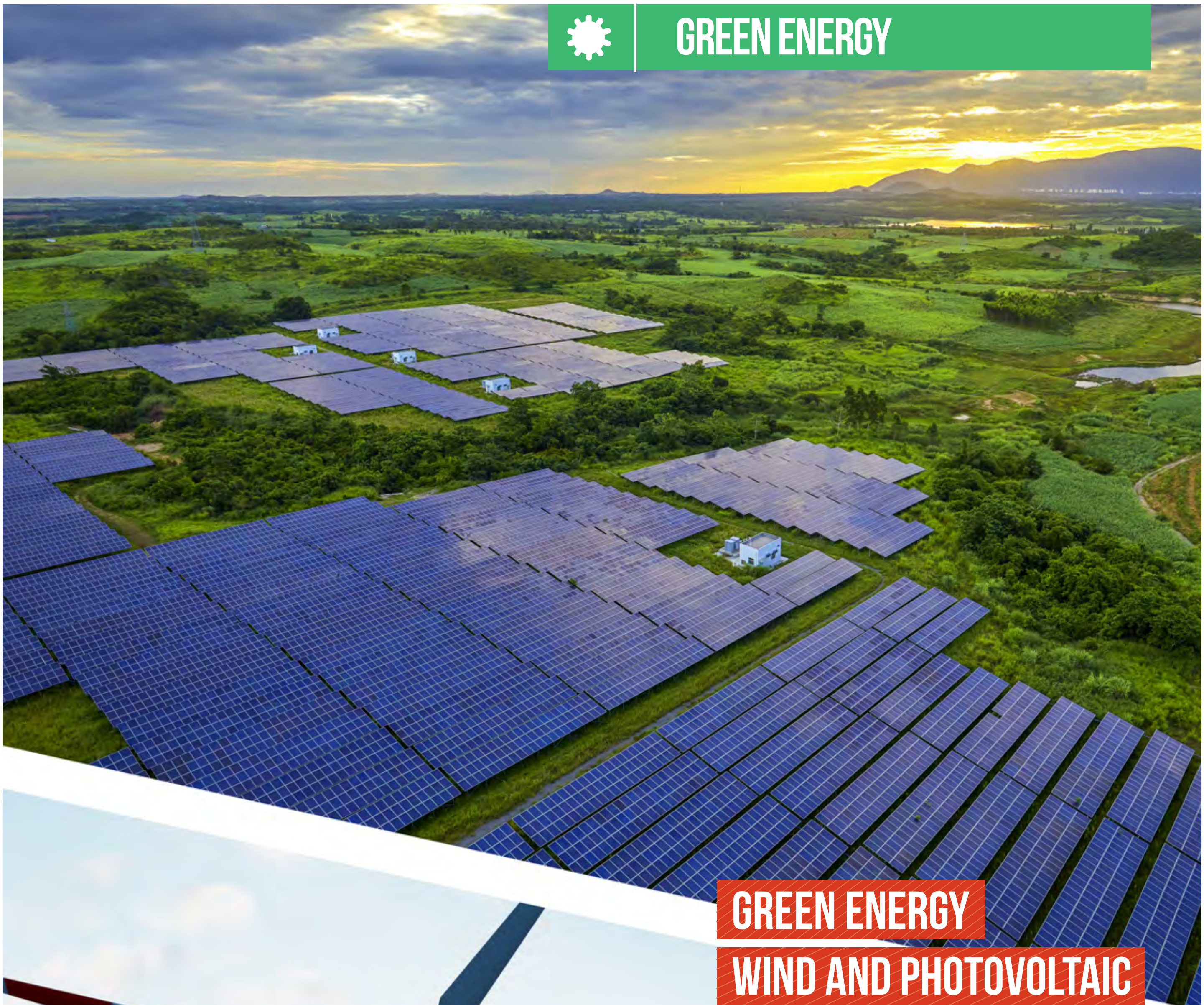

GREEN ENERGY
WIND AND PHOTOVOLTAIC

TecniKabel

SPECIAL ELECTRICAL AND OPTICAL CABLES

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SPECIAL ELECTRICAL AND OPTICAL CABLES


Tecni Kabel

INTRODUCTION

TK Wind cables

The use of clean energy sources, such as the sun and wind, to produce electricity, is becoming increasingly common.
Wind turbines are now a well-established technology; they convert the kinetic energy in the wind into electrical power to be fed into the grid or feed parallel loads.
A wind turbine uses a variety of mechanical and electrical components. The latter include cables designed and built to withstand the heavy twisting that occurs when the turbine nacelle rotates to follow changes in wind direction.
Moreover, the different potential location sites means that cables must withstand temperatures from -40° to +80°, or even salty climates.
This catalogue includes:
- "TK WIND power and control cables" and "TK WIND buses and signal cables" for nacelle rotation and propeller blade movement;
- "TK WIND energy cables" to transport electricity generated by the alternator to the base of the tower where it is converted into AC power for public and private use.

Our technical department is available to evaluate any request involving cables other than those described and put forward an appropriate solution.

PRODUCT LINES

- TRANSPORTATION
- OIL / GAS & PETROCHEMICALS
- TELECOMMUNICATION
- OPTICAL
- AUTOMATION
- SUBSEA
- NAVAL
- DEFENSE
- BUILDING TECHNOLOGY
- GREEN ENERGY
- AUTOMOTIVE

TECNIKABEL

is focused on constant product innovation to get competitive advantages with endless commitment to research and development.

PRODUCTION

Updated production Systems, stringent process procedures and expert operators reached the goal to carry out our production efficient and flexible.

In 30 years of activity, we produced more than 26.000 different types of cables.

FINAL INSPECTIONS

At the end of every production process each cable is checked in its electrical and physical performances for a complete compliance to customer specifications.

LABORATORY TESTS

We submit our cables to the most severe tests, simulating critical applications. In addition to the tests required by current norms, we invest on new special equipment for additional mechanical and electrical testing, heading to a steady increase of standard performance of our cables.

MATERIALS RESEARCH AND DEVELOPMENT

Our thirty year experience took us to carry on research of new materials in order to improve performances, costs and fulfill the standards required by our customers.

QUALITY SYSTEM

Since 1978, constant commitment to Quality has awarded Tecnikabel approval from American and European Authorities, complying with the most demanding international manufacturing and quality standards.

INDEX

SYMBOLS

ENVIRONMENTAL PROPERTIES

- FLAME RETARDANT SINGLE WIRE (EN/IEC 60332-1-2, EN 50265-2-1)
- FLAME RETARDANT BUNCHED WIRES (IEC 60332-3, EN 50305 9.1.2, EN 503059-1, EN 50266-2-5, EN 50266-2)
- FIRE RESISTANCE (IEC 60331, EN50200, EN 50362, BS6387 CWZ)
- REDUCED EMISSION OF FUMES AND TOXIC GASES (IEC 60754-1; EN 50267-2-1/2, EN 50305 9.2)
- SMOKE DENSITY (EN/IEC 61034-1/2) (EN 50268-2; EN 50268-1/2)
- LOW ACIDITY AND CORROSIVITY OF EVOLVED GASES (IEC 60754-2, EN 50267-2-2)
- WEATHERING TEST RESISTANCE (OUTDOOR)
- INDOOR
- WATER RESISTANCE
- RODENT RESISTANCE
- TORSION RESISTANCE
- HAZARDOUS AREA
- FLEXIBLE INSTALLATION
- FULLY DIELECTRIC
- DIRECT BURIAL
- ANTIBALLISTIC PROTECTION
- UV RESISTANT
- ARCTIC CABLE
- INDOOR/OUTDOOR
- REDUCTION FACTOR
- OZONE RESISTANCE

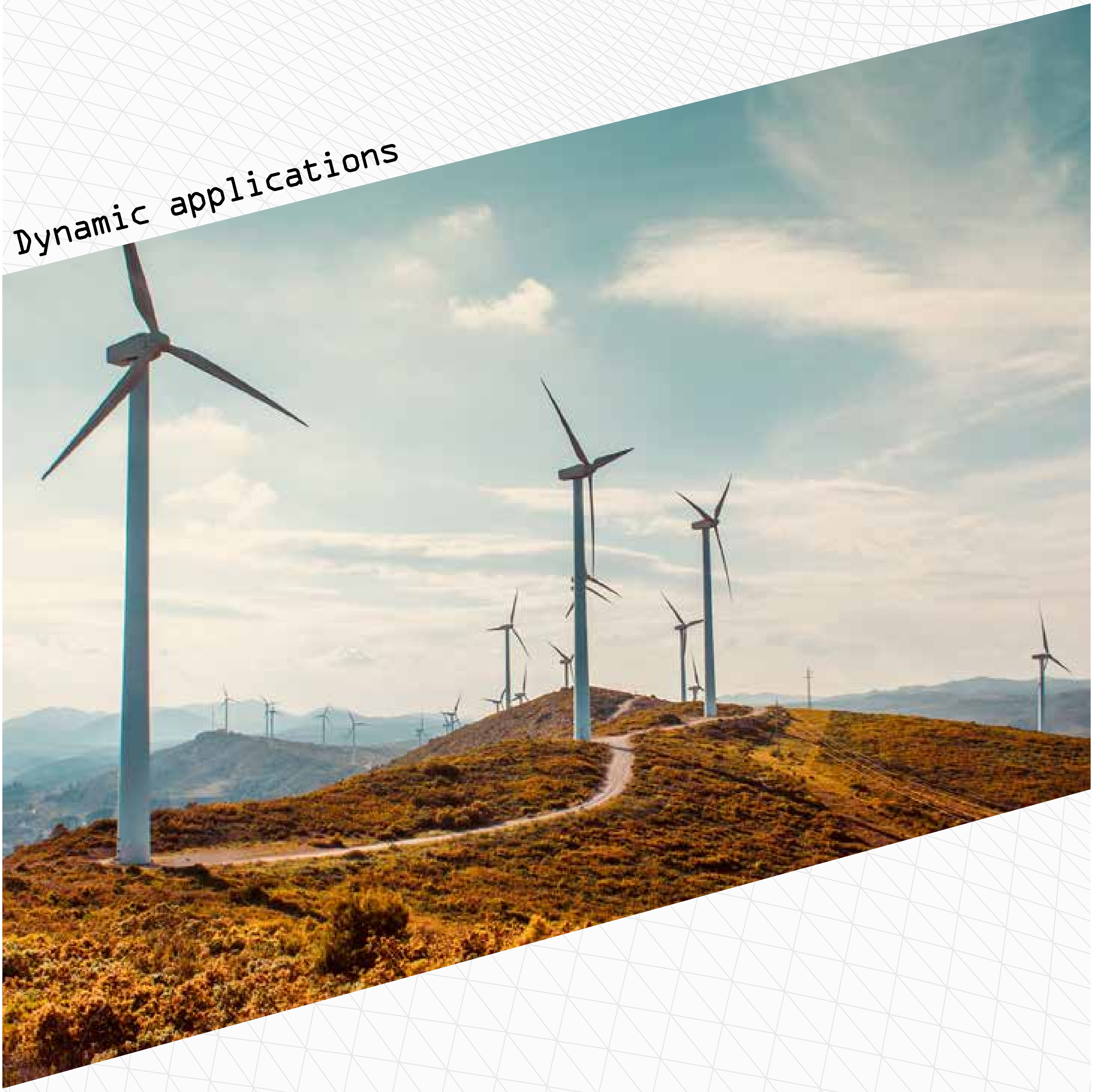
CHEMICAL PROPERTIES

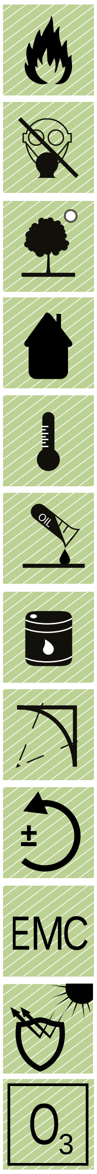
- MINERAL OIL RESISTANCE
- HYDROCARBONS RESISTANCE
- PVC VERSION

MECHANICAL PROPERTIES

- MECHANICAL RESISTANCE
- REDUCED BENDING RADIUS
- WORK AT LOW TEMPERATURE
- DIRECTIVE EMC 2014/30/EU ELECTROMAGNETIC COMPATIBILITY

Dynamic applications





ON REQUEST

CABLE SPECIFICATION

Conductors	CEI 20-29 Class 6 - IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black (other colours available upon request)
Overall Shield (optional)	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Black Ral 9005 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000 V (Rated voltage 1,8/3 kV also available)
Test voltage	3000 V (10'500 V applicable for 1,8/3 kV)
Temperature range	-40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 1000 V – CSA AWM I/II A/B 90°C 1000V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND UNSHIELDED AND SHIELDED SINGLE CORE CABLES - TORSION RESISTANT

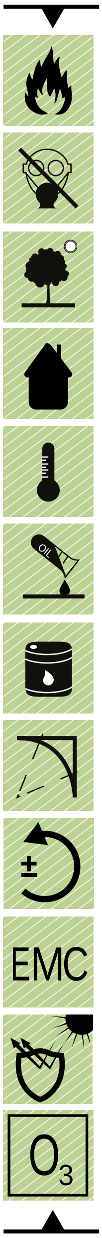
COPPER CONDUCTOR PUR JACKET SINGLE CORE UNSHIELDED POWER CABLES

Section (mm^2)	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
16	9.6	154	216
25	11.2	240	321
35	12.7	336	455
50	15.0	480	625
70	16.6	672	800
95	19.4	912	1095
120	22.6	1150	1345
150	23.8	1440	1719
185	25.3	1776	2022
240	28.5	2304	2515
300	34.5	2646	3090
400	35.3	2863	3243

COPPER CONDUCTOR PUR JACKET SINGLE CORE SHIELDED POWER CABLES

Section (mm^2)	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
16	10.2	181	253
25	11.8	272	366
35	13.4	401	495
50	15.6	579	682
70	17.4	766	869
95	20.4	1009	1200
120	23.5	1272	1490
150	24.6	1705	1822
185	26.3	2095	2283
240	29.5	2510	2700
300	37.9	3577	3913
400	38.9	3818	4152

TK-WIND UNSHIELDED AND SHIELDED MULTICORE CONTROL AND POWER CABLE TORSION RESISTANT



ON REQUEST

CABLE SPECIFICATION

Conductors	CEI 20-29 Class 6 - IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered + Yellow/Green
Overall Shield *(optional)*	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Black Ral 9035 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	300 V Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) 1000V Cross-sectional area ≥ 1.0mm² (AWG18)
Test voltage	2000 Va.c. Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) 3000 Va.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-40°C ÷ +90°C
Torsion	± 150° x meter
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (1.5÷16mm² / Dynamic Installation) 10 x Ø (25÷50mm² / Dynamic Installation)

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 300 V – CSA AWM I/II A/B 90°C 300 V - Cross-sectional area 0,5mm2, (AWG21) ÷ 1,0mm2 (AWG18) Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 1000 V – CSA AWM I/II A/B 90°C 1000V - Cross-sectional area ≥ 1,0mm2 (AWG18)
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

MULTICORE UNSHIELDED POWER CABLES COPPER CONDUCTOR, PUR JACKET 90°C

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G1.5mm²	8.2	58	104
4G2.5mm²	11	96	146
4G4mm²	11.5	154	214
4G6mm²	13.6	230	327
4G10mm²	17.8	354	527
4G16mm²	20.4	615	857
4G25mm²	25.2	960	1315
4G35mm²	30.5	1344	1865
4G50mm²	356.6	1920	2866
5G1.5mm²	8.9	72	124
5G2.5mm²	11	120	175
5G4mm²	13	192	263
5G6mm²	14.8	288	395
5G10mm²	18.8	480	645
5G16mm²	18.8	480	645

MULTICORE UNSHIELDED POWER CABLES COPPER CONDUCTOR, PUR JACKET 90°C

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G1.5mm²	8.7	91	126
4G2.5mm²	10.9	160	167
4G4mm²	12.3	230	238
4G6mm²	14.2	282	352
4G10mm²	18.6	485	566
4G16mm²	21.5	723	858
4G25mm²	26.2	1090	1442
4G35mm²	31.8	1536	2046
4G50mm²	37.6	2380	3073
5G1.5mm²	9.5	110	149
5G2.5mm²	11.6	190	204
5G4mm²	13.6	280	288
5G6mm²	15.5	340	408
5G10mm²	19.6	562	697
5G16mm²	23.5	890	1086

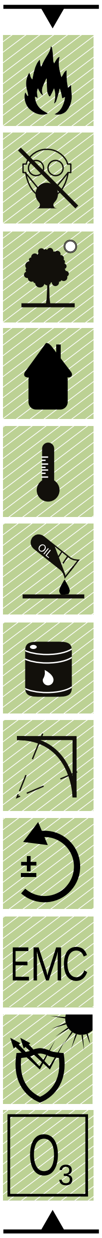
MULTICORE SHIELDED CONTROL CABLES COPPER CONDUCTOR, PUR JACKET 90°C

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G0.5mm²	5.9	20	62
7G0.5mm²	7.5	34	94
12G0.5mm²	8.8	58	148
4G1mm²	7.0	38	75
7G1mm²	9.0	67	117
12G1mm²	10.8	116	186
18G1mm²	16	173	282
25G1mm²	17.6	240	315
34G1mm²	22	327	493
41G1mm²	24.4	394	577
4G1.5mm²	8.2	58	104
7G1.5mm²	11	101	162
12G1.5mm²	13	173	267
18G1.5mm²	19.2	260	384
25G1.5mm²	21.8	360	539
4G2.5 mm²	10	96	145
7G2.5 mm²	13.5	168	231
12G2.5 mm²	16	288	385
18G2.5 mm²	24.6	432	554

MULTICORE SHIELDED CONTROL CABLES COPPER CONDUCTOR, PUR JACKET 90°C

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G0.5mm²	6.3	46	84
7G0.5mm²	8.0	70	118
12G0.5mm²	9.4	105	181
4G1mm²	7.4	68	95
7G1mm²	9.4	99	143
12G1mm²	11.5	175	220
18G1mm²	16.6	196	315
25G1mm²	18.2	285	446
34G1mm²	22.8	450	580
41G1mm²	25.4	530	660
4G1.5mm²	8.7	91	126
7G1.5mm²	11.6	140	192
12G1.5mm²	13.6	240	304
18G1.5mm²	19.8	345	446
25G1.5mm²	22.6	500	608
4G2.5 mm²	10.9	160	167
7G2.5 mm²	13.6	261	150
12G2.5 mm²	16.8	311	422
18G2.5 mm²	25	472	636

TK-WIND SHIELDED AND UNSHIELDED MULTIPAIR CONTROL AND SIGNAL CABLES TORSION RESISTANT



ON REQUEST

CABLE SPECIFICATION

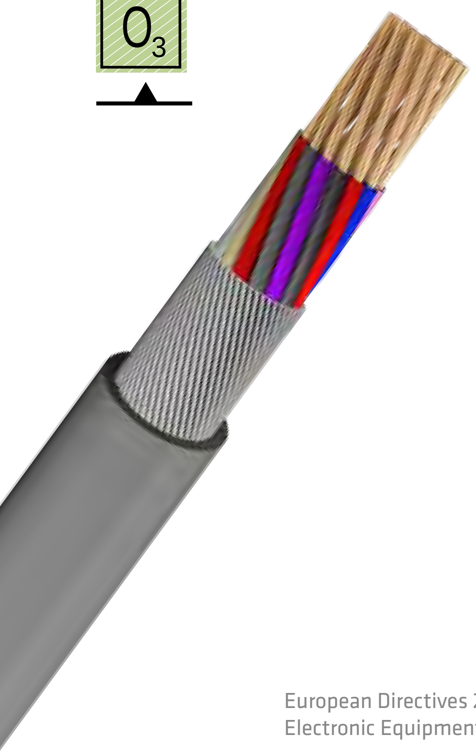
Conductors	CEI 20-29 Class 6 - IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	White/Black numbered or DIN 47100
Overall Shield (optional)	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Grey Ral 7040 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	300 V
Test voltage	2000 V a.c.
Temperature range	-40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	UL 80°C 300V – CSA AWM I/II A/B 80°C 300V, Cross-sectional area ≤ 0,50mm² (AWG21)
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

UNSHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x0.25mm²	4.2	4.8	21.4
3x0.25mm²	4.8	7.5	25
4x0.25mm²	4.9	10	29.4
5x0.25mm²	5.6	12.5	34.1
7x0.25mm²	6.4	17.5	42.5
12x0.25mm²	6.9	29	56
16x0.25mm²	8.7	37	82
18x0.25mm²	9.8	45	90.2
25x0.25mm²	10.9	63	119
30x0.25mm²	12	72	107
36x0.25mm²	13.2	86	163

UNSHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x0.35mm²	4.4	6.7	27
3x0.35mm²	4.6	10	32
4x0.35mm²	5	13	38
5x0.35mm²	5.4	17	44
7x0.35mm²	6.4	23.5	55
12x0.35mm²	7.4	41	86
16x0.35mm²	9.7	54	110
18x0.35mm²	10.6	61	120
25x0.35mm²	11.8	84	164
30x0.35mm²	12.8	101	186
36x0.35mm²	14.4	121	221

SHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x0.25mm²	4.6	15	23
3x0.25mm²	4.9	19	33.4
4x0.25mm²	5.2	21	39.2
5x0.25mm²	5.5	29	45.1
7x0.25mm²	6.3	39	61
12x0.25mm²	7.3	54	90
16x0.25mm²	9.7	67	106
18x0.25mm²	10.4	78	117
25x0.25mm²	11.5	101	152
30x0.25mm²	12.6	105	170
36x0.25mm²	13.8	118	198

SHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x0.35mm²	4.8	16	34.6
3x0.35mm²	5	20	40.2
4x0.35mm²	5.4	25	48
5x0.35mm²	5.8	29	55.2
7x0.35mm²	6.8	38	68
12x0.35mm²	7.8	65	112
16x0.35mm²	10.3	83	137
18x0.35mm²	11.2	88	149
25x0.35mm²	12.4	122	195
30x0.35mm²	13.4	142	221
36x0.35mm²	15	165	257

Other formation and section available on request

SHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x2x0.25mm²	6	23	45.7
3x2x0.25mm²	6.4	28	55.1
4x2x0.25mm²	6.8	38	72.2
6x2x0.25mm²	8.2	52	96.2
8x2x0.25mm²	9.4	64	116
10x2x0.25mm²	10	75	137
12x2x0.25mm²	10.5	89	156
16x2x0.25mm²	11.8	107	189

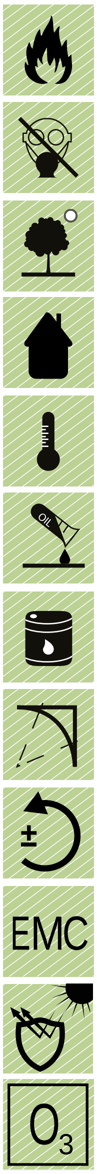
SHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x2x0.35mm²	7	28	54.7
3x2x0.35mm²	7.3	42	76.5
4x2x0.35mm²	7.9	49	88.7
6x2x0.35mm²	9.4	68	119
8x2x0.35mm²	10.6	83	143
10x2x0.35mm²	12	102	173
12x2x0.35mm²	12.6	120	198
16x2x0.35mm²	14	147	257

SHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x2x0.50mm²	7.8	45	79.3
3x2x0.50mm²	7.9	58	103
4x2x0.50mm²	8.5	73	118
6x2x0.50mm²	10.4	101	160
8x2x0.50mm²	11.4	124	194
10x2x0.50mm²	13.5	150	236

