Weight
nom.		nom.	Dia. max.	R ₂₀ IEC 60228	Dia.	Outer dia.	nom.
AWG	mm ²	n × mm dia.	mm	max. Ω/km	mm	mm	kg/100 m
26	0.15	19 × 0.10	0.50	133	0.81 ± 0.05	1.64 ± 0.12	0.17
24	0.25	19 × 0.13	0.60	84.2	0.94 ± 0.05	1.76 ± 0.12	0.30
22	0.38	19 × 0.16	0.76	52.1	1.09 ± 0.05	1.90 ± 0.12	0.43
20	0.60	19 × 0.20	0.96	31.8	1.27 ± 0.05	2.09 ± 0.15	0.65
18	0.93	19 × 0.25	1.20	20.2	1.52 ± 0.05	2.35 ± 0.15	0.95
16	1.25	19 × 0.28	1.36	15.6	1.73 ± 0.05	2.55 ± 0.15	1.30

Other cross sections on request.

MIL 5932/34 E2

Screened pairs

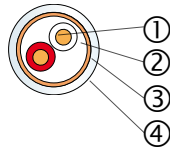
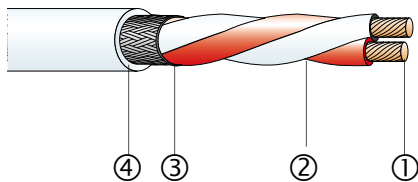


Figure shows MIL 5932 E2

- Easy to process
- Resistant to oils, fuels, lubricants, alkaline solutions and acids
- Notch and abrasion resistant
- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- High resistance to heat pressure

Application

For applications inside electrical equipment and for control and supply cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation	ETFE-X, extruded fluorocarbon, electron beam crosslinked
Core colours	various, on request
③ EMV screen	two cores twisted
④ Sheath	optimised
Colour	ETFE-X, extruded fluorocarbon, electron beam crosslinked
	white

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	−55 up to +150 °C
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1

MIL 5932/34 E2

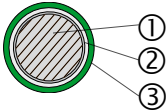
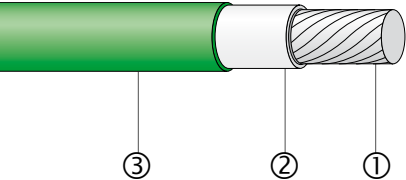
Screened pairs

Extract from our delivery programme

Cross section		Conductor			Core	Cable	Weight
nom.		Construction nom. n × mm dia.	Dia. max. mm	R20 IEC 60228 max. Ω/km	Dia. mm	Outer dia. mm	nom. kg/100 m
AWG	mm ²						
26	0.15	19 × 0.10	0.51	140.0	0.81 ± 0.05	2.45 ± 0.12	1.1
24	0.25	19 × 0.12	0.61	88.5	0.94 ± 0.05	2.70 ± 0.12	1.3
22	0.38	19 × 0.16	0.77	54.7	1.09 ± 0.05	2.98 ± 0.12	1.7
20	0.60	19 × 0.20	0.99	33.4	1.27 ± 0.05	3.36 ± 0.12	2.2
18	0.96	19 × 0.25	1.23	21.1	1.52 ± 0.05	3.87 ± 0.12	3.0
16	1.2	19 × 0.29	1.40	14.9	1.73 ± 0.05	4.34 ± 0.13	3.7
14	1.94	19 × 0.36	1.68	10.3	2.15 ± 0.05	5.20 ± 0.13	5.4

MIL 4412 A1

Single core



- Flame retardant
- Easy to process
- High media and abrasion resistance
- Excellent high and low temperature and ozone resistance
- Weatherproof
- Constructions and dimensions acc. to MIL-W-81044

Application

For protected installations inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation 1	polyalkene, extruded polyalkene, electron beam crosslinked
③ Insulation 2	XLPE, extruded polyvinylidene fluoride, electron beam crosslinked
Core colours	various, on request

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	-65 up to +150 °C
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1

Approval

Department of the Navy	Ref. 0812 101-AD 3
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MIL 4412 A1

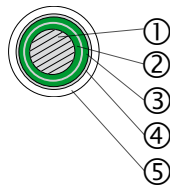
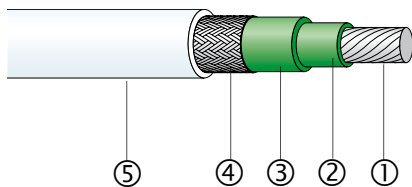
Single core

Extract from our delivery programme

Cross section		Conductor			Core	Weight
nom.		Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ MIL-W-81044/12 max. Ω/km	Dia. mm	nom. kg/100 m
AWG	mm ²					
28	0.09	7 × 0.13	0.40	225.1	0.76 ± 0.05	0.13
26	0.15	19 × 0.10	0.51	135.5	0.87 ± 0.05	0.19
24	0.25	19 × 0.13	0.61	85.96	1.02 ± 0.05	0.30
22	0.38	19 × 0.16	0.77	53.15	1.18 ± 0.05	0.43
20	0.60	19 × 0.20	0.99	32.42	1.40 ± 0.05	0.65
18	0.93	19 × 0.25	1.23	20.44	1.66 ± 0.05	0.95
16	1.25	19 × 0.29	1.40	15.78	1.83 ± 0.05	1.30
14	1.93	19 × 0.36	1.68	10.04	2.27 ± 0.08	1.97
12	2.97	37 × 0.32	2.22	6.63	2.75 ± 0.08	2.87

MIL 4412 E1

Single core – screened



- Flame retardant
- Easy to process
- High media and abrasion resistance
- Excellent high and low temperature and ozone resistance
- Weatherproof
- Constructions and dimensions acc. to NEMA WC 27500

Application

For protected installations inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation 1	polyalkene, extruded polyalkene, electron beam crosslinked
③ Insulation 2	XLPVDF, extruded polyvinylidene fluoride, electron beam crosslinked
Core colours	various, on request
④ EMV screen	optimised
⑤ Sheath	XLPVDF, electron beam crosslinked
Colour	white

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	–55 up to +150 °C
Transfer impedance up to 30 MHz	250 mΩ/m
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1

MIL 4412 E1

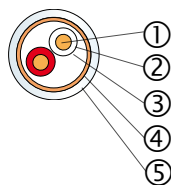
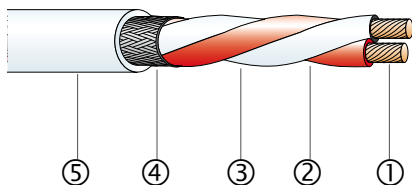
Single core – screened

Extract from our delivery programme

Cross section		Conductor			Core	Cable	Weight
nom.		Construction nom.	Dia. max.	R ₂₀ IEC 60228	Dia.	Outer dia.	nom.
AWG	mm ²	n × mm dia.	mm	max. Ω/km	mm	mm	kg/100 m
26	0.15	19 × 0.10	0.51	135.5	0.87 ± 0.05	1.65 ± 0.1	0.17
24	0.25	19 × 0.13	0.61	85.96	1.02 ± 0.05	1.90 ± 0.1	0.30
22	0.38	19 × 0.16	0.79	53.15	1.19 ± 0.05	2.05 ± 0.1	0.43
20	0.60	19 × 0.20	0.99	32.42	1.40 ± 0.05	2.30 ± 0.1	0.65
18	0.93	19 × 0.25	1.23	20.44	1.66 ± 0.05	2.50 ± 0.1	0.95
16	1.25	19 × 0.29	1.40	15.78	1.83 ± 0.05	2.70 ± 0.1	1.30
14	1.93	19 × 0.36	1.80	10.04	2.27 ± 0.08	3.15 ± 0.1	1.97
12	2.97	37 × 0.32	2.24	6.63	2.75 ± 0.08	3.60 ± 0.1	2.87

MIL 4412 E2

Screened pairs



- Easy to process
- High resistance to heat pressure
- High chemical and abrasion resistance
- Excellent high and low temperature and ozone resistance
- Weatherproof
- Flame retardant
- Constructions and dimensions acc. to NEMA WC 27500

Application

For protected installation inside electrical equipment, elements of control and supply cables and system cables.

Composition of cable

① Conductor	stranded tin plated copper, acc. to MIL-W-29606 TCC
② Insulation 1	polyalkene, extruded polyalkene, electron beam crosslinked
③ Insulation 2	XLPVDF, extruded polyvinylidene fluoride, electron beam crosslinked
Core colours	various, on request
④ EMV screen	two cores twisted
⑤ Sheath	optimised
Colour	XLPVDF, electron beam crosslinked
	white

Technical data

Voltage rating	600 V AC
Test voltage	2500 V AC
Temperature range	-55 up to +150 °C
Transfer impedance up to 30 MHz	200 mΩ/m
Min. bending radius	3 × core-dia.

Fire tests

Flame propagation:	
Vertical of a single cable	EN 50265-2-1, IEC 60332-1

MIL 4412 E2

Screened pairs

Extract from our delivery programme

Cross section		Conductor			Core	Cable	Weight
nom.		Construction nom. n × mm dia.	Dia. max. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Outer dia. mm	nom. kg/100 m
AWG	mm ²						
2 × 26	0.15	19 × 0.10	0.51	138.5	0.87 ± 0.05	2.60 ± 0.1	0.94
2 × 24	0.25	19 × 0.13	0.61	87.9	1.02 ± 0.05	2.85 ± 0.1	1.33
2 × 22	0.38	19 × 0.16	0.79	54.4	1.19 ± 0.05	3.15 ± 0.1	1.71
2 × 20	0.60	19 × 0.20	0.99	33.2	1.40 ± 0.05	3.60 ± 0.1	2.14
2 × 18	0.93	19 × 0.25	1.23	20.9	1.66 ± 0.05	4.30 ± 0.1	3.38

VG 95218 T020

Type A and type G



- Temperature range
–55 up to +150 °C
- Resistant to oils, fuels, lubricants,
alkaline solutions and acids
- Notch and abrasion resistant
- Small outer diameter, low weight
- Flame retardant,
self-extinguishing
- Easy to strip
- Easy to process
- Soldering resistant

Application

Wiring of electrical/electronic systems, for system cables in defence, aircraft, sensor systems, instrumentation, motors, transformers and industrial automation.

Technical data

Cross section from to	type A	0.25 - 16 mm ²
	type G	1.5 - 95 mm ²
Insulation material	type A	ETFE
	type G	polyolefin-X
Voltage rating	600 V AC	
Number of conductors	1	
Conductor class	VG 95218/BWB specification	

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U3.h/10015
VDE	certificate no. 9430

VG 95218 T020

Type E and type F



- Temperature range
–55 up to +105 °C
- Resistant to oils, fuels, lubricants,
alkaline solutions and acids
- Notch and abrasion resistant
- Small outer diameter, low weight
- Flame retardant,
self-extinguishing
- Easy to strip
- Easy to process
- Soldering resistant
- Halogen free

Application

Wiring of electrical/electronic systems, for system cables in defence, aircraft, sensor systems, instrumentation, motors, transformers and industrial automation.

Technical data

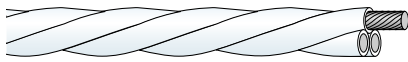
Cross section from to	type E	0.15 – 3 mm ²
	type F	1.5 – 95 mm ²
Insulation material	type E	high tech polymer/aromatic p.
	type F	polyolefin-X
Voltage rating	600 V	
Number of conductors	1	
Conductor class	VG 95218/BWB specification	

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U3.h/10015
VDE	certificate no. 106443 and 134557

VG 95218 T021

Type C and type E



- type C acc. to T020 type E
- type E acc. to T020 type A

Application

Wiring of electrical/electronic systems, for system cables in defence, aircraft, sensor systems, instrumentation, motors, transformers and industrial automation.

Technical data

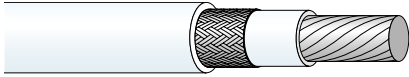
Cross section from to		0.15 – 3 mm ²
Insulation material	type C type E	high tech polymer/aromatic p. ETFE white
Voltage rating	600 V	
Number of conductors	2 – 4	
Conductor class	VG 95218/BWB specification	

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U3.h/10016
VDE	certificate no. 9431 and 106444

VG 95218 T022

Type C screened



- Temperature range
–55 up to +150 °C
- Resistant to oils, fuels, lubricants,
alkaline solutions and acids
- Notch and abrasion resistant
- Small outer diameter, low weight
- Flame retardant,
self-extinguishing
- Easy to strip
- Easy to process
- Soldering resistant

Application

Wiring of electrical/electronic systems, for system cables in defence, aircraft, sensor systems, instrumentation, motors, transformers and industrial automation.

Technical data

Cross section from to	0.25 – 2.5 mm ²
Insulation material	ETFE white
Voltage rating	600 V
Number of conductors	1
Conductor class	VG 95218/BWB specification
Screen	CU tinned, optimised
Jacket	ETFE white

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U3.h/10017
VDE	certificate no. 9432

VG 95218 T023

Type F, multi core screened



- Temperature range
–55 up to +150 °C
- Resistant to oils, fuels, lubricants,
alkaline solutions and acids
- Notch and abrasion resistant
- Small outer diameter, low weight
- Flame retardant,
self-extinguishing
- Easy to strip
- Easy to process
- Soldering resistant

Application

Wiring of electrical/electronic systems, for system cables in defence, aircraft, sensor systems, instrumentation, motors, transformers and industrial automation.

Technical data

Cross section from to	0.25 – 3.0 mm ²
Insulation material	ETFE
Voltage rating	600 V
Number of conductors	2 – 7
Conductor class	VG 95218/BWB specification
Screen	CU tinned, optimised
Jacket	ETFE white

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U3.h/10018
VDE	certificate no. 9433

VG 95218 T024

Type K



- Temperature range
–40 up to +150 °C
- Weatherproof
- Resistant to mineral oils and fuels
- High abrasion resistance
- Flame resistant, self-extinguishing
- Non-melting
- Flexible
- System compatibility with heat shrink
parts according to
VG 95343 part 14

Application

System cables in defence, aircraft, sensor systems and instrumentation.

Technical data

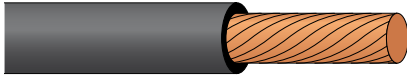
Cross section from to	1.5 – 95 mm ²
Insulation material	RADOX®
Voltage rating	600 V
Number of conductors	1
Conductor class	VG 95218/BWB specification
Jacket	RADOX elastomer S, black

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U48/05019
VDE	certificate no. 40000936

VG 95218 T025

Type G, high flexible



- Temperature range
–40 up to +150 °C
- Weatherproof
- Resistant to mineral oils and fuels
- High abrasion resistance
- Flame resistant, self-extinguishing
- Non-melting
- Flexible
- System compatibility with heat shrink
parts according to
VG 95343 part 14

Application

System cables in defence, sensor systems, instrumentation and ground wires.

Technical data

Cross section from to	10 - 240 mm ²
Insulation material	RADOX [®] elastomer S, black
Voltage rating	600 V
Number of conductors	1
Conductor class	VG 95218/BWB specification, plain

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U48/06099
VDE	certificate no. 40000952

VG 95218 T026

Type H, high flexible



- Temperature range
–40 up to +150 °C
- Weatherproof
- Resistant to mineral oils and fuels
- High abrasion resistance
- Flame resistant, self-extinguishing
- Non-melting
- Flexible
- System compatibility with heat shrink
parts according to
VG 95343 part 14

Application

Control and supply cables in fixed and moving systems of defence and sensor systems.

Technical data

Cross section from to	25 - 240 mm ²
Insulation material	RADOX® elastomer S, black
Voltage rating	600 V
Number of conductors	1
Conductor class	VG 95218/BWB specification, bare
Screen	CU tinned, optimized
Jacket	RADOX elastomer S, black

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U48/06100
VDE	certificate no. 40000957

VG 95218 T027

Type B, multi core



- Temperature range
–40 up to +150 °C
- Weatherproof
- Resistant to mineral oils and fuels
- High abrasion resistance
- Flame resistant, self-extinguishing
- Non-melting
- Flexible
- System compatibility with
heat shrink parts according to
VG 95343 part 14

Application

Control and supply cables in fixed and moving systems of defence and sensor systems.

Technical data

Cross section from to	0.25 – 35 mm ²
Insulation material	ETFE white
Voltage rating	600 V
Number of conductors	2 – 61
Conductor class	VG 95218/BWB specification
Jacket	RADOX® elastomer S, black

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U48/08018
VDE	certificate no. 40000959

VG 95218 T028

Type D and type A, multi core, screened



- Temperature range
–40 up to +150 °C
- Weatherproof
- Resistant to mineral oils and fuels
- High abrasion resistance
- Flame resistant, self-extinguishing
- Non-melting
- Flexible
- System compatibility with
heat shrink parts according to
VG 95343 part 14

Application

Control and supply cables in fixed and moving systems of defence and sensor systems.

Technical data

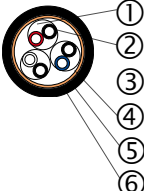
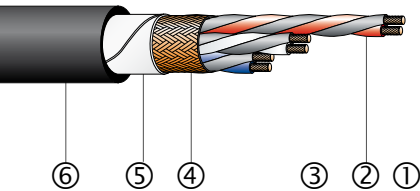
Cross section from to	0.25 – 13 mm ²
Insulation material	ETFE white
Voltage rating	600 V
Number of conductors	2 – 104
Conductor class	VG 95218/BWB specification
Screen	CU tinned, optimized (type A double screen)
Jacket	RADOX® elastomer S, black

Approvals

BA für Wehrtechnik und Beschaffung	certificate of approval no. U3.h/10019
VDE	certificate no. 9438

RADOX® MFH

MFH-S Multi cores and twisted pairs screened and unscreened



- Ozone, hydrolysis, chemical resistant
- Weatherproof
- Easy to process
- Leight weight
- Wide operating temperature range
- Halogen free
- Flame retardant

Application

For fixed installations in dry, damp or wet locations, inside and outside of ships, industrial equipment, defence equipment, buses, other vehicles and railway rolling stock.

