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ISO 9001  
ISO 14001

**CABLES AND WIRES  
CATALOGUE 2008**

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# INTRODUCTION

**TELE-FONIKA KABLE** is the biggest cable producer in central and eastern europe. In terms of sales, it is europe's fourth biggest cable manufacturer and is noted as one of the world's largest suppliers of cable and wire.

The present position of the company is the result of **dynamic development supported by the realization of investment projects** in 1994-2003, including the acquisition of krakowska fabryka kabli sa (1998) and elektrim kable sa (2002). Over 25,000 different types of cable and wire are produced at the company's plants located in kraków, myślenice, szczecin and bydgoszcz, and delivered to customers in more than 80 countries worldwide. Our products are provided with certificates confirming their superior quality and compliance with the requirements of international standards as defined by certifying institutions.

We are a recognized and reliable supplier of copper, aluminium and fiber optic cables used by the world's leading companies specializing in telecommunications, the power industry, electronics, ship building and mining.

Our goal is **to deliver products of the highest quality at competitive prices**. In order to meet customer expectations, we serve their needs via our sales representatives and a network of sales offices, which operate actively on the international market.

# CHAPTER I

## SINGLE CORE NON-SHEATHED CABLES

# PVC INSULATED SINGLE CORE NON-SHEATHED CABLES

H05V-U, H05V-R, H05V-K, H05V2-U, H05V2-R, H05V2-K,  
H07V-U, H07V-R, H07V-K, H07V2-U, H07V2-R, H07V2-K

## TYPE: H05V-U, H05V-R, H05V-K 300/500 V

PVC insulated non sheathed single core cables for internal wiring

### NORM:

**HD 21.3, DIN VDE 0281-3, BS 6004**

### CONSTRUCTION:

**Conductor:** annealed copper, class 1 solid (H075-U), class 2 stranded (H05V-R) or class 5 flexible (H05V-K) conductor acc. to EN 60228

**Insulation:** PVC compound type TI 1

**Colour of insulation:** green/yellow, blue, black, brown, grey, orange, pink, red, violet, white, green, yellow or other colours

**Maximum conductor operating temperature:** +70°C

**Lowest ambient temperature for fixed installation (static):** -30°C

**Lowest installation temperature (flexing):** -5°C

**Maximum short-circuit conductor temperature:** +160°C

**Test voltage 50Hz:** 2000V

**Flame propagation:** EN 60332-1-2 (IEC 60332-1)

**Minimum bending radius:** 4 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Fixed protected installation inside appliances and in, or on, lighting fittings. Suitable for installation in surface mounted or embedded conduits, only for signalling or control circuits.

**Standard length cable packing:** 100 m in rings or on spools, or in cardboard boxes. Other forms of packing and delivery are available on request.



### H05V-U 300/500V

Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 70°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
0,5	0,6	2,0	8	36,0	0,014
0,75	0,6	2,2	11	24,5	0,013
1	0,6	2,3	14	18,1	0,011

### H05V-R 300/500V\*

Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 70°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
0,5	0,6	2,1	9	36,0	0,014
0,75	0,6	2,3	12	24,5	0,012
1	0,6	2,5	14	18,1	0,011

H05V-K 300/500V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 70°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
0,5	0,6	2,2	8	39,0	0,013
0,75	0,6	2,3	11	26,0	0,011
1	0,6	2,5	13	19,5	0,010

\* in standard BS 6004

## TYPE: H05V2-U, H05V2-R, H05V2-K 300/500 V

PVC insulated non sheathed single core cables for internal wiring

**NORM:**  
**HD 21.7, DIN VDE 0281-7, BS 6004**

### CONSTRUCTION:

**Conductor:** annealed copper, class 1 solid (H052-U), class 2 stranded (H05V2-R) or class 5 flexible (H05V2-K) conductor acc. to EN 60228

**Insulation:** heat resistant PVC compound type TI 3

**Colour of insulation:** green/yellow, blue, black, brown, grey, orange, pink, red, violet, white, green, yellow