Other formation and section available on request



ON REQUEST

CABLE SPECIFICATION

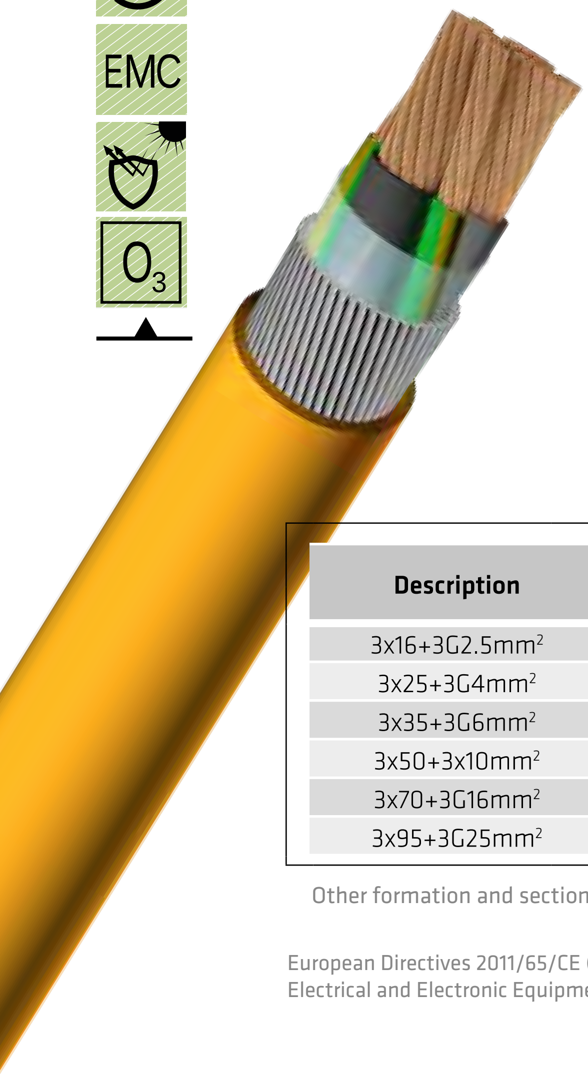
Conductors	CEI 20-29 Class 6 - IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards) 2Y
Core identification	Grey, Black, Brown, Yellow/Green
Overall Shield	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Orange Ral 2003 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000 V (Rated voltage 1,8/3 kV also available)
Test voltage	3000 V (10'500 V applicable for 1,8/3 kV)
Temperature range	-20°C ÷ +90°C (Static Installation)
Bending Radius	8 x Ø
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 1000 V – CSA AWM I/II A/B 90°C 1000V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



SHIELDED POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
3x16+3G2.5mm^2	20.2	587	852
3x25+3G4mm^2	24.5	930	1170
3x35+3G6mm^2	27.4	1360	1756
3x50+3x10mm^2	29.6	1841	2207
3x70+3G16mm^2	34	2640	2890
3x95+3G25mm^2	38.5	2574	3850

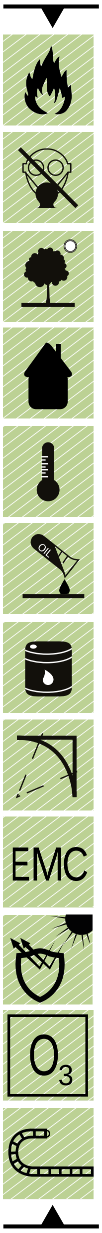
Other formation and section available on request

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND SERVO MOTOR SHIELDED POWER CABLE - FLEXION RESISTANT 0,6/1 KV

NACELLE

TOWER



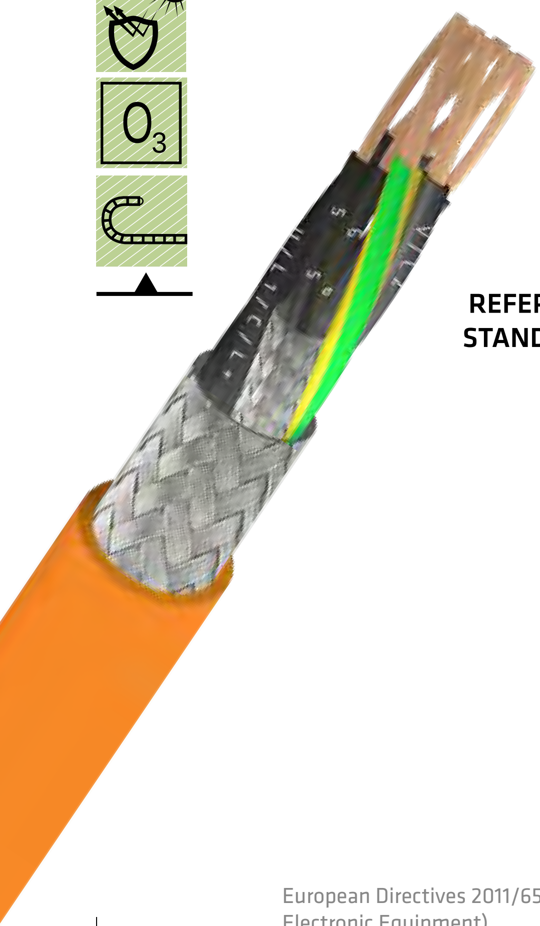
ON REQUEST

CABLE SPECIFICATION

Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered U/L1/C/L+, V/L2, W/ L3/D/L-, Yellow/Green
Pairs Identification (where request)	One pair: black, white. Two pairs: Black Numbered 5÷6 and Black Numbered 7÷8
Pairs Shield (where request)	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Overall Shield	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Orange Ral 2003 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000 V Cross-sectional area 1.0mm² (AWG18)
Test voltage	4000 V a.c. Cross-sectional area 1.0mm² (AWG18)
Temperature range	-40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (1.5 – 16mm² / Dynamic Installation) 10 x Ø (25 – 50mm² / Dynamic Installation)
Torsion	+/- 150° x meter



REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 1000 V – CSA AWM I/II A/B 90°C 1000 V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

SERVO CABLES PUR 90°C - 1000 V

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(4G1.5)H2	8.7	83	131
(4G2.5)H2	10.8	130	198
(4G4)H2	12.2	193	276
(4G6)H2	14	282	376
(4G10)H2	17.6	450	567
(4G16)H2	21.2	720	885
(4G25)H2	25	1003	1314
(4G35)H2	28.8	1514	2146
(4G50)H2	33.9	2167	2992

SERVO CABLES 90°C 1000V

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4G1.5 + (2x1.5)H2]H2	11.6	149	221
[4G2.5 + (2x1.5)H2]H2	13	193	264
[4G4 + (2x1.5)H2]H2	14.7	255	315
[4G6 + (2x1.5)H2]H2	16.2	339	480
[4G10 + (2x1.5)H2]H2	19.7	526	774
[4G16 + (2x1.5)H2]H2	23.6	773	1043
[4G25 + (2x1.5)H2]H2	27.4	1190	1567
[4G35 + (2x1.5)H2]H2	31	1590	1978
[4G50 + (2x1.5)H2]H2	34.5	2240	2766

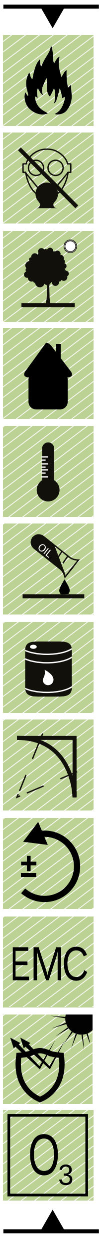
SERVO CABLES 90°C 1000V

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4G1 + 2x(2x0.75)H2]H2	12.2	137	216
[4G1.5 + 2x(2x0.75)H2]H2	12.8	155	259
[4G2.5 + 2x(2x1)H2]H2	14.2	220	320
[4G4 + (2x1) + (2x1.5)H2]H2	16.3	293	439
[4G6 + (2x1) + (2x1.5)H2]H2	18	372	594
[4G10 + (2x1) + (2x1.5)H2]H2	21.8	570	845
[4G16 + 2x (2x1.5)H2]H2	25.5	830	1231
[4G25 + 2x (2x1.5)H2]H2	30	1213	1615
[4G35 + 2x (2x1.5)H2]H2	31.2	1598	2022

TK-WIND ENCODER AND RESOLVER CABLE - FLEXION RESISTANT

NACELLE

TOWER



ON REQUEST

CABLE SPECIFICATION

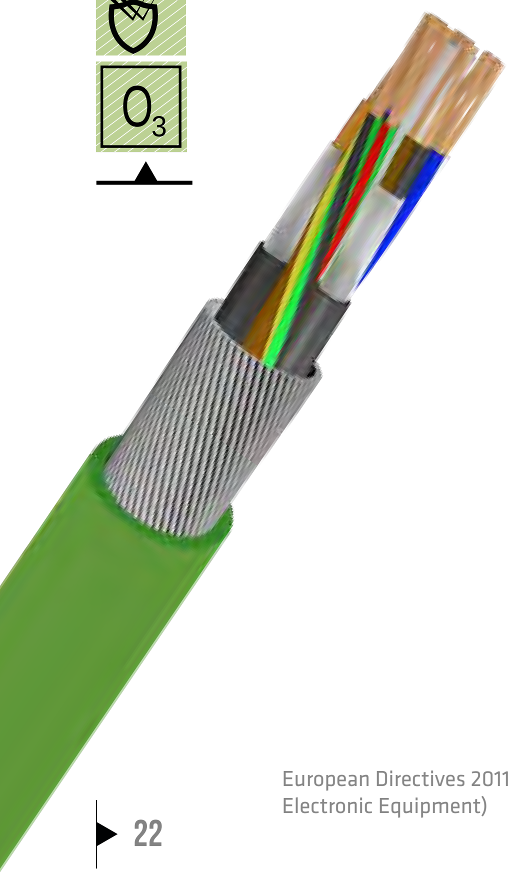
Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin and/or Polyester (UL-CSA Standards)
Core identification	More informations are available upon request
Overall Shield	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Green Ral 6018 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	30 V or 300V
Test voltage	1000V a.c. or 2000V a.c.
Temperature range	-40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 300 V – CSA AWM I/II A/B 90°C 300 V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - HEIDENHAIN

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4x2x0.14 + (4x0.14)H1 + 4x0.5]H2	8.6	70	102
[3x(2x0.14)H1 + 2x(0.5)H1]H2	8.9	66	124
(4x2x0.14 + 4x0.50)H2	9	51	106
[4x2x0.14 + (4x0.14)H1 + 4x0.5]H2	8.6	70	102
[3x(2x0.14)H1 + 2x(0.5)H1]H2	8.9	66	124
(4x2x0.14 + 4x0.50)H2	9	51	106

Note: outer sheath black

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - B&R

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(5x2x0.14 + 2x0.50)H2	7.9	42	73.2
(3x2xAWG24)H2	6.5	27	52.4

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - ELAU

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(3x2x0.25 + 2x0.50)H2	8.2	47	88
3x(2x0.25)H2	10.2	74	150

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - CONTROL TECHNIQUES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[(2x0.34)H + 6x2x0.32 + 2 x1)]H2	11	102	172
(2x2xAWG26) H2	5.6	19	45

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - LENZE

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
3x(2x0.14)H2 + (2x0.50)H2	10	47	152
4x(2x0.14)H2 + 2x(1)H2	11.5	70	229

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - YASKAWA

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(2x2x0.34)H2	8.5	36	83.3

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - BOSCH REXROTH

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(4x2x0.25 + 2x0.50)H2	8.7	65	111
[4x2x0.14 + 4x1 + (4x0.14)H2]H2	9.7	93	165
[3x(2x0.25)H2 + 3x0.25 + 2x1]H2	10	59	115
(9x0.50)H2	8.8	75	148
(4x2x0.25 + 2x0.50)H2	8.7	65	111
[4x2x0.14 + 4x1 + (4x0.14)H2]H2	9.7	93	165
[3x(2x0.25)H2 + 3x0.25 + 2x1]H2	10	59	115
(9x0.50)H2	8.8	75	148

ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - SIEMENS

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(12x0.25)H2	7.2	48	82.3
(4x2x0.38 + 4x0.50)H2	9.2	71	130
(8x2x0.18)H2	7.8	54	85
(4x2x0.18)H2	6.5	28	45
[3x(2x0.14)H1 + 4x0.14 + 4x0.25 + 2x0.50]H2	9.5	76	139
[3x(2x0.14)H1 + 4X0.14 + 2x0.50]H2	8.9	66	101
(2x2xAWG26 + 2xAWG22)H2 Drive Cliq	7.0	33	71
(2x2xAWG24 + 2xAWG22)H2 Drive Cliq	7.3	36	74

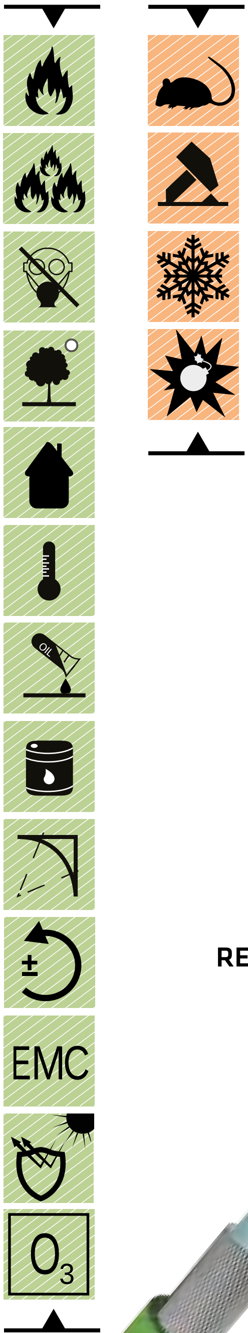
ANALOGIC/DIGITAL ENCODER SIGNAL TRANSMISSION - FANUC

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(4x2x0.18 + 2x0.50)H2	7.7	32.9	70.5
(3x2x0.18 + 6x0.50)H2	8.4	63	94
(3x2x0.18 + 6x1)H2	9.6	89	140
(5x2x0.18 + 6x0.50)H2	9.4	71	94
(2x0.18 + 5x0.5)H2	7.4	48.6	143
(2x2x0.18 + 5x0.5)H2	7.7	44.5	84.4
(10x2xAWG24)H2	9.8	60	121
(10x2xAWG28)H2	6.4	47	66

RESOLVER SIGNAL TRANSMISSION

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[3x(2x0.25)H2]H2	8.5	74	150
[4x(2x0.25)H2]H2	9	85	120
[8x(2x0.25)H2]H2	11.6	139	206
[4x(2x0.34)H2]H2	10.2	97	145
[5x(2x0.34)H2]H2	11.6	113	166

ON REQUEST



CABLE SPECIFICATION

Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	See following table
Overall Shield	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Green Ral 6018 *(other colours available upon request)*

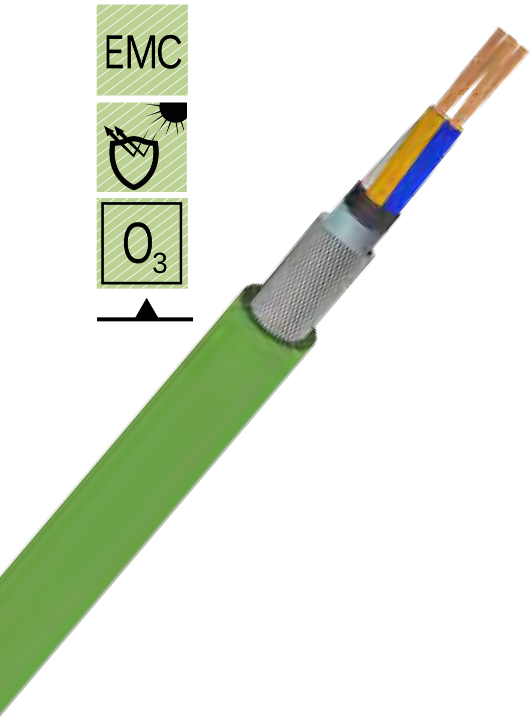
Available in version with PVC outer sheath.

TECHNICAL DATA

Operating voltage	30 V
Test voltage	1000 V a.c.
Mutual capacitance	≤ 60 pF/m
Characteristic impedance	100 Ω ± 15 Ω
Transmission speed	100 Mbit/s with maximum length 100m 10 Mbit/s with maximum length 500m
Temperature range	- 40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 30 V – CSA AWM I/II A/B 90°C 30 V or UL 758, CSA C22.2 210.2. UL AWM 90°C 300 V – CSA AWM I/II A/B 90°C 300 V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

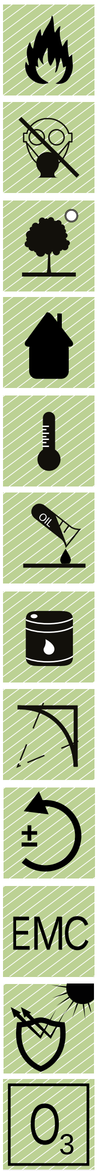


European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

BUS CABLE - ETHERNET CAT 5E

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
Ethernet Category 5E (2x2xAWG24)H1	6.3	21	50
Ethernet Category 5E (4x2xAWG24)H1	7.2	33	68
Ethernet Category 5E (4x2xAWG26)H1	6.4	26	53
Ethercat/Profinet Category 5E (4xAWG22)H1	6.5	31	65
Ethercat/Profinet Category 5E (4xAWG24)H1	5.5	22	46

2x2xAWG24	(Blue - White/Blue) - (Orange - White/Orange)
4x2xAWG24	(Blue - White/Blue) - (Orange - White/Orange) (Green - White/Green) - (Brown - White/Brown)
4x2xAWG24	(Blue - White/Blue) - (Orange - White/Orange) (Green - White/Green) - (Brown - White/Brown)
2xAWG22	White - Yellow - Blue - Orange
4xAWG24	White - Yellow - Blue - Orange



ON REQUEST

CABLE SPECIFICATION

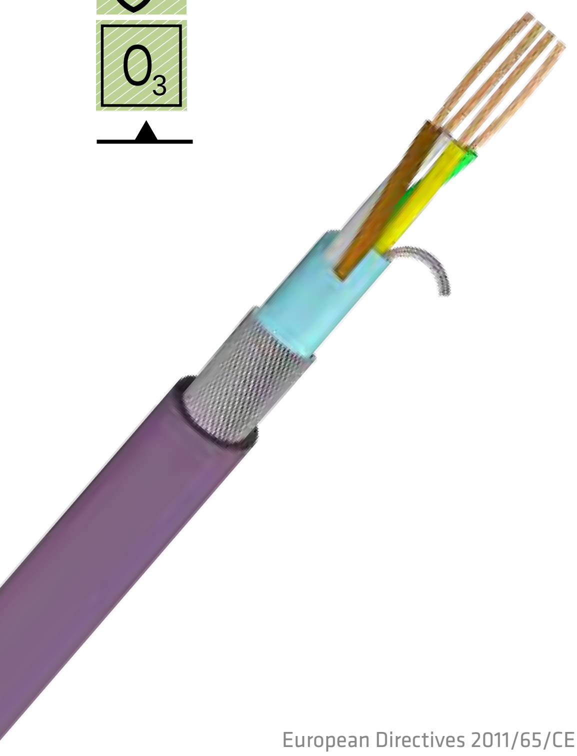
Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	See following table
Overall Shield	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Violet Ral 4001 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	30 V or 300 V
Test voltage	1000 V a.c. or 2000 V a.c.
Mutual capacitance	≤ 60 pF/m
Characteristic impedance	120 Ω ± 15 Ω
Transmission speed	1000 Kbit/s with maximum length 40m 500 Kbit/s with maximum length 300m 100 Kbit/s with maximum length 600m 50 Kbit/s with maximum length 1000m
Temperature range	- 40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 30 V – CSA AWM I/II A/B 90°C 30 V or UL 758, CSA C22.2 210.2. UL AWM 90°C 300 V – CSA AWM I/II A/B 90°C 300 V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 –IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

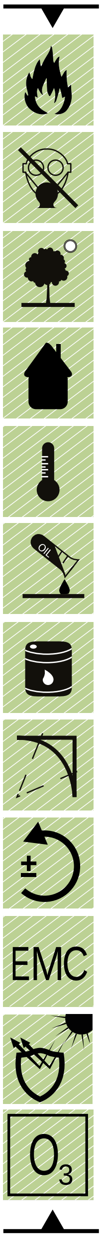
BUS CABLE - CANOPEN - CANBUS

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(2x0.34)H2	6	25	50
(2x2x0.34)H2	7.5	36	68.5
(1x4x0.34)Q/H2	7.5	36	68.5
(2x0.50)H2	6.8	28	69.1
(2x2x0.50)H2	8.8	48	92.7
2x0.34	(White – Brown)		
2x2x0.34	(White – Brown) – (Green – Yellow)		
1x4x0.34	White – Green – Brown – Yellow		
2x0.50	(White – Brown)		
2x2x0.50	(White – Brown) – (Green – Yellow)		

TK-WIND BUS CABLE - PROFIBUS DP-FLEX - TORSION RESISTANT

NACELLE

TOWER



ON REQUEST

CABLE SPECIFICATION

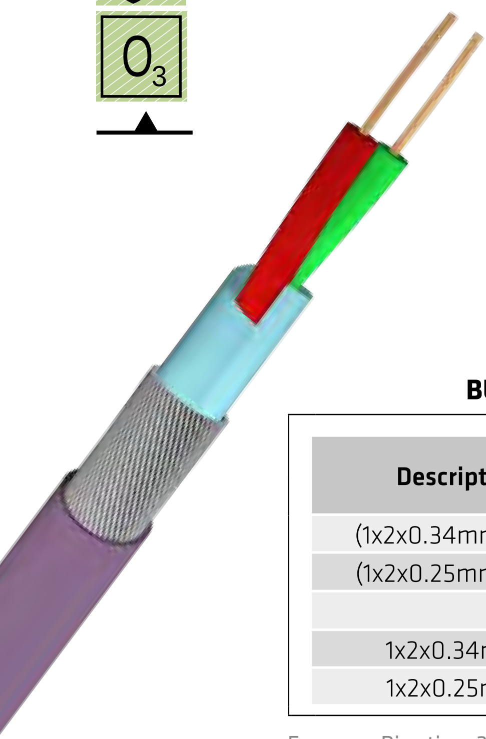
Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Foam Polyolefin (UL-CSA Standards)
Core identification	See following table
Overall Shield	Tinned Copper Wrapping
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Violet Ral 4001 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	30 V or 300 V
Test voltage	1000 V a.c. or 2000 V a.c.
Mutual capacitance	≤ 30 pF/m
Characteristic impedance	150 Ω ± 15 Ω
Transmission speed	12 Mbit/s with maximum length 200m 0.6 kbit/s with maximum length 1000m
Temperature range	- 40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Torsion	± 150° x meter

REFERENCE STANDARDS

Main standards	Cable according to UL 758, CSA C22.2 210.2. UL AWM 90°C 30 V – CSA AWM I/II A/B 90°C 30 V or UL 758, CSA C22.2 210.2. UL AWM 90°C 300 V – CSA AWM I/II A/B 90°C 300 V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



BUS CABLE - PROFIBUS - TORSION RESISTANT

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(1x2x0.34mm²)HH2	8.2	24	70.4
(1x2x0.25mm²)HH2	7.8	20	67.1
1x2x0.34mm²		Green - Red	
1x2x0.25mm²		Green - Red	

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND BUS CABLE - DEVICENET DROP AND TRUNK FLEX RESISTANT

NACELLE

TOWER

ON REQUEST

EMC

O_3

CABLE SPECIFICATION

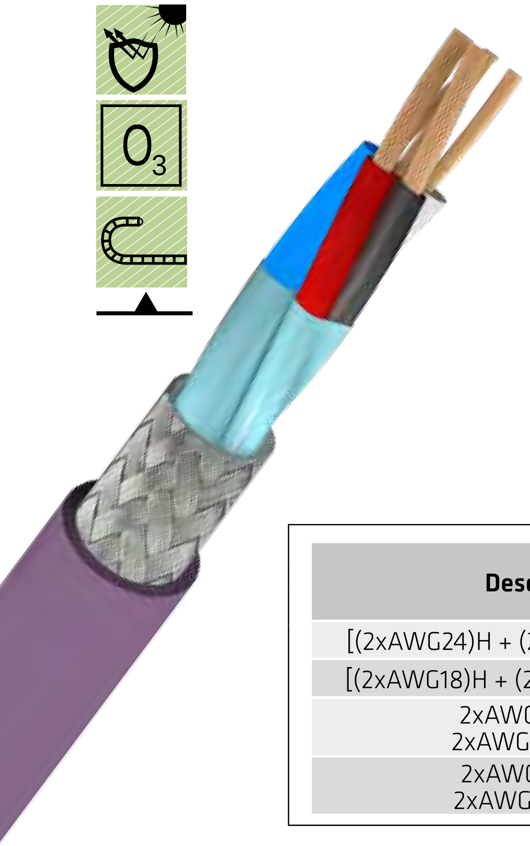
Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin and Foam Polyolefin (UL-CSA Standards)
Core identification	See following table
Pairs shield	Aluminum/Plastic on each pairs
Overall shield	Tinned Copper Braid Coverage ≥ 85% according to EMC 89/336 ©
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Violet Ral 4001 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	30 V or 300 V
Test voltage	1000 V a.c. or 2000 V a.c.
Mutual capacitance	≤ 50 pF/m
Characteristic impedance	120 Ω ± 15 Ω
Transmission speed	500 Kbit/s with maximum length 200m 250 Kbit/s with maximum length 250m 125 Kbit/s with maximum length 500m
Temperature range	- 40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)