Composition of cable

① Centre (if necessary)	RADOX filler
② Cores	type MA14; RADOX TI301 (145 °C/20 000 hours)
Conductor	stranded tin plated copper, acc. to EN 60228, class 5
Core colours	optional with pair screen and drain wire
③ Fillers (optional)	see table
④ EMV screening	RADOX
⑤ Separator	optimised tin plated copper braid, optical coverage: ≥ 85 %
⑥ Sheath	textile yarn
Colour	RADOX elastomer S FH (SHF 2; SHF mud NEK 606)
	black and blue

Technical data

Voltage rating U_0/U	600/1000 V AC
Test voltage	3500 V AC
Temperature range	-50 up to +145 °C
Min. bending radius	fixed
	≤ 12 mm
	≥ 12 mm
	flexing
	> 12 mm
	> 12 mm
	3 × cable-dia.
	4 × cable-dia.
	5 × cable-dia.
	6 × cable-dia.

Fire tests

Flame propagation:	
Vertial of a single cable	EN 50265-2-1, IEC 60332-1
Content of halogen acid gas	EN 50267-2-1, IEC 60754-1
	0 mg/g
Fire protection in rolling stock:	
Level of protection	DIN 5510
Hazard level	EN 45545
	Level 1 - 4
	HL1 - HL3

Approvals

GERMANISCHER LLOYD	certificate no. 43159-02 HH	
DNV	certificate no. E-12873	TAP DNV 827.11
NEK 606	mud resistant	NEK TS 606, 4.1
ABS (American Bureau of Shipping)	certificate no. 15-GD1369103-PDA	

RADOX® MFH

Extract from our delivery programme

Multi cores

Cross section n × mm ²	R ₂₀ IEC 60228 max. Ω/km	Overall screen cross section mm ²	Cable Ø mm	Core colours	Weight nom. kg/100 m
3 × 0.5	40.1	2.11	5.75 ± 0.3	bk, bu, bn	6.4
5 × 0.75	26.7	2.9	7.35 ± 0.3	bk, bu, bn, gy, light blu	10.9
7 × 0.75	26.7	3.43	8.35 ± 0.3	bk, bu, bn, gy, light blu, wh, og	14.1
12 × 0.75	26.7	3.96	9.55 ± 0.3	wh num	18.8
25 × 0.75	26.7	5.94	12.9 ± 0.4	wh num	33.6
37 × 0.75	26.7	9.98	14.8 ± 0.4	wh num	50.0
50 × 0.75	26.7	11.64	17.1 ± 0.5	wh num	64.8
3 × 1.5	13.7	2.9	7.45 ± 0.3	bk, bu, bn	11.8
5 × 1.5	13.7	3.96	8.9 ± 0.3	bk, bu, bn, gy, light blu	16.8
7 × 1.5	13.7	4.0	10.1 ± 0.4	bk, bu, bn, gy, light bu, wh, og	21.7
12 × 1.5	13.7	5.55	11.9 ± 0.4	wh num	31.4
3 × 2.5	8.21	2.9	8.6 ± 0.3	bk, bu, bn	15.6
5 G 2.5	26.7	4.36	10.5 ± 0.4	gnye, bu, bn, bk, gy	23.7
19 × 2.5	8.21	10.9	17.9 ± 0.5	wh num	73.4
3 × 4	4.8	3.7	9.8 ± 0.3	bk, bu, bn	22.0
4 × 4	5.09	5.22	13.0 ± 0.4	bu, bn, bk, bk	29.7
3 × 6	3.2	4.22	11.3 ± 0.4	bk, bu, bn	30.1
8 × 2.5 und 2 × 0.75	26.7	9.98	15.3 ± 0.5	wh num	47.7

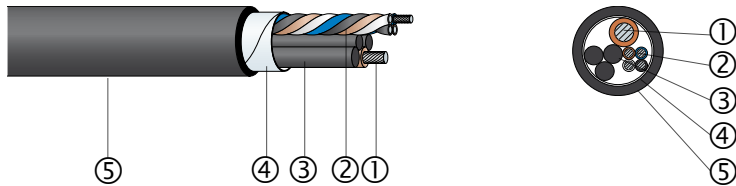
Weitere Kabelkonstruktionen auf Anfrage.

Twisted pairs

Cross section n × mm ²	R ₂₀ IEC 60228 max. Ω/km	Overall screen cross section mm ²	Cable Ø mm	Core colours	Weight nom. kg/100 m
2 × 0.5	40.1	2.11	5.55 ± 0.3	bk, bu	5.8
2 × 2 × 0.5	40.1	2.38	7.9 ± 0.3	bk, bu, bn, gy	10.1
2 × (2 × 0.5)	40.1	3.17	8.3 ± 0.3	bk, bu, bn, gy	12.0
5 × 2 × 0.5	40.1	3.96	9.75 ± 0.3	wh num	16.4
7 × 2 × 0.5	40.1	4.75	11.8 ± 0.4	wh num	22.8
14 × 2 × 0.5	40.1	9.98	14.1 ± 0.4	wh num	34.8
14 × (2 × 0.5)	40.1	9.98	15.5 ± 0.5	wh num	45.5
4 × 2 × 0.75	26.7	3.96	10.0 ± 0.3	wn num	16.4
4 × (2 × 0.75)	26.7	4.75	10.5 ± 0.3	wh num	21.3
8 × 2 × 0.75	26.7	9.98	11.6 ± 0.4	wn num	24.5
12 × 2 × 0.75	26.7	9.98	15.6 ± 0.5	wh num	43.9
12 × (2 × 0.75)	26.7	11.64	17.1 ± 0.5	wh num	54.0
19 × 2 × 0.75	26.7	11.64	18.3 ± 0.5	wh num	60.4
8 × (2 × 1.5)	13.7	13.86	19.5 ± 0.5	wh num	72.4
16 × (2 × 1.5)	13.7	16.63	24.0 ± 0.5	wh num	122.2
2 × 4	5.09	3.7	10.8 ± 0.4	bk, bu	18.6
2 × 2 × 2.5	8.21	5.55	13.7 ± 0.4	bk, bu, bn, gy	28.7
2 × (2 × 2.5)	8.21	5.15	13.9 ± 0.4	bk, bu, bn, gy	33.0
2 × 2 × 4	4.8	9.98	16.6 ± 0.5	bk, bu, bn, gy	46.8
2 × 6	3.2	4.36	10.7 ± 0.4	bk, bu	24.4
2 × 2 × 6	3.2	13.3	18.9 ± 0.5	bk, bu, bn, gy	58.9

Hybrid cables

$2 \times 2 \times 0.25 \text{ mm}^2 + 1\text{KO MA14} / \text{REMS FH BK}$ (example out of our product range)



- Customised solutions
- Physical and chemical characteristics according to specifications
- Power and data transmission
- Installation of one cable only
- Small dimensions
- Low weight
- Multifunctional

Application

Control cable, CCTV for example in tunnels, buildings, airports

Composition of cable

① Coaxial cable 75 Ω	type RG_179-B/U	
Inner conductor	steel, copper and silver plated	dia: 0.30 mm
Insulation	PTFE	dia: 1.53 mm
Screening	silver plated copper braid	dia: 2.00 mm
Sheath	FEP, colour: brown	dia: 2.54 mm
② 2 pairs of $2 \times 0.25 \text{ mm}^2$	type Multi A-14 A2-0.25	
Conductor	tin plated copper	dia: $19 \times 0.12 \text{ mm}$
Dual wall	high tech polymer	dia: 1.02 mm
Colours	blue/brown, black/grey	dia: 2.04 mm
③ 3 × fillers	RADOX®	
④ Separator	plastic tape	
⑤ Sheath	RADOX elastomer S FH	
Colour	black	dia: $7.1 \pm 0.3 \text{ mm}$

Technical data

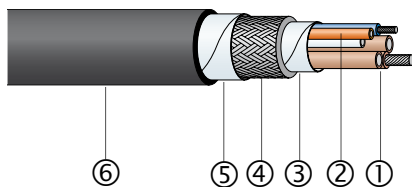
Conductor resistance at 20 °C	$< 86.0 \Omega/\text{km}$
Voltage rating	600 V AC
Test voltage	2500 V
Max. conductor temperature	+120 °C
Min. operating temperature	-25 °C
Min. bending radius	$10 \times \text{cable-dia.}$

Coaxial cable RG_179-B/U:

Impedance	75 Ω
Capacitance	63 pF/m
Velocity of signal propagation	69 % of the speed of light
Attenuation at 20 °C (typ. value)	
f = 1 MHz	3.0 dB/100 m
f = 10 MHz	9.5 dB/100 m
f = 100 MHz	30 dB/100 m

Hybrid cables

3 × 24 AWG + 3 × KO 2253D-02 (example out of our product range)



- Customised solutions
- Physical and chemical characteristics according to specifications
- Power and data transmission
- Installation of one cable only
- Small dimensions
- Low weight
- Multifunctional

Application

Control cable, CCTV for example in tunnels, buildings, airports

Composition of cable

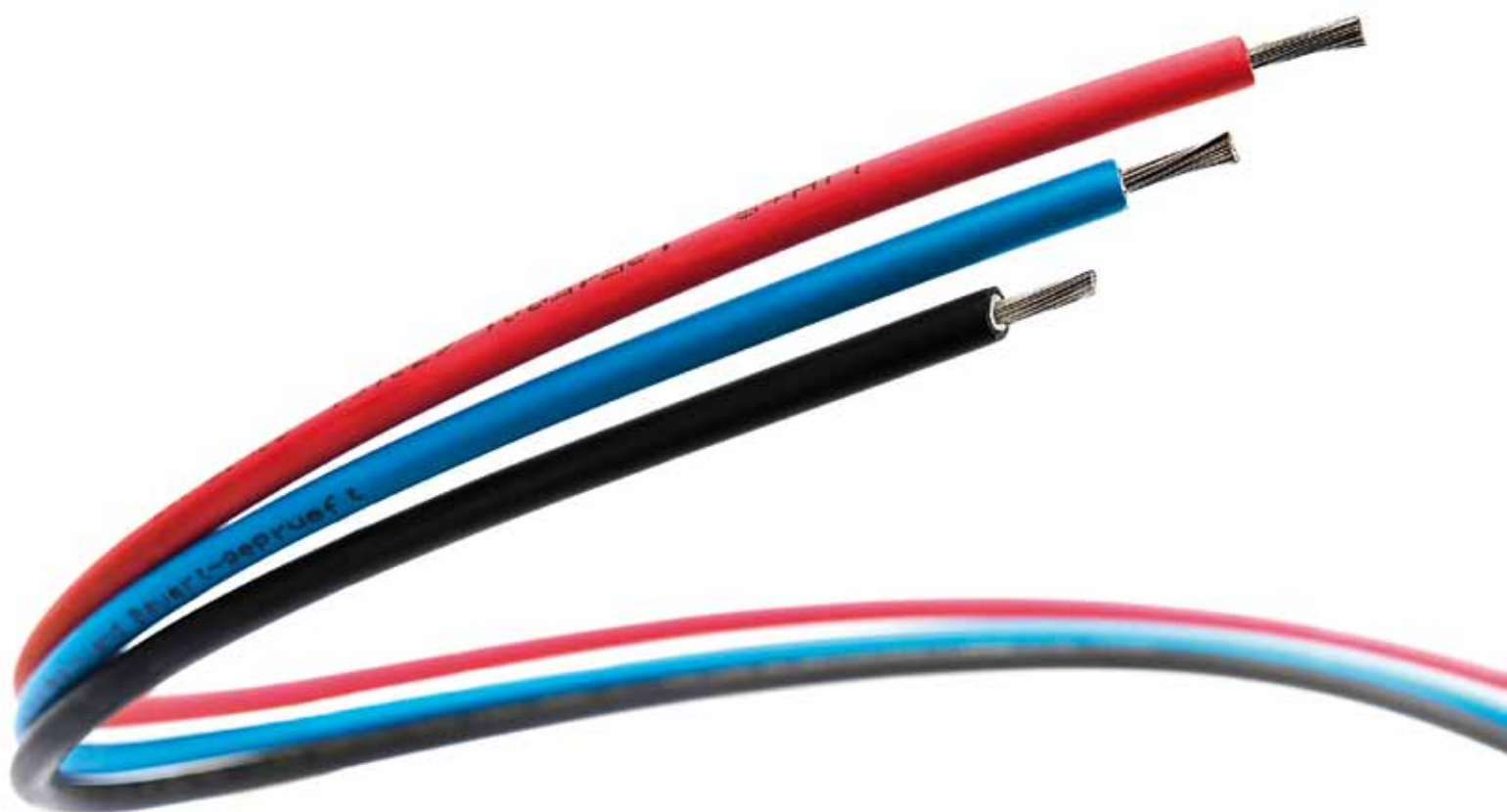
① 3 coaxial cables 75 Ω	type K 02253 D-02	
Inner conductor	steel, copper and silver plated	dia: 0.30 mm
Insulation	PTFE	dia: 1.53 mm
Screening 1	silver plated copper braid	dia: 2.00 mm
Screening 2	silver plated copper braid	dia: 2.50 mm
Sheath	FEP, colour: brown	dia: 3.00 mm
② 3 cores 24 AWG	type 22759-32A1-24	
Conductor	tin plated copper	dia: 19 × 0.13 mm
Insulation	XETFE	dia: 0.94 mm
Colours	white, blue, orange	
③ Separator	plastic tape	
④ EMV screening	tin plated copper braid	dia: 7.3 mm
⑤ Separator	plastic tape	
⑥ Sheath	RADOX® elastomer S	
Colour	black	dia: 9.3 ± 0.3 mm

Technical data

Conductor resistance at 20 °C		< 90.5 Ω/km
Voltage rating		600 V
Test voltage		1500 V
Transfer impedance	f ≤ 30 MHz	80 mΩ/m
Temperature range	(cores)	−50 up to +150 °C
Temperature range	(sheath)	−40 up to +150 °C

Coaxial cable K 02253D-02:

Impedance		75 Ω
Capacitance		63 pF/m
Velocity of signal propagation		69 % of the speed of light
Attenuation at 20 °C (typ. value)	f = 1 MHz	30 dB/100 m
	f = 10 MHz	9.5 dB/100 m
	f = 100 MHz	30 dB/100 m
Temperature range		−40 up to +150 °C



RADOX® Solar cables

RADOX® Solar cable means flexible single and multi-core cables specially designed for wiring solar plants.

RADOX® Solar cables are extremely robust and resist high mechanical load and abrasion. High temperature resistance and excellent weather-proofing characteristics provide a long service life. Due to RADOX® technology, these outstanding properties have been achieved with small cable diameters.

Tight production tolerances – specifically for automated processes – enable easy assembly of cables. This represents a special advantage for molding, casting or soldering with no shrinking or other changes in electron-beam cross-linked material. There is no cold flow with RADOX® cables which guarantees long-term, optimum tightness for connectors or transitions. In case of fire there is no occurrence of corrosive or toxic gases. Smoke production in case of fire is very low.

General features

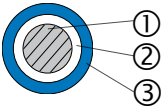
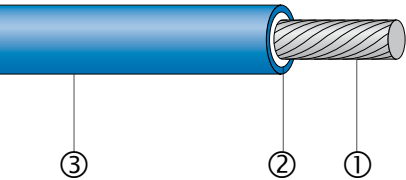
- Temperature range for applications –40 to +120 °C
- RADOX® electron-beam cross-linked materials do not melt or flow, even at high temperatures
- High resistance against UV-, ozone- and hydrolyses
- Very high mechanical robustness and resistance against water, oil and chemicals
- Compact and flexible
- Years of approved applications worldwide
- TÜV Rheinland and UL approval

RADOX SOLAR cable single core	102
RADOX® Solar 125 WW	104
RADOX Smart	106
RADOX® Solar 125 WW +	108
RADOX® Solar 125 AC multi-core	110

All our cables fully comply with the European directives 76/769/EEG, 2003/11/EEG, 2000/53/EEG, 2003/53/EEG and 2011/65/EU (RoHS).

RADOX® Solar cable

Single core cable



- TÜV Rheinland approval, PV1-F
- Double insulated construction (safety class II)
- Space saving outer diameter
- Long service life, extremely robust
- Electronbeam, cross-linked insulation and sheath
- High resistance against heat, cold, oil, abrasion, ozone, UV and weather
- Halogen free, flame retardant
- Flexible, easy to strip
- Meter marking – easy installation

Application

Specifically designed for connecting photovoltaic system components inside and outside of buildings and equipment with high mechanical requirements and extreme weather conditions.

Composition of cable

① Conductor	stranded tin plated copper, fine wired, acc. to EN 60228, class 5
② Insulation	RADOX® 125
③ Sheat	RADOX® 125
Colours	see table

Technical data

Conductor resistance at 20 °C see table

TÜV Rheinland:	voltage rating line to ground	U_o	600 V AC
	voltage rating line to line	U	1000 V AC
	maximum voltage line to ground		720 V AC
	maximum voltage line to line	U_m	1200 V AC
	maximum voltage line to ground	V_o	1100 V DC
	maximum voltage line to line		1800 V DC
	test voltage AC		6.5 kV
	test voltage DC		15 kV
	lower ambient temperature		-40 °C
	upper ambient temperature		+90 °C
	max. conductor temperature		+120 °C

Min. bending radius 4 × cable-dia.

RADOX® Solar cable

Single core cable

Complies with:

Vertical flame spread
Corrosivity of combustion gases
Amount of halogen acid gas
Content of fluorine
Acid and alkaline resistance
Wheather resistance
RoHS Directive

$50 < L \leq 540$ mm
 $pH \geq 4.3$, $\sigma \leq 10$ $\mu S/mm$
 $HCl + HBr \leq 0.5$ %
 $HF \leq 0.1$ %
168 h/23 °C
720 h
fulfilled

EN 60332-1-2, IEC 60332-1-2
EN 50267-2-2, IEC 60754-2
EN 50267-2-1, IEC 60754-1
EN 60684-2, 45.2
EN 60811-2-1, 10
EN ISO 4892-2, Meth. A
2002/95/EC

Approvals

* TÜV Rheinland

Wires for photovoltaic-systems PV1-F

2 Pfg 1169/08.07,
certificate no. R60024042

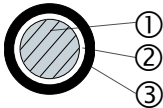
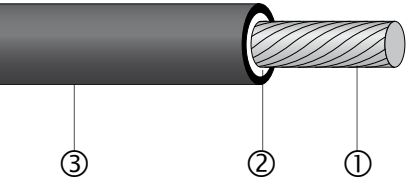
Extract from our delivery programme

Cross section	Conductor		Core	Conductor resistance	Weight	Colour	Item no.
mm ²	Construction n × mm	d mm	d mm	R ₂₀ max. Ω/km	kg/100 m		
1.5	30 × 0.25	1.52 ± 0.05	4.3 ± 0.15	13.7	3.2	black	12558072
2.5*	48 × 0.25	2.01 ± 0.05	5.2 ± 0.15	8.21	4.6	red	12529712
2.5*	48 × 0.25	2.01 ± 0.05	5.2 ± 0.15	8.21	4.6	blue	12529713
2.5*	48 × 0.25	2.01 ± 0.05	5.2 ± 0.15	8.21	4.6	black	12529714
4.0*	56 × 0.30	2.54 ± 0.05	5.8 ± 0.15	5.09	6.6	red	12545801
4.0*	56 × 0.30	2.54 ± 0.05	5.8 ± 0.15	5.09	6.6	blue	12537896
4.0*	56 × 0.30	2.54 ± 0.05	5.8 ± 0.15	5.09	6.6	black	12545802
6.0*	81 × 0.30	3.30 ± 0.10	6.9 ± 0.20	3.39	9.2	red	12568182
6.0*	81 × 0.30	3.30 ± 0.10	6.9 ± 0.20	3.39	9.2	blue	12568183
6.0*	81 × 0.30	3.30 ± 0.10	6.9 ± 0.20	3.39	9.2	black	12552756
10	78 × 0.40	4.30 ± 0.10	8.1 ± 0.15	1.95	14.4	black	12537897
16	119 × 0.40	5.30 ± 0.10	9.5 ± 0.20	1.24	21.0	black	12567377
25	182 × 0.40	6.60 ± 0.10	11.1 ± 0.20	0.779	29.6	black	12567378
35	266 × 0.40	7.80 ± 0.10	12.8 ± 0.25	0.565	41.7	black	12567379
50	378 × 0.40	9.30 ± 0.10	15.0 ± 0.25	0.393	60.2	black	12567380
70	348 × 0.50	11.40 ± 0.10	17.5 ± 0.30	0.277	80.8	black	12567381
95	444 × 0.50	12.80 ± 0.10	19.3 ± 0.30	0.210	103.1	black	12567382
120	551 × 0.50	14.60 ± 0.10	21.8 ± 0.30	0.164	126.0	black	12567383
150	722 × 0.50	16.80 ± 0.10	24.4 ± 0.30	0.132	161.7	black	12567384

Other cross sections and colours on request.

RADOX® Solar 125 WW

Single core for PV installations



- Approved according to global standards for PV systems (PV1-F)
- Meets the EN 50618 standard for PV cables
- High resistance against high and low temperatures, oil, abrasion, ozone, UV and harsh weather
- Increased safety due to dual insulation, notch-resistant
- Short circuit-resistant
- Space saving outer diameter
- Large operational temperature range -40 to +120 °C
- Long service life
- Halogen free, flame retardant
- Flexible, easy to strip
- Marked every metre for easy installation

Application

Specially developed for indoor and outdoor installation of photovoltaic system components, and devices which are exposed to high mechanical load and extreme weather conditions. Complies with European standards (CENELEC HD), the double-insulation design also supports the use in non-earthed photovoltaic systems. RADOX Solar cables allow low cost installation without conduits if required.

Composition of cable

① Conductor	stranded tin plated copper, fine wired, acc. to IEC/EN 60228, class 5
② Insulation	RADOX 125 I Solar
③ Outer insulation	RADOX 125 S Solar
Colours	see table

Technical data

UL	voltage rating	600 V AC
	test voltage	3.0 kV AC
	temperature rating	90 °C wet or dry, sunlight resistant
TÜV Rheinland:	voltage rating line to ground	U_o 600 V AC/900 V DC
	voltage rating line to line	U 1000 V AC/1500 V DC
	maximum voltage line to ground	720 V AC
	maximum voltage line to line	U_m 1200 V AC
	maximum voltage line to ground	V_o 1100 V DC
	maximum voltage line to line	1800 V DC
	test voltage AC	6.5 kV
	test voltage DC	15 kV
	lower ambient temperature	-40 °C
	upper ambient temperature	+90 °C
	max. conductor temperature	+120 °C
Min. bending radius	4 × cable-dia.	

RADOX® Solar 125 WW

Single core for PV installations

Complies with:

Vertical flame spread	50 < L ≤ 540 mm	EN 60332-1-2, IEC 60332-1-2
Corrosivity of combustion gases	pH ≥ 4.3, σ ≤ 10 µS/mm	EN 50267-2-2, IEC 60754-2
Amount of halogen acid gas	HCl + HBr ≤ 0.5 %	EN 50267-2-1, IEC 60754-1
Content of fluorine	HF ≤ 0.1 %	EN 60684-2, 45.2
Acid and alkaline resistance	168 h/23 °C	EN 60811-2-1, 10
Weather resistance	720 h	EN ISO 4892-2, Meth. A
RoHS Directive	fulfilled	2002/95/EC

Approvals

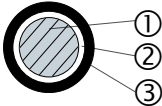
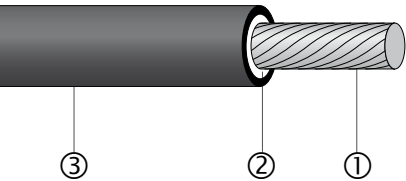
*TÜV Rheinland	Wires for photovoltaic-systems, PV1-F	TÜV Rheinland 2 Pfg 1169
	Electric cables for photovoltaic systems	certificate R02210086
		EN 50618

Extract from our delivery programme

Cross-section	Conductor	Core	Conductor resistance	Weight	Colour (Pos. 3)	Item no.
mm ²	d mm	d mm	R ₂₀ max. Ω/km	kg/100 m		
2.5 *	1.94	5.35	7.74	5.3	black red blue	85004363 85004189 85004987
4.0 *	2.35	5.85	5.04	6.9	black red blue	85004988 85013104 85004188
6.0 *	3.05	6.80	3.35	9.9	black red blue	85004991 85004413 85013105
10.0 *	4.15	8.80	1.91	17.2	black	85004450

RADOX® Smart

Single core cable



- With UL and TÜV Rheinland approvals
- Double insulated construction (safety class II)
- For reliable and durable connections
- Halogen free, flame retardant
- Lean, powerful and flexible
- Of proven RADOX® quality
- Meter marking – easy installation

Application

USA

- Type PV: Suitable for interconnection wiring of grounded and ungrounded photovoltaic power systems as described in section 690.31 (A) and other parts of the National Electrical Code (NEC), NFPA 70. For single conductor, double insulated wires installation without using a conduit is permitted according to section 690.35 (D) of the NEC.
- Type RHH oder RHW-2: Suitable for any of the wiring methods recognised in chapter 3 and as specified in their respective tables or as permitted elsewhere in the NEC.

Europe

- Suitable for the installation methods reference no. 2, 3A, 4A, 5A, 11, 11A, 12, 13, 14, 15, 16, 21, 22A, 23A, 24A, 25, 31A, 32A, 33A, 41, 43, 51, 72, 73, 75 in table 52H of HD 384.5.52 (CH: SEV 1000 section 5.2; DE: DIN VDE 0100-520).

Composition of cable

① Conductor	stranded tin plated copper, fine wired, acc. to EN 60228, class 5
② Inner insulation	RADOX FI
③ Outer insulation	RADOX FS
Colour	black

Technical data

UL:	voltage rating		600 V AC
	test voltage		3.0 kV AC
	temperature rating		90 °C wet or dry, sunlight resistant
TÜV Rheinland:	voltage rating line to ground	U_o	600 V AC
	voltage rating line to line	U	1000 V AC
	maximum voltage line to ground		720 V AC
	maximum voltage line to line	U_m	1200 V AC
	maximum voltage line to ground	V_o	1100 V DC
	maximum voltage line to line		1800 V DC
	test voltage AC		6.5 kV AC
	test voltage DC		15 kV DC
	lower ambient temperature		−40 °C
	upper ambient temperature		+90 °C
	maximum conductor temperature		+120 °C
Min. bending radius	4 × cable-dia.		

RADOX® Smart

Single core cable

Complies with:

Vertical FT1	$L \leq 250 \text{ mm}$, $T \leq 60 \text{ s}$	UL 1581 # 1060
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	EN 60332-1-2, IEC 60332-1-2
Corrosivity of combustion gases	$\text{pH} \geq 4.3$, $\sigma \leq 10 \text{ } \mu\text{S/mm}$	EN 50267-2-2, IEC 60754-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1, IEC 60754-1
Content of fluorine	$\text{HF} \leq 0.1 \%$	EN 60684-2, 45.2
Acid and alkaline resistance	168 h/23 °C	EN 60811-2-1, 10
Wheather resistance	720 h	EN ISO 4892-2, Meth. A
RoHS Directive	fulfilled	2002/95/EC

Approvals

*UL	Photovoltaic wire	Type PV, UL subject 4703, UL listed E305787
*UL	Thermoset-insulated wires and cables	Type RHH and RHW-2, UL 44, listed E310273
*TÜV Rheinland	Wires for photovoltaic-systems, PV1-F	2 Pfg 1169/08.07, Zertifikat R60026135

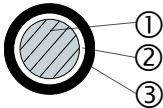
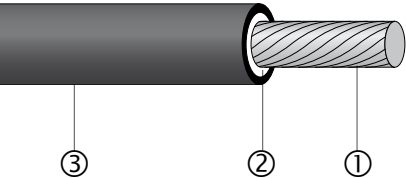
Extract from our delivery programme

Cross section		Conductor		Core	Conductor resistance	Weight	Item no.
AWG	mm ²	Construction n × mm	d _{nom.} mm	d mm	R ₂₀ max. Ω/km	kg/100 m	
14 *	2.5	48 × 0.26	2.0	5.3 ± 0.2	8.21	5.1	12583222
12 *	4.0	61 × 0.29	2.5	6.0 ± 0.3	5.09	7.1	12583780
10 *	6.0	82 × 0.30	3.2	7.0 ± 0.3	3.39	9.9	12583781

Other cross sections and colours on request.

RADOX® Solar 125 WW+

Reinforced single core for PV installations



- Suitable for high system voltages/ UL 2000 V
- Cost savings thanks to higher system voltage/more modules per string
- Meets the EN 50618 standard for PV cables
- High resistance against high and low temperatures, oil, abrasion, ozone, UV and harsh weather
- Increased safety due to dual insulation, notch-resistant
- Short circuit-resistant
- Large operational temperature range -40 to +120 °C
- Long service life
- Halogen free, flame retardant
- Flexible, easy to strip
- Marked every metre for easy installation

Application

Specially developed for indoor and outdoor installation of photovoltaic system components, and devices which are exposed to high mechanical load and extreme weather conditions. Complies with European standards (CENELEC HD), the double-insulation design also supports the use in non-earthed photovoltaic systems. RADOX Solar cables allow low cost installation without conduits if required.

Composition of cable

① Conductor	stranded tin plated copper, fine wired, IEC/EN 60228, class 5
② Inner Insulation	RADOX 125 I Solar
③ Outer Insulation	RADOX 125 S Solar
Colours	see table

Technical data

UL:	voltage rating	2 kV
	test voltage AC	3.0 kV AC
	temperature rating	90 °C wet or dry, sunlight resistant
TÜV Rheinland:	voltage rating line to ground	U ₀ 1000 V AC/1500 V DC
	voltage rating line to line	U 1600 V AC/3000 V DC
	maximum voltage line to ground	1200 V AC/1800 V DC
	maximum voltage line to line	U _m 1500 V AC/3000 V DC
	test voltage AC	6.5 kV
	test voltage DC	15 kV
	lower ambient temperature	-40 °C
	upper ambient temperature	+90 °C
	max. conductor temperature	+120 °C
Min. bending radius	4 × cable-Ø	

RADOX® Solar 125 WW+

Reinforced single core for PV installations

Complies with:

Vertical FT1	$L \leq 250 \text{ mm}$, $T \leq 60 \text{ s}$	UL 1581 # 1060
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	EN 60332-1-2, IEC 60332-1-2
Corrosivity of combustion gases	$\text{pH} \geq 4.3$, $\sigma \leq 10 \text{ } \mu\text{S/mm}$	EN 50267-2-2, IEC 60754-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1, IEC 60754-1
Content of fluorine	$\text{HF} \leq 0.1 \%$	EN 60684-2, 45.2
Acid and alkaline resistance	168 h/23 °C	EN 60811-2-1, 10
Wheather resistance	720 h	EN ISO 4892-2, Meth. A
RoHS Directive	fulfilled	2002/95/EC

Approvals

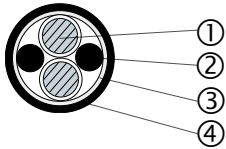
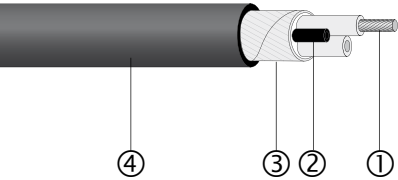
*TÜV Rheinland	Wires for photovoltaic-systems, PV1500 PC-F	2 Pfg 1169/05.12, certificate R60089765
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Extract from our delivery programme

Cross-section	Conductor	Core	Conductor resistance	Weight	Colour (Pos. 3)	Item no.
mm ²	d mm	d mm	R ₂₀ max. Ω/km	kg/100 m		
2.5 *	1.94	6.45	7.74	6.8	black red blue	85004376 85004395 85004994
4.0 *	2.35	6.90	5.04	8.5	black red blue	85004996 85013119 85004412
6.0 *	3.05	7.85	3.35	11.8	black red blue	85004997 85004415 85013120
10.0 *	4.15	9.50	1.91	18.8	black	85004451

RADOX® Solar 125 AC

Multi-core cable for PV installations



- Multi-core AC cable with dual insulation
- Space-saving, enhanced outer diameter
- Short circuit and earth fault resistant
- High resistance against high and low temperature, oil, abrasion, ozone, UV and weather
- Easy to strip
- Halogen free, flame retardant
- Complies with TÜV Rheinland 2PFG1940/12.11 for AC cables

Application

- Specially developed for connecting photovoltaic system components, modules or section cables
- Especially for use in micro-inverters and AC PV modules
- For permanent installation in dry and wet environments, agricultural businesses or outdoor facilities
- Dual insulated construction supports the use in non-earthed photovoltaic systems (complies with European standards (CENELEC HD)).

Composition of cable

① Conductor	stranded tin plated copper, fine wired, IEC/EN 60228 class 5
② Inner Insulation	RADOX 125 I Solar
③ Outer Insulation	RADOX 125 S Solar
④ Jacket	RADOX 125 S Solar, Colour: black

Technical data

TÜV Rheinland:	nominal voltage, line to earth	U_o	450 V AC
	nominal voltage, line to line	U	750 V AC
	nominal voltage for protected and fixed installations, line to earth	U_o	600 V AC
	nominal voltage for protected and fixed installations, line to line	U	1000 V AC
	max. operating voltage, line to earth	U_m	495 V AC
	max. operating voltage, line to line		825 V AC
	test voltage AC		6.5 kV
	test voltage DC		15 kV
	lower ambient temperature		-40 °C
	upper ambient temperature		+90 °C
	max. conductor temperature 20 000 h		+120 °C
	expected life time 30 years		+85 °C

Min. bending radius 4 × cable-dia.

RADOX® Solar 125 AC

Multi-core cable for PV installations

Complies with:

Vertical FT1	$L \leq 250 \text{ mm}, T \leq 60 \text{ s}$	UL 1581 # 1060
Vertical flame spread	$50 < L \leq 540 \text{ mm}$	EN 60332-1-2, IEC 60332-1-2
Corrosivity of combustion gases	$\text{pH} \geq 4.3, \sigma \leq 10 \text{ } \mu\text{S/mm}$	EN 50267-2-2, IEC 60754-2
Amount of halogen acid gas	$\text{HCl} + \text{HBr} \leq 0.5 \%$	EN 50267-2-1, IEC 60754-1
Content of fluorine	$\text{HF} \leq 0.1 \%$	EN 60684-2, 45.2
Acid and alkaline resistance	168 h/23 °C	EN 60811-2-1, 10
Weather resistance	720 h	EN ISO 4892-2, Meth. A
RoHS Directive	fulfilled	2002/95/EC

Approvals

*TÜV Rheinland	Cables for photovoltaic-systems, PV07AC-F	2 Pfg 1940/11.12, certificate R60089875
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Extract from our delivery programme

Cross-section	Conductor	Core	Cable	Conductor resistance	Weight	Item no.
mm ²	d mm	d mm	d mm	R ₂₀ max. Ω/km	kg/100 m	
2 × 0.75 *	1.10	2.85	7.65	25.4	7.65	85023772
2 × 2.5 *	1.94	3.70	9.65	7.74	9.65	85006459
3 G 2.5 *	1.94	3.70	10.50	7.74	10.5	85006435



RADOX® FR

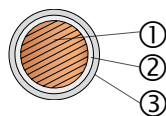
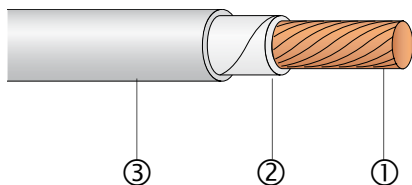
Safety cables with circuit integrity in case of fire

RADOX FR AUS, single core	114
RADOX FR AUS multi core cable, 0.75 - 2.5 mm	116
RADOX FR AUS multi core cable, 4.0 - 35 mm	118

All our cables fully comply with the European directives 76/769/EWG, 2003/11/EG, 2000/53/EG, 2003/53/EG and 2011/65/EU (RoHS).

RADOX® FR AUS

Single core cable with circuit integrity in case of fire



- Halogen free
- Flame retardant
- In case of fire no corrosive gases and low smoke
- Circuit integrity in case of fire
- Excellent high and low temperature, and ozone resistance
- Weatherproof
- Easy to strip

Application

For emergency support systems: emergency lighting, smoke spill fans, fire alarms and sprinklers, emergency evacuation intercommunication systems, etc.

Composition of cable

① Core	stranded bare copper acc. to EN 60228, class 2
② Flame barrier	
③ Insulation	RADOX 125

Technical data

Voltage rating		600 / 1000 V
Test voltage		3500 V AC
Max. conductor temperature		+110 °C
Max. conductor temperature	(short circuit max. 5 s)	+280 °C
Min. operating temperature	flexing	-25 °C
Min. conductor temperature	fixed	-40 °C
Min. bending radius	fixed	6 × cable-dia.
	flexing	10 × cable-dia.