REFERENCE STANDARDS

Main standards	UL 90°C 300V – CSA AWM I/II A/B 0°C 300V, or UL 0°C 30V – CSA AWM I/II A/B 80°C 30V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



SHIELDED POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[(2xAWG24)H + (2xAWG22)H]H2 Drop	7.1	31	74.7
[(2xAWG18)H + (2xAWG15)H]H2 Trunk	11	102	179
2xAWG24 - Data 2xAWG22 - Power		(Blue – White) (Red – Black)	
2xAWG18 - Data 2xAWG15 - Power		(Blue – White) (Red – Black)	

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND BUS CABLE - INTERBUS FLEX RESISTANT

NACELLE

TOWER

ON REQUEST

EMC

O_3

CABLE SPECIFICATION

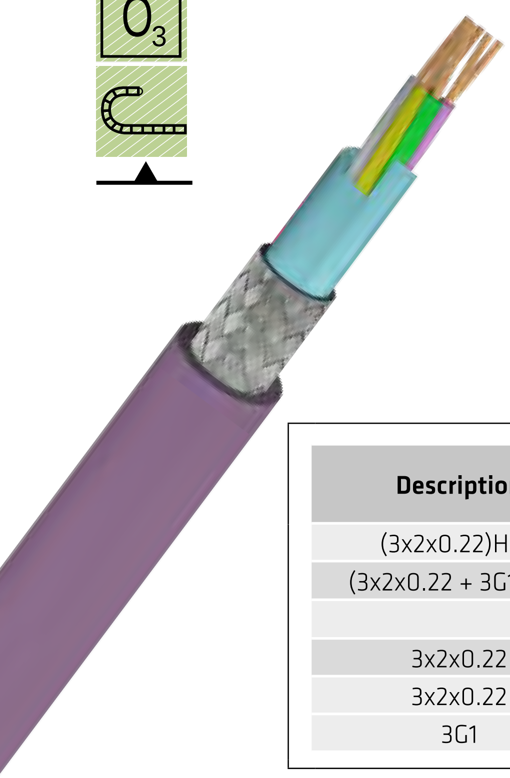
Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	See following table
Overall Shield	Aluminum/Plastic Tape and/or Tinned Copper Braid Coverage ≥ 85% according to EMC 89/336 ©
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Violet Ral 4001 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	30 V or 300 V
Test voltage	1000 V a.c. or 2000 V a.c.
Mutual capacitance	≤ 60 pF/m
Characteristic impedance	100 Ω ± 15 Ω
Transmission speed	500 Kbit/s with maximum length 400m
Temperature range	- 40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)

REFERENCE STANDARDS

Main standards	UL 90°C 300V – CSA AWM I/II A/B 90°C 300V, or UL 90°C 30V – CSA AWM I/II A/B 90°C 30V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



BUS CABLE - INTERBUS

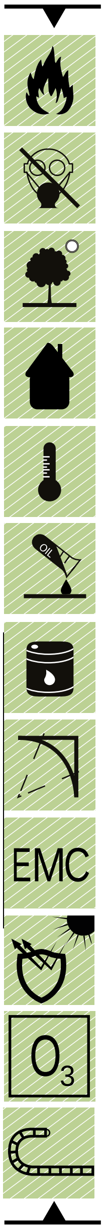
Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
(3x2x0.22)HH2	7	24	61.7
(3x2x0.22 + 3G1)HH2	8.4	61	96.6
3x2x0.22	(White-Brown) – (Green-Yellow) – (Grey-Pink)		
3x2x0.22	(White-Brown) – (Green-Yellow) – (Grey-Pink)		
3G1	Blue – Red – Yellow/Green		

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND ETHERNET CATEGORY 6 FLEX RESISTANT

NACELLE

TOWER



ON REQUEST

CABLE SPECIFICATION

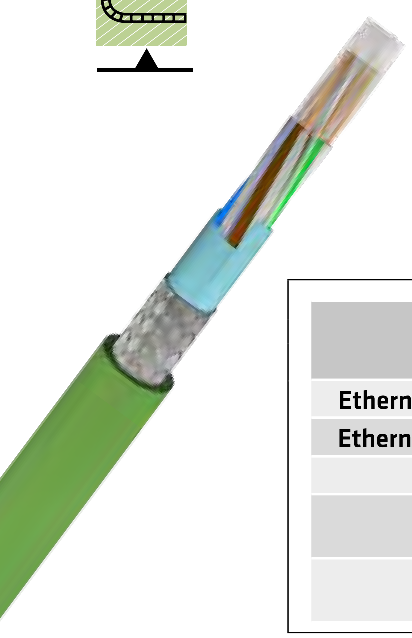
Conductors	Bare Copper according to CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	See following table
Overall shield	Aluminum/Plastic Tape and Tinned Copper Braid Coverage ≥ 85% according to EMC 2014/30/EU ©
Sheath	Polyurethane 12Y (UL-CSA Standards)
Outer jacket colour	Green Ral 6018 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	30 V or 300 V
Test voltage	1000 V a.c. or 2000 V a.c.
Mutual capacitance	≤ 50 pF/m
Characteristic impedance	100 Ω
Temperature range	- 40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)

REFERENCE STANDARDS

Main standards	UL 90°C 300V – CSA AWM I/II A/B 90°C 300V, or UL 90°C 30V – CSA AWM I/II A/B 90°C 30V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



SHIELDED POWER CABLES

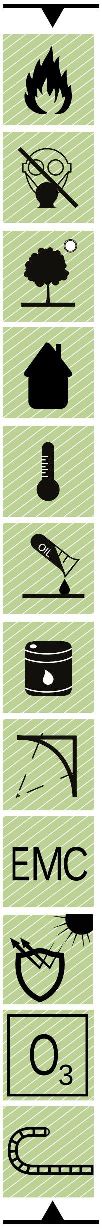
Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
Ethernet Category 6 (4x2xAWG24)HH2	7.8	34	70
Ethernet Category 6 (4x2xAWG26)HH2	7.4	27	63
4x2xAWG24	(Blue - White/Blue) - (Orange - White/Orange) (Green - White/Green) - (Brown - White/Brown)		
4x2xAWG26	(Blue - White/Blue) - (Orange - White/Orange) (Green - White/Green) - (Brown - White/Brown)		

TK-WIND SERVO CABLE SHIELDED FLEXION RESISTANT

NACELLE

TOWER

ON REQUEST



CABLE SPECIFICATION

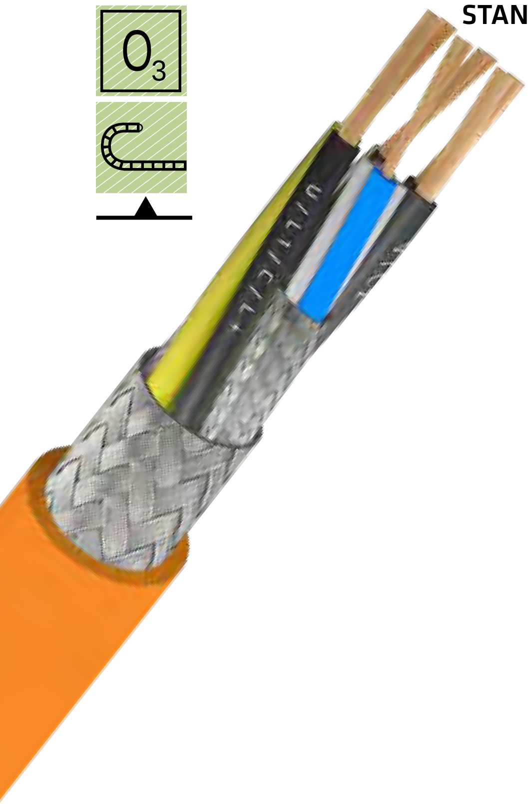
Conductors	CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered U/L1/C/L+, V/L2, W/L3/D/L-, Yellow/Green
Pairs Identification (where request)	One pair: blue, white. Two pairs: black, white and blue, white
Pairs Shield (where request)	Tinned Copper Braid Coverage ≥ 85% according to EMC 89/336 ©
Overall Shield (optional)	Tinned Copper Spiral
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Orange Ral 2003 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000V Cross-sectional area ≥ 1.0mm² (AWG18)
Test voltage	4000V a.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-40°C ÷ +90°C
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (1.5 – 16mm² / Dynamic Installation)

REFERENCE STANDARDS

Main standards	UL 90°C 1000V – CSA AWM I/II A/B 90°C 1000V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND SERVO CABLE SHIELDED FLEXION RESISTANT

DSL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4G1 + (2XAWG22)H2/H]H2	10.8	93	163
[4G1.5 + (2XAW G22)H2/H]H2	11.5	113	194
[4G2.5 + (2XAW G22)H2/H]H2	12.9	161	253
[4G4 + (2XAW G22)H2/H]H2	14.2	222	325
[4 G0.50 + (2X0.50)H2 + (2XAWG22)H2/H]H2	11.5	93	173
[4G1 + (2X0.75)H2 + (2 XAWG22)H2/H]H2	11.9	124	202
[4G1.5 + (2X0.75)H2 + (2XAWG22)H2/H]H2	13.1	145	238
[4G2.5 + (2X1)H2 + (2 XAWG22)H2/H]H2	14.3	198	298
[4G4 + (2X1)H2 + (2X AWG22)H2/H]H2	16.1	265	388
[4G6 + (2X1)H2 + (2X AWG22)H2/H]H2	18.1	336	481
[4G10 + (2X1.5)H2 + (2 XAWG22)H2/H]H2	21.2	532	736
[4G16 + (2X1.5)H2 + (2 XAWG22)H2/H]H2	26.2	776	1099

Other formation and section available on request

...guaranteed up to 100 m...

TK-WIND TAT TACTICAL CABLES - TORSION RESISTANT

NACELLE

TOWER

ON REQUEST

OPTICAL CORE

Fiber Structure	Tight Buffer 900 µm
Tight Colour Code	See table C
Assembling	2 to 12 fibers
Strain Relief	Aramid yarns
Outer Sheath	Polyurethane 11Y (UL-CSA Standard)

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 90°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 5 x outer diameter Dynamic: 8 x outer diameter
Torsion	± 150° x meter

REFERENCE STANDARDS

Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16

FIRE PERFORMANCE

Fire retardant	IEC 60332-1-2

ON REQUEST

Water resistant

MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2	5.0	25	1500	4000	15
4	5.5	30	1500	4000	15
6	6.0	35	1500	4000	15
8	7.2	45	2000	4000	15
12	8.5	60	2000	4000	15
24	10	75	2000	4000	15

Types mentioned here are standard. Other configurations available on request.

ON REQUEST

OPTICAL CORE

Fiber Structure	Optical fiber 900 µm Semitight Buffer 900 µm
Tight Colour Code	White
Strain Relief	Aramid yarns
Sub unit Sheath	Numbered flame retardant, low smoke and halogen-free material Ø 2 mm
Assembling	2 to 12 sub unit
Armouring	Aramid yarns braid
Outer Sheath	Flame retardant, halogen-free Polyurethane material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 90°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 5 x outer diameter Dynamic: 10 x outer diameter
Torsion	± 150° x meter

REFERENCE STANDARDS

Ozone resistance	IEC 60811-403
U.V. radiation resistance	ASTM-D-2565-16

FIRE PERFORMANCE

Fire retardant	IEC 60332-1-2
Halogen-free	EN 50267-2-1 - IEC 60754-1

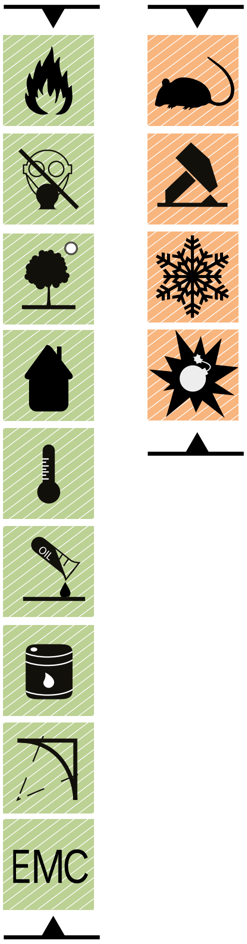
MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2	8.0	60	1000	2000	10
4	8.5	65	1500	2000	10
6	10.5	95	2000	2000	10
12	14.5	155	3000	2000	10

Types mentioned here are standard. Other configurations available on request.

Dynamic applications

ON REQUEST



CABLE SPECIFICATION

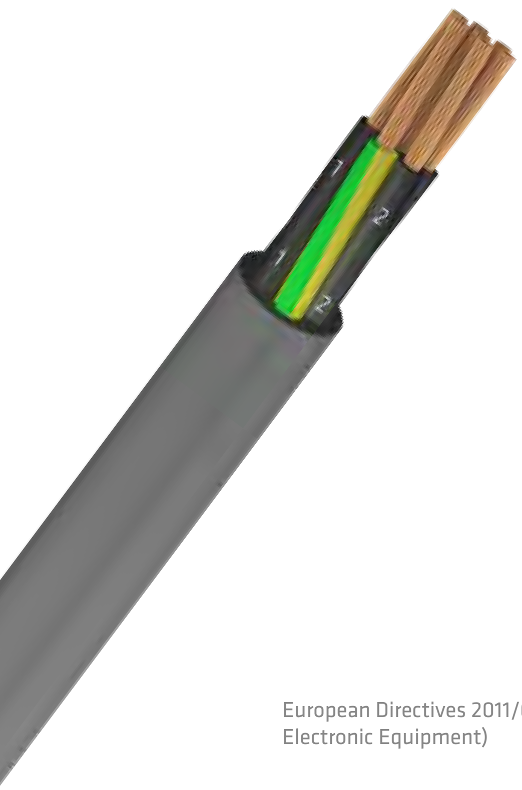
Conductors	CEI 20-29 CLASS 6 - IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered + Yellow/Green
Overall Shield (optional)	Tinned Copper Spiral
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Grey Ral 7040 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	300V Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) 1000V Cross-sectional area ≥ 1.0mm² (AWG18)
Test voltage	2000 Va.c. Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) 3000 Va.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-40°C ÷ +90°C
	≤ 12 conductors : concentric conductors > 12 conductors : in group
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (1.5÷16mm² / Dynamic installation) 10 x Ø (25÷50mm² / Dynamic Installation)
Maximum Speed	240 m/min

REFERENCE STANDARDS

Main standards	UL 80°C 300V – CSA AWM I/II A/B 80°C 300V, Cross-sectional area 0,5mm² (AWG21) ÷ 1,0mm² (AWG18) UL 80°C 1000V – CSA AWM I/II A/B 80°C 1000V, Cross-sectional area ≥ 1,0mm² (AWG18)
NFPA	According to NFPA 79-2018-Chapter 12.9
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

MULTICORE UNSHIELDED POWER CABLES COPPER CONDUCTOR, PUR JACKET 80°C

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G1.5mm²	8.2	58	104
4G2.5mm²	11	96	146
4G4mm²	11.5	154	214
4G6mm²	13.6	230	327
4G10mm²	17.8	354	527
4G16mm²	20.4	615	857
4G25mm²	25.2	960	1315
4G35mm²	30.5	1344	1865
4G50mm²	356.6	1920	2866
5G1.5mm²	8.9	72	124
5G2.5mm²	11	120	175
5G4mm²	13	192	263
5G6mm²	14.8	288	395
5G10mm²	18.8	480	645
5G16mm²	18.8	480	645

MULTICORE UNSHIELDED POWER CABLES COPPER CONDUCTOR, PUR JACKET 80°C

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G1.5mm²	8.7	91	126
4G2.5mm²	10.9	160	167
4G4mm²	12.3	230	238
4G6mm²	14.2	282	352
4G10mm²	18.6	485	566
4G16mm²	21.5	723	858
4G25mm²	26.2	1090	1442
4G35mm²	31.8	1536	2046
4G50mm²	37.6	2380	3073
5G1.5mm²	9.5	110	149
5G2.5mm²	11.6	190	204
5G4mm²	13.6	280	288
5G6mm²	15.5	340	408
5G10mm²	19.6	562	697
5G16mm²	23.5	890	1086

ON REQUEST

CABLE SPECIFICATION

Conductors	Bare Copper according to CEI 20-29 Class 6 – IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	See following table
Pairs Shield	Aluminum/Plastic Tape
Overall Shield	Aluminum/Plastic Tape and Tinned Copper Braid Coverage ≥ 85% according to EMC 2014/30/EU ©
Sheath	PVC Y (UL-CSA Standards)
Outer jacket colour	Green Ral 6018 *(other colours available upon request)*

TECHNICAL DATA

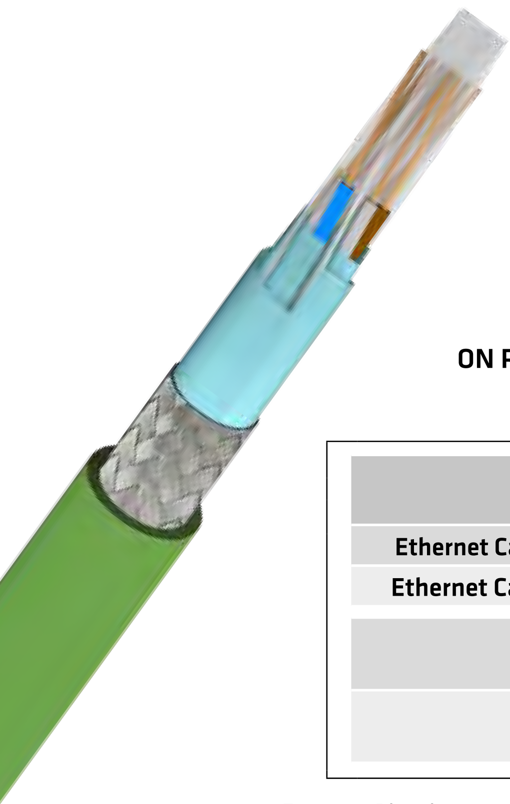
Operating voltage	30 V or 300 V (600V on request)
Test voltage	1000 V a.c. or 2000 V a.c.
Mutual capacitance	< 50 pF/m
Characteristic impedance	100 Ω
Temperature range	-20°C ÷ +80°C (Static Installation) -5°C ÷ +80°C (Dynamic Installation)
Bending Radius	5 x Ø (Static Installation) 7.5 x Ø (Dynamic Installation)
Maximum Speed	180 m/min
Maximum Acceleration	10 m/s²
Maximum Chain length	15 m (only horizontal)
Flex life	5.000.000 cycles

REFERENCE STANDARDS

Main standards	UL 80°C 300V – CSA AWM I/II A/B 80°C 300V, or UL 80°C 30V – CSA AWM I/II A/B 80°C 30V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

ON REQUEST

Outer jacket	LSZH



BUS CABLES - ETHERNET CAT 7

Description	Nominal Diameter (mm)	Copper Weight (kg/km)	Cable weight (kg/km)
Ethernet Category 7 [4x(2xAWG24)H]HH2	10.3	42	108
Ethernet Category 7 [4x(2xAWG26)H]HH2	9.4	32	90

4x2xAWG24	(Blue - White/Blue) - (Orange - White/Orange) (Green - White/Green) - (Brown - White/Brown)
4x2xAWG26	(Blue - White/Blue) - (Orange - White/Orange) (Green - White/Green) - (Brown - White/Brown)

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

Fixed applications

CABLE SPECIFICATION

Conductor	Flexible stranded copper
Cross section	From 18 AWG to 4/0 AWG
Insulation	PVC UL Type A or PVC + Transparent Nylon skin UL Type B
Core identification	Coloured

TECHNICAL DATA

Minimum bending radius	10 x outer diameter
Working temperature	-20°C ÷ 90°C
Max conductor resistance	UL1063
Rated voltage	600 V LISTED 1000 V - 2000 V version available on request

REFERENCE STANDARDS

Construction	NEC Art. 310, UL 1063
CE Directives Low Voltage	2014/35/UE
Flame retardant	EN 50265-1-2 - IEC 60332-1-2 - UL 1277 and VW-1 - CSA FT1 and FT4
Hydrocarbons and oil resistance	UL 1581 - UL 1277 Oil Resistance I and Oil Resistant II - IEC 60811-2-1
Water resistance	UL 1581
Ozone resistance	IEC 60811-2-1

ON REQUEST

UV resistance

TK-WIND MTW - 90°C - 600 V - TYPE A AND TYPE B SINGLE CORE CABLE TRAY CABLES

TYPE A - PVC INSULATION

Section	ø nominal (mm)	Copper weight (kg/km)
AWG 18	2.9	8.3
AWG 16	3.15	12
AWG 14	4.3	18.9
AWG 12	4.8	30.2
AWG 10	5.4	47.0
AWG 8	7.0	76.1
AWG 6	7.9	118.8
AWG 4	9.5	188.7
AWG 2	11.3	293.5
AWG 1/0	14.7	482.1
AWG 2/0	16.0	61.3
AWG 3/0	17.5	758.1
AWG 4/0	19.3	995.69

TYPE B - PVC INSULATION + NYLON

Section	ø nominal (mm)	Copper weight (kg/km)
AWG 18	2.9	8.3
AWG 16	3.15	12
AWG 14	4.3	18.9
AWG 12	4.8	30.2
AWG 10	5.4	47.0
AWG 8	7.0	76.1
AWG 6	7.9	118.8
AWG 4	9.5	188.7
AWG 2	11.3	293.5
AWG 1/0	14.7	482.1
AWG 2/0	16.0	61.3
AWG 3/0	17.5	758.1
AWG 4/0	19.3	995.69

TK-WIND THHN/THWN/THW/TW - 90°C - 600 V - TYPE A AND TYPE B SINGLE CORE CABLE TRAY CABLES

CABLE SPECIFICATION

Conductor	Flexible stranded copper
Cross section	From 18 AWG to 4/0 AWG
Insulation	PVC UL Type A or PVC + Transparent Nylon skin UL Type B
Core identification	Coloured

TECHNICAL DATA

Minimum bending radius	10 x outer diameter
Working temperature	-20°C ÷ 90°C
Max conductor resistance	UL83
Rated voltage	600 V LISTED 1000 V - 2000 V version available on request

REFERENCE STANDARDS

Construction	NEC Art. 310, UL 83
CE Directives Low Voltage	2014/35/UE
Flame retardant	EN 50265-1-2 - IEC 60332-1-2 - UL 1277 and VW-1 - CSA FT1 and FT4
Hydrocarbons and oil resistance	UL 1581 - UL 1277 Oil Resistance I and Oil Resistant II - IEC 60811-2-1
Water resistance	UL 1581
Ozone resistance	IEC 60811-2-1

ON REQUEST

UV resistance

LISTED

TW TYPE A - PVC INSULATION - 60°C

Section	ø nominal (mm)	Copper weight (kg/km)
AWG 14	4.3	18.9
AWG 12	4.8	30.2
AWG 10	5.4	47.0
AWG 8	7.0	76.1
AWG 6	7.9	118.8
AWG 4	9.5	188.7
AWG 2	11.3	293.5
AWG 1/0	14.7	482.1
AWG 2/0	16.0	61.3
AWG 3/0	17.5	758.1
AWG 4/0	19.3	995.69

THW TYPE A - PVC INSULATION - 75°C

Section	ø nominal (mm)	Copper weight (kg/km)
AWG 14	4.3	18.9
AWG 12	4.8	30.2
AWG 10	5.4	47.0
AWG 8	7.0	76.1
AWG 6	7.9	118.8
AWG 4	9.5	188.7
AWG 2	11.3	293.5
AWG 1/0	14.7	482.1
AWG 2/0	16.0	61.3
AWG 3/0	17.5	758.1
AWG 4/0	19.3	995.69

THW TYPE A - PVC INSULATION - 75°C

Section	ø nominal (mm)	Copper weight (kg/km)
AWG 14	4.3	18.9
AWG 12	4.8	30.2
AWG 10	5.4	47.0
AWG 8	7.0	76.1
AWG 6	7.9	118.8
AWG 4	9.5	188.7
AWG 2	11.3	293.5
AWG 1/0	14.7	482.1
AWG 2/0	16.0	61.3
AWG 3/0	17.5	758.1
AWG 4/0	19.3	995.69

CABLE SPECIFICATION

Conductor	Flexible stranded copper
Cross section	From 18 AWG to 4/0 AWG
Insulation	PVC UL
Core identification	Coloured
Shield (optional)	Copper braid 85% coverage
Sheath	PVC

TECHNICAL DATA

Minimum bending radius	10 x outer diameter
Working temperature	-20°C ÷ 90°C
Max conductor resistance	UL1063
Rated voltage	600 V LISTED 1000 V - 2000 V version available on request

REFERENCE STANDARDS

Construction	NEC Art. 310, UL 1063
CE Directives Low Voltage	2014/35/UE
CE Directive (EMC) Electromagnetic compatibility	2014/30/UE
Flame retardant	EN 50265-1-2 - IEC 60332-1-2 - UL 1277 and VW-1 - CSA FT1 and FT4
Hydrocarbons and oil resistance	UL 1581 - UL 1277 Oil Resistance I and Oil Resistant II - IEC 60811-2-1
Water resistance	UL 1581
Ozone resistance	IEC 60811-2-1

ON REQUEST

UV resistance

LISTED

MTW UNSHIELDED

N. Cond. x Section	ø nominal (mm)	Copper weight (kg/km)
FR(3GAWG18)R	8.6	24.9
FR(4GAWG18)R	9.4	33.2
FR(5GAWG18)R	10.2	41.5
FR(7GAWG18)R	11.2	58.1
FR(12GAWG18)R	15.2	99.6
FR(25GAWG18)R	17.6	149.4
FR(25GAWG18)R	22.0	207.5
FR(3GAWG16)R	9.4	38.9
FR(4GAWG16)R	10.2	51.9
FR(5GAWG16)R	11.1	64.8
FR(7GAWG16)R	12.2	90.8
FR(12GAWG16)R	16.5	155.6
FR(25GAWG16)R	19.3	233.4
FR(25GAWG16)R	24.2	324.2
FR(3GAWG14)R	10.2	61.9
FR(4GAWG14)R	11.2	82.6
FR(7GAWG14)R	13.4	144.6
FR(3GAWG14)R	11.3	98.0
FR(4GAWG14)R	12.4	130.6
FR(7GAWG14)R	14.9	228.6
FR(4GAWG10)R	15	203.7
FR(4GAWG8)R	18.4	334.5
FR(4GAWG6)R	24.7	529.4
FR(4GAWG4)R	29.5	964.1
FR(4GAWG2)R	31.5	1342.8

MTW SHIELDED

N. Cond. x Section	ø nominal (mm)	Copper weight (kg/km)
FR(3GAWG18)ST/R	9	43.8
FR(4GAWG18)ST/R	9.8	54.3
FR(5GAWG18)ST/R	10.8	76.9
FR(7GAWG18)ST/R	11.8	97.4
FR(12GAWG18)ST/R	15.8	154.5
FR(25GAWG18)ST/R	18.2	214.1
FR(25GAWG18)ST/R	22.6	289.2
FR(3GAWG16)ST/R	10	73.4
FR(4GAWG16)ST/R	10.8	89.4
FR(5GAWG16)ST/R	11.8	104.3
FR(7GAWG16)ST/R	12.8	135.3
FR(12GAWG16)ST/R	17.2	215.7
FR(25GAWG16)ST/R	20	304.7
FR(25GAWG16) ST/R	24.8	412.3
FR(3GAWG14) ST/R	10.8	99.4
FR(4GAWG14)ST/R	11.8	129.1
FR(7GAWG14)ST/R	14	195.8
FR(3GAWG14)ST/R	12	138.9
FR(4GAWG14) ST/R	13	176
FR(7GAWG14)ST/R	15.5	284.4
FR(4GAWG10)ST/R	15.6	259.3
FR(4GAWG8)ST/R	19	402.3
FR(4GAWG6) ST/R	25.5	656.3
FR(4GAWG4)ST/R	30.4	1114.8
FR(4GAWG2)ST/R	32.4	1500.3

CABLE SPECIFICATION

Conductor	Flexible stranded copper
Cross section	From 18 AWG to 4/0 AWG
Insulation	PVC UL + Transparent Nylon skin UL
Core identification	Coloured
Shield (optional)	Copper braid 85% coverage
Sheath	PVC

TECHNICAL DATA

Minimum bending radius	10 x outer diameter
Working temperature	-20°C ÷ 90°C
Max conductor resistance	UL1063 - UL1777
Rated voltage	600 V LISTED 1000 V - 2000 V version available on request

REFERENCE STANDARDS

Construction	NEC Art. 310
CE Directives Low Voltage	2014/35/UE
CE Directive (EMC) Electromagnetic compatibility	2014/30/UE
Flame retardant	EN 50265-1-2 - IEC 60332-1-2 - UL 1277 and VW-1 - CSA FT1 and FT4
Hydrocarbons and oil resistance	UL 1581 - UL 1277 Oil Resistance I and Oil Resistant II - IEC 60811-2-1
Water resistance	UL 1581
Ozone resistance	IEC 60811-2-1

ON REQUEST

UV resistance

LISTED

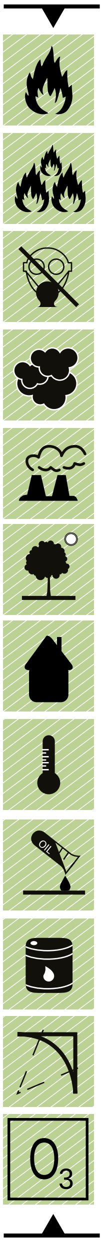
TC-ER UNSHIELDED

N. Cond. x Section	ø nominal (mm)	Copper weight (kg/km)
FR(3GAWG18)R	7.6	24.9
FR(4GAWG18)R	8.3	33.2
FR(5GAWG18)R	9	41.5
FR(7GAWG18)R	9.7	58.1
FR(12GAWG18)R	12.4	100
FR(25GAWG18)R	15.2	140.4
FR(25GAWG18)R	18	207.5
FR(3GAWG16)R	8.4	38.9
FR(4GAWG16)R	9.2	51.9
FR(5GAWG16)R	10	64.9
FR(7GAWG16)R	10.7	90.8
FR(12GAWG16)R	14.7	155.6
FR(25GAWG16)R	16.9	233.5
FR(25GAWG16)R	20.1	324.3
FR(3GAWG14)R	9.3	61.9
FR(4GAWG14)R	10.2	82.9
FR(7GAWG14)R	11.9	144.6
FR(3GAWG14)R	10.4	97.8
FR(4GAWG14)R	11.3	130.6
FR(7GAWG14)R	14.2	229.6
FR(4GAWG10)R	14.5	203.6
FR(4GAWG8)R	18.1	334.5
FR(4GAWG6)R	22.8	590
FR(4GAWG4)R	28.2	964.1
FR(4GAWG2)R	30.8	1342.8

TC-ER SHIELDED

N. Cond. x Section	ø nominal (mm)	Copper weight (kg/km)
FR(3GAWG18)ST/R	8	40.6
FR(4GAWG18)ST/R	8.7	51.2
FR(5GAWG18)ST/R	9.4	61.8
FR(7GAWG18)ST/R	10.2	79.4
FR(12GAWG18)ST/R	13	143.8
FR(25GAWG18)ST/R	15.8	203.4
FR(25GAWG18)ST/R	18.6	272.7
FR(3GAWG16)ST/R	8.8	56.9
FR(4GAWG16)ST/R	9.6	72.4
FR(5GAWG16)ST/R	10.4	85.9
FR(7GAWG16)ST/R	11.2	114.6
FR(12GAWG16)ST/R	15.3	209.5
FR(25GAWG16)ST/R	17.5	294.6
FR(25GAWG16) ST/R	20.9	428.7
FR(3GAWG14) ST/R	9.7	82.5
FR(4GAWG14)ST/R	10.6	105.8
FR(7GAWG14)ST/R	12.5	186.1
FR(3GAWG14)ST/R	11	132.4
FR(4GAWG14) ST/R	11.9	171.3
FR(7GAWG14)ST/R	14.8	278.2
FR(4GAWG10)ST/R	15.1	257.2
FR(4GAWG8)ST/R	18.7	400
FR(4GAWG6) ST/R	23.6	700
FR(4GAWG4)ST/R	29.2	1140.2
FR(4GAWG2)ST/R	31.8	1544.9

ON REQUEST



CABLE SPECIFICATION

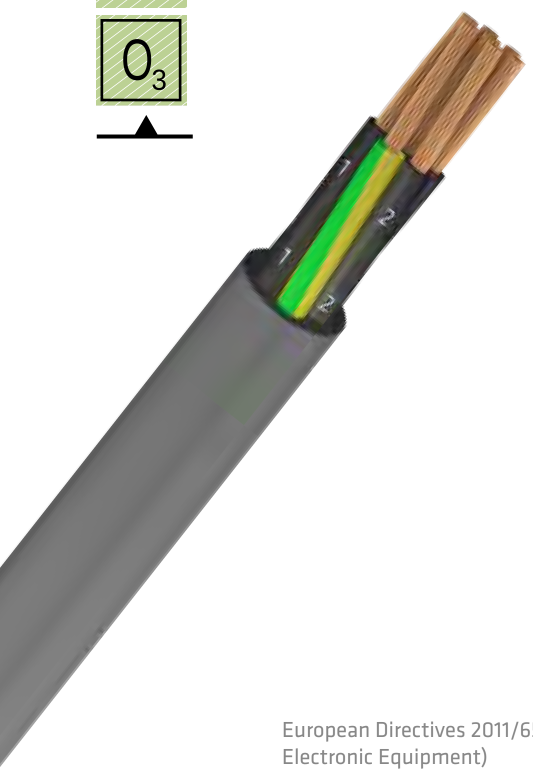
Conductors	Bare Copper Conductor (IEC 60228 Class 5)
Insulation	PVC + Nylon Insulation, Type THHN UL83 Table 10 and 11 Section ≥ AWG14 or Type TFFN UL 66 Table 4.7 AWG18 ÷AWG16 Colour Black Numbered + Yellow/Green
Pairs only type SERVO (if required)	2 cores twisted (Colour Pairs : Black Numbered 5÷6 and 7÷8) + Plastic Tape Shield Tinned Copper Braid – Coverage ≥ 85% Plastic Tape wrapped
Overall Shield (if required)	Shield Tinned Copper Braid – Coverage ≥ 85%
Outer jacket colour	PVC Sheath, UL 1277 T - Chapter 12.1 Grey Ral 7040 *(other colours available upon request)*

TECHNICAL DATA

Electrical Resistance at 20°C	IEC 60228 Class 5
Insulation Resistance at 20°C	≥ 20 MΩxkm
Operating Voltage	600 V
Test Voltage	3 kVa.c.
Temperature Range	-25°C ÷ +90°C (Fixed Use)
Bending Radius	5 x Ø (Fixed Use)

REFERENCE STANDARDS

Flame retardant	EN 50265-1-2 - IEC 60332-1-2 - UL 1277 and VW-1 - CSA FT1 and FT4
Hydrocarbons and oil resistance	UL 1581 - UL 1277 Oil Resistance I and Oil Resistant II - IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Standard Reference	UL Type TC-ER 90°C 600V and CSA Type CIC 90°C 600V UL Type MTW UL Recognized
Ozone resistance	IEC 60811-2-1



ON REQUEST

	UV resistance

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TRAY CABLES MULTICORE UNSHIELDED

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
FR(2 x AWG18)R	7.3	17	79
FR(3 G AWG18)R	7.6	25	91
FR(4 G AWG18)R	8.3	33	108
FR(5 G AWG18)R	9	42	130
FR(7 G AWG18)R	9.7	58	156
FR(9 G AWG18)R	11.5	75	199
FR(12 G AWG18)R	12.4	100	240
FR(18 G AWG18)R	15.2	149	370
FR(25 G AWG18)R	18	208	497
FR(34 G AWG18)R	22	226	651
FR(41 G AWG18)R	23.2	340	854
FR(3 G AWG16)R	8.4	39	117
FR(4 G AWG16)R	9.2	52	140
FR(5 G AWG16)R	10	65	166
FR(7 G AWG16)R	10.7	91	207
FR(12 G AWG16)R	14.7	156	352
FR(18 G AWG16)R	16.9	233	495
FR(25 G AWG16)R	20.1	324	664
FR(41 G AWG16)R	26	532	1103
FR(3 G AWG14)R	9.3	62	154
FR(4 G AWG14)R	10.2	83	188
FR(5 G AWG14)R	11	103	226
FR(7 G AWG14)R	11.9	145	281
FR(12 G AWG14)R	16.4	248	481
FR(18 G AWG14)R	19.2	372	695
FR(25 G AWG14)R	23.5	516	984
FR(3 G AWG12)R	10.4	98	207
FR(4 G AWG12)R	11.3	131	253
FR(5 G AWG12)R	12.4	163	312
FR(7 G AWG12)R	14.2	229	419
FR(4 G AWG10)R	14.5	204	402
FR(5 G xAWG10)R	15.8	255	491
FR(12 G AWG10)R	23.6	611	1050
FR(4 G AWG8)R	18.1	334	651
FR(5 G xAWG8)R	19.8	418	801
FR(4 G AWG6)R	22.8	589	1066
FR(4 G AWG4)R	28.2	964	1661
FR(4 G AWG2)R	30.8	1343	2164
FR(4 G AWG1/0)R	36.8	1756	3002
FR(4 G AWG2/0)R	51.8	2846	5327

TRAY CABLES MULTICORE SHIELDED

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
FR(3 G AWG18)ST/R	8	41	103
FR(4 G AWG18)ST/R	8.7	51	124
FR(5 G AWG18)ST/R	9.4	62	149
FR(7 G AWG18)ST/R	10.2	79	178
FR(12 G AWG18)ST/R	13	144	284
FR(18 G AWG18)ST/R	15.8	203	426
FR(25 G AWG18)ST/R	18.6	273	566
FR(3 G AWG16)ST/R	8.8	57	129
FR(4 G AWG16)ST/R	9.6	72	155
FR(5 G AWG16)ST/R	10.4	87	184
FR(7 G AWG16)ST/R	11.2	115	228
FR(12 G AWG16)ST/R	15.3	210	406
FR(18 G AWG16)ST/R	17.5	295	556
FR(25 G AWG16)ST/R	20.9	429	771
FR(3 G AWG14)ST/R	9.7	83	164
FR(4 G AWG14)ST/R	10.6	106	203
FR(5 G AWG14)ST/R	11.6	142	258
FR(7 G AWG14)ST/R	12.5	186	315
FR(18 G AWG14)ST/R	20	465	822
FR(25 G AWG14)ST/R	24.5	630	1112
FR(3 G AWG12)ST/R	11	132	227
FR(4 G AWG12)ST/R	11.9	171	281
FR(7 G AWG12)ST/R	14.8	278	459
FR(4 G AWG10)ST/R	15.1	257	433
FR(4 G AWG8)ST/R	18.7	400	669
FR(4 G AWG6)ST/R	23.6	699	1166
FR(4 G AWG4)ST/R	29.2	1140	1814
FR(4 G AWG2)ST/R	31.8	1545	2323

TRAY CABLES MULTICORE SERVO

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
FR[4GAWG18 + (2xAWG18)ST]ST/R	11.6	88	198
FR[4GAWG16 + (2xAWG18)ST]ST/R	12.4	125	251
FR[4GAWG14 + (2xAWG18)ST]ST/R	13.2	160	299
FR[4GAWG12 + (2xAWG16)ST]ST/R	15.3	227	414
FR[4GAWG10 + (2xAWG16)ST]ST/R	17.3	307	533
FR[4GAWG8 + (2xAWG16)ST]ST/R	20.8	480	816
FR[4GAWG6 + (2xAWG16)ST]ST/R	25.5	758	1242
FR[4GAWG4 + (2xAWG16)ST]ST/R	31	1195	1875
FR[4GAWG2 + (2xAWG16)ST]ST/R	35	1596	2455
FR[4GAWG16 + 2x(2xAWG18)ST]ST/R	15	166	347
FR[4GAWG14 + 2x(2xAWG18)ST]ST/R	15.7	200	393
FR[4GAWG12 + (2xAWG18)ST + (2xAWG16)ST]ST/R	17	266	486
FR[4GAWG10 + (2xAWG18)ST + (2xAWG16)ST]ST/R	19.4	377	647
FR[4GAWG8 + (2xAWG18)ST + (2xAWG16)ST]ST/R	23.4	515	974
FR[4GAWG6 + 2x(2xAWG16)ST]ST/R	27.5	840	1385

CABLE SPECIFICATION

Conductor	Flexible stranded aluminium
Cross section	From 12 AWG to 4/0 AWG
Insulation	Cross linked polyethylene
Core identification	Black

TECHNICAL DATA

Minimum bending radius	10 x outer diameter
Working temperature	-20°C ÷ 90°C
Max conductor resistance	UL1063
Rated voltage	600 V - 1000 V - 2000 V - 3000V

REFERENCE STANDARDS

Construction	NEC Art. 310, UL 1063
CE Directives Low Voltage	2014/35/UE
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water resistance	UL 1581
Ozone resistance	IEC 60811-2-1

SINGLE CORE CABLE - XLPE INSULATED

Section	ø nominal (mm)	Copper weight (kg/km)
AWG 12	4.8	9
AWG 10	5.4	14.2
AWG 8	7.0	23
AWG 6	7.9	36.5
AWG 4	9.5	57.3
AWG 2	11.3	89.1
AWG 1/0	14.7	146.2
AWG 2/0	16.0	185.1
AWG 3/0	17.5	230
AWG 4/0	19.3	301.8

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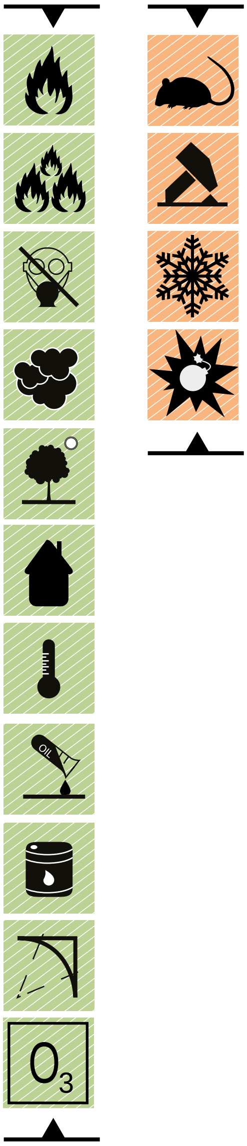


CABLE SPECIFICATION

Conductors	CEI 20-29 Class 5 – IEC 60228 Class 5 – VDE 0295 Class 5
Insulation	PVC Y (UL-CSA Standards)
Core identification	Black Numbered + Yellow/Green
Overall Shield	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Sheath	PVC Y (UL-CSA Standards)
Outer jacket colour	Grey Ral 7040 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	300 V Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) 1000 V Cross-sectional area ≥ 1.0mm² (AWG18)
Test voltage	2000V a.c. Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) 3000V a.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-20°C ÷ +80°C (Static Installation)
Bending Radius Static Installation	5 x Ø

REFERENCE STANDARDS

Main standards	UL 90°C 300V – CSA AWM I/II A/B 90°C 300V, Cross-sectional area 0.5mm² (AWG21) ÷ 1.0mm² (AWG18) UL 80°C 1000V – CSA AWM I/II A/B 80°C 1000V, Cross-sectional area ≥ 1.0mm² (AWG18)
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-2-1
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

ON REQUEST

Outer jacket	LSZH sheated

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

UNSHIELDED MULTICORE CONTROL CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x0.50mm²	5.3	11	42.8
3x0.50mm²	5.4	15	51.2
4x0.50mm²	5.9	23	61.8
5x0.50mm²	6.1	25	72.6
7x0.50mm²	6.6	40	93.4
12x0.50mm²	8	58	147
18x0.50mm²	9.3	103	216
25x0.50mm²	11	143	288
34x0.50mm²	12.4	165	379
41x0.50mm²	14	197	435

UNSHIELDED MULTICORE CONTROL CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x1mm²	5.7	19	51.7
3x1mm²	5.9	29	62.6
4x1mm²	6.5	38	75.1
5x1mm²	7.1	48	90.2
7x1mm²	8.2	67	117
12x1mm²	10	116	186
18x1mm²	11.5	173	272
25x1mm²	14.2	240	315
34x1mm²	16.2	327	493
41x1mm²	17.6	394	577

SHIELDED MULTICORE CONTROL CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x0.50mm²	5.4	30	50.1
3x0.50mm²	5.8	39	61.5
4x0.50mm²	6.3	46	83.5
5x0.50mm²	6.5	54	94.7
7x0.50mm²	7	70	118
12x0.50mm²	8.4	106	181
18x0.50mm²	10	153	253
25x0.50mm²	11.3	202	330
34x0.50mm²	13	277	458
41x0.50mm²	14.6	328	549

SHIELDED MULTICORE CONTROL CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x1mm²	6.1	42	58.8
3x1mm²	6.3	56	82.7
4x1mm²	7	68	95.3
5x1mm²	7.5	79	114
7x1mm²	8.6	99	143
12x1mm²	10.8	160	219
18x1mm²	12.2	250	315
25x1mm²	15	330	446
34x1mm²	17	450	581
41x1mm²	18.5	530	659

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x1.5mm²	6.7	29	68.8
3x1.5mm²	7.2	43	85
4x1.5mm²	7.8	58	104
5x1.5mm²	8.6	72	124
7x1.5mm²	9.4	101	162
12x1.5mm²	10.2	173	267
18x1.5mm²	14.5	260	384
25x1.5mm²	17.8	360	529
34x1.5mm²	20.2	490	709
41x1.5mm²	23.2	590	882

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x2.5mm²	8	48	93.4
3x2.5mm²	8.5	72	117
4x2.5mm²	9.2	96	145
5x2.5mm²	10.1	120	175
7x2.5mm²	11	168	231
12x2.5mm²	15	288	385
18x2.5mm²	18	432	554
25x2.5mm²	22	600	781

TK-WIND MULTICORE CONTROL AND POWER CABLE UNSHIELDED AND SHIELDED

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x4mm²	9	77	134
3x4mm²	9.5	116	171
4x4mm²	10.6	154	214
5x4mm²	11.8	192	263
7x4mm²	13	269	355

SHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x1.5mm²	7.2	57	83.9
3x1.5mm²	7.6	75	105
4x1.5mm²	8.2	91	126
5x1.5mm²	9.2	110	149
7x1.5mm²	10	140	192
12x1.5mm²	12.9	240	304
18x1.5mm²	15.2	345	446
25x1.5mm²	18.6	497	608
34x1.5mm²	21	650	843
41x1.5mm²	24.2	720	998

SHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x2.5mm²	8.5	100	107
3x2.5mm²	9	120	138
4x2.5mm²	9.9	160	167
5x2.5mm²	10.7	190	204
7x2.5mm²	11.6	261	260
12x2.5mm²	15.8	311	422
18x2.5mm²	18.6	472	635
25x2.5mm²	23	640	911

SHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
2x4mm²	9.6	110	134
3x4mm²	10.2	165	193
4x4mm²	11.2	230	238
5x4mm²	12.4	280	288
7x4mm²	13.6	360	385

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x6mm²	13.6	230	327
5x6mm²	14.8	288	395
7x6mm²	18.2	403	533

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x10mm²	16.7	384	527
5x10mm²	18.8	480	645
7x10mm²	23.5	672	882

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x16mm²	20.4	615	857
5x16mm²	22.7	768	1041
7x16mm²	28	1076	1385

UNSHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x25mm²	25.2	960	1315
4x35mm²	30.5	1344	1865
4x50mm²	36.6	1920	2866
4x70mm²	39.4	2688	3561
4x95mm²	45.6	3650	4713

SHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight kg/km)
4x6mm²	14.2	282	352
5x6mm²	15.5	340	408
7x6mm²	19.2	450	573

SHIELDED MULTICORE CONTROL AND POWER CABLES

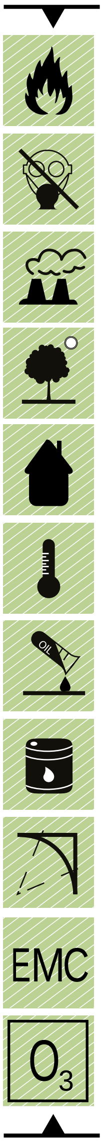
Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x10mm²	18.6	485	566
5x10mm²	19.6	562	697
7x10mm²	24.5	796	985

SHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x16mm²	21.5	723	858
5x16mm²	23.5	889	1086
7x16mm²	29	1240	1439

SHIELDED MULTICORE CONTROL AND POWER CABLES

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4x25mm²	26.2	1090	1442
4x35mm²	31.8	1536	2046
4x50mm²	37.6	2381	3073
4x70mm²	40.5	2921	3801
4x95mm²	46.8	3950	4992