Fire tests

Content of halogen acid gas	IEC 60754-1, EN 50267-2-1	0 mg/g
Corrosivity of combustion gases	IEC 60754-2, EN 50267-2-3	
Smoke density	IEC 61034-2, EN 50268-2	
Circuit integrity	AS/NZS 3013, WS5	

RADOX® FR AUS

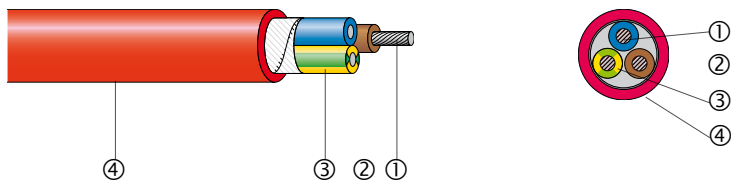
Single core cable with circuit integrity in case of fire

Extract from our delivery programme

Cross section	Conductor			Core			
mm ²	Construction nom. n × mm dia.	Dia. nom. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. nom. mm	Colour	Weight nom. kg/100 m	Fire load kJ/m
1.5	7 × 0.54	1.62	11.50	3.50	black	2.5	180
2.5	7 × 0.69	2.07	7.56	4.10	black	3.7	266

RADOX® FR AUS – 0.75 to 2.5 mm²

Multi core cable with circuit integrity in case of fire – LSFH



- Halogen free
- Flame retardant
- In case of fire no corrosive gases and low smoke
- Circuit integrity in case of fire
- Excellent high and low temperature, and ozone resistance
- Weatherproof
- Easy to strip

Application

For emergency support systems: emergency lighting, smoke spill fans, fire alarms and sprinklers, emergency evacuation intercommunication systems, etc.

Composition of cable

① Cores	
Conductor	stranded bare copper acc, to EN 60228, class 5
Flame barrier	
Insulation	RADOX 125
Colours	see table
② Fillers (optional)	RADOX
③ Conductor	stranded bare copper acc, to EN 60228, class 5
Insulation	RADOX 125
Colour	yellow-green
④ Sheath	LSFH
Colour	see table

Technical data

Voltage rating	0.75 and 1.0 mm ² 1.5 and 2.5 mm ²	300 / 500 V 600 / 1000 V
Test voltage		3500 V
Temperature range	fixed	–40 up to +90 °C
Min. bending radius		10 × cable-dia.

Fire tests

Flame propagation::		
Vertical of a single cable	IEC 60332-1, EN 50265-2-1	
Vertical of bunched cables	IEC 60332-3-24, EN 50266-2-4	category C
Content of halogen acid gas	IEC 60754-1, EN 50267-2-1	0 mg/g
Corrosivity of combustion gases	IEC 60754-2, EN 50267-2-3	
Smoke density	IEC 61034-2, EN 50268-2	
Circuit integrity	AS/NZS 3013, WS5	

RADOX® FR AUS – 0.75 to 2.5 mm²

Multi core cable with circuit integrity in case of fire – LSFH

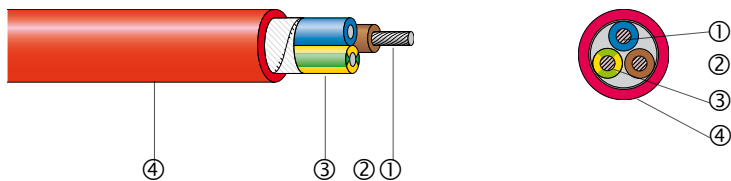
Extract from our delivery programme

Cross section	Conductor			Core colours*		Cable			
mm ²	Construction nom. n × mm dia.	dia. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Colour	Dia. mm	Weight nom. kg/100 m	Fire load kJ / m	Colour
2 × 0.75	7 × 0.37	1.11	24.8	2.5	WH, RD	7.8	8.1	955	RD
3 × 0.75	7 × 0.37	1.11	24.8	2.5	WH, RD, BU	8.4	9.6	1055	RD
4 × 0.75	7 × 0.37	1.11	24.8	2.5	WH, RD, BK, BU	9.3	11.8	1250	RD
10 × 0.75	7 × 0.37	1.11	24.8	2.5	WH num.	14.5	25.5	2474	RD
20 × 0.75	7 × 0.37	1.11	24.8	2.5	WH num.	19.2	46.6	4274	RD
2 × 1.0	7 × 0.43	1.29	18.2	3.1	WH, RD	8.5	9.8	1131	RD
3 × 1.0	7 × 0.43	1.29	18.2	3.1	WH, RD, BU	9.1	11.7	1248	RD
4 × 1.0	7 × 0.43	1.29	18.2	3.1	WH, RD, BK, BU	10.3	14.8	1519	RD
2 × 1.5	7 × 0.53	1.59	12.2	3.4	WH, RD	9.2	12.1	1305	RD
3 × 1.5 3 G 1.5	7 × 0.53	1.59	12.2	3.4	WH, RD, BU RD, BK, GNYE	9.9	14.5	1446	RD RD
4 × 1.5 4 G 1.5	7 × 0.53	1.59	12.2	3.4	WH, RD, BK, BU WH, RD, BK, GNYE	10.9	18.2	1724	RD RD
5 G 1.5	7 × 0.53	1.59	12.2	3.4	WH, RD, BK, BU, GNYE	12.1	22.8	2125	RD
7 × 1.5 7 G 1.5	7 × 0.53	1.59	12.2	3.4 3.4	WH num. BK num., GNYE	13.1	27.4	2363	RD RD
10 × 1.5	7 × 0.53	1.59	12.2	3.4	WH num.	17.4	40.4	3464	RD
12 G 1.5	7 × 0.53	1.59	12.2	3.4	WH num., GNYE	17.9	44.9	3756	RD
16 × 1.5	7 × 0.53	1.59	12.2	3.4	WH num.	20.3	59.2	4824	RD
21 G 1.5	7 × 0.53	1.59	12.2	3.4	WH num., GNYE	22.6	73.9	5875	RD
41 G 1.5	7 × 0.53	1.59	12.2	3.4	WH num., GNYE	32.3	144.5	11 150	RD
56 G 1.5	7 × 0.53	1.59	12.2	3.4	BK num., BU, GNYE	36.3			OG
2 × 2.5	7 × 0.67	2.01	7.56	3.9	WH, RD	10.6	16.7	1715	RD
3 × 2.5 3 G 2.5	7 × 0.67	2.01	7.56	3.9	WH, RD, BU RD, BK, GNYE	11.3	20.1	1858	RD RD
4 × 2.5 4 G 2.5	7 × 0.67	2.01	7.56	3.9	WH, RD, BK, BU WH, RD, BU, GNYE	12.6	25.3	1341	RD RD
5 G 2.5	7 × 0.67	2.01	7.56	3.9	WH, RD, BK, BU, GNYE	14.0	31.7	2525	RD
7 G 2.5	7 × 0.67	2.01	7.56	3.9	WH num., GNYE	15.4	39.6	3231	RD
11 G 2.5	7 × 0.67	2.01	7.56	3.9	WH num., GNYE	20.8	60.5	4828	RD
12 G 2.5	7 × 0.67	2.01	7.56	3.9	WH num., GNYE	20.8	64.6	5188	RD
21 G 2.5	7 × 0.67	2.01	7.56	3.9	WH num., GNYE	26.3	106	7759	RD
50 × 2.5	7 × 0.67	2.01	7.56	3.9	WH num.	40.8	244	17 928	RD

* Description for core colours see page 126.

RADOX® FR AUS – 4.0 to 35 mm²

Multi core cable with circuit integrity in case of fire – RADOX® 125



- Halogen free
- Flame retardant
- In case of fire no corrosive gases and low smoke
- Circuit integrity in case of fire
- Excellent high and low temperature, and ozone resistance
- Weatherproof
- Easy to strip

Application

For emergency support systems: emergency lighting, smoke spill fans, fire alarms and sprinklers, emergency evacuation intercommunication systems, etc.

Composition of cable

① Cores	
Conductor	stranded bare copper, 4 and 6 mm ² stranded bare copper, 10 up to 120 mm ²
Flame barrier	
Insulation	RADOX 125, colours see table
② Fillers (optional)	RADOX
③ Conductor	stranded bare copper, 4 and 6 mm ² stranded bare copper, 10 up to 120 mm ²
Insulation	RADOX 125
Colours	yellow-green
④ Sheath	RADOX 125
Colour	see table

Technical data

Voltage rating		600 / 1000 V
Test voltage		3500 V AC
Max. conductor temperature		+110 °C
Max. conductor temperature	(short circuit max. 5 s)	+280 °C
Min. operating temperature	flexing	–25 °C
Min. conductor temperature	fixed	–40 °C
Min. bending radius	fixed	6 × cable-dia.
	flexing	10 × cable-dia.

Fire tests

Flame propagation:		
Vertical of a single cable	IEC 60332-1, EN 50265-2-1	
Vertical of bunched cables	IEC 60332-3-24, EN 50266-2-4	category C
Content of halogen acid gas	IEC 60754-1, EN 50267-2-1	0 mg/g
Corrosivity of combustion gases	IEC 60754-2, EN 50267-2-3	
Smoke density	IEC 61034-2, EN 50268-2	
Circuit integrity	AS/NZS 3013, WS5	

RADOX® FR AUS – 4.0 to 35 mm²

Multi core cable with circuit integrity in case of fire – RADOX® 125

Extract from our delivery programme

Cross section	Conductor			Core		Cable			
mm ²	Construction nom. n × mm dia.	Dia. mm	R ₂₀ IEC 60228 max. Ω/km	Dia. mm	Colour*	Dia. mm	Weight nom. kg/100 m	Fire load kJ / m	Colour
2 × 4 2 × 4	7 × 0.86	2.58	4.70	4.4	BK, RD WH, RD	12.1	23.0	2313	OG RD
3 × 4 3 G 4	7 × 0.86	2.58	4.70	4.4	WH, RD, BU RD, BK, GNYE	12.9	28.1	2468	RD red
4 × 4 4 G 4	7 × 0.86	2.58	4.70	4.4	WH, RD, BK, BU WH, RD, BU, GNYE	14.6	36.4	3047	RD RD
5 G 4					WH, RD, BK, BU, GNYE	16.2	44.9		RD
2 × 6	7 × 1.07	3.21	3.11	5.0	WH, RD	13.6	30.5	2892	RD
3 G 6	7 × 1.07	3.21	3.11	5.0	RD, BK, GNYE	14.5	37.0	2996	RD
4 G 6	7 × 1.07	3.21	3.11	5.0	WH, RD, BU, GNYE	16.4	48.8	1430	RD
5 G 6	7 × 1.07	3.21	3.11	5.0	WH, RD, BK, BU, GNYE	18.1	59.8	3778	RD
2 × 10	7 × 1.36	4.08	1.83	6.6	BK, RD	17.9	53.8	4378	OG
3 × 10 3 G 10	7 × 1.36	4.08	1.83	6.6	WH, RD, BURD, BK, GNYE	19.0	63.6		OG OG
4 × 10 4 G 10	7 × 1.36	4.08	1.83	6.6	WH, RD, BK, BU WH, RD, BU, GNYE	21.1	78.3	6144	OG OG
5 G 10	7 × 1.36	4.08	1.83	6.6	WH, RD, BK, BU, GNYE	22.9	96.1	7132	OG
3 × 16	7 × 1.36	4.08	1.83	6.6	WH, RD, BU	20.7	84.5		OG
4 × 16	7 × 1.36	4.08	1.83	6.6	WH, RD, BK, BU	23.1	108.3		OG
4 G 16	7 × 1.70	4.85	1.15	7.5	WH, RD, BU, GNYE	23.1	75.1		OG
5 G 16	7 × 1.70	4.85	1.15	7.5	WH, RD, BK, BU, GNYE	25.2	127.4	7683	OG
3 × 25	7 × 2.15	6.10	0.734	9.2	WH, RD, BU	24.4	126.3		OG
4 × 25 4 G 25	7 × 2.15	6.10	0.734	9.2	WH, RD, BK, BU WH, RD, BU, GNYE	27.0	157.4	1054	OG OG
5 G 25	7 × 2.15	6.10	0.734		WH, RD, BK, BU, GNYE	30.3	197.5	11 761	OG
3 × 35	7 × 2.53	7.2	0.524	10.3	WH, RD, BU	26.9	160.6		OG
4 × 35 4 G 35	7 × 2.53	7.2	0.524	10.3	WH, RD, BK, BU WH, RD, BU, GNYE	29.7	203.6	11 304	OG OG
5 G 35	7 × 2.53	7.2	0.524	10.3	WH, RD, BK, BU GNYE	33.6	257.6	13 912	OG

* Description for core colours see page 126

General technical information

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Electrical formulas

Formulas

Required conductor cross section for electric cables

given	Direct current	Single phase alternating current	Three phase alternating current
Voltage drop, current	$\frac{200 \cdot L \cdot I}{\gamma \cdot u_0 \cdot U}$	$\frac{200 \cdot L \cdot I \cdot \cos \varphi}{\gamma \cdot u_0 \cdot U}$	$\frac{173 \cdot L \cdot I \cdot \cos \varphi}{\gamma \cdot u_0 \cdot U}$
Voltage drop, power	$\frac{200 \cdot L \cdot P}{\gamma \cdot u_0 \cdot U^2}$	$\frac{200 \cdot L \cdot P}{\gamma \cdot u_0 \cdot U^2}$	$\frac{100 \cdot L \cdot P}{\gamma \cdot u_0 \cdot U^2}$
Voltage drop, current	$\frac{200 \cdot L \cdot I^2}{\gamma \cdot p_0 \cdot P}$	$\frac{200 \cdot L \cdot I^2}{\gamma \cdot p_0 \cdot P}$	$\frac{300 \cdot L \cdot I^2}{\gamma \cdot p_0 \cdot P}$
Voltage drop, voltage	$\frac{200 \cdot L \cdot P}{\gamma \cdot p_0 \cdot U^2}$	$\frac{200 \cdot L \cdot P}{\gamma \cdot p_0 \cdot U^2 \cdot \cos^2 \varphi}$	$\frac{100 \cdot L \cdot P}{\gamma \cdot p_0 \cdot U^2 \cdot \cos^2 \varphi}$

Key

I	=	Current in ampère	A	=	Conductor cross section in mm ²
γ	=	Conductivity (copper 56, aluminium 34)	u ₀	=	Voltage drop in % of the operating voltage
L	=	Conductor lengths (single) in meters	U	=	Operating voltage in volts
P	=	Transmission power in watts	cos φ	=	Power factor (usually assumed to be 0.8)
p ₀	=	Power loss in % of the transmission power			

The formulas stated for alternating and three-phase current do not give any consideration to the inductive resistance. This resistance is a function of the distance of the individual conductors between one another.
Determination of the current if the power is known.

Direct current:

I	=	$\frac{P}{U \cdot \eta}$
P	=	Rated power in W
U	=	Voltage in V
I	=	Current in A
η	=	Efficiency

Example:

What is the current that a heating unit of 3.4 kW absorbs at 440 V?
(η = 1)

$$I = \frac{3400}{440 \cdot 1} = 7.7 \text{ A}$$

Alternating current:

I	=	$\frac{P}{U \cdot \cos \varphi \cdot \eta}$
P	=	Rated power in W
U	=	Voltage in V
I	=	Current in A
cos φ	=	Phase shift
η	=	Efficiency

Example:

What is the current consumption of an alternating current motor of 1.9 kW at cos φ = 0.77 and an efficiency of 79 %?
The voltage is 230 V, 50 Hz.

$$I = \frac{1900}{230 \cdot 0.77 \cdot 0.79} = 13.6 \text{ A}$$

Three phase current:

I	=	$\frac{P}{1.73 \cdot \cos \varphi \cdot \eta \cdot U}$
P	=	Rated power in W
U	=	Voltage in V
I	=	Current in A
cos φ	=	Phase shift
η	=	Efficiency

Example:

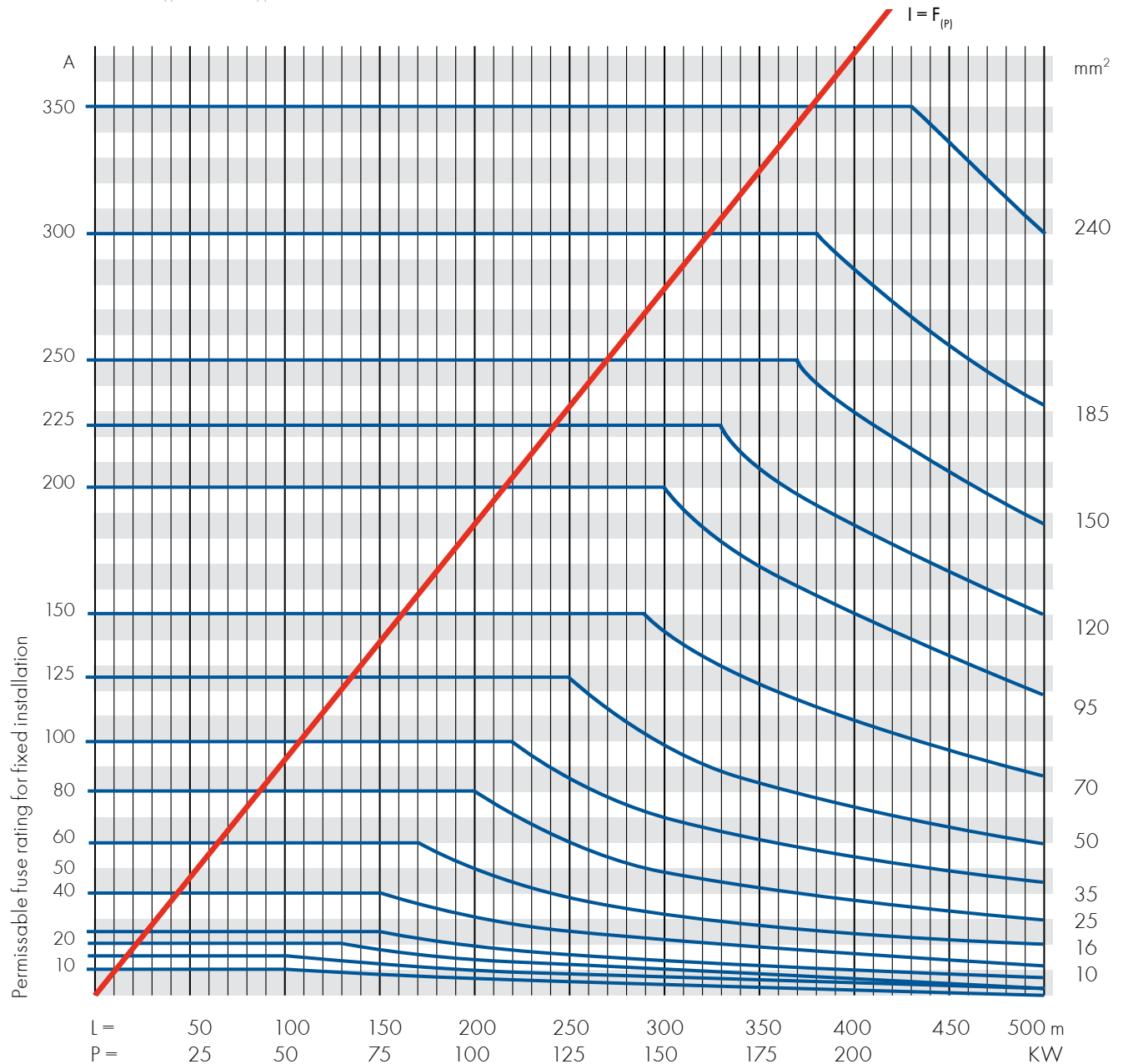
What current does a three phase motor of 22 kW consume at 400 V, 50 Hz, with cos φ = 0.89 and an efficiency of 90 %?

$$I = \frac{22000}{1.73 \cdot 400 \cdot 0.89 \cdot 0.9} = 39.7 \text{ A}$$

Table of three phase current

Permissible three phase cable loading at 5 % voltage drop

Presentation: $I = F_{(I)}$ and $I = F_{(P)} \cos \varphi = 0.82$



Example:

A power of 70 kW is to be transmitted across a distance of $L = 450$ m. The function $I = F_{(P)}$ gives us $70 \text{ kW} \approx 130 \text{ A}$ (mixed users). The function $I = F_{(I)}$ provides the cable cross section of 95 mm^2 .

A length of 500 metres would already require a cable of 120 mm^2 to ensure that the voltage loss and therefore also the power loss would be in an acceptable and economical range.

Representation: $I = F_{(I)}$ shows that, for example, for 95 mm^2 the permissible fuse of 200 A determines the load limit up to $L = 300$ m, i.e. $U_v < 5 \%$.

From 300 mm^2 the cross section can no longer be fully utilised.

Characteristics of materials

Typical characteristics of various insulation and jacket materials for cables

Abbreviations ¹⁾ CENELEC type	Insulation compounds													
	Thermoplastics							Crosslinked materials						
	PVC	PE	PBT-FR	TPE-E	ETFE	FEP	PTFE	EPR	PE-X	RX 125	RX 155S	RX 155	PVDF-X	SIR
	TII							EI6						EI2
Thermal characteristics														
Thermal resistance														
20 000 h °C	70	70	110	110	135	180	250	90	90	120	130	135	135	180
24 h °C	100	100	160	160	220	240	300	180	180	200	220	220	220	260
Short circuit °C	160	100	160	160	250	250	300	250	250	250	250	250	300	350
Resistance to cold, moved °C	-5	-55	-40	-40	-55	-55	-70	-40	-55	-40	-55	-55	-55	-55
Mechanical characteristics														
Tensile strenght N/mm ²	≥ 12.5	≥ 10	≥ 25	≥ 30	≥ 30	≥ 10	≥ 20	≥ 5.0	≥ 12.5	≥ 12.5	≥ 12.5	≥ 15	≥ 28	≥ 5.0
Elongation at break %	≥ 125	≥ 300	≥ 200	≥ 200	≥ 150	≥ 200	≥ 200	≥ 200	≥ 200	≥ 200	≥ 200	≥ 300	≥ 200	≥ 150
Abrasion resistance	satisf.	good	good	very good	very good	satisf.	satisf.	satisf.	very good	good	very good	good	very good	poor
Flexibility ²⁾	satisf.	poor	poor	poor	poor	poor	poor	very good	poor	satisf.	poor	satisf.	poor	very good
Electrical characteristics														
Volume resistivity at 20 °C Ωcm	10 ¹⁴	10 ¹⁶	10 ¹⁵	10 ¹⁵	10 ¹⁶	10 ¹⁸	10 ¹⁸	10 ¹⁵	10 ¹⁶	10 ¹⁴	10 ¹⁶	10 ¹⁶	10 ¹⁴	10 ¹⁵
Dielectric constant at 1 kHz	5.0	2.3	3.7	3.8	2.6	2.2	2.0	3.0	2.4	4.2	2.6	2.8	5.7	3.0
Fire characteristics														
Flame retardant	yes	no	yes	no	yes	yes	yes	no	no	yes	yes	yes	yes	ja
Halogen free	no	yes	yes	yes	no	no	no	yes	yes	yes	no	no	no	ja
Corrosive combustion gases	yes	no	no	no	yes	yes	yes	no	no	no	yes	yes	yes	no
Smoke generation	strong	average	average	average	low	low	low	average	average	low	strong	strong	low	average
Resistance to														
Ionizing radiation kGy	100	1000	1000	1000	2000	100	1	2000	1000	1000	1000	1000	1000	500
Solvents ³⁾	satisf.	satisf.	good	good	very good	very good	very good	satisf.	satisf.	satisf.	good	satisf.	very good	satisf.
Oils and fuels ³⁾	satisf.	satisf.	good	good	very good	very good	very good	poor	satisf.	satisf.	good	satisf.	very good	satisf.
Acids and alkaline solutions ³⁾	good	very good	satisf.	satisf.	very good	very good	very good	very good	very good	good	good	good	very good	satisf.
Water/hydrolysis ³⁾	good	very good	satisf.	satisf.	very good	very good	very good	good	very good	good	very good	very good	very good	very good
Weather/UV radiation	good	poor	good	good	very good	very good	very good	good	satisf.	good	good	good	very good	very good

¹⁾ RX = RADOX®, for other abbreviations see following page «Material designations»

²⁾ Depends greatly on cable construction

³⁾ Influenced by type, time and medium temperature

Important:

As the characteristics of compounds may vary widely according to their specific formulation, the values stated in the table must be understood as approximate values referring to typical representatives of their material class.

The data is based on laboratory investigations and practical experience. It is stated to the best of our knowledge, but without guarantee. We will gladly advise you in individual cases.

Characteristics of materials

Typical characteristics for cables

Abbreviation ¹⁾ CENELEC type	Sheat compounds							
	Thermoplastics		Crosslinked materials					
	LSFH	TPU	CR	RX 125A	RX 125M	RX 125TM	REMS	REMS FH
		TMPU	EM2					
Thermal characteristics								
Thermal resistance								
20 000 h (°C)	90	90	60	120	120	120	130	120
24 h (°C)	130	140	120	200	200	200	200	200
Short circuit (°C)	250	200	200	280	280	280	280	280
Resistance to cold, moved (°C)	-25	-55	-25	-25	-25	-25	-40	-25
Mechanical characteristics								
Tensile strenght N/mm ²	≥ 9.0	≥ 25	≥ 10	≥ 10	≥ 9	≥ 10	≥ 15	≥ 10
Elongation at break %	≥ 125	≥ 300	≥ 300	≥ 125	≥ 125	≥ 125	≥ 300	≥ 125
Abrasion resistance	good	very good	good	good	good	good	good	good
Flexibility ²⁾	satisf.	satisf.	very good	satisf.	good	good	good	good
Electrical characteristics								
Volume resistivity at 20 °C Ωcm	10 ¹³	10 ¹²	10 ¹⁰	10 ¹⁴	10 ¹²	10 ¹²	10 ¹²	10 ¹²
Dielectric constant at 1 kHz	5	7	8	4.8	6	5	4.8	5.5
Fire characteristics								
Flame retardant	yes	no	yes	yes	yes	yes	yes	yes
Halogen free	yes	yes	no	yes	yes	yes	no	yes
Corrosive combustion gases	no	no	yes	no	no	no	yes	no
Smoke generation	low	average	stark	low	low	low	stark	low
Resistance to								
Ionizing radiation kGy	1000	5000	500	1000	1000	1000	1000	1000
Solvents ³⁾	poor	satisf.	satisf.	satisf.	satisf.	satisf.	satisf.	satisf.
Oils and fuels ³⁾	poor	good	good	satisf.	good	good	very good	very good
Acids and alkaline solutions ³⁾	satisf.	satisf.	very good	good	good	very good	very good	good
Water/hydrolysis ³⁾	satisf.	very good	good	good	good	very good	good	good
Weather/UV radiation	satisf.	good	good	good	good	good	very good	good

1) RX = RADOX®, for other abbreviations see following page «Material designations»

2) Depends greatly on cable construction

3) Influenced by type, time and medium temperature

Important:

As the characteristics of compounds may vary widely according to their specific formulation, the values stated in the table must be understood as approximate values referring to typical representatives of their material class.

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Colour table

• BK	=	black/schwarz	• GN	=	green/grün
• TQ	=	turquoise/türkis	• GY	=	grey/grau
• WH	=	white/weiss	• OG	=	orange/orange
• BN	=	brown/braun	• VT	=	violet/violett
• BU	=	blue/blau	• PK	=	pink/rosa
• RD	=	red/rot			
• YE	=	yellow/gelb	• GNYE	=	green-yellow/grün-gelb

Material designations

Thermoplastics

ETFE	Ethylene-tetrafluoroethylene copolymer
FEP	Tetrafluoroethylene-perfluoropropylene copolymer
LSFH™	Halogen free, flame retardant material (low smoke free of halogen)
PBT FR	Flame retardant polybutylene terephthalate
PE	Polyethylene
PTFE	Polytetrafluoroethylene
PVC	Polyvinylchloride
TPE-E	Thermoplastic polyester elastomers
TPU	Thermoplastic polyurethane

Crosslinked materials

CR Chloroprene rubber	
EPR	Ethylene propylene rubber
PE-X	Crosslinked polyethylene
PVDF-X	Crosslinked polyvinylidene fluoride
RADOX® 125	Polyolefin copolymer
RADOX® 125A	Polyolefin copolymer
RADOX® 125M	Polyolefin copolymer
RADOX® 125TM	Ethylene acrylate copolymer
RADOX® 155	Polyolefin copolymer
RADOX® 155S	Polyolefin copolymer
RADOX® ELASTOMER S (REMS)	Ethylene acrylate copolymer
RADOX® ELASTOMER S FH (REMS FH)	Ethylene acrylate copolymer
SIR	Silicon rubber
ETFE-X	Crosslinked Ethylene tetrafluorethylene

RADOX® is a registered trademark of HUBER+SUHNER for electron beam crosslinked, heat resistant cable insulations and sheaths.

LSFH™ is a registered trademark of HUBER+SUHNER for halogen free, flame retardant cable sheaths.

Core colours VDE 0293-308 /HD 308 S2 vs. HD 308

Example

Core numbers:

New
HD 308 S2

Old
HD 308

with yellow-green grounding wire

3					
4					
5					

3					
4					
5					

Old
SEV 1101, 1102

without yellow-green grounding wire

2					
3					
4					
5					

2					
3					
4					
5					

black



brown



blue



grey

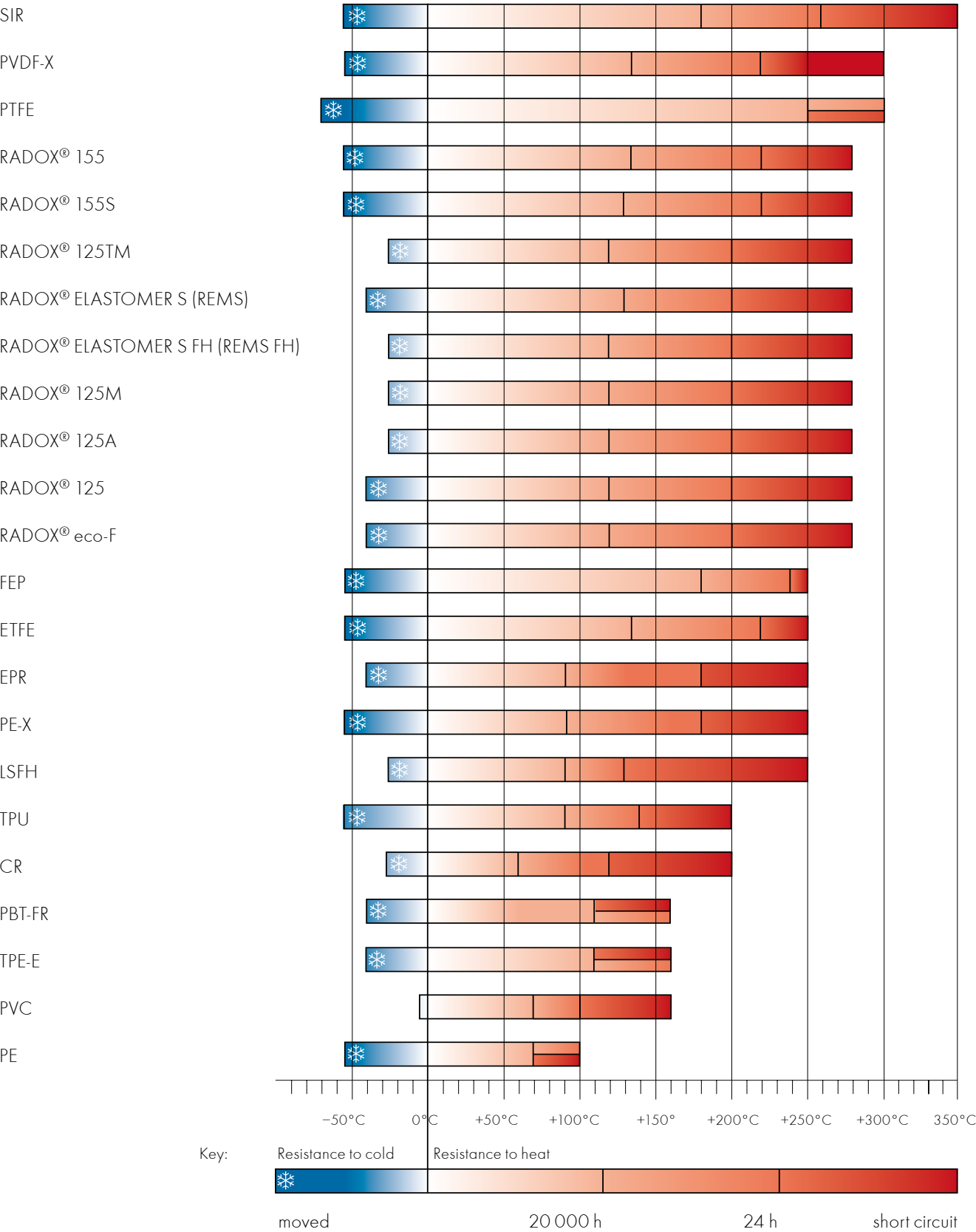


yellow-green



Resistance to cold and heat

Typical operating temperature ranges of different insulations and sheaths



Standards

System for type designation of electric cables according to CENELEC HD 361

Example:

light weight PVC sheathed cable, flat

H	03	V	V	H	-	F	2	X	0.75
1	2	3	4	5	-	6	7	8	9

1	Type of standard
H	harmonised type
A	acknowledged national type

2	Voltage rating UO/U
01	100/100 V
03	300/300 V
05	300/500 V
07	450/750 V

3	Insulation material
4	Sheat material
R	Ethylen propylen rubber, 90 °C
G	Ethylen vinylacetat
N	Polychloropren rubber
Q	Polyurethane
R	Ethylen propylen rubber, 60 °C
S	Silicon rubber
V	PVC
V2	PVC, 90 °C
V3	PVC, cold resistant
V5	PVC, oil resistant
Z	Crosslinked polyolefin compound, little corrosive gases, low smoke
Z1	Thermoplastic polyolefin compound, little corrosive gases, low smoke

5	Construction feature
H	flat, divisible line
H2	flat, non-divisible line

6	Conductor type
F	stranded (class 5) with flexible cables
H	stranded (class 6) with flexible cables
K	stranded (class 5) with permanently installed cables
R	stranded (class 2)
U	solid (class 1)

7	Number of cores
---	-----------------

8	Protective earth conductor
X	without protectivte earth conductor (yellow-green)
G	with protectivte earth conductor (yellow-green)

9	Conductor cross section in mm²
---	--------------------------------

Conversion AWG

Metric wire cross sections and wire diameters

AWG = American Wire Gauge

AWG	with UL/CSA		with MIL
	Cross section mm ² nom.	Diameter mm nom.	Cross section mm ² nom.
36	0.013	0.13	-
34	0.020	0.16	-
32	0.032	0.20	-
30	0.051	0.25	0.057
28	0.081	0.32	0.090
26	0.13	0.40	0.15
24	0.21	0.51	0.24
22	0.32	0.64	0.38
20	0.52	0.81	0.62
18	0.82	1.0	0.96
16	1.3	1.3	1.2
14	2.1	1.6	1.9
12	3.3	2.1	3.0
10	5.3	2.6	4.7
8	8.4	3.3	8.6
6	13	4.1	14
4	21	5.2	22
3	27	5.8	-
2	34	6.5	34
1	42	7.3	41
1/0	54	8.3	53
2/0	67	9.3	67
3/0	85	10	84
4/0	107	12	107

Thermal classes of insulating materials acc. to EN 60085

Thermal class	Max. limiting temperature	Thermal class	Max. limiting temperature	Thermal class	Max. limiting temperature
Y	90 °C	B	130 °C	200	200 °C
A	105 °C	F	155 °C	220	220 °C
E	120 °C	H	180 °C	250	250 °C

Wire cross section

according to EN 60228 and Cenelec HD 383

Table 1

Nom. cross section	Construction: number of wires (approximate value) strand diameter (maximum)		max. direct current at 20 °C	
mm ²	Solid, class 1 n × mm	Stranded, class 2 n × mm	Bare Ω/km	Tinned Ω/km
0.5	1 × 0.80	7 × 0.30	36.0	36.7
0.75	1 × 1.00	7 × 0.37	24.5	24.8
1	1 × 1.13	7 × 0.43	18.1	18.2
1.5	1 × 1.38	7 × 0.52	12.1	12.2
2.5	1 × 1.78	7 × 0.67	7.41	7.56
4	1 × 2.25	7 × 0.85	4.61	4.70
6	1 × 2.76	7 × 1.04	3.08	3.11
10	1 × 3.57	7 × 1.35	1.83	1.84
16	1 × 4.50	7 × 1.70	1.15	1.16
25	-	7 × 2.16	0.727	0.734
35	-	7 × 2.52	0.524	0.529
50	-	19 × 1.78	0.387	0.391
70	-	19 × 2.16	0.268	0.270
95	-	19 × 2.52	0.193	0.195
120	-	37 × 2.03	0.153	0.154
150	-	37 × 2.25	0.124	0.126
185	-	37 × 2.52	0.0991	0.100
240	-	61 × 2.25	0.0754	0.0762
300	-	61 × 2.52	0.0601	0.0607
400	-	61 × 2.84	0.0470	0.0475
500	-	61 × 3.20	0.0366	0.0369
630	-	91 × 2.97	0.0283	0.0286

Terminals:

Because of the larger diameter in classes 2, 5 and 6 compared with class 1, you have to select a terminal for these classes that is one nominal cross section larger.