ON REQUEST

CABLE SPECIFICATION

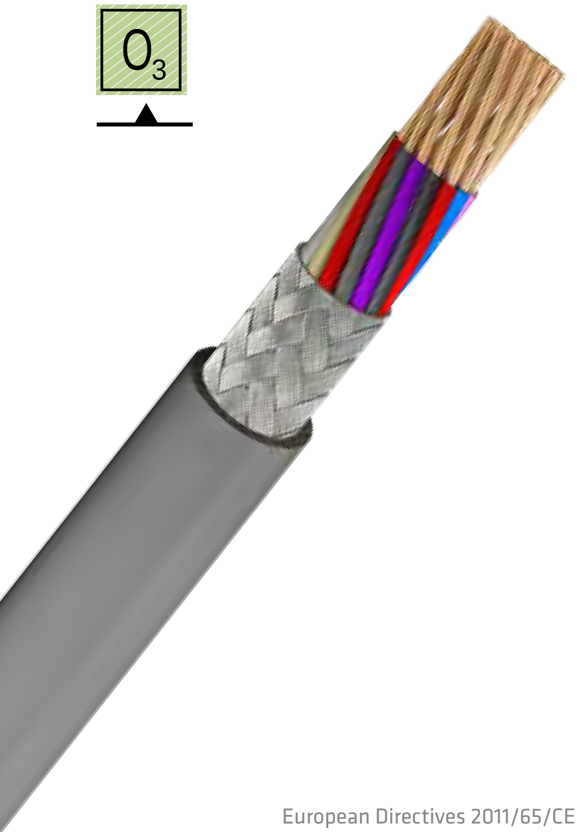
Conductors	CEI 20-29 Class 5 – IEC 60228 Class 5 – VDE 0295 Class 5
Insulation	PVC Y (UL-CSA Standards)
Core identification	DIN 47100
Overall Shield	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Sheath	PVC Y (UL-CSA Standards)
Outer jacket colour	Grey Ral 7040 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	300 V
Test voltage	2000 V a.c.
Temperature range	-20°C ÷ +80°C (Static Installation)
Bending Radius Static Installation	5 x Ø

REFERENCE STANDARDS

Main standards	UL 90°C 300V – CSA AWM I/II A/B 90°C 300V, Cross-sectional area ≤ 0,50mm² (AWG21)
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-2-1
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



ON REQUEST

	UV resistance

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND MULTIPAIR CONTROL AND SIGNAL CABLE UNSHIELDED AND SHIELDED

SHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
$2x2x0.25mm^2$	6	23	45.7
$3x2x0.25mm^2$	6.4	28	55.1
$4x2x0.25mm^2$	6.8	38	72.2
$6x2x0.25mm^2$	8.2	52	96.2
$8x2x0.25mm^2$	9.4	65	116
$10x2x0.25mm^2$	10.4	75	137
$12x2x0.25mm^2$	10.9	89	156
$16x2x0.25mm^2$	12.1	108	189

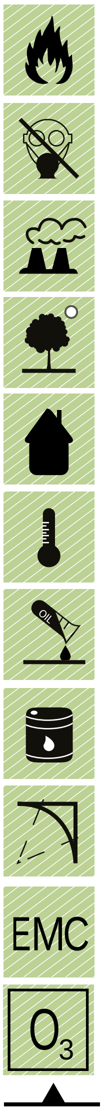
UNSHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
$2x2x0.35mm^2$	7	28	54.7
$3x2x0.35mm^2$	7.3	42	76.5
$4x2x0.35mm^2$	7.9	49	88.7
$6x2x0.35mm^2$	9.4	68	119.1
$8x2x0.35mm^2$	10.6	83	143
$10x2x0.35mm^2$	12	102	173
$12x2x0.35mm^2$	12.6	120	198
$16x2x0.35mm^2$	14	147	257

UNSHIELDED MULTICORE CONTROL AND SIGNAL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
$2x2x0.50mm^2$	7.8	45	79.3
$3x2x0.50mm^2$	7.9	58	103
$4x2x0.50mm^2$	8.5	73	118
$6x2x0.50mm^2$	10.4	101	160
$8x2x0.50mm^2$	11.4	124	194
$10x2x0.50mm^2$	13.2	150	236

ON REQUEST



CABLE SPECIFICATION

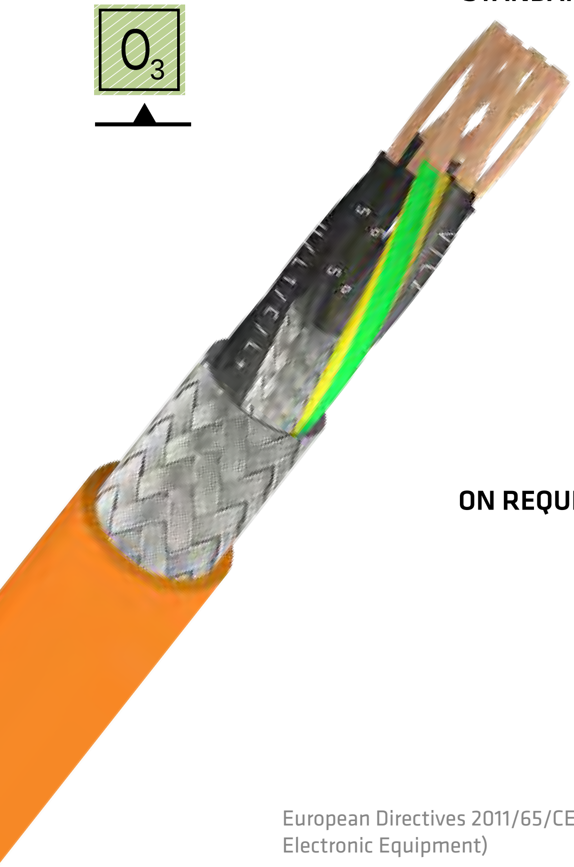
Conductors	CEI 20-29 Class 5 – IEC 60228 Class 5 – VDE 0295 Class 5
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered U/L1/C/L+, V/L2, W/L3/D/L-, Yellow/Green
Pairs Identification (where request)	One pair: black, white. Two pairs: Black Numbered 5÷6 and Black Numbered 7÷8
Pairs Shield	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Overall Shield	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Sheath	PVC (UL-CSA Standards)
Outer jacket colour	Orange Ral 2003 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000 V Cross-sectional area ≥ 1.0mm² (AWG18)
Test voltage	4000 V a.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-20°C ÷ +80°C
Bending Radius Static Installation	5 x Ø

REFERENCE STANDARDS

Main standards	UL75, UL1581, UL 80°C 1000V – CSA AWM I/II A/B 80°C 1000V Cross-sectional area ≥ 1.0mm² (AWG18)
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Ozone resistance	IEC 60811-2-1
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility



ON REQUEST

Outer jacket	LSZH sheated

ON REQUEST

UV resistance

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND SERVOMOTOR POWER CABLE SHIELDED 0.6/1KV

SERVO CABLES 80°C 1000V

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G1.5 H2	8.4	83	131
4G2.5 H2	10.6	130	198
4G4 H2	11.5	193	276
4G6 H2	13.2	275	376
4G10 H2	16.5	440	567
4G16 H2	21.2	705	885
4G25 H2	25	1003	1314
4G35 H2	31.8	1514	2146
4G50 H2	37.6	2168	2992

SERVO CABLES 80°C 1000V

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4G1.5 + (2x1.5) H2]H2	11.6	149	221
[4G2.5 + (2x1.5) H2]H2	13	192	264
[4G4 + (2x1.5) H2]H2	14.3	255	315
[4G6 + (2x1.5) H2]H2	15.8	339	480
[4G10 + (2x1.5) H2]H2	18.5	526	774
[4G16 + (2x1.5) H2]H2	23.6	773	1043
[4G25 + (2x1.5) H2]H2	28.5	1190	1567
[4G35 + (2x1.5) H2]H2	32.4	1590	1978
[4G50 + (2x1.5) H2]H2	37.6	2230	2766

SERVO CABLES 80°C 1000V

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4G1 + 2x(2x0.75) H2]H2	12	135	216
[4G1.5 + 2x(2x0.75) H2]H2	12.6	154	259
[4G2.5 + 2x(2x1) H2]H2	14.2	210	320
[4G4 + (2x1) + (2x1.5) H2]H2	15.8	287	439
[4G6 + (2x1) + (2x1.5) H2]H2	17.5	370	594
[4G10 + (2x1) + (2x1.5) H2]H2	20.5	570	845
[4G16 + 2x (2x1.5) H2]H2	26	830	1231
[4G25 + 2x (2x1.5) H2]H2	28.8	1213	1615
[4G35 + 2x (2x1.5) H2]H2	32.8	1598	2022

TK-WIND HYBRID CABLE

TOWER

PARK

ON REQUEST

CABLE SPECIFICATION

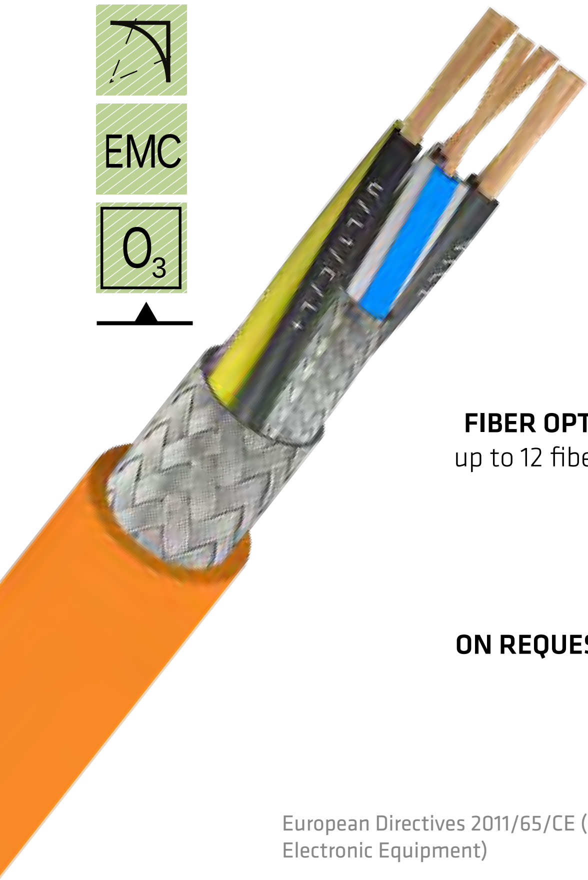
Conductors	CEI 20-29 Class 5 – IEC 60228 Class 5 – VDE 0295 Class 5
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered U/L1/C/L+, V/L2, W/ L3/D/L-, Yellow/Green
Pairs Identification (where request)	One pair: blue, white. Two pairs: black, white and blue, white
Pairs Shield (where request)	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Overall Shield	Tinned Copper Coverage ≥ 85% according to EMC 89/336 ©
Sheath	PVC (UL-CSA Standards)
Outer jacket colour	Orange Ral 2003 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000 V Cross-sectional area ≥ 1.0mm² (AWG18)
Test voltage	4000 V a.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-20°C ÷ +80°C
Bending Radius Static Installation	5 x Ø

REFERENCE STANDARDS

Main standards	UL 80°C 1000V – CSA AWM I/II A/B 80°C 1000V
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility
Ozone resistance	IEC 60811-2-1



FIBER OPTIC
up to 12 fibers

Optical core	Jelly filled loose tube (PBTP)
Fiber colour code	See table A
Protection	Longitudinal glass or aramidic yarns
Outer sheath	Halogen free SHF1 ø 0.35mm

ON REQUEST

Outer jacket	LSZH sheated

ON REQUEST

UV resistance

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

DSL

Description	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
[4G1.5 + (2XAWG22)H2/H]H2	11.5	111	193
[4G1.5 + (2X0,75)H2 + (2XAWG22)H2/H]H2	13.1	143	236
[4G2.5 + (2X1)H2 + (2 XAWG22)H2/H]H2	14.3	194	297

Also available with additional optical cable.

...guaranteed up to 100 m...

TK-WIND/TK-SUN LAN S/FTP CAT 6A_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

Conductors	Stranded Bare Copper 23 AWG
Insulation	Cellular Polyolefin
Core identification	1. White – Blue 2. White – Orange 3. White – Green 4. White – Brown
Individual pairs shield	Alluminium/polyester tape
Overall shield	Tinned Copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	8,6 mm

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	≤ 69,5 Ω/km
Nominal capacitance	55 pF/m
Characteristic Impedance	@ 100 MHz: 100 ± 5 Ω

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-24
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C

ON REQUEST

Outer jacket	PVC sheathed and PE Sheath

ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Corrugated steel tape (H9)
Outer diameter	12mm

Transmission Characteristics Category 6A (IEC 61156-6)

Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	250	500
Maximum Attenuation	**dB/100**	3.12	5.70	8.89	11.23	12.57	15.75	22.48	28.70	36.13	41.36	46.60	67.89
Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	250	500
Minimum Return Loss	**dB**		23.01	25.00	25.00	25.00	23.33	20.74	18.99	17.35	16.40	15.60	15.60
Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	250	500
Minimum NEXT	**dB**	75.30	66.27	60.30	57.24	55.78	52.88	48.36	45.30	42.45	40.78	39.33	34.82
Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	250	500
Minimum PS-NEXT	**dB**	72.30	63.27	57.30	54.24	52.78	49.88	45.36	42.30	39.45	37.78	36.33	31.82

TK-WIND/TK-SUN LAN S/FTP CAT 7_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

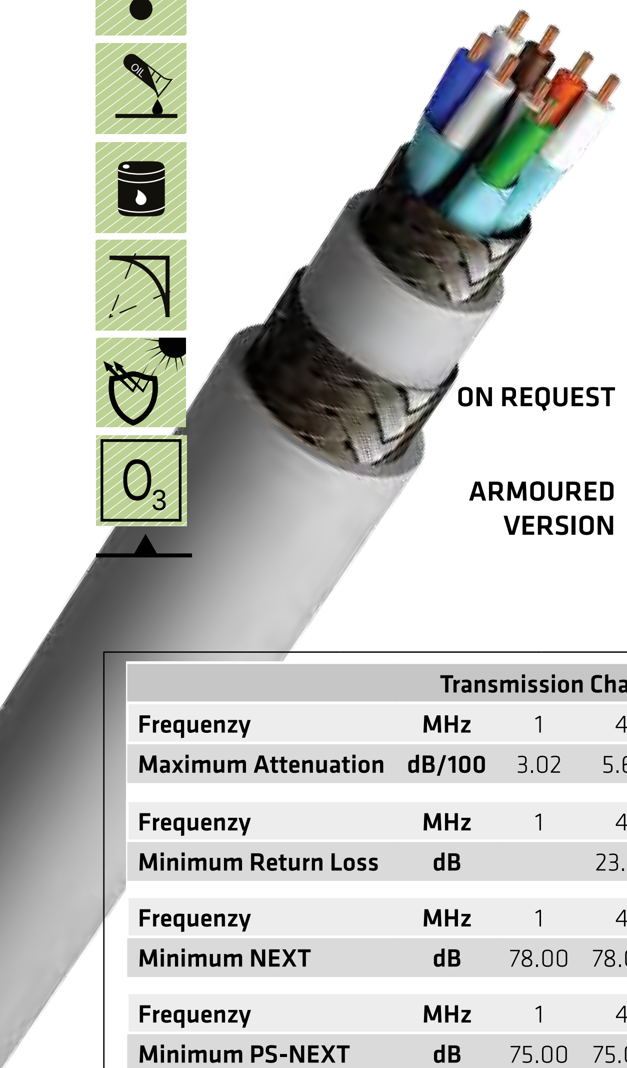
Conductors	Stranded Bare Copper 23 AWG
Insulation	Cellular Polyolefin
Core identification	1. White – Blue 2. White – Orange 3. White – Green 4. White – Brown
Individual pairs shield	Alluminium/polyester tape
Overall shield	Tinned Copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	8,6 mm

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	≤ 69,5 Ω/km
Nominal capacitance	55 pF/m
Characteristic Impedance	@ 100 MHz: 100 ± 5 Ω

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-24
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ON REQUEST

Outer jacket	PVC sheathed and PE Sheath

ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Corrugated steel tape (H9)
Outer diameter	12mm

Transmission Characteristics Category 7 (IEC 61156-6)

Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	300	600
Maximum Attenuation	**dB/100**	3.02	5.61	8.78	11.12	12.44	15.62	22.32	28.53	35.96	41.20	51.28	75.15
Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	300	600
Minimum Return Loss	**dB**		23.01	25.00	25.00	25.00	23.33	20.74	18.99	17.35	16.40	15.60	15.60
Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	300	600
Minimum NEXT	**dB**	78.00	78.00	78.00	78.00	78.00	78.00	75.46	72.40	69.55	67.88	65.24	60.73
Frequenzy	**MHz**	1	4	10	16	20	31.25	62.5	100	155	200	300	600
Minimum PS-NEXT	**dB**	75.00	75.00	75.00	75.00	75.00	75.00	72.46	69.40	66.55	64.88	62.24	57.73

TK-WIND/TK-SUN PROFIBUS PA_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

Conductors	Stranded Bare Copper 18 AWG
Insulation	Foam-Skin Polyolefin
Core identification	Green-Red
Shield	Alluminium/polyester tape + tinned copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	8.3 mm

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	≤ 21.5 Ω/km
Nominal capacitance	60 pF/m
Characteristic Impedance	@ 31.25 KHz: 100 ± 20 Ω
Nominal attenuation	@ 10 MHz: 2 dB/km @ 39 MHz: 3 dB/km @ 100KHz: 6 dB/km @ 1 KHz: 37 dB/km

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C

ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB) Corrugated steel tape (H9)
Outer diameter	11.7 mm

ON REQUEST

Outer jacket	PVC sheath

TK-WIND/TK-SUN PROFIBUS DP_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

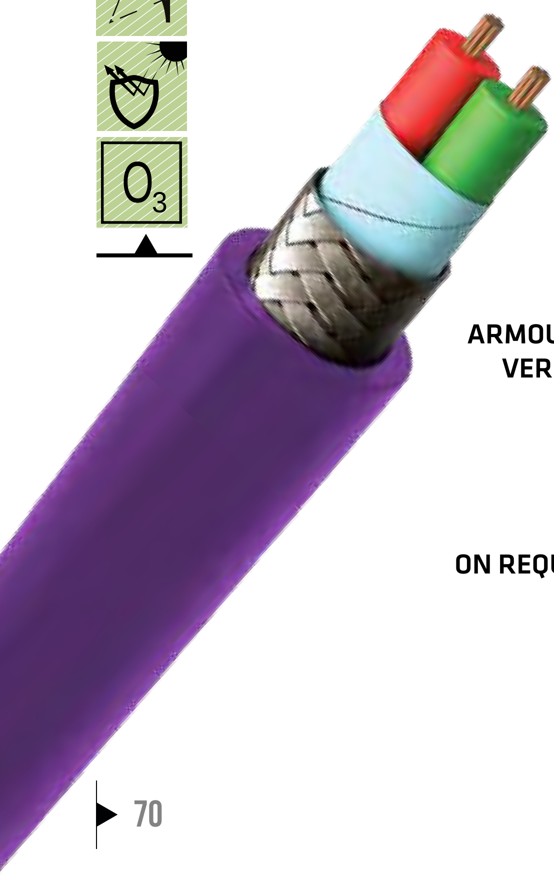
Conductors	Stranded Bare Copper 0,35 mm²
Insulation	Foam-Skin Polyolefin
Core identification	Green-Red (1 pair) Green- Blue; Red -Brown (2 pairs 4 cores laid in quad formation)
Shield	Alluminium/polyester tape + tinned copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	8.6 mm — SHF1 - SHF2 (1 pair) 9.5 mm — SHF1 - SHF2 (2 pairs)

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1)
Conductor resistance	≤ 55 Ω/km
Nominal capacitance	30 pF/m
Characteristic Impedance	@ 3 ÷ 20 MHz: 150 ± 15 Ω @ 38,4 KHz: 185 ± 18,5 Ω @ 9,6 KHz: 250 ± 25 Ω
Nominal attenuation	@ 16 MHz: 45 dB/km @ 4 MHz: 22 dB/km @ 38,4KHz: 5 dB/km @ 9,6 KHz: 3 dB/km

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB) Corrugated steel tape (H9)
Outer diameter	1 pair: 12 mm 2 pairs: 13 mm

ON REQUEST

Outer jacket	PVC sheath

TK-WIND/TK-SUN CANBUS LSZH CABLE 1 PAIR_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

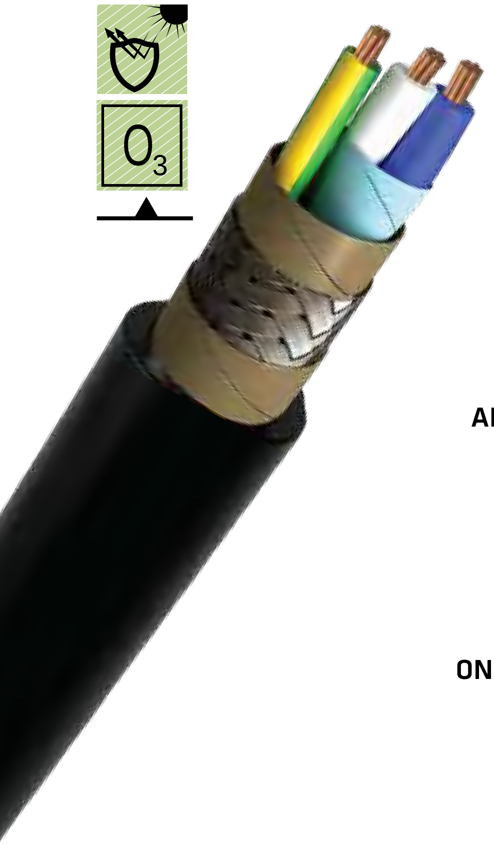
Conductors	Stranded bare copper 0,75 mm²
Insulation	Foam-Skin Polyolefin
Core identification	White - Blue
Individual pairs shield	Alluminium/polyester tape
Earth conductor	Stranded tinned copper Yellow/Green
Overall shield	Tinned Copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	11,5 mm

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	≤ 26 Ω/km (Bare copper) @ 20°C: ≤ 26,7 Ω/km (Tinned copper)
Nominal capacitance	40 pF/m
Characteristic Impedance	@ 1 MHz: 120 Ω ± 10%
Nominal attenuation	@ 1 MHz: 13,2 dB/km

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB) Corrugated steel tape (H9)
Outer diameter	15 mm

ON REQUEST

Outer jacket	PVC sheath

TK-WIND/TK-SUN CANBUS LSZH CABLE 2 AND 4 PAIRS_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

Conductors	Stranded bare copper 0,75 mm²
Insulation	Foam-Skin Polyolefin
Core identification	Green - Blue; Red - Brown (Colour code for 2 pairs 4 cores laid in quad formation) White - Blue; White - Orange; White - Orange; White - Brown (Colour code for 4 pairs cables)
Shield	Alluminium/polyester tape + Tinned copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	10.5 mm – 2 pairs (1 star quad) 15.5 mm – 4 pairs

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	≤ 26 Ω/km
Nominal capacitance	40 pF/m
Characteristic Impedance	@ 1 MHz: 120 Ω ± 10%
Nominal attenuation	@ 1 MHz: 13,2 dB/km

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (fSHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C

ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB) Corrugated steel tape (H9)
Outer diameter	2 pairs: 14 mm 4 pairs: 18.8 mm

ON REQUEST

Outer jacket	PVC sheath

TK-WIND/TK-SUN RS 485 LSZH CABLE_ARMOURED AND UNARMOURED - 20/24 AWG

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

Conductors	Stranded Tinned Copper 20/24 AWG
Insulation	Cellular Polyolefin
Core identification	White - Blue (Colour code for 1 pair cable) White – Blue; White - Orange (Colour code for 2 pairs 4 cores laid in quad formation) White – Blue; White - Orange, White - Orange; White - Brown (Colour code for 4 pairs cable)
Shield	Alluminium/polyester tape + Tinned copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR

Outer diameter

20 AWG	24 AWG	
8,8 mm	7 mm	1 pair SHF1
10,8 mm	9 mm	1 pair SHF2
9,4 mm	7.9 mm	2 pairs (1 star quad) SHF1
11,4 mm	9.8 mm	2 pairs (1 star quad) SHF2
-	10 mm	4 pairs SHF1
15,8 mm	12 mm	4 pairs SHF2