Wire cross sections

according to EN 60228 and Cenelec HD 383

Table 2

Nom. cross section	Construction: number of wires (approximate value) strand diameter (maximum)		Max. direct current at 20 °C	
mm ²	Stranded, class 5 n × mm	Stranded, class 6 n × mm	Bare Ω/km	Tinned Ω/km
0.5	19 × 0.21	25 × 0.16	39.0	40.1
0.75	24 × 0.21	38 × 0.16	26.0	26.7
1	32 × 0.21	50 × 0.16	19.5	20.0
1.5	30 × 0.26	75 × 0.16	13.3	13.7
2.5	50 × 0.26	125 × 0.16	7.98	8.21
4	56 × 0.31	200 × 0.16	4.95	5.09
6	80 × 0.31	174 × 0.21	3.30	3.39
10	77 × 0.41	290 × 0.21	1.91	1.95
16	123 × 0.41	462 × 0.21	1.21	1.24
25	190 × 0.41	722 × 0.21	0.780	0.795
35	266 × 0.41	1012 × 0.21	0.554	0.565
50	385 × 0.41	664 × 0.31	0.386	0.393
70	348 × 0.51	928 × 0.31	0.272	0.277
95	468 × 0.51	1260 × 0.31	0.206	0.210
120	589 × 0.51	1590 × 0.31	0.161	0.164
150	741 × 0.51	1990 × 0.31	0.129	0.132
185	912 × 0.51	2452 × 0.31	0.106	0.108
240	1184 × 0.51	3180 × 0.31	0.0801	0.0817
300	1480 × 0.51	3976 × 0.31	0.0641	0.0654
400	1961 × 0.51	-	0.0486	0.0495
500	1702 × 0.61	-	0.0384	0.0391
630	2146 × 0.61	-	0.0287	0.0292

Guide to installation

Smallest allowable bending radii for power and signal cables

Conductor type	Cable diameter D mm			
Installation method	D ≤ 8	8 < D ≤ 12	12 < D ≤ 20	D > 20
solid, class 1/stranded, class 2				
- carefully bent at connection	2D	3D	4D	4D
- normal use	4D	5D	6D	6D
stranded, class 5 (HUBER+SUHNER)				
- fixed	3D	3D	4D	4D
- flexing	4D	4D	5D	6D

Allowable tensile stress

1. For installing cables by pulling on the conductors, or by drawing sleeve, the following max. pulling force (P) is allowed:

$$P = 50 \times A \text{ (N)}$$

A = Sum of conductor cross section (mm²)

2. When installing cables with high tensile armouring, the following max. pulling force (P) is allowed:

$$P = 9 \times D^2 \text{ (N)}$$

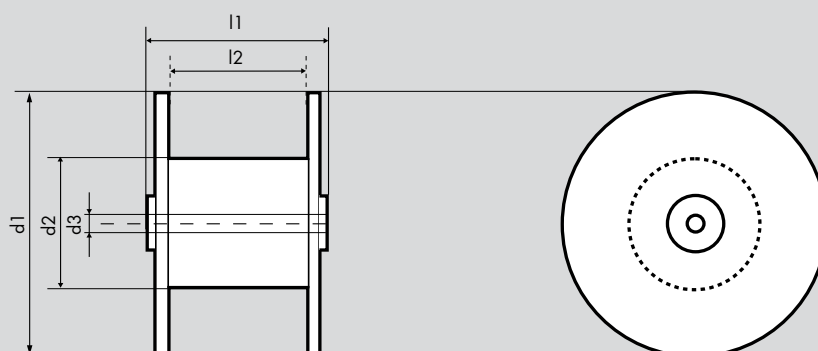
D = cable diameter over armouring (mm)

The calculation of pulling forces necessary for installation is done using the following formulas:

Pulling force for installation of a straight section without elevation difference.		Pulling force for installation of a straight section with elevation difference	
P =	$10 \times G \times L \times \mu$	P =	$10 \times G \times (L \times \mu \pm h)$
with	P: pulling force at the end of the stretch (N)	with	h: elevation difference (m)
	G: weight of the cable (kg/m)		Friction coefficient μ
	L: length of the section (m)	0.15 - 0.30	installation with rollers
	μ : coefficient of friction	0.40 - 0.60	installation in cement pipes installation in plastic pipes
		0.15 - 0.25	- with special lubricating grease
		0.15 - 0.30	- with water

N.B.: Very long cables with thermoplastic sheaths can be pulled into plastic pipes with the aid of lubricants only. Local heating, occurring mainly in bends, may cause the cable to stick to the pipe wall.

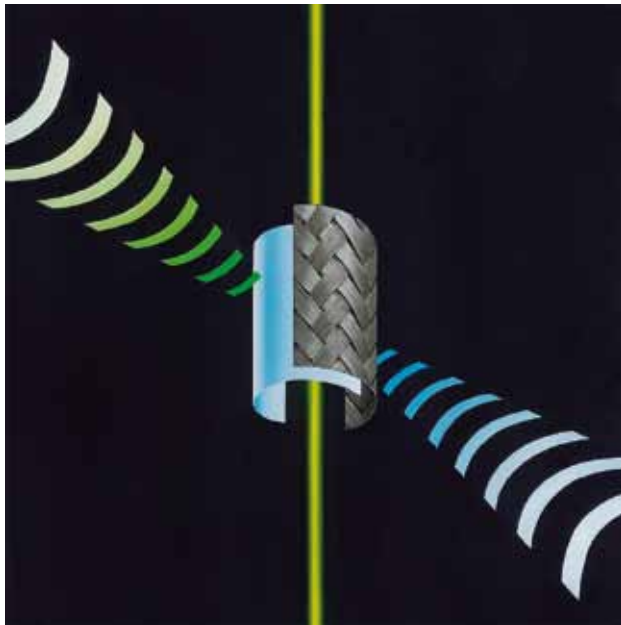
Delivery spools



Spool type														
One way spools														
	Nr. 5	Nr. 6	Nr. 7	DIN	L	L	L	L	LHL	LHL	LHL	LHL	LHL	LHL
				250	355	450/13	450/14	500	710	900	1050	1250	1400	1600
d 1	140	140	170	250	355	450	450	500	710	900	1050	1250	1400	1600
d 2	65	65	65	160	200	200	312	250	360	450	550	700	700	800
d 3	60	60	60	22	36	50	50	50	82	82	82	92	92	92
l 1	56	106	135	200	160	244	244	321	430	545	698	726	880	1025
l 2	50	100	130	160	150	228	228	305	400	450	600	630	760	900
Tara kg	0.08	0.10	0.15	0.71	1.54	2.48	3.02	3.16	10	36	53	74	120	174

Cable dia mm	Cable length per delivery spool m													
1		970	2020	3710	8100									
2			500	930	2030	5820								
4					510	1450	940	2240	5880					
6					220	650	420	1000	2610	4770	8380			
8						360	230	560	1470	2680	4710			
10						230	150	360	940	1720	3010			
12								250	650	1190	2090			
14								180	480	880	1540			
16								140	370	670	1180			
18								110	290	530	930			
20									230	430	750	1060	1750	2710
22										350	620	880	1450	2240
24										300	520	740	1220	1880
26										250	450	630	1040	1610
28										220	380	540	890	1380
30										190	330	470	780	1210
32										170	290	410	680	1060
34										150	260	370	610	940
36										130	230	330	540	840
38										120	210	290	490	750
40											190	260	440	680
45											150	210	350	540
48											130	180	300	470

EMC screened cables



The screening of cables can be described by the two coupling quantities of transfer impedance Z_T and transfer admittance Y_T . Both coupling quantities are basically a function of the geometry and the environment; depending on the specific application and requirements, the coupling quantities can be optimised for a given cable.

EMI	electromagnetic interference
EMP	electromagnetic pulse
ESD	electrostatic discharge
LEMP	lightning electromagnetic pulse
NEMP	nuclear electromagnetic pulse
TEMPEST	tap-proofness (eaves-dropping protection)
NEXT	near end crosstalk

With HUBER+SUHNER, your screening problems will end.

We can ensure this thanks to the vast experience accumulated in this field responding to every kind of customer need and collaborating continuously with research institutes.



Measurement engineering at HUBER+SUHNER

Complies with the following standards:
IEC 96-1 and 46 A/DIN 47250/
VG 95373/CCITT/...

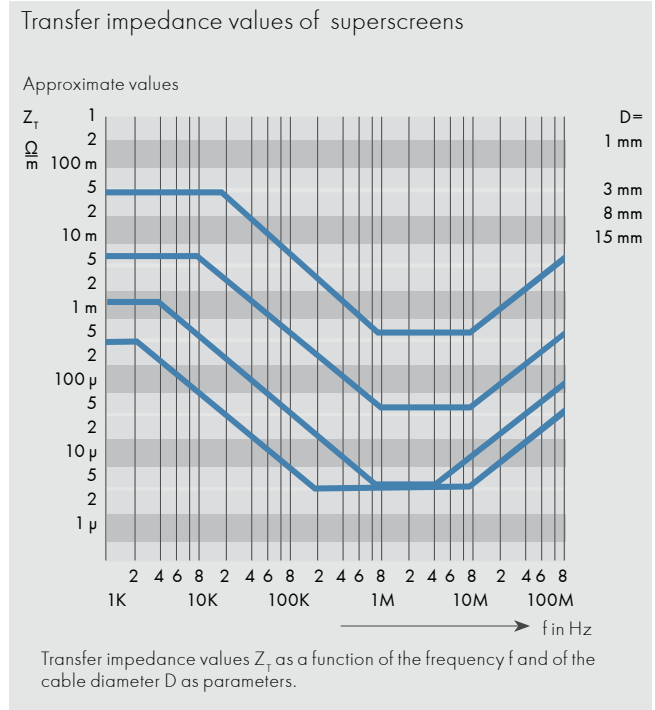
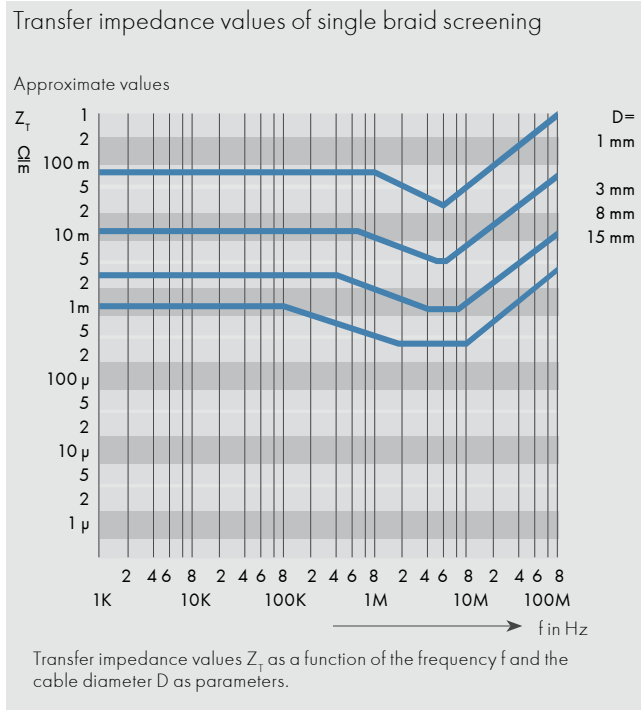


Screenings for all EMC requirements

HUBER+SUHNER designs, optimises and produces products for a wide variety of performance classes. These products are implemented using different braids, foils, high-permeability intermediate layers, microwave absorbing and semi-conducting layers, mixed screens, etc.

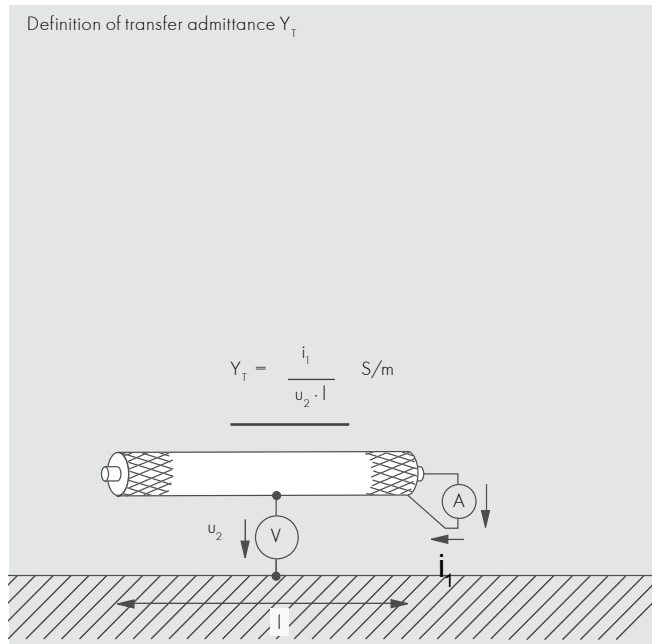
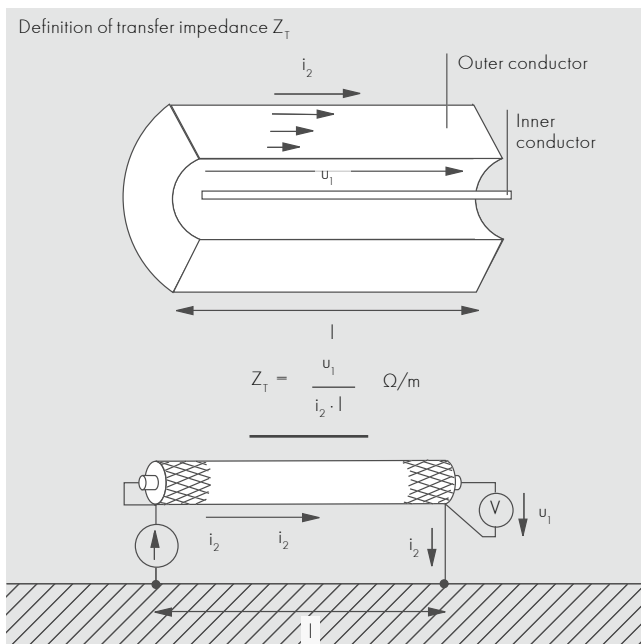
EMC screened cables

Screened cables from single braid to superscreen



The transfer impedance Z_T (also called «coupling resistance») refers to the relationship between the current in one wire and the longitudinal voltage it induces in the other wire (ohmic-inductive coupling).

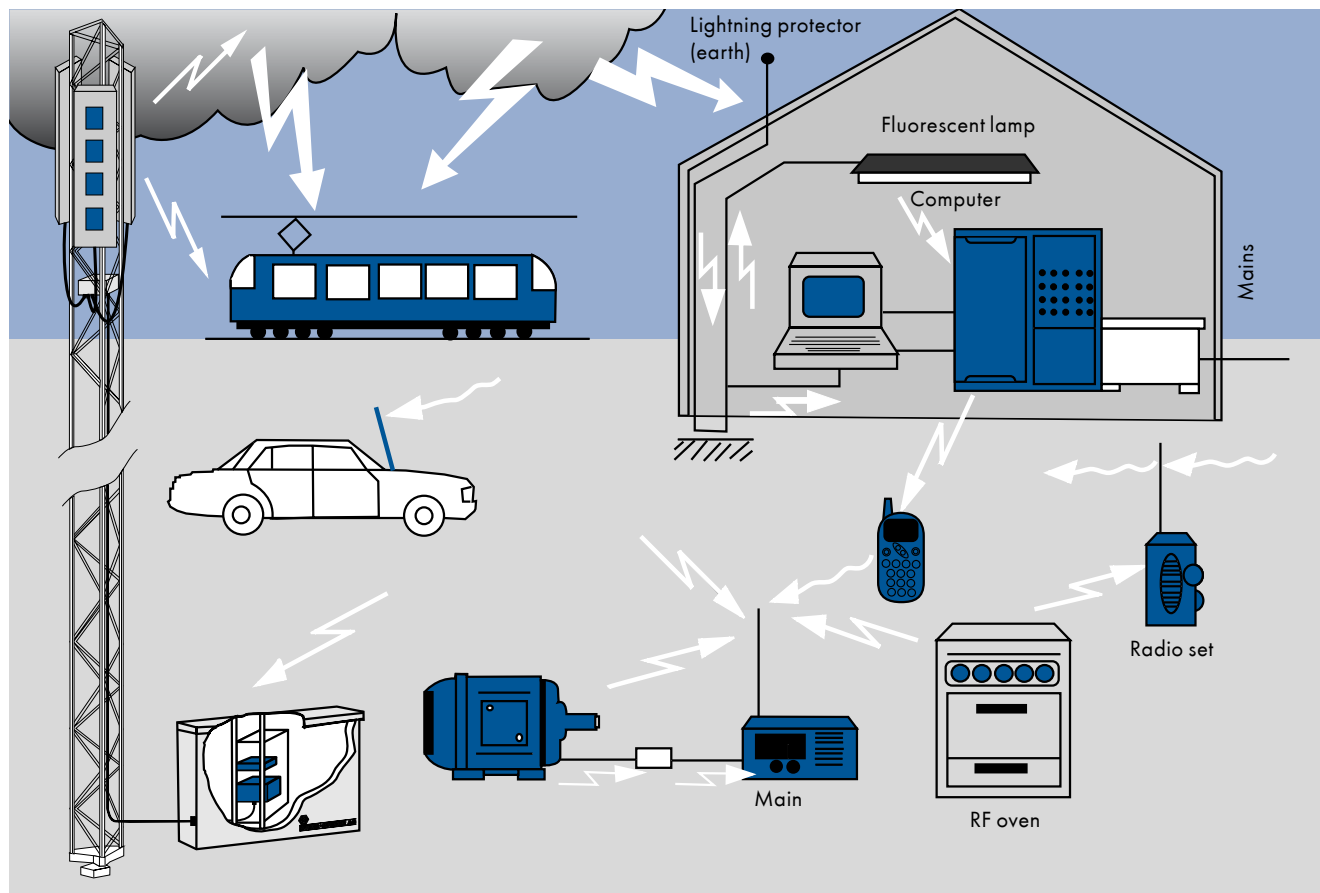
The transfer admittance Y_T refers to the relationship between the voltage in one wire and the leak current it induces in the other line (capacitive coupling).



The cable together with its surroundings form a three-conductor system. It consists of two coupled conductors with one common conductor (screen).

Transfer impedance Z_T and transfer admittance Y_T are cable quantities which are always defined in conjunction with the surroundings of the cable and the construction of the cable itself.

Protect your equipment and machinery from interference and failure



The situation

Environmental pollution is a modern buzzword. But do you ever think of it as «pollution» by electromagnetic radiation, by «electrosmog»?

Your problem

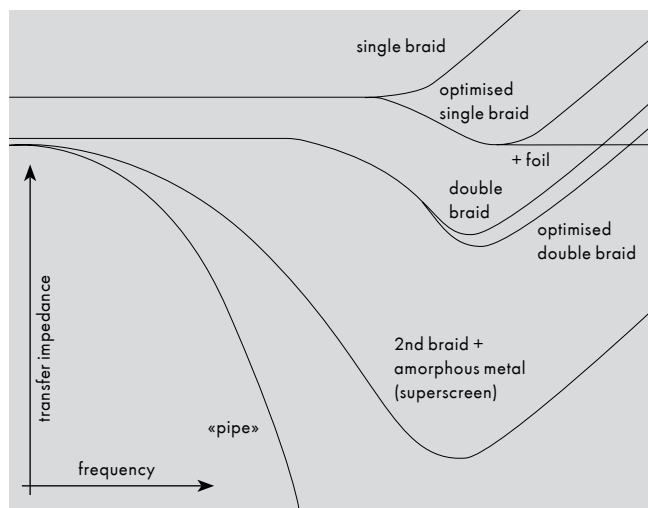
Only when machinery starts to fail and plant operation is disrupted do the people in charge start thinking. But things don't have to reach that point. Non-screened cables act in the same way as antennas, attracting interference from the outside or radiating it.

Our solution

Copper braids prevent dangerous interferences with cables. At the same time, the interference radiated by the cable is reduced. Our solution consists not only in the specification of a degree of coverage. HUBER+SUHNER also defines the effectiveness of a copper braid as a measurable quantity. This noise immunity is expressed by the transfer impedance (coupling resistance) at a given frequency (MHz) in Ω/m .

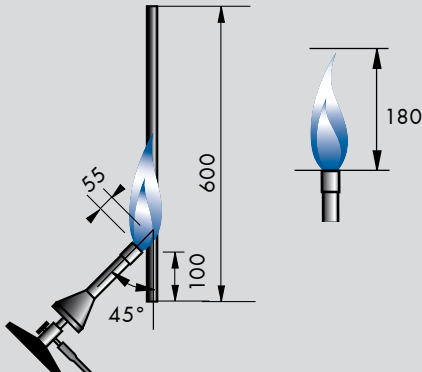
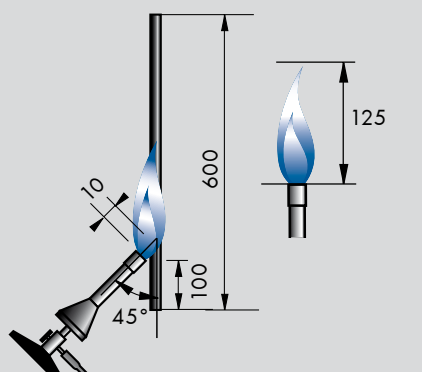
Optimised, high grade screening

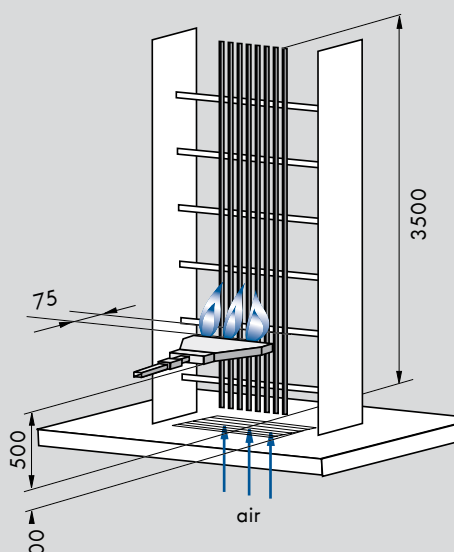
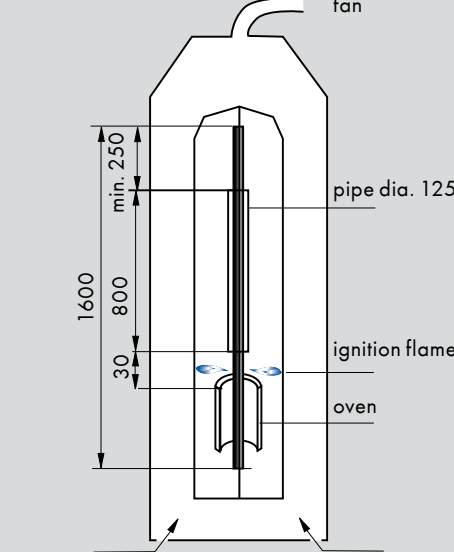
Optimized screening braids enable even the most intractable screening problems to be solved. And in screening cables, we take care to ensure that performance of the screened cables will not be significantly affected in terms of flexibility, workability, weight and dimensions.



Fire test methods

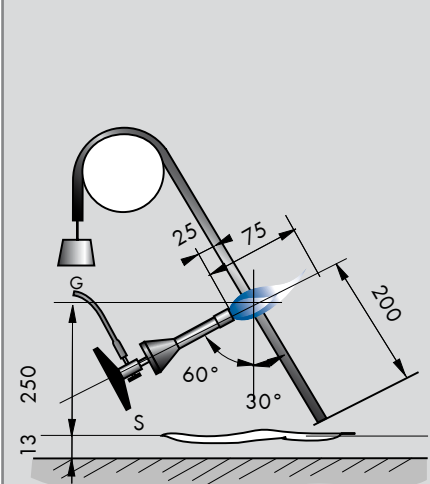
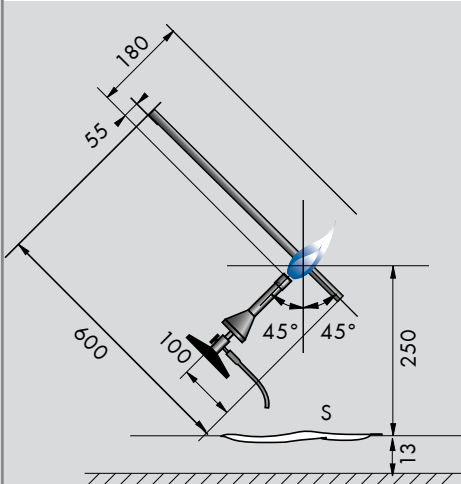
Fire test methods for electrical wires and cables

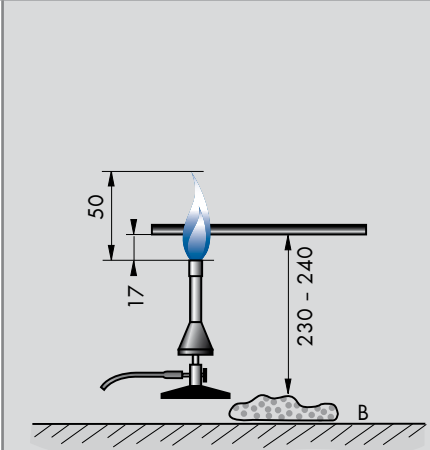
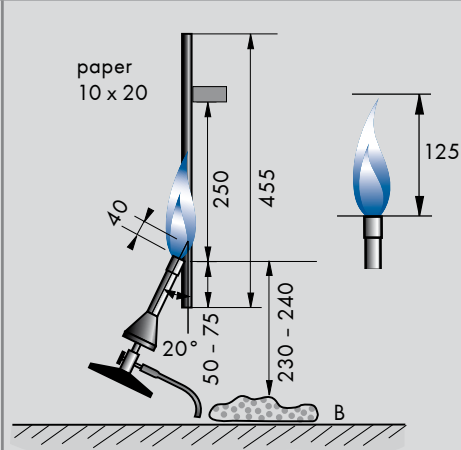
Designation	EN 50265-2-1 IEC 60332-1	EN 50265-2-2 IEC 60332-2
Flame temperature	Determined by the prescribed adjustment of the flame.	Determined by the prescribed adjustment of the flame.
Test duration	cable dia $D \leq 25$ mm: 60 s cable dia $25 < D \leq 50$ mm: 120 s	20 s
Conditions	The cable shall be self extinguishing. The damage by fire shall be more than 50 mm from the top fastening clamp.	The cable shall be self extinguishing. The damage by fire shall be more than 50 mm from the top fastening clamp.
		

Designation	EN 50266-2-4 IEC 60332-3-24	NF C32-070 test 2 UIC 895 VE appendix 7
Flame temperature	Determined by the prescribed propane gas and air volumes.	830 ± 50 °C
Test duration	cat. A (7 l combustible material): 40 min. cat. B (3.5 l combustible material): 40 min. cat. C (1.5 l combustible material): 20 min.	30 min.
Conditions	The damage by fire shall be maximum 2.5 m from the lower burner end.	The cable piece projecting from the pipe shall be not damaged.
		

Fire test methods

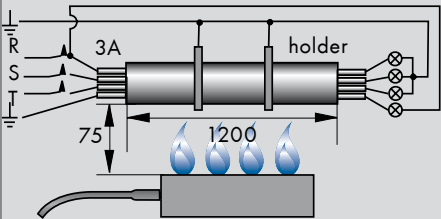
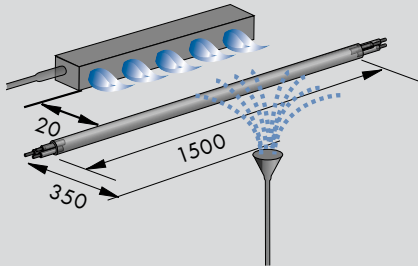
Fire test methods for electrical wires and cables

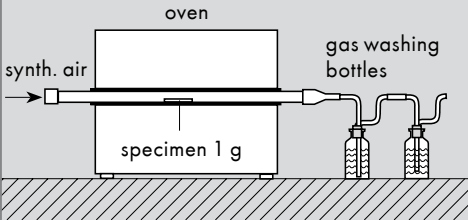
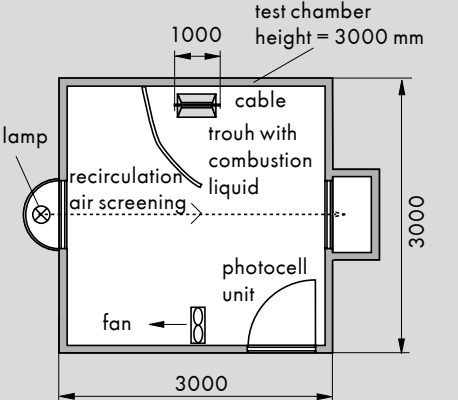
Designation	MIL-W-22759 and MIL-W-81044 VG 95218-2 procedure 4	VG 95218-2 procedure 3
Flame temperature	min. 950 °C	Determined by the prescribed adjustment of the flame.
Test duration	30 s	cable dia $D \leq 25$ mm: 60 s cable dia $25 < D \leq 50$ mm: 120 s
Conditions	The specimen shall not continue to burn for more than 30 s, and damage by fire shall not exceed 76 mm. Dripping material shall not ignite the tensioned tissue paper (S).	The specimen shall not continue to burn for more than 30 s, and damage by fire shall not exceed 76 mm. Dripping material shall not ignite the tensioned tissue paper (S).
		

Designation	UL 1581 section 1090 Horizontal specimen AWM flame test	UL 1581 section 1061 UL 1581 section 1080 (VW1)
Flame temperature	Determined by the prescribed adjustment of the flame.	Determined by the prescribed adjustment of the flame.
Test duration	30 s	sect.1061: 60 s flaming, 30 s pause (3 ×) sect.1080: 15 s flaming, 15 s pause (5 ×)
Conditions	The rate of the flame propagation shall not exceed 25 mm/min. Dripping material shall not ignite the cotton wool underneath (B).	The paper shall not be burned more than 25 %, and the specimen shall not continue to burn for more than 60 s. Dripping material shall not ignite the cotton wool underneath (B).
		

Fire test methods

Fire test methods for electrical wires and cables

Designation	IEC 60331-21, IEC 60331-23 DIN VDE 0472-814 BS 6387, category C	BS 6387, category W
Flame temperature	IEC, DIN VDE: min. 750 °C BS : 950 ± 40 °C	650 ± 40 °C
Test duration	IEC: 90 min. recommended DIN VDE, BS: 180 min.	30 min.
Conditions	Zwischen den Adern wird eine Prüfspannung angelegt. IEC: power cable: U_0/U IEC, DIN VDE: data cable: 110 V DIN VDE: power cable: 230/400 V BS: all U_0/U The fuses shall not blow and the incandescent lamps shall not extinguish.	A test voltage is applied between the cores which equals the mains voltage U_0/U . After 15 min. exposure to the flame, the sprinkler is additionally switched on. The fuses shall not blow and the incandescent lamps shall not extinguish.
		

Designation	EN 50267-2-2 IEC 60754-2	EN 50268-2 IEC 61034-2
Flame temperature	min. 935 °C	Determined by the composition of the combustion liquid.
Test duration	30 min.	40 min.
Conditions	The pH value of the washing water shall be min. 4.3, its conductivity shall not exceed 10 µS/mm.	The light permeability of the resulting smoke shall be min. 60 %.
		

Current carrying capacity

of RADOX® 125 single core and multi core cables

Scope

The following tables referring to RADOX connecting leads and multicore cables give easy and fast support for the layout of apparatus and components. The following remarks are based on today's state of the art and practical experience as described in the standard IEC 60216, IEC 60287 and IEC 60364. The application of products will frequently vary from the theoretical values of constant ambient temperature, constant current carrying, homogeneous laying and others. That means, in practice the theoretical current carrying will differ from the real values. For a safe layout of apparatus and components it is recommended to carry out a test with the installed connecting lead or cable under service conditions.

Definitions

Current load	current passed through the cable during operation
Continuous operation	an operation with constant current whose duration is at least long enough to allow the system to reach thermal equilibrium, but may then go on indefinitely
Current rating	maximum permissible current under determined operating
Permissible operating temperature	maximum permissible temperature on the conductor in continuous operation
Wire	insulated single core
Cable	bundle with jacket with one ore more insulated single cores
Conductor temperature	temperature of the surface of the core material

General remarks

The current rating of a cable depends on the conductor cross section, on the cable design, on the characteristics of the insulation materials, on the installation conditions and, for larger cross sections, on the frequency (skin and proximity effects). Also, additional heating effects due to higher ambient temperatures, due to heating elements and due to bunching of cables have to be taken into account.

The conductor cross section has to be selected in such a way that the actual current load does not exceed the current rating, i.e. the conductor temperature does not exceed the permissible operating temperature. The determining factor is the appropriate, most unfavourable operating condition, encountered during operation over the whole length of the cable.

Current rating under service conditions I in A

$$I = I_N \cdot f_1 \cdot f_2 \cdot f_3 \cdot f_4 \cdot f_5$$

I in A Current rating for continuous operation under service conditions

I_N in A Current rating for continuous operation under standard conditions

f_1 Reduction factor for increased ambient temperature

f_2 Conversion factor for deviated conductor temperature, acc. to. temperature index, IEC 60216 (20 000 h)

f_3 Reduction factor for multicore cables

f_4 Reduction factor for increased frequency

f_5 Reduction factor for bunched cables

Current carrying capacity

of RADOX® single core and multi core cables

Standard conditions for current rating (I_N [A])

The tabled values for the current rating were calculated according to IEC 60287 for the following standard conditions:

- Continuous operation
- Single circuit for 3-phase current, single conductor for 1-phase current
- 30 °C ambient temperature and sufficiently large and ventilated spaces, whose ambient temperature is not appreciably increased by the heat coming from the cables.
- 120 °C conductor temperature
- Frequency up to 200 Hz

Installation in air, unrestricted heat dissipation, means that the following installation conditions are observed:

- Distance of the cables from the wall, from the floor, from the ceiling > cable diameter
- Distance between two adjacent power circuits > 2 x cable diameter
- Vertical distance between power circuits laid one upon another for individual cables > 2 x cable diameter and for layers of cables > 200 mm
- Perforated tray with a perforation > 30 % of the total surface

Open trays are continuous supports with vertical sides, but without cover. A possible perforation accounts for < 30 % of the total surface.

Closed ducts are entirely closed. Pipes belong to this category also. The max. filling degree is 60 %.