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	20 AWG: ≤ 33 Ω/km 24 AWG: ≤ 88 Ω/km
Nominal capacitance	42 pF/m
Characteristic Impedance	@ 1 MHz: 100 ÷ 130 Ω
Nominal attenuation	20 AWG: @ 1 MHz: 12 dB/km 24 AWG: @ 1 MHz: 20 dB/km

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C

ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB) Corrugated steel tape (H9)

Outer diameter

20 AWG	24 AWG
1 pair: 11,8 mm	1 pair: 10.1 mm
2 pairs: 12,5 mm	2 pairs: 11 mm
4 pairs: 16,8 mm	4 pairs: 13 mm

ON REQUEST

Outer jacket	PVC sheathed

TK-WIND RS 422 LSZH CABLE_ARMOURED AND UNARMOURED - 20/24 AWG

TOWER

PARK

NACELLE

ON REQUEST

CABLE SPECIFICATION

Conductors	Stranded Tinned Copper 20/24 AWG
Insulation	Polyolefin
Core identification	White - Blue (Colour code for 1 pair cable) White – Blue; White - Orange (Colour code for 2 pairs 4 cores laid in quad formation) White – Blue; White - Orange, White - Orange; White - Brown (Colour code for 4 pairs cable)
Shield	Alluminium/polyester tape + Tinned copper braid
Outer sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR

Outer diameter

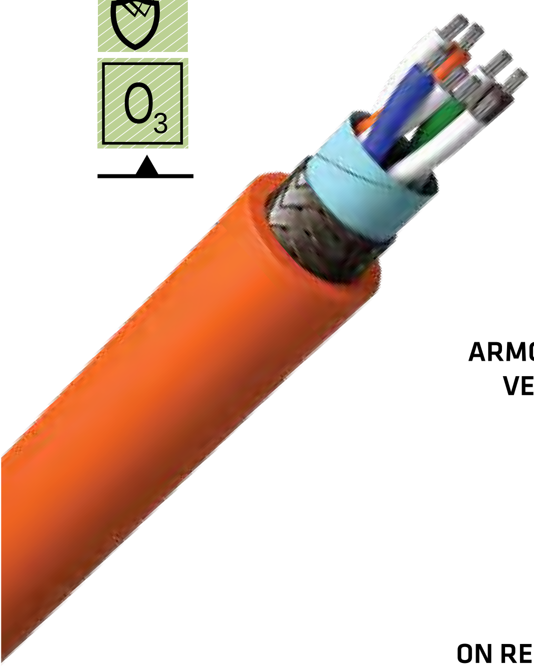
20 AWG	24 AWG	
8.8 mm	7 mm	1 pair SHF1
10.8 mm	8.8 mm	1 pair SHF2
9.4 mm	7.6 mm	2 pairs (1 star quad) SHF1
11.4 mm	9.5 mm	2 pairs (1 star quad) SHF2
13.8 mm	9.8 mm	4 pairs SHF1
15.8 mm	11.8 mm	4 pairs SHF2

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	20 AWG: ≤ 33 Ω/km 24 AWG: ≤ 88 Ω/km
Nominal capacitance	52 pF/m
Characteristic Impedance	@ 1 MHz: 100 ÷ 15 Ω
Nominal attenuation	20 AWG: @ 1 MHz: 16 dB/km 24 AWG: @ 1 MHz: 28 dB/km

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ARMOURED VERSION

Material
Galvanized steel wire braid (GSWB)
Tinned copper wire braid (TCWB)
Corrugated steel tape (H9)

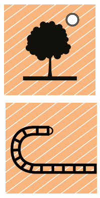
Outer diameter

20 AWG	24 AWG
1 pair: 11.8 mm	1 pair: 9.8 mm
2 pairs: 12.5 mm	2 pairs: 10.5 mm
4 pairs: 16.8 mm	4 pairs: 12.8 mm

ON REQUEST

Outer jacket	PVC sheath

ON REQUEST



OPTICAL CORE

Fiber Structure	Tight Buffer 600 µm or 900 µm Semitight Buffer 900 µm
Tight Colour Code	White, Red
Strain relief	Aramid yarns
Outer Sheath	Flame retardant, low smoke and halogen-free material

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE

Fire propagation	IEC 60332-1-2 IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

Outer jacket	PVC sheath

ON REQUEST

UV resistance
Ozone resistance

MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
1	2.0	5	200	250	5
1	3.0	8	200	400	8
2	1.6x3.2	7	300	200	5
2	2.0x4.0	10.5	400	250	5

Types mentioned here are standard. Other configurations available on request.

TK-WIND/TK-SUN MTB BREAKOUT_ARMOURED AND UNARMOURED

TOWER

PARK

NACELLE

ON REQUEST

OPTICAL CORE

Fiber Structure	White Tight Buffer Ø 0.9 mm
Strain relief	Aramid yarns
Sub unit Sheath	Numbered Halogen-free SHF1 Ø 2 mm
ASSEMBLING	
Outer Sheath	Halogen free SHF1 UVR Halogen free cross-linked SHF2 UVR
Outer diameter	2 fibers 6.5 mm 4 fibers 7.5 mm 8 fibers 10 mm 12 fibers 13 mm 16 fibers 12.5 mm 24 fibers 15.5 mm

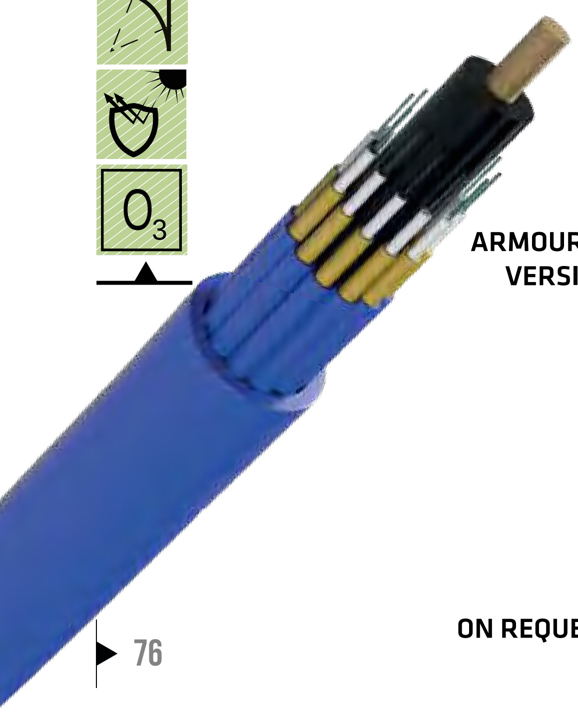
All cables are available with all type of fibers.

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Tensile performance (IEC 60794-1-21-E1)	500 N (Δα reversible) unarmoured cables 1500 N (Δα reversible) for armoured cables
Crush (IEC 60794-1-21-E3)	2000 N/100 mm (Δα reversible)
Impact (IEC 60794-1-21-E4)	20 J (Δα reversible)
Water penetration (IEC 60794-1-22-F5)	No water leakage (limited to inner sheath)

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB) Corrugated steel tape (H9)
Outer diameter	2 fibers 9.5 mm 4 fibers 11 mm 8 fibers 13.5 mm 12 fibers 16.5 mm 16 fibers 16 mm 24 fibers 19 mm

ON REQUEST

Outer jacket	Polyethilene

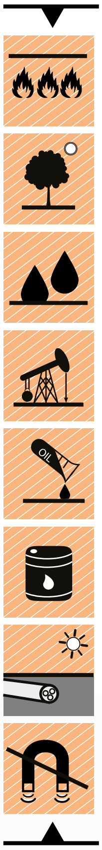
TK-WIND/TK-SUN MTBA ARMOURED BREAKOUT CABLES - LSZH

TOWER

PARK

NACELLE

ON REQUEST



OPTICAL CORE

Fiber Structure	Tight Buffer 900 µm Semitight Buffer 900 µm
Tight Colour Code	White
Strain relief	Aramid yarns
Sub unit Sheath	Numbered flame retardant, low smoke and halogen-free material Ø 2mm
Assembling	4 to 24 sub units
Inner Sheath	Flame retardant, low smoke and halogen-free material
Armouring	Galvanized steel wire braid (GSWB)
Outer Sheath	Flame retardant, low smoke and halogen-free material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 12 x outer diameter Dynamic: 18 x outer diameter

FIRE PERFORMANCE

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

Fire resistant
UV-Resistant
Water resistant
Ozone resistant
Oil resistant
Hydrocarbons resistant
Polyethylene sheath for direct burial
Fully dielectric

MAIN FEATURES

No. of Fiber	Nominal diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
4	11.0	180	1000	2000	20
6	12.0	200	1500	2000	20
8	13.8	230	2000	2000	20
12	16.5	300	2500	2000	20
16	16.0	280	3500	2000	20
24	19.0	350	4500	2000	20

Types mentioned here are standard. Other configurations available on request.

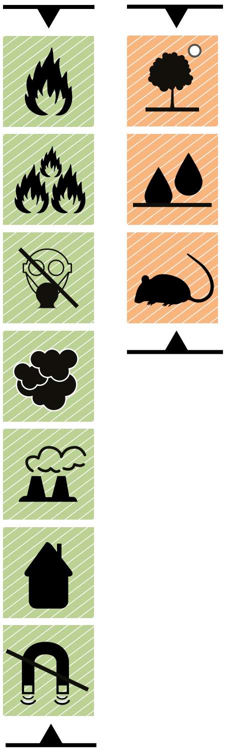
TK-WIND/TK-SUN MTD MULTI TIGHT DISTRIBUTION CABLES - LSZH

TOWER

PARK

NACELLE

ON REQUEST



OPTICAL CORE

Fiber Structure	Tight Buffer 900 µm Semitight Buffer 900 µm
Tight Colour Code	See table C
Assembling	2 to 24 fibers
Strain relief	Aramid/Glass yarns
Inner Sheath*	Flame retardant, low smoke and halogen-free material
Assembling	48 (4x12 inner sheath*) 96 fibers (8x12 inner sheath*)
Outer Sheath	Flame retardant, low smoke and halogen-free material

*Inner Sheath for 48/96 fibers.
All cables are available with all type of fibers.

TECHNICAL DATA

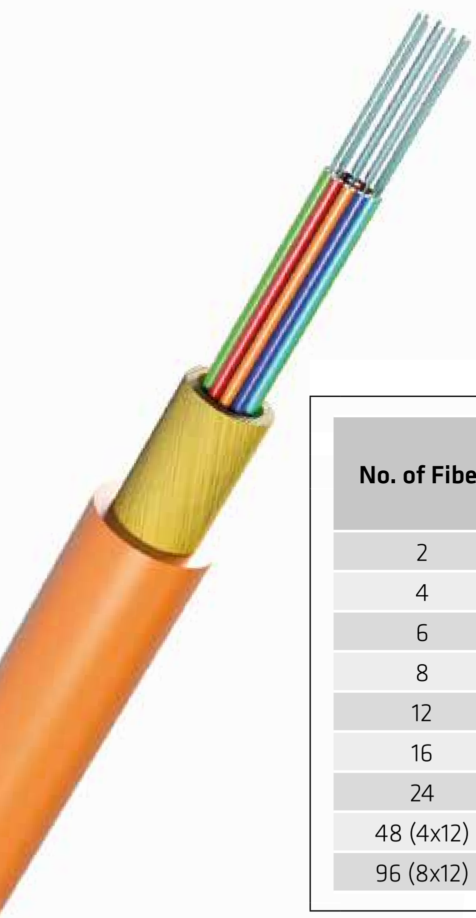
Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

UV-Resistant
Water resistant
Rodent resistant
Ozone resistant



MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2	4.8	20	500	2000	5
4	5.2	25	500	2000	5
6	6.0	30	500	2000	5
8	6.2	35	500	2000	5
12	6.7	45	750	2000	5
16	7.7	55	750	2000	5
24	8.5	70	1000	2000	5
48 (4x12)	19.0	300	3000	3000	15
96 (8x12)	26.5	630	5000	3000	15

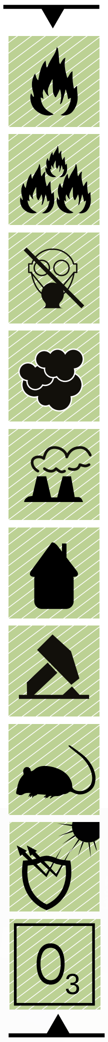
Types mentioned here are standard. Other configurations available on request.

TK-WIND/TK-SUN MTDA ARMOURED MULTI TIGHT DISTRIBUTION CABLES - LSZH

TOWER

PARK

NACELLE



ON REQUEST

OPTICAL CORE

Fiber Structure	Tight Buffer 900 µm Semitight Buffer 900 µm
Tight Colour Code	See table C
Assembling	4 to 24 fibers
Protection	Glass yarns
Inner Sheath	Flame retardant, low smoke and halogen-free material
Armouring	Galvanized steel wire braid (GSWB)
Outer Sheath	Flame retardant, low smoke and halogen-free material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-22
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes
Ozone resistance	IEC 60811-2-1

ON REQUEST

UV-Resistant
Water resistant
Ozone resistant
Oil resistant
Hydrocarbons resistant
Polyethylene sheath for direct burial
Fully dielectric

MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
4	8.5	100	1000	2000	25
8	9.4	115	1000	2000	25
12	10.3	140	1500	2000	25
24	12.1	180	2000	2000	25

Types mentioned here are standard. Other configurations available on request.

TK-WIND/TK-SUN VBBX UNITUBE CABLES

PARK

ON REQUEST

OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	Natural
Assembling	1 to 24 fibers
Outer Sheath	Polyethylene material UV-Resistant

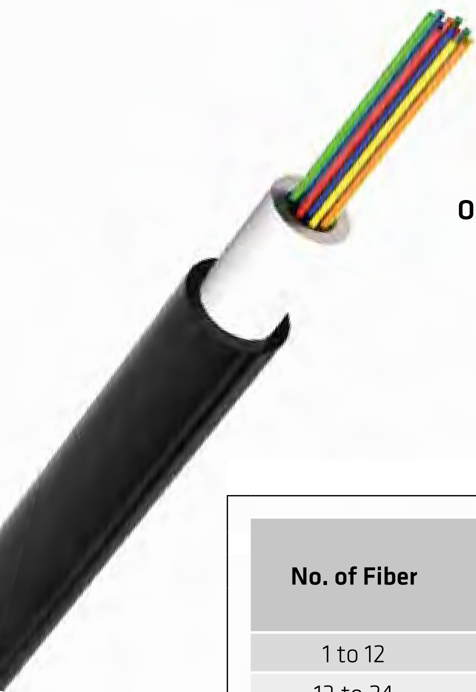
All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE

Ozone resistance	IEC 60811-2-1



ON REQUEST

Sheath	LSZH for indoor installation

MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
1 to 12	2.8	3.8	12	100	3
13 to 24	3.0	4	15	100	3

Types mentioned here are standard. Other configurations available on request.

OPTICAL CORE

Fiber Structure	Optical fiber 250 µm
Strain Relief	Aramid yarns
Sub unit Sheath	Flame retardant, low smoke and halogen-free material Ø 0.9 mm
Assembling	4 to 36 fibers
Inner Sheath*	Flame retardant, low smoke and halogen-free material
Assembling	72 (3x24 inner sheath*) 144 fibers (6x24 inner sheath*)
Outer Sheath	Flame retardant, low smoke and halogen-free material

*Inner Sheath for 72/144 fibers.
All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-10°C to + 60°C
Installation temperature	-0°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE

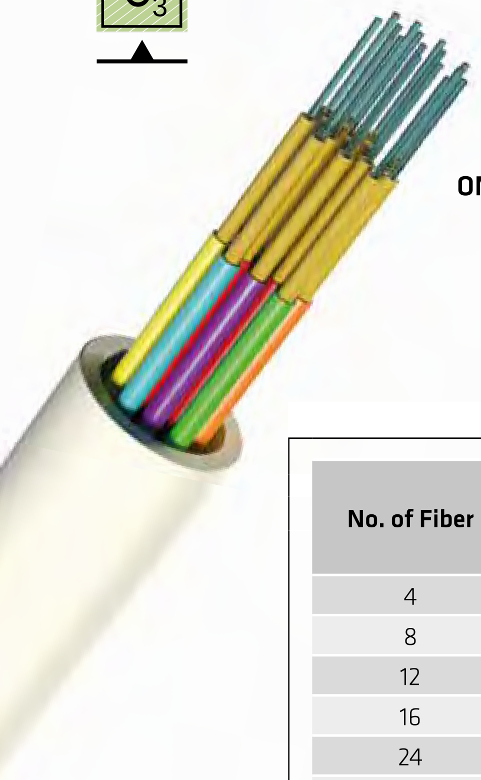
Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-25 Cat. D
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes
Ozone resistance	IEC 60811-2-1

ON REQUEST

Inner and Outer jacket	Polyethilene

ON REQUEST

UV resistance
Ozone resistance

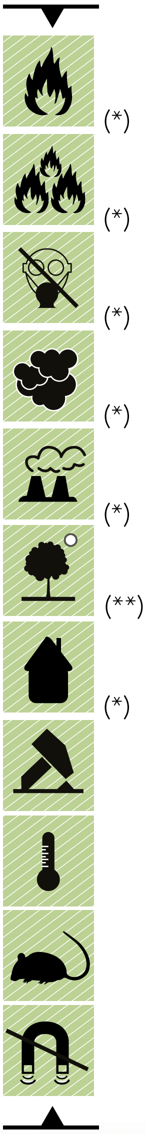


MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
4	4.0	20	400	500	3
8	5.0	28	400	500	3
12	6.0	30	500	500	5
16	7.0	50	500	500	5
24	8.0	67	500	500	5
36	9.5	95	500	500	5
72 (3X24)	19.5	320	1000	1000	10
144 (6X24)	26.5	560	1500	1000	10

Types mentioned here are standard. Other configurations available on request.

ON REQUEST



OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	Natural
Protection	Aramid/Glass yarns
Outer Sheath	Flame retardant, low smoke and halogen-free

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

Outer jacket	Polyethilene
	UV-Resistant
	Fire resistant
	Water resistant
	Oil resistant
	Hydrocarbons resistant

(*) Only for LSZH version
(**) Only for PE version

MAIN FEATURES ARAMID YARNS + LSZH SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	6.4	40	1500	2000	10
13 to 24	3.5	6.9	50	1500	2000	10

MAIN FEATURES GLASS YARNS + LSZH SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	7.0	55	2500	2000	10
13 to 24	3.5	8.0	65	2500	2000	10

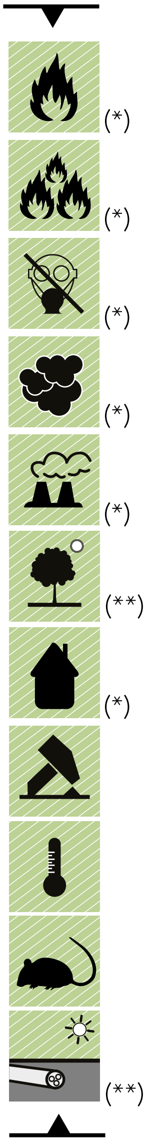
MAIN FEATURES ARAMID YARNS + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	6.4	35	1500	2000	10
13 to 24	3.5	6.9	45	1500	2000	10

MAIN FEATURES GLASS YARNS + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	7.0	45	2500	2000	10
13 to 24	3.5	8.0	55	2500	2000	10

Types mentioned here are standard. Other configurations available on request.



ON REQUEST

OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	Natural
Assembling	2 to 24 fibers
Protection	With or without Aramid/Glass yarns
Armouring	Corrugated and thermowelded steel tape (CST)
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

UV-Resistant
Fire resistant
Water resistant
Oil resistant
Hydrocarbons resistant

(*) Only for LSZH version
(**) Only for PE version

TK-WIND/TK-SUN UT9X ARMOURED UNITUBE CABLES

MAIN FEATURES CST + LSZH SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 24	3.5	9.0	95	750	2500	10

MAIN FEATURES CST + ARAMID YARNS + LSZH SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 24	3.5	9.0	110	1500	3000	15

MAIN FEATURES CST + GLASS YARNS + LSZH SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 24	3.5	10	140	3000	3500	20

MAIN FEATURES CST + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 24	3.5	9.0	55	750	2500	10

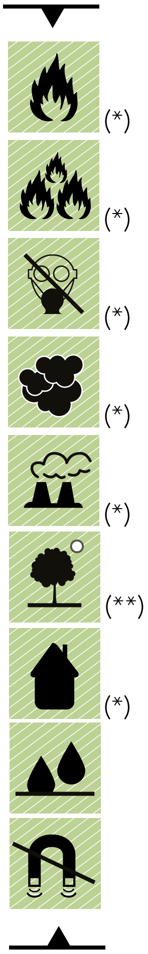
MAIN FEATURES CST + ARAMID YARNS + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 24	3.5	9.0	85	1500	3000	15

MAIN FEATURES CST + GLASS YARNS + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 24	3.5	10	100	3000	3500	20

Types mentioned here are standard. Other configurations available on request.



OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	See table B
Assembling	5 to 12 loose tubes/fillers 12 to 288 fibers
Central element	Fiber reinforced polymer or galvanized steel wire
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

All cables are available with all type of fibers.

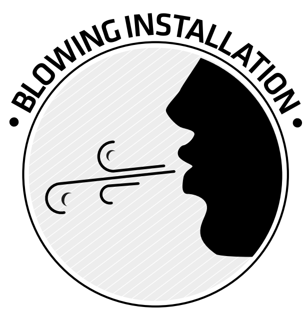
TECHNICAL DATA

Operating temperature range	-30°C to + 70°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-25 Cat. D
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

(*) Only for LSZH version
(**) Only for PE version



MAIN FEATURES LSZH SHEATH

No. of Fiber	No. of fiber each loose	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	12	1.9	1	4	7.2	55	1000	1000	3
12	12	1.8	1	5	7.3	60	1000	1000	3
24	12	1.9	2	3	7.2	55	1000	1000	3
24	12	1.8	2	4	7.3	60	1000	1000	3
36	12	1.9	3	2	7.2	55	1000	1000	3
36	12	1.8	3	3	7.3	60	1000	1000	3
48	12	1.9	4	1	7.2	55	1000	1000	3
48	12	1.8	4	2	7.3	60	1000	1000	3
60	12	1.9	5	/	7.2	55	1000	1000	3
60	12	1.8	5	1	7.3	60	1000	1000	3
72	12	1.8	6	/	7.3	60	1000	1000	3
96	12	1.7	8	/	7.5	60	1000	1000	3
96*	24	2.0	4	2	7.5	65	1000	1000	3
120*	24	2.0	5	1	7.5	65	1000	1000	3
144*	24	2.0	6	/	7.5	65	1000	1000	3
192*	24	2.0	8	/	8.5	70	1000	1000	3

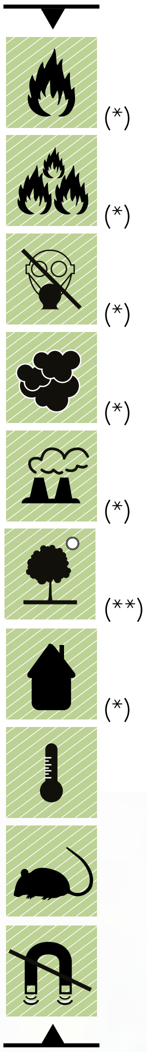
*** 200µm OF**

MAIN FEATURES PE SHEATH

No. of Fiber	No. of fiber each loose	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	12	1.9	1	4	6.3	35	1000	1000	3
12	12	1.8	1	5	6.3	40	1000	1000	3
24	12	1.9	2	3	6.3	35	1000	1000	3
24	12	1.8	2	4	6.3	40	1000	1000	3
36	12	1.9	3	2	6.3	35	1000	1000	3
36	12	1.8	3	3	6.3	40	1000	1000	3
48	12	1.9	4	1	6.3	35	1000	1000	3
48	12	1.8	4	2	6.3	40	1000	1000	3
60	12	1.9	5	/	6.3	35	1000	1000	3
60	12	1.8	5	1	6.3	40	1000	1000	3
72	12	1.8	6	/	6.3	40	1000	1000	3
96	12	1.8	8	/	7.5	50	1000	1000	3
96	24	2.2	4	2	7.5	65	1000	1000	3
120	24	2.2	5	1	7.5	65	1000	1000	3
144	24	2.2	6	/	7.5	65	1000	1000	3
192*	24	1.8	8	/	7.5	50	1000	1000	3
288*	36	2.0	8	/	8	70	1000	1000	3
396*	36	2.0	11	/	11	80	1000	1000	3

*** 200µm OF**

TK-WIND/TK-SUN MTX MULTITUBE DIELECTRIC CABLES



ON REQUEST

(*) Only for LSZH version

(**) Only for PE version

OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	See table B
Assembling	6 to 24 loose tubes/fillers 12 to 288 fibers
Central element	fiber reinforced polymer
Protection	Aramid/Glass yarns
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

All cables are available with all type of fibers.