Maximum permitted conductor temperature for various insulating materials according to IEC 60216 (20 000 h / 50 % elongation at break):

PVC, CR	70 °C
PE-X, EPR	90 °C
RADOX 125	120 °C
RADOX 155	135 °C

Life time expectation

If crosslinked wires are used at higher temperatures than indicated by the temperature index of IEC 60216, the life time is reduced accordingly. Analogical, the life time will increase at lower temperature. RADOX® 125 for example has a life span of 20 000 h at a conductor temperature of +120 °C, which is approx. 2.5 years. If it is used at another temperature, life time expectations are as follows:

Example RADOX 125, i.e. 120 °C / 20 000 h

160 °C	1 250 h
150 °C	2 500 h
140 °C	5 000 h
130 °C	10 000 h
120 °C	20 000 h
110 °C	40 000 h
100 °C	80 000 h
90 °C	160 000 h
80 °C	320 000 h

Current carrying capacity

of RADOX® single core and multi core cables

Reduction factors for increased ambient temperature (f_1)

Ambient temp. °C	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115
Reduction factor f_1	1	0.97	0.94	0.91	0.88	0.85	0.82	0.78	0.75	0.71	0.67	0.62	0.58	0.53	0.47	0.41	0.33	0.22

Reduction factors for different permissible conductor temperature (f_2)

Conductor temp. °C	135	120	110	100	90	80
Reduction factor f_2	1.04	1	0.96	0.91	0.85	0.79

Reduction factors for multicore cables (f_3)

No. of cores in cable	3	4	5	7	8	10	14	16	19	20	24	27	33	40	61
Reduction factor f_3	1.0	0.80	0.75	0.65	0.62	0.55	0.50	0.48	0.45	0.44	0.40	0.39	0.37	0.35	0.30

Reduction factors for increased frequency (f_4)

Frequency Hz*	400	600	800	1000	2000	3000	4000	5000	10 000
Copper conductor cross section mm ²	faktors f_4								
1.5	1	1	1	1	1	1	1	1	1
2.5	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	0.98
6	1	1	1	1	1	1	1	0.99	0.93
10	1	1	1	1	1	1	0.96	0.93	0.82
16	1	1	1	1	1	0.95	0.91	0.87	0.76
25	1	1	1	1	0.94	0.88	0.83	0.80	0.69
35	1	1	1	0.98	0.89	0.82	0.77	0.74	0.64
50	1	1	0.97	0.94	0.83	0.76	0.72	0.69	0.59
70	1	0.95	0.91	0.88	0.77	0.71	0.67	0.63	0.54
95	0.98	0.93	0.88	0.84	0.73	0.67	0.63	0.60	0.51
120	0.94	0.88	0.84	0.80	0.69	0.64	0.60	0.57	0.48
150	0.90	0.85	0.80	0.77	0.66	0.61	0.57	0.54	0.46
185	0.88	0.82	0.77	0.74	0.64	0.58	0.54	0.52	0.44
240	0.85	0.77	0.72	0.69	0.60	0.54	0.51	0.48	0.41
300	0.79	0.73	0.69	0.66	0.57	0.52	0.48	0.46	0.39
400	0.75	0.69	0.65	0.63	0.54	0.49	0.46	0.44	0.37

* We recommend that you use a special conductor design for frequencies > 800 Hz and cross sections > 25 mm² (waveguide design).

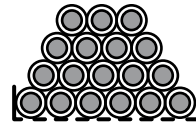
Current carrying capacity

of RADOX® single cores

Installation method	Connecting lead in free air or perforated tray										
Number of simultaneous loaded conductors on each tray											
	1	2	3	4	6	8	10	16	20	4	6
Reduction factor f_s	1	0.87	0.81	0.78	0.75	0.74	0.73	0.72	0.71	0.71	0.62
Copper conductor cross section mm ²	Current carrying capacity A										
0.50	19	16.4	15.3	14.7	14.2	14.0	13.8	13.6	13.4	13.4	11.7
0.75	24	20.8	19.4	18.6	17.9	17.7	17.4	17.2	17.0	17.0	14.8
1.0	29	24.8	23.1	22.2	21.4	21.1	20.8	20.5	20.2	20.2	17.7
1.5	36	31	29	28	27	26	26	26	25	25	22
2.5	49	43	40	38	37	36	36	35	35	35	30
4	66	57	53	51	49	49	48	47	47	47	41
6	85	74	69	67	64	63	62	61	61	61	53
10	121	105	98	94	91	90	88	87	86	86	75
16	163	142	132	127	122	121	119	117	116	116	101
25	219	191	177	171	164	162	160	158	155	155	136
35	272	237	220	212	204	201	199	196	193	193	169
50	344	299	279	268	258	255	251	248	244	244	213
70	439	382	356	342	329	325	320	316	312	312	272
95	523	455	424	408	392	387	382	377	371	371	324
120	621	540	503	484	466	460	453	447	441	441	385
150	723	629	586	564	542	535	528	521	513	513	448
185	825	718	668	644	619	611	602	594	586	586	512
240	996	867	807	777	747	737	727	717	707	707	618
300	1150	1001	932	897	863	851	840	828	817	817	713
400	1473	1282	1194	1149	1105	1091	1076	1061	1046	1046	914

Continuous current rating

conductor temperature 120 °C, ambient temperature 30 °C

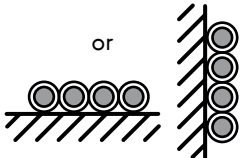


8	10	16	20	4	6	8	10	16	20	4	6	8	10	16	20
0.57	0.53	0.47	0.45	0.67	0.59	0.54	0.50	0.45	0.43	0.71	0.58	0.52	0.48	0.41	0.38

10.8	10.0	8.9	8.5	12.7	11.2	10.2	9.5	8.5	8.1	13.4	11.0	9.8	9.1	7.7	7.2
13.6	12.7	11.2	10.8	16.0	14.1	12.9	12.0	10.8	10.3	17.0	13.9	12.4	11.5	9.8	9.1
16.2	15.1	13.4	12.8	19.1	16.8	15.4	14.3	12.8	12.3	20.2	16.5	14.8	13.7	11.7	10.8
20	19	17	16	24	21	19	18	16	15	25	21	19	17	15	14
28	26	23	22	33	29	26	24	22	21	35	28	25	23	20	19
38	35	31	30	44	39	36	33	30	28	47	38	34	32	27	25
49	45	40	38	57	50	46	43	38	37	61	49	44	41	35	32
69	64	57	54	81	71	65	61	54	52	86	70	63	58	50	46
93	86	77	73	109	96	88	82	73	70	116	95	85	78	67	62
125	116	103	99	147	129	118	110	99	94	155	127	114	105	90	83
155	144	128	122	182	160	147	136	122	117	193	158	141	131	112	103
196	182	162	155	230	203	186	172	155	148	244	200	179	165	141	131
250	233	206	198	294	259	237	220	198	189	312	255	228	211	180	167
298	277	246	235	350	309	282	262	235	225	371	303	272	251	214	199
354	329	292	279	416	366	335	311	279	267	441	360	323	298	255	236
412	383	340	325	484	427	390	362	325	311	513	419	376	347	296	275
470	437	388	371	553	487	446	413	371	355	586	479	429	396	338	314
568	528	468	448	667	588	538	498	448	428	707	578	518	478	408	378
656	610	541	518	771	679	621	575	518	495	817	667	598	552	472	437
840	781	693	663	987	870	796	737	663	634	1046	855	766	708	604	560

Current carrying capacity

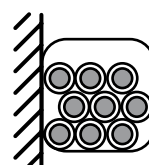
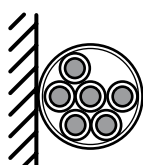
of RADOX® single cores

Installation method	on floor or wall				fixed on a ceiling or under floor							
Number of simultaneous loaded conductors on each tray												
Reduction factor f_s	1	0.87	0.79	0.75	0.95	0.81	0.72	0.68	0.66	0.64	0.63	0.62
Copper conductor cross section mm ²	Current carrying capacity A											
0.50	18	15.3	14.2	13.5	17.1	14.5	12.9	12.2	11.9	11.5	11.3	11.1
0.75	23	19.3	17.9	17.0	21.6	18.4	16.3	15.4	15.0	14.5	14.3	14.1
1.0	27	23.0	21.4	20.3	25.7	21.9	19.5	18.4	17.9	17.3	17.1	16.8
1.5	34	29	27	25	32	27	24	23	22	22	21	21
2.5	46	39	37	35	44	38	33	32	31	30	29	29
4	63	53	49	47	59	51	45	43	41	40	39	39
6	81	69	64	61	77	66	58	55	53	52	51	50
10	115	98	91	86	109	93	83	78	76	74	72	71
16	155	132	122	116	147	125	111	105	102	99	98	96
25	208	177	164	156	198	169	150	141	137	133	131	129
35	258	220	204	194	245	209	186	176	171	165	163	160
50	327	278	258	245	310	265	235	222	216	209	206	203
70	417	354	329	313	396	338	300	284	275	267	263	259
95	497	422	393	373	472	402	358	338	328	318	313	308
120	590	501	466	442	560	478	425	401	389	378	372	366
150	687	584	543	515	653	556	495	467	453	440	433	426
185	784	666	619	588	745	635	564	533	517	502	494	486
240	946	804	747	710	899	766	681	643	624	606	596	587
300	1093	929	863	819	1038	885	787	743	721	699	688	677
400	1352	1150	1069	1114	1285	1096	974	920	893	866	852	839

Continuous current rating

conductor temperature 120 °C, ambient temperature 30 °C

in conduit, in a void or in a pipe



≥ 9	1	2	3	4	5	6	7	8	9	10	12	14	16	20
0.61	1	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50	0.48	0.45	0.43	0.41	0.38

11.0	14.4	11.5	10.1	9.3	8.6	8.2	7.8	7.5	7.2	6.9	6.5	6.2	5.9	5.5
13.9	18.2	14.5	12.7	11.8	10.9	10.4	9.8	9.4	9.1	8.7	8.2	7.8	7.4	6.9
16.5	22	17.3	15.2	14.1	13.0	12.3	11.7	11.3	10.8	10.4	9.7	9.3	8.9	8.2
21	27	22	19	18	16	15	15	14	14	13	12	12	11	10
28	37	30	26	24	22	21	20	19	19	18	17	16	15	14
38	50	40	35	33	30	29	27	26	25	24	23	22	21	19
49	65	52	45	42	39	37	35	34	32	31	29	28	27	25
70	92	74	64	60	55	52	50	48	46	44	41	40	38	35
94	124	99	87	81	74	71	67	64	62	59	56	53	51	47
127	166	133	117	108	100	95	90	87	83	80	75	72	68	63
158	207	165	145	134	124	118	112	107	103	99	93	89	85	79
199	261	209	183	170	157	149	141	136	131	125	118	112	107	99
254	334	267	234	217	200	190	180	173	167	160	150	143	137	127
303	397	318	278	258	238	227	215	207	199	191	179	171	163	151
360	472	378	330	307	283	269	255	245	236	227	212	203	194	179
419	549	440	385	357	330	313	297	286	275	264	247	236	225	209
478	627	502	439	408	376	357	339	326	314	301	282	270	257	238
577	757	606	530	492	454	431	409	394	378	363	341	325	310	288
666	874	699	612	568	524	498	472	454	437	420	393	376	358	332
825	973	779	682	633	584	555	526	506	487	468	438	419	399	370

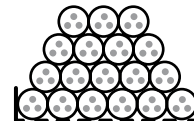
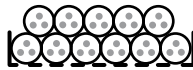
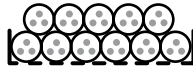
Current carrying capacity

of RADOX® multi core cables

Installation method	Multicore cables in free air or perforated trays										
Number of simultaneous loaded conductors on each tray											
	1	2	3	4	6	8	10	16	20	4	6
Reduction factor f_s	1	0.87	0.81	0.78	0.75	0.74	0.73	0.72	0.71	0.71	0.62
Copper conductor cross section mm ²	Current carrying capacity A										
0.50	14.5	12.6	11.7	11.3	10.9	10.7	10.6	10.4	10.3	10.3	9.0
0.75	18.5	16.1	15.0	14.4	13.9	13.7	13.5	13.3	13.1	13.1	11.5
1.0	22	19.1	17.8	17.2	16.5	16.3	16.1	15.8	15.6	15.6	13.6
1.5	28	25	23	22	21	21	21	21	20	20	18
2.5	38	34	31	30	29	29	28	28	27	27	24
4	51	44	42	40	39	38	38	37	37	37	32
6	66	58	54	52	50	49	49	48	47	47	41
10	95	83	77	75	72	71	70	69	68	68	59
16	128	112	104	100	96	95	94	93	91	91	80
25	167	146	136	131	126	124	122	121	119	119	104
35	205	179	167	160	154	152	150	148	146	146	128
50	257	224	209	201	193	191	188	186	183	183	160
70	325	283	264	254	244	241	238	234	231	231	202
95	382	333	310	298	287	283	279	276	272	272	237
120	443	386	359	346	333	328	324	319	315	315	275

Continuous current rating

conductor temperature 120 °C, ambient temperature 30 °C

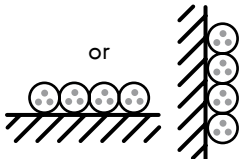
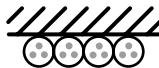


8	10	16	20	4	6	8	10	16	20	4	6	8	10	16	20
0.57	0.53	0.47	0.45	0.67	0.59	0.54	0.50	0.45	0.43	0.71	0.58	0.52	0.48	0.41	0.38

8.3	7.7	6.8	6.5	9.7	8.6	7.8	7.3	6.5	6.2	10.3	8.4	7.5	7.0	5.9	5.5
10.5	9.8	8.7	8.3	12.4	10.9	10.0	9.3	8.3	8.0	13.1	10.7	9.6	8.9	7.6	7.0
12.5	11.7	10.3	9.9	14.7	13.0	11.9	11.0	9.9	9.5	15.6	12.8	11.4	10.6	9.0	8.4
16	15	14	13	19	17	16	14	13	13	20	17	15	14	12	11
22	21	18	18	26	23	21	19	18	17	27	23	20	19	16	15
30	28	24	23	35	31	28	26	23	22	37	30	27	25	21	20
38	35	32	30	45	39	36	33	30	29	47	39	35	32	28	26
55	51	45	43	64	57	52	48	43	41	68	56	50	46	39	37
73	68	61	58	86	76	70	64	58	56	91	75	67	62	53	49
96	89	79	76	112	99	91	84	76	72	119	97	87	81	69	64
117	109	97	93	138	121	111	103	93	89	146	119	107	99	85	78
147	137	121	116	173	152	139	129	116	111	183	150	134	124	106	98
186	173	153	147	218	192	176	163	147	140	231	189	169	156	134	124
218	203	180	172	256	226	207	191	172	165	272	222	199	184	157	146
253	235	209	200	297	262	240	222	200	191	315	257	231	213	182	169

Current carrying capacity

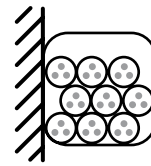
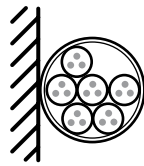
of RADOX® multi core cables

Installation method	on floor or wall				fixed on a ceiling or under floor							
Number of simultaneous loaded conductors on each tray												
Reduction factor f_s	1	0.87	0.79	0.75	0.95	0.81	0.72	0.68	0.66	0.64	0.63	0.62
Copper conductor cross section mm ²	Current carrying capacity A											
0.50	13.5	11.5	10.7	10.1	12.8	10.9	9.7	9.2	8.9	8.6	8.5	8.4
0.75	17	14.5	13.4	12.8	16.2	13.8	12.2	11.6	11.2	10.9	10.7	10.5
1.0	20	17.0	15.8	15.0	19.0	16.2	14.4	13.6	13.2	12.8	12.6	12.4
1.5	26	23	21	20	25	22	19	18	18	17	17	17
2.5	35	30	28	27	34	29	26	24	24	23	23	22
4	48	41	38	36	46	39	35	33	32	31	31	30
6	62	53	49	47	59	51	45	43	41	40	40	39
10	88	75	70	66	84	72	64	60	59	57	56	55
16	116	99	92	87	111	94	84	79	77	75	74	72
25	154	131	122	116	147	125	111	105	102	99	98	96
35	190	162	151	143	181	154	137	130	126	122	120	118
50	239	204	189	180	228	194	173	163	158	153	151	149
70	299	255	237	225	285	243	216	204	198	192	189	186
95	351	299	278	264	334	285	253	239	232	225	222	218
120	405	345	320	304	385	329	292	276	268	260	256	252

Continuous current rating

conductor temperature 120 °C, ambient temperature 30 °C

in conduit, in a void or in a pipe



≥ 9	1	2	3	4	5	6	7	8	9	10	12	14	16	20
0.61	1	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50	0.48	0.45	0.43	0.41	0.38

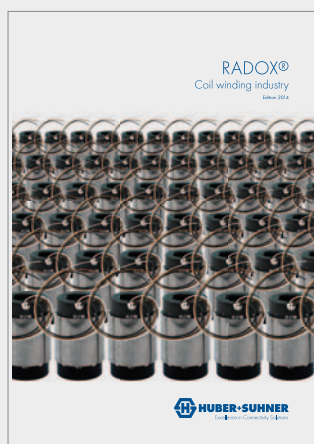
8.2	10.8	8.6	7.6	7.0	6.5	6.2	5.8	5.6	5.4	5.2	4.9	4.6	4.4	4.1
10.4	13.6	10.9	9.5	8.8	8.2	7.8	7.3	7.1	6.8	6.5	6.1	5.8	5.6	5.2
12.2	15.8	12.6	11.1	10.3	9.5	9.0	8.5	8.2	7.9	7.6	7.1	6.8	6.5	6.0
16	21	17	15	14	13	12	12	11	11	11	10	10	9	8
22	28	23	20	19	17	16	16	15	14	14	13	13	12	11
30	38	31	27	25	23	22	21	20	19	19	18	17	16	15
38	48	39	34	32	29	28	26	25	24	24	22	21	20	19
54	67	54	47	44	41	39	37	35	34	33	31	29	28	26
71	89	72	63	58	54	51	49	47	45	43	41	39	37	34
94	119	96	84	78	72	68	65	62	60	58	54	52	49	46
116	147	118	103	96	89	84	80	77	74	71	67	64	61	56
146	184	148	129	120	111	105	100	96	92	89	83	80	76	70
183	234	188	164	153	141	134	127	122	117	113	106	101	96	89
215	275	220	193	179	165	157	149	143	138	132	124	119	113	105
248	338	271	237	220	203	193	183	176	169	163	153	146	139	129

Further catalogues



RADOX® SOLAR

Item no. 84017606



RADOX®
wires and cables for the coil
winding industry

Item no. 84022718

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