TECHNICAL DATA

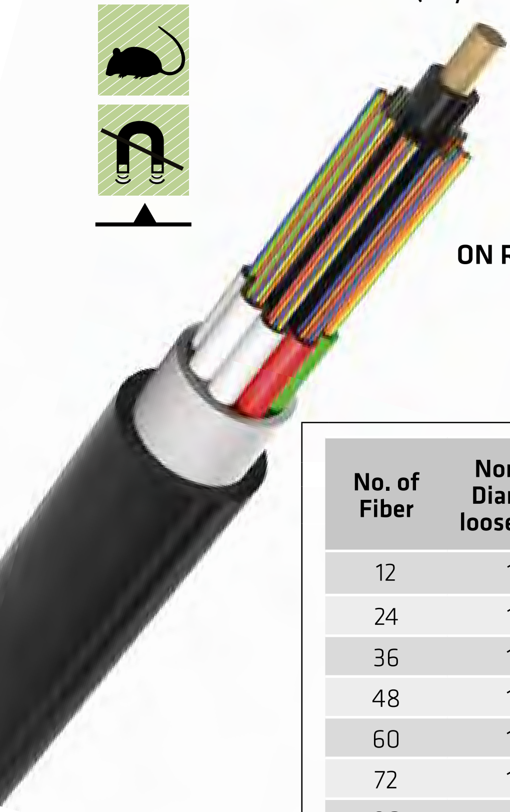
Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

Outer jacket	Polyethylene



MAIN FEATURES ARAMID YARNS + LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	9	80	1500	1500	15
24	1.9	2	4	9	80	1500	1500	15
36	1.9	3	3	9	80	1500	1500	15
48	1.9	4	2	9	80	1500	1500	15
60	1.9	5	1	9	80	1500	1500	15
72	1.9	6	/	9	80	1500	1500	15
96	1.9	8	/	10	95	2000	2000	20
144	1.9	12	/	13	150	2500	2000	20
192	1.9	16	/	13	150	2500	2000	20
216	1.9	18	/	13.5	160	2500	2000	20
288	1.9	24	/	15	180	3000	3000	25

MAIN FEATURES GLASS YARNS + LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	9.5	90	2500	2000	15
24	1.9	2	4	9.5	90	2500	2000	15
36	1.9	3	3	9.5	90	2500	2000	15
48	1.9	4	2	9.5	90	2500	2000	15
60	1.9	5	1	9.5	90	2500	2000	15
72	1.9	6	/	9.5	90	2500	2000	15
96	1.9	8	/	10.5	105	3000	3000	20
144	1.9	12	/	13.5	160	3500	3000	20
192	1.9	16	/	13.5	160	3500	3000	20
216	1.9	18	/	14	170	3500	3000	20
288	1.9	24	/	15.5	190	4000	4000	25

Types mentioned here are standard. Other configurations available on request.

MAIN FEATURES ARAMID YARNS + PE SHEATH

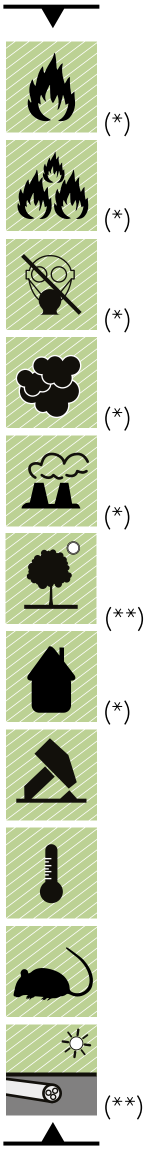
No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	9	70	1500	1500	15
24	1.9	2	4	9	70	1500	1500	15
36	1.9	3	3	9	70	1500	1500	15
48	1.9	4	2	9	70	1500	1500	15
60	1.9	5	1	9	70	1500	1500	15
72	1.9	6	/	9	70	1500	1500	15
96	1.9	8	/	10	80	2000	2000	20
144	1.9	12	/	13	120	2500	2000	20
192	1.9	16	/	13	120	2500	2000	20
216	1.9	18	/	13.5	130	2500	2000	20
288	1.9	24	/	15	150	3000	3000	25

MAIN FEATURES GLASS YARNS +PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	9.5	75	2500	2000	15
24	1.9	2	4	9.5	75	2500	2000	15
36	1.9	3	3	9.5	75	2500	2000	15
48	1.9	4	2	9.5	75	2500	2000	15
60	1.9	5	1	9.5	75	2500	2000	15
72	1.9	6	/	9.5	75	2500	2000	15
96	1.9	8	/	10.5	85	3000	3000	20
144	1.9	12	/	13.5	130	3500	3000	20
192	1.9	16	/	13.5	130	3500	3000	20
216	1.9	18	/	14	140	3500	3000	20
288	1.9	24	/	15.5	160	4000	4000	25

Types mentioned here are standard. Other configurations available on request.

ON REQUEST



OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	See table B
Assembling	6 to 24 loose tubes/filler 12 to 288 fibers
Central element	fiber reinforced polymer
Protection	With or without Aramid/Glass yarns
Armouring	Corrugated and thermowelded steel tape (CST)
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

UV-Resistant
Fire resistant
Water resistant
Oil resistant
Hydrocarbons resistant

(*) Only for LSZH version
(**) Only for PE version

MAIN FEATURES CST+LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	11	150	1500	2000	15
24	1.9	2	4	11	150	1500	2000	15
36	1.9	3	3	11	150	1500	2000	15
48	1.9	4	2	11	150	1500	2000	15
60	1.9	5	1	11	150	1500	2000	15
72	1.9	6	/	11	150	1500	2000	15
96	1.9	8	/	12	170	2000	2500	20
144	1.9	12	/	14.5	230	2000	2500	20
192	1.9	16	/	14.5	230	2000	2000	20
216	1.9	18	/	15.5	260	2000	2000	25
288	1.9	24	/	17.5	350	2500	3000	25

MAIN FEATURES ARAMID+CST +LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	12	160	2000	2000	15
24	1.9	2	4	12	160	2000	2000	15
36	1.9	3	3	12	160	2000	2000	15
48	1.9	4	2	12	160	2000	2000	15
60	1.9	5	1	12	160	2000	2000	15
72	1.9	6	/	12	160	2000	2000	15
96	1.9	8	/	13	180	2500	2500	20
144	1.9	12	/	15.5	250	2500	2500	20
192	1.9	16	/	15.5	250	3000	3000	25
216	1.9	18	/	16.5	280	3000	3000	25
288	1.9	24	/	18.5	360	3500	3000	25

Types mentioned here are standard. Other configurations available on request.

MAIN FEATURES GLASS YARNS +CST +LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	12	170	2500	2000	15
24	1.9	2	4	12	170	2500	2000	15
36	1.9	3	3	12	170	2500	2000	15
48	1.9	4	2	12	170	2500	2000	15
60	1.9	5	1	12	170	2500	2000	15
72	1.9	6	/	12	170	2500	2000	15
96	1.9	8	/	13	190	3000	2500	20
144	1.9	12	/	15.5	270	2500	2500	20
192	1.9	16	/	15.5	270	3000	3000	25
216	1.9	18	/	15.5	300	3000	3000	25
288	1.9	24	/	17.5	380	3500	3000	25

MAIN FEATURES CST+PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	11	120	1500	2000	15
24	1.9	2	4	11	120	1500	2000	15
36	1.9	3	3	11	120	1500	2000	15
48	1.9	4	2	11	120	1500	2000	15
60	1.9	5	1	11	120	1500	2000	15
72	1.9	6	/	11	120	1500	2000	15
96	1.9	8	/	12	140	2000	2500	20
144	1.9	12	/	14.5	190	2000	2500	20
192	1.9	16	/	14.5	190	2000	2000	20
216	1.9	18	/	15.5	220	2000	2000	25
288	1.9	24	/	17.5	260	2500	3000	25

Types mentioned here are standard. Other configurations available on request.

TK-WIND/TK-SUN MT9X ARMOURED MULTITUBE CABLES

MAIN FEATURES ARAMID+CST +PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	12	130	2000	2000	15
24	1.9	2	4	12	130	2000	2000	15
36	1.9	3	3	12	130	2000	2000	15
48	1.9	4	2	12	130	2000	2000	15
60	1.9	5	1	12	130	2000	2000	15
72	1.9	6	/	12	130	2000	2000	15
96	1.9	8	/	13	150	2500	2500	20
144	1.9	12	/	15.5	210	2500	2500	20
192	1.9	16	/	15.5	210	3000	3000	25
216	1.9	18	/	16.5	240	3000	3000	25
288	1.9	24	/	18.5	290	3500	3000	25

MAIN FEATURES GLASS YARNS+CST +PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	12	140	2500	2000	15
24	1.9	2	4	12	140	2500	2000	15
36	1.9	3	3	12	140	2500	2000	15
48	1.9	4	2	12	140	2500	2000	15
60	1.9	5	1	12	140	2500	2000	15
72	1.9	6	/	12	140	2500	2000	15
96	1.9	8	/	13	160	3000	2500	20
144	1.9	12	/	15.5	220	2000	2500	20
192	1.9	16	/	15.5	220	3000	3000	25
216	1.9	18	/	16.5	250	3000	3000	25
288	1.9	24	/	18.5	310	3500	3000	25

Types mentioned here are standard. Other configurations available on request.

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ON REQUEST

OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	See table B
Assembling	8 loose tubes/fillers 16 to 96 fibers
Central element	Fiber reinforced polymer
Inner Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material
Strain Relief	Aramid yarns
Armouring	Welded and corrugated steel tape (H6)
Anticorrosion Protection	Bituminous/jelly layer
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 15 x outer diameter Dynamic: 20 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

UV-Resistant
Fire resistant
Water resistant
Oil resistant
Hydrocarbons resistant

(*) Only for LSZH version
(**) Only for PE version

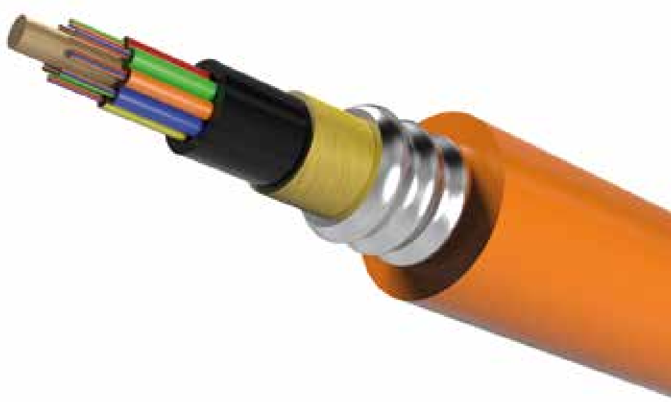
MAIN FEATURES LSZH+ARAMID YARNS+H6+LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
16	1.8	4	4	20	460	3000	10000	30
32	1.8	8	0	20	460	3000	10000	30
48	1.8	6	2	20	460	3000	10000	30
64	1.8	8	0	20	460	3000	10000	30
96	1.8	8	0	20	460	3000	10000	30

MAIN FEATURES PE+ARAMID YARNS+H6+PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
16	1.8	4	4	20	380	3000	10000	30
32	1.8	8	0	20	380	3000	10000	30
48	1.8	6	2	20	380	3000	10000	30
64	1.8	8	0	20	380	3000	10000	30
96	1.8	8	0	20	380	3000	10000	30

Types mentioned here are standard. Other configurations available on request.



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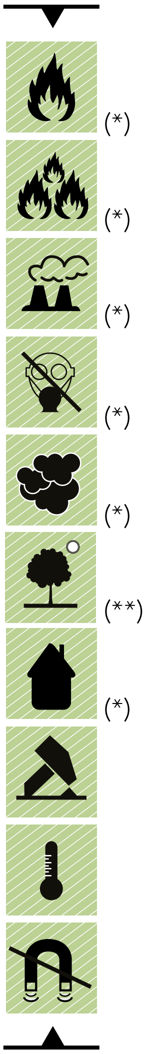
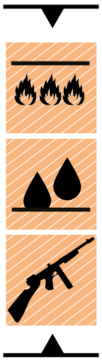




OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	See table B
Assembling	6 to 24 loose tubes/fillers 12 to 288 fibers
Central element	Fiber reinforced polymer
Inner Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material
***Antibalistic protection**	Aramid tapes or glass flats
Strain Relief	Aramid yarns
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

*On request.

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

UV-Resistant
Fire resistant
Water resistant

(*) Only for LSZH version
(**) Only for PE version

MAIN FEATURES LSZH+ARAMID YARNS+LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	13	160	7500	3000	20
24	1.9	2	4	13	160	7500	3000	20
36	1.9	3	3	13	160	7500	3000	20
48	1.9	4	2	13	190	7500	3000	20
60	1.9	5	1	13	160	7500	3000	20
72	1.9	6	0	13	160	7500	3000	20
96	1.9	8	0	14	200	7500	3000	20
144	1.9	12	0	16.5	240	7500	3000	20
192	1.9	16	0	16.5	240	7500	3000	20
216	1.9	18	0	17	280	7500	3000	20
288	1.9	24	0	19	370	7500	3000	20

MAIN FEATURES LSZH+ARAMID YARNS AND TAPES +LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	15	190	7500	3000	20
24	1.9	2	4	15	190	7500	3000	20
36	1.9	3	3	15	190	7500	3000	20
48	1.9	4	2	15	190	7500	3000	20
60	1.9	5	1	15	190	7500	3000	20
72	1.9	6	0	15	190	7500	3000	20
96	1.9	8	0	16	230	7500	3000	20
144	1.9	12	0	18.5	280	7500	3000	20
192	1.9	16	0	18.5	280	7500	3000	20
216	1.9	18	0	19	320	7500	3000	20
288	1.9	24	0	21	420	7500	3000	20
288	1.9	24	0	21	420	7500	3000	20

Types mentioned here are standard. Other configurations available on request.

MAIN FEATURES LSZH+ARAMID YARNS+GLASS FLAT + LSZH SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	15	210	7500	3000	20
24	1.9	2	4	15	210	7500	3000	20
36	1.9	3	3	15	210	7500	3000	20
48	1.9	4	2	15	210	7500	3000	20
60	1.9	5	1	15	210	7500	3000	20
72	1.9	6	0	15	210	7500	3000	20
96	1.9	8	0	16	260	7500	3000	20
144	1.9	12	0	18.5	320	7500	3000	20
192	1.9	16	0	18.5	320	7500	3000	20
216	1.9	18	0	19	360	7500	3000	20
288	1.9	24	0	21	480	7500	3000	20

MAIN FEATURES PE+ARAMID YARNS+PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	13	120	7500	3000	20
24	1.9	2	4	13	120	7500	3000	20
36	1.9	3	3	13	120	7500	3000	20
48	1.9	4	2	13	120	7500	3000	20
60	1.9	5	1	13	120	7500	3000	20
72	1.9	6	0	13	120	7500	3000	20
96	1.9	8	0	14	140	7500	3000	20
144	1.9	12	0	16.5	200	7500	3000	20
192	1.9	16	0	16.5	200	7500	3000	20
216	1.9	18	0	17	230	7500	3000	20
288	1.9	24	0	19	290	7500	3000	20

Types mentioned here are standard. Other configurations available on request.

TK-WIND/TK-SUN MTAS MULTITUBE ADSS CABLES

MAIN FEATURES PE+ARAMID YARNS AND TAPES +PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	15	150	7500	3000	20
24	1.9	2	4	15	150	7500	3000	20
36	1.9	3	3	15	150	7500	3000	20
48	1.9	4	2	15	150	7500	3000	20
60	1.9	5	1	15	150	7500	3000	20
72	1.9	6	0	15	150	7500	3000	20
96	1.9	8	0	16	160	7500	3000	20
144	1.9	12	0	18.5	240	7500	3000	20
192	1.9	16	0	18.5	240	7500	3000	20
216	1.9	18	0	19	270	7500	3000	20
288	1.9	24	0	21	330	7500	3000	20

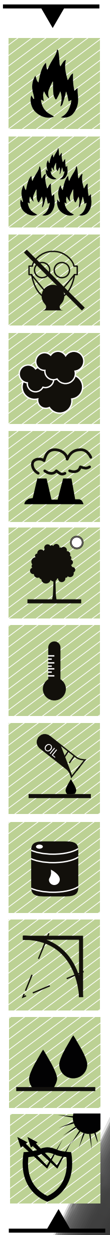
MAIN FEATURES PE+ARAMID YARNS+GLASS FLAT + PE SHEATH

No. of Fiber	Nominal Diameter loose (mm)	No. loose	No. filler	Nominal Diameter cable (mm)	Nom. Weight (kg/km)	Max pulling force (N)	Max crush (N/dm)	Impact (J)
12	1.9	1	5	15	170	7500	3000	20
24	1.9	2	4	15	170	7500	3000	20
36	1.9	3	3	15	170	7500	3000	20
48	1.9	4	2	15	170	7500	3000	20
60	1.9	5	1	15	170	7500	3000	20
72	1.9	6	0	15	170	7500	3000	20
96	1.9	8	0	16	190	7500	3000	20
144	1.9	12	0	18.5	260	7500	3000	20
192	1.9	16	0	18.5	260	7500	3000	20
216	1.9	18	0	19	310	7500	3000	20
288	1.9	24	0	21	380	7500	3000	20

Types mentioned here are standard. Other configurations available on request.

TK-SUN-SOLAR CABLE H1Z2Z2-K

ON REQUEST

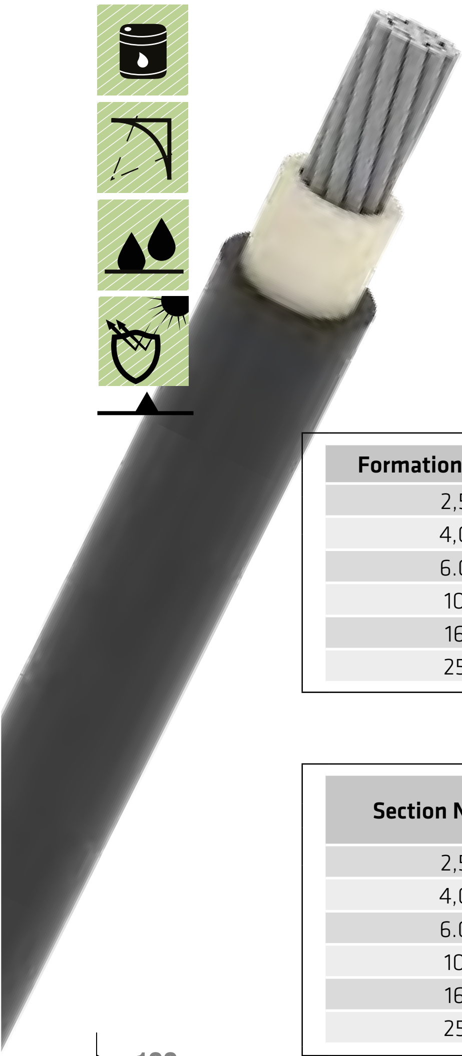


CABLE SPECIFICATION

Conductors	Flexible stranded Tinned annealed Copper Class 5 acc. to IEC 60228 – CEI 20-29 - VDE 0295
Cross Section	From 2.5 up to 25 mm2 (Other section available on request)
Insulation	LSZH Cross linked XLPO compound CEI EN 50618 and IEC 63930
Colour of insulation	Neutral
Sheath	LS0H cross-linked XLPO compound CEI EN 50618 and IEC 63930 UV, Ozone and Water Resistant
Colours of Sheath	Red, Blue or Black
Reference Standard	CEI EN 50618
CE Directives Low Voltage	2014/35/UE
Fire reaction class (Construction Product Regulation)	Eca
Operating Voltage AC	1000 V – Max 1200 VAC
Operating Voltage DC	1500 V – Max 1800 VDC

TECHNICAL DATA

Minimun Bending Radius	15 x Outer Diameter
Working temperature	-40°C to +90°C
Max current rating capacity	EN 50618, table A-3



REFERENCE STANDARDS

Main standards	CEI EN 50618 IEC 62930
Fire retardant	EN IEC 60332-1 and 2 CEI EN 50265-2-1
Halogen Free	EN 50525-1 – DIN IEC 60754-1 and 2 IEC 62821-1 Annex B DIN VDE 0285-525-1 and appendix B
Low Smoke emission	IEC 61034-1 and 2
Weathering and UV Resistance	CEI EN 50289-4-17 A DIN EN 50618 Appendix E
Ozone resistance	CEI EN 50396 – BS EN 50618
Water resistance	UL 1581 IEC 60811 DIN VDE 0285-525-2-21 and annex E

DIMENSIONAL CHARACTERISTICS

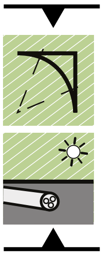
Formation N x mm^2	Outer diam nominal mm	Approx Copper weight kg/km	Approx Cable weight kg/km
2,5	5.2	24	57
4,0	5.8	38.5	84
6.0	6.5	57.7	107
10	8.0	96.0	160
16	8.9	153.8	241
25	10.7	240.3	344

Other section available on request

ELECTRICAL CHARACTERISTICS

Section N x mm^2	Electrical resistance at 20°C (Ohm)	Rating Current in air at 60°C for single cable (A)	Permissible short circuit current x 1 sec (kA)
2,5	<8.21	41	0.32
4,0	<5.09	55	0.50
6.0	<3.39	70	0.76
10	<1.90	98	1.26
16	<1.25	132	2.01
25	<0.795	176	3.15

Other section available on request



ROPE SPECIFICATION

Conductors	Round stranded bare Copper Class 2 of CEI 20-29 - IEC 60228 - VDE 0295
Cross Section	25 - 35 - 50 – 63 – 95 – 120 – 150 – 240 – 300 – 400 mm2
CE Directives Low Voltage	2014/35/UE

TECHNICAL DATA

Minimum bending radius	10 x Outer Diameter
Electrical resistance	According to table Class 2 of IEC 60228, CEI 20-29 and VDE 0295

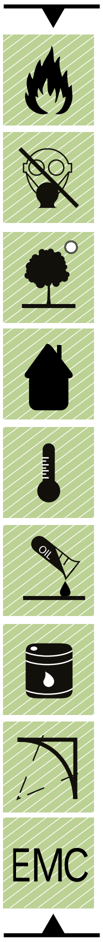
MAIN FEATURES

Section mm^2	Nominal Diameter (mm)	Copper Weight (kg/km)	Max Electrical resistance in DC at 20°C Ohm / Km
25	6.42	225	0.727
35	7.56	310	0.524
50	9.15	444	0.387
70	10.8	607	0.268
95	12.6	842	0.193
120	14.2	1065	0.153
150	16.7	1308	0.124
185	17.6	1841	0.0991
240	20.2	2157	0.0754
300	22.5	2663	0.0601
400	26	3584	0.0470

Other section available on request, including $63mm^2$ and $125mm^2$


LIFT THEN
PULL HANDLE
PULL FOR
FIRE

TK-WIND FIRE ALARM SHIELDED CABLE



ON REQUEST

CABLE SPECIFICATION

Conductor	IEC 60228 Class 6 – VDE 0295 Class 6
Insulation	Polyolefin (UL-CSA Standards)
Core identification	Black Numbered + Yellow/Green (control) Coloured + yellow/green (power) also available without Y/G
Overall Shield (optional)	Tinned Copper Spiral according to EMC 89/336 © Available also braid shield
Sheath	Polyurethane 11Y (UL-CSA Standards)
Outer jacket colour	Color red RAL 3000 *(other colours available upon request)*

TECHNICAL DATA

Operating voltage	1000V
Test voltage	3000 Va.c. Cross-sectional area ≥ 1.0mm² (AWG18)
Temperature range	-40°C ÷ +80°C
Torsion	180° x meter

REFERENCE STANDARDS

Main standards	UL 80°C 300V – CSA AWM I/II A/B 80°C 300V, Cross-sectional area 0,5mm² (AWG21) ÷ 1,0mm² (AWG18) UL 80°C 1000V – CSA AWM I/II A/B 80°C 1000V, Cross-sectional area ≥ 1,0mm² (AWG18)
NFPA	According to NFPA 79-2018-Chapter 12.9
Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Halogen Free	EN 50267-2-1 - IEC 60754-1
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
Water Resistance	UL 1581 – IEC 60811
Directives	EC Directives Product compliant with Low Voltage Regulation 2014/35/EU Directive EMC 2014/30/EU Electromagnetic Compatibility

COPPER CONDUCTOR, PUR JACKET 80°C MULTICORE UNSHIELDED CONTROL CABLES

Section	ø nominal (mm)	Copper weight (kg/km)	Cable weight (kg/km)
4G0.5mm²	5.9	20	62
4G1mm²	7.0	38	75

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

TK-WIND/TK-SUN SAR ARMOURED SIMPLEX CABLES - LSZH FENCING CABLE

ON REQUEST

OPTICAL CORE

Fiber Structure	Tight Buffer 600 µm or 900 µm Semitight Buffer 900 µm
Tight Colour Code	White
Strain relief	Aramid yarns
Inner Sheath	Flame retardant, low smoke and halogen-free material
Armouring	Galvanized steel wire braid (GSWB)
Outer Sheath	Flame retardant, low smoke and halogen-free material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 15 x outer diameter

FIRE PERFORMANCE

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-24 Cat. C
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

UV-Resistant
Oil resistant
Hydrocarbons resistant
Polyethylene sheath for direct burial
Fully dielectric

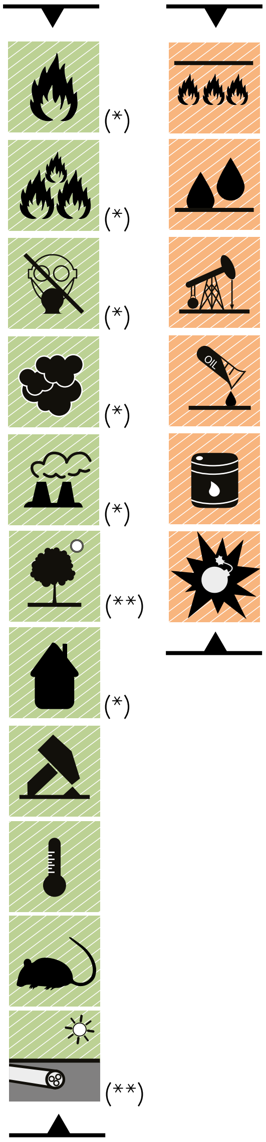
MAIN FEATURES

No. of Fiber	Nominal Diameter (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
1	5.5	40	500	1000	10

Types mentioned here are standard. Other configurations available on request.

TK-WIND/TK-SUN UTXD ARMOURED UNITUBE DOUBLE SHEATH CABLES FENCING CABLE

ON REQUEST



OPTICAL CORE

Fiber Structure	Jelly filled loose tube
Fiber Colour Code	See table A
Loose tube Colour	Natural
Assembling	2 to 24 fibers
Strain relief	Aramid/Glass yarns
Inner Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material
Armouring	Galvanized steel wire braid (GSWB) or corrugated and thermowelded steel tape (CST)
Outer Sheath	Flame retardant, low smoke and halogen-free or Polyethylene material

All cables are available with all type of fibers.

TECHNICAL DATA

Operating temperature range	-40°C to + 80°C
Installation temperature	-10°C to + 50°C
Minimum bending radius	Static: 10 x outer diameter Dynamic: 20 x outer diameter

FIRE PERFORMANCE
(Only for LSZH version)

Flame retardant	IEC 60332-1-2
Fire retardant	IEC 60332-3-22 Cat. A
Halogen Free	EN 50267-2-1 - IEC 60754-1
Smoke density	IEC 61034-1/2
Fumes	No corrosive and toxic fumes

ON REQUEST

- UV-Resistant
- Fire resistant
- Water resistant
- Oil resistant
- Hydrocarbons resistant

(*) Only for LSZH version
(**) Only for PE version

TK-WIND/TK-SUN UTXD ARMOURED UNITUBE DOUBLE SHEATH CABLES FENCING CABLE

MAIN FEATURES LSZH + GSWB + LSZH SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	8.6	100	1500	2500	10
13 to 24	3.5	10	130	1500	2500	10

MAIN FEATURES PE + GSWB + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	8.6	70	1500	2500	10
13 to 24	3.5	10	90	1500	2500	10

MAIN FEATURES LSZH + CST + LSZH SHEATH

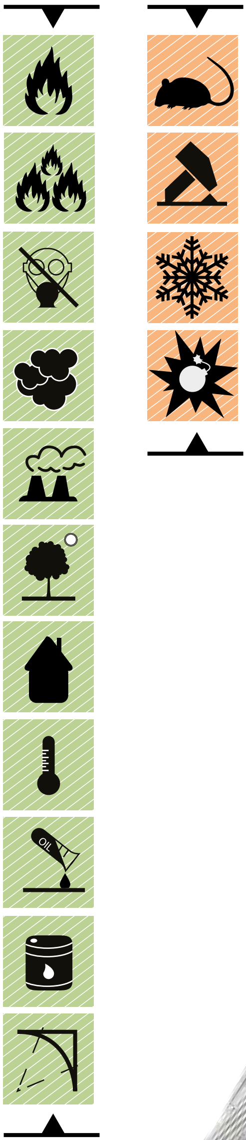
No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	10	125	2000	3000	15
13 to 24	3.5	10.5	145	2000	3000	15

MAIN FEATURES PE + CST + PE SHEATH

No. of Fiber	Nominal diameter loose (mm)	Nominal diameter cable (mm)	Nom. Weight (kg/km)	Max pulling Force (N)	Max Crush (N/dm)	Impact (J)
2 to 12	2.8	10	85	2000	3000	15
13 to 24	3.5	10.5	105	2000	3000	15

Types mentioned here are standard. Other configurations available on request.

ON REQUEST



CABLE SPECIFICATION

FIBER OPTIC up to 12 fibers	**Optical core**	Jelly filled loose tube (PBTP)
	Fiber colour code	See table A
	Protection	Longitudinal glass or aramidic yarns
	Outer sheath	Halogen free SHF1
POWER CONDUCTOR	**Conductor**	Stranded tinned copper
	Insulation	Cross-linked polyethylene (XLPE)
ASSEMBLING	**Outer sheath**	Halogen free SHF1 UVR Halogen free SHF2 UVR

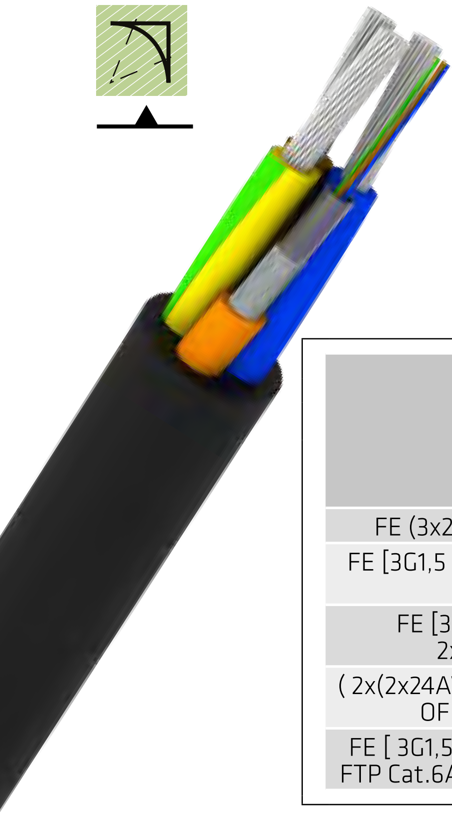
TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Operating voltage	0.6/1 kV power conductors

On request available with LAN cable CAT.5E, CAT.6A and more (see table below)

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-24
Halogen Free	EN 50267-2-1 - IEC 60754-1
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 –IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB)

ON REQUEST

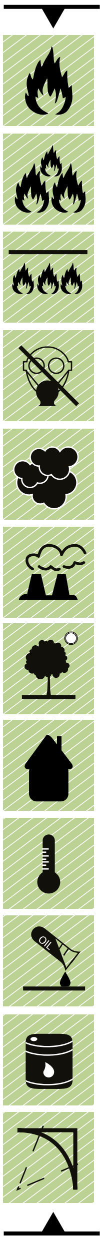
UV resistance
Ozone resistance

MAIN FEATURES + LSZH SHEATH

Cable Structure (*)	Under armour diameter Nominal mm	Overall diameter Nominal mm	Electrical Resistance Power Ohm / km	Electrical Resistance AWG24 Ohm / km	Electrical Resistance LAN 6/A Ohm / km
FE (3x2,5mm² + 4 OF SM] MH2M2	11.2	15.0	< 8.21	-	-
FE [3G1,5 mm² + 2x(2x24AWG)SN/M+4 OF SM] M	-	15.6	< 13.3	< 90	-
FE [3G1,5 mm² + FTP Cat.6A + 2x(2x24AWG)SN/M] M	-	16.0	< 13.3	< 90	< 80
(2x(2x24AWG)SN]/M+3G1,5 + CAT.5E + 4 OF SM + 4 OF MM] MF2M	16.5	21	< 13.3	< 90	-
FE [3G1,5 mm² + 2x(2x24AWG)SN/M + FTP Cat.6A +4 OF SM + 2 OF MM] MF2M	17.8	22.5	< 13.3	< 90	-

Other configurations available on request.

TK-WIND/TK-SUN HYBRID_FIRE RESISTANT ARMOURED AND UNARMOURED CCTV CABLE



ON REQUEST

CABLE SPECIFICATION

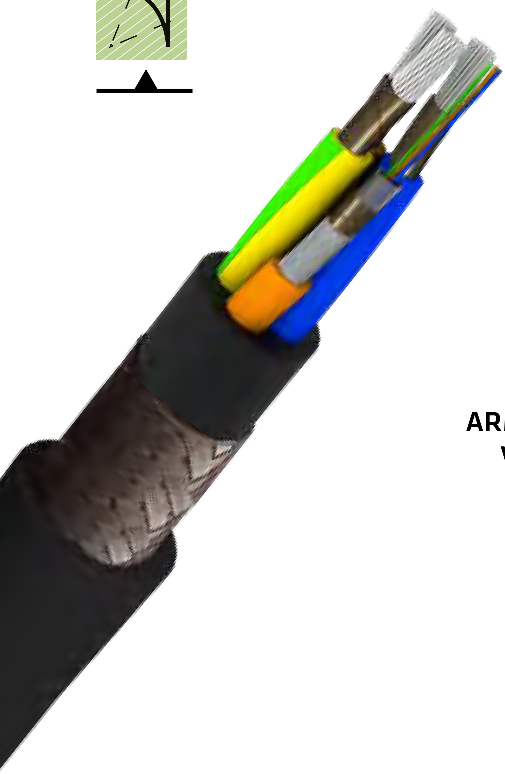
FIBER OPTIC up to 12 fibers	**Optical core**	Jelly filled loose tube (PBTP)
	Fiber colour code	See table A
	Flame barrier	Mica tape
	Protection	Longitudinal glass or aramidic yarns
	Outer sheath	Halogen free SHF1 Ø 4 mm
POWER CONDUCTOR 3 units	**Conductor**	Stranded tinned copper 2.5 mm²
	Flame barrier	MIca tape
	Insulation	Cross-linked polyethylene (XLPE) Ø 4 mm
ASSEMBLING	**Outer sheath**	Halogen free SHF1 Halogen free Cross-linked SHF2 UVR
	Outer diameter	13 mm | SHF1 - SHF2

TECHNICAL DATA

Minimun Bending Radius	10 x Ø
Temperature	- 40°C ÷ + 70°C (SHF1) - 40°C ÷ + 90°C (SHF2)
Conductor resistance	≤ 8.21 Ω/km
Operating voltage	0.6/1 kV

REFERENCE STANDARDS

Flame Retardant	EN50265-1-2 – IEC 60332-1-2 – UL VW-1 – CSA FT1
Fire retardant	IEC 60332-3-2
Halogen-free	IEC 60754-1/2
Low smoke density	IEC 61034-1/2
Toxicity of evolved gas	EN 50305 9.2
Ozone resistance	IEC 60811-403 (SHF2)
Hydrocarbons and Oil Resistance	UL 1581 – IEC 60811-2-1
U.V. radiation resistance	ASTM-D-2565-16
Cold bend	- 40°C/-65°C



ARMOURED VERSION

Material	Galvanized steel wire braid (GSWB) Tinned copper wire braid (TCWB)
Outer diameter	16 mm

Also available with RG coax cable and Ethernet communication cable.

OFF-SHORE installations

ON REQUEST

CABLE SPECIFICATION

Conductors	Flexible stranded Tinned Copper according to Class 5 of IEC 60228, CEI 20-29 and VDE 0295
Cross Section	Single Core cables: from 4 mm² up to 25 mm² Multicore cables available on request Hybrid version also available, including Optical cable and cables for data transmission (e.g. Ethernet, coax etc)
Insulation	Polyolefin
Inner Sheath	Thermoplastic compound
Strain relief	Aramidic or textile yarns (Specific Minimum Breaking Strength or Safe Working Load values on request)
Bedding	Thermoplastic compound UV resistant and Water resistant
Outer Sheath	Thermoplastic compound UV resistant and Water resistant
Colour of Outer Sheath	Black or Red or Yellow or Blue (Other colors available on request)

TECHNICAL DATA

Operating Voltage	From 600 V up to 1800 VAC
Minimum bending radius	10 x Outer Diameter
Working Temperature	-40°C to +90°C
Max current rating capacity	EN 50618, table A-3

REFERENCE STANDARDS

Water resistance	UL 1581 IEC 60811
UV Resistance	CEI EN 50289-4-17 A
Neutrally Bouyant	Excellent
CE Directives Low Voltage	2014/35/UE

European Directives 2011/65/CE (RoHS - Reduction of Hazardous Substances) and 2002/96/CE (WEEE – Waste from Electrical and Electronic Equipment)

OPTICAL FIBER CABLES GENERAL INFORMATION

FIBER TYPES

- Single-mode ITU-T G.652D - IEC 60793-2-50 Type B.1.3
- Single-mode ITU-T G.657A1 - IEC 60793-2-50 Type B.1.3 and B.6.A
- Single-mode ITU-T G.657A2 / B2 - IEC 60793-2-50 Type B.1.3 and B.6.A&B
- Single-mode ITU-T G.657A1 Type 200micron
- Single-mode NZD ITU-T G.655E/656 - IEC 60793-2-50 Type B4/B5

- Multimode 62.5/125 OM1 IEC 60793-2-10 Type A1 - OM1
- Multimode 62.5/125 OM1 IEC 60793-2-10 Type A1 - OM1+
- Multimode 50/125 OM2 ITU-T G.651.1 IEC 60793-2-10 Type A1 - OM2
- Multimode 50/125 OM3 ITU-T G.651.1 IEC 60793-2-10 Type A1 - OM3
- Multimode 50/125 OM4 ITU-T G.651.1 IEC 60793-2-10 Type A1 - OM4
- Multimode 50/125 OM5 ITU-T G.651.1 IEC 60793-2-10 Type A1 - OM5

STANDARD FIBER COLOUR CODE (TABLE A, EIA - TIA 598)

1 – Blue	7 – Red	13 – Blue (with black ring)	19 – Red (with black ring)
2 – Orange	8 – Black	14 – Orange (with black ring)	20 – Natural (with black ring)
3 – Green	9 – Yellow	15 – Green (with black ring)	21 – Yellow (with black ring)
4 – Brown	10 - Violet	16 – Brown (with black ring)	22 – Violet (with black ring)
5 – Grey	11 – Pink	17 – Grey (with black ring)	23 – Pink (with black ring)
6 – White	12 - Turquoise	18 – White (with black ring)	24 - Turquoise (with black ring)

*Other colours on request

N° OF FIBRE	STANDARD COLOURS OF LOOSE TUBE (EIA - TIA 598)	
2	1 – Blue (With 2 OF) 2 – Filler 3 – Filler	4 – Filler 5 – Filler 6 – Filler
4	1 – Blue(With 2 OF) 2 – Orange (With 2 OF) 3 – Filler	4 – Filler 5 – Filler 6 – Filler
8	1 – Blue (With 4 OF) 2 – Orange (With 4 OF) 3 – Filler	4 – Filler 5 – Filler 6 – Filler
12	1 – Blue (With 4 OF) 2 – Orange (With 4 OF) 3 – Green (With 4 OF)	4 – Filler 5 – Filler 6 – Filler
24	1 – Blue(With 6 OF) 2 – Orange (With 6 OF) 3 – Green(With 6 OF)	4 – Brown (With 6 OF) 5 – Filler 6 – Filler
48	1 – Blue(With 12 OF) 2 – Orange (With 12 OF) 3 – Green(With 12 OF)	4 – Brown (with 12 OF) 5 – Filler 6 – Filler
60	1 – Blue(With 12 OF) 2 – Orange (With 12 OF) 3 – Green(With 12 OF)	4 – Brown (with 12 OF) 5 – Grey (with 12 OF) 6 – Filler
72	1 – Blue(With 12 OF) 2 – Orange (With 12 OF) 3 – Green(With 12 OF)	4 – Brown (with 12 OF) 5 – Grey (with 12 OF) 6 – White (with 12 OF)

STANDARD TIGHT COLOUR CODE (TABLE C, EIA - TIA 598)

1- Blue	7- Red	13- Blue with black ring	19- Red with black ring
2- Orange	8- Black	14- Orange with black ring	20- White with double black ring
3- Green	9- Yellow	15- Green with black ring	21- Yellow with black ring
4- Brown	10- Violet	16- Brown with black ring	22- Violet with black ring
5- Grey	11- Pink	17- Grey with black ring	23- Pink with black ring
6- White	12- Turquoise (Aqua)	18- White with black ring	24- Turquoise with black ring

*Other colours on request

SINGLE-MODE FIBER PROPERTIES

	SM-LWP ITU-T G.652.D	SM ITU-T G.657.A1	SM ITU-T G.657.A2	SM 200 µm ITU-T G.657.A1	SM NZD ITU-T G.655.D
Mode Field Diameter @ 1310 nm	9.1 ± 0.4 µm	9.1 ± 0.4 µm	8.6 ± 0.4 µm	8.8 ± 0.4 µm	
Mode Field Diameter @ 1550 nm	10.2 ± 0.5 µm	10.2 ± 0.5 µm		9.8 ± 0.5 µm	9.6 ± 0.4 µm
Cladding diameter	125.0 ± 0.7 µm	125.0 ± 0.7 µm	125.0 ± 0.7 µm	125.0 ± 0.7 µm	125.0 ± 0.7 µm
Coating diameter	242 ± 7 µm	242 ± 7 µm	242 ± 7 µm	200 ± 10 µm	242 ± 7 µm
Cladding non-circularity	≤ 0.7 %	≤ 0.7 %	≤ 0.7 %	≤ 0.7 %	≤ 1.0 %
Core/cladding concentricity error	≤ 0.5 µm	≤ 0.5 µm	≤ 0.5 µm	≤ 0.5 µm	≤ 0.5 µm
Coating/cladding concentricity error	≤ 12 µm	≤ 12 µm	≤ 12 µm	≤ 12 µm	≤ 12 µm
Cable cut-off wavelength	≤ 1260 nm	≤ 1260 nm	≤ 1260 nm	≤ 1260 nm	≤ 1450 nm
Zero dispersion wavelength (λo)	1300-1324 nm	1300-1324 nm	1300-1324 nm	1300-1324 nm	
Dispersion slope (So) @ (λo)	≤ 0.090 ps/(nm²*km)	≤ 0.090 ps/(nm²*km)	≤ 0.092 ps/(nm²*km)	≤ 0.092 ps/(nm²*km)	
Chromatic dispersion @ 1285 – 1330 nm	≤ 3.5 ps/(nm*km)	≤ 3.5 ps/(nm*km)			
Chromatic dispersion @ 1550 nm	≤ 18 ps /(nm*km)	≤ 18 ps/(nm*km)			
Chromatic dispersion @ 1625 nm	≤ 22 ps/(nm*km)	≤ 22 ps/(nm*km)			
Chromatic dispersion @ 1530 – 1565 nm					2.0 -6.0 ps/(nm*km)
Chromatic dispersion @ 1565 – 1625 nm					4.5 to 11.2 ps/(nm*km)
PMD Individual Fiber @ 1550 nm	≤ 0.1 ps/√km	≤ 0.1 ps/√km	≤ 0.1 ps/√km	≤ 0.1 ps/√km	≤ 0.15 ps/√km
Attenuation @ 1310 nm	≤ 0.36 dB/km	≤ 0.36 dB/km	≤ 0.36 dB/km	≤ 0.36 dB/km	
Attenuation @ 1383nm	≤ 0.36 dB/km	≤ 0.36 dB/km	≤ 0.36 dB/km	≤ 0.36 dB/km	
Attenuation @ 1550 nm	≤ 0.25 dB/km	≤ 0.25 dB/km	≤ 0.25 dB/km	≤ 0.25 dB/km	≤ 0.27 dB/km
Attenuation @ 1625 nm	≤ 0.28 dB/km	≤ 0.28 dB/km	≤ 0.28 dB/km	≤ 0.28 dB/km	≤ 0.30 dB/km
Attenuation with bending					
Mandrel Radius 15mm@1550 10 turns		≤ 0.25 dB	≤ 0.03 dB	≤ 0.25 dB	
Mandrel Radius 15mm@1625 10 turns		≤ 1.0 dB	≤ 0.1 dB	≤ 1.0 dB	
Mandrel Radius 10mm@1550 1 turns		≤ 0.75 dB	≤ 0.1 dB	≤ 0.75 dB	
Mandrel Radius 10mm@1625 1 turns		≤ 1.5 dB	≤ 0.2 dB	≤ 1.5 dB	
Mandrel Radius 7.5mm@1550 1 turns			≤ 0.5 dB		
Mandrel Radius 7.5mm@1625 1 turns			≤ 1.0 dB		
Proof test	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa

MULTIMODE FIBER PROPERTIES

	MM62.5 OM1	MM62.5 OM1+	MM50 OM2	MM50 OM3	MM50 OM4	MM50 OM5
Core diameter	62.5 ± 2.5 µm	62.5 ± 2.5 µm	50 ± 2.5 µm	50 ± 2.5 µm	50 ± 2.5 µm	50 ± 2.5 µm
Core non-circularity	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %
Cladding diameter	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm
Coating diameter	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm
Cladding non-circularity	≤ 0.7 %	≤ 0.7 %	≤ 0.7 %	≤ 0.7 %	≤ 0.7 %	≤ 0.7 %
Core/cladding concentricity error	≤ 1 µm	≤ 1 µm	≤ 1 µm	≤ 1 µm	≤ 1 µm	≤ 1 µm
Coating/cladding concentricity error	≤ 10 µm	≤ 10 µm	≤ 6 µm	≤ 6 µm	≤ 6 µm	≤ 6 µm
Numerical Aperture	0.275 ± 0.015	0.275 ± 0.015	0.200 ± 0.015	0.200 ± 0.015	0.200 ± 0.015	0.200 ± 0.015
Attenuation @ 850 nm	≤ 3.50 dB/km	≤ 3.50 dB/km	≤ 2.80 dB/km	≤ 2.80 dB/km	≤ 2.80 dB/km	≤ 2.80 dB/km
Attenuation @ 953 nm						≤ 1.50 dB/km
Attenuation @ 1300 nm	≤ 1.00 dB/km	≤ 1.00 dB/km	≤ 0.80 dB/km	≤ 0.80 dB/km	≤ 0.80 dB/km	≤ 0.80 dB/km
Overfilled Modal Bandwidth @ 850 nm	≥ 200 MHz*km	≥ 220 MHz*km	≥ 500 MHz*km	≥ 1500 MHz*km	≥ 3500 MHz*km	≥ 3500 MHz*km
Overfilled Modal Bandwidth @ 953 nm						≥ 1850 MHz*km
Overfilled Modal Bandwidth @ 1300 nm	≥ 500 MHz*km	≥ 800 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km	≥ 500 MHz*km
Effective Modal Bandwidth (EMB) @850 nm				≥ 2000 MHz*km	≥ 4700 MHz*km	≥ 4700 MHz*km
Effective Modal Bandwidth (EMB) @953 nm						≥ 2470 MHz*km
Fibre capacity 10GBASE-SR	33 m	33 m	83 m	300 m	550 m	550 m
Fibre capacity 1000BASE-SX	274 m	500 m	600 m	1000 m	1100 m	1100 m
Fibre capacity 40GBASE-SR4/100GBASE-SR10				140 m	170 m	170 m
Proof test	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa	≥ 0.7 GPa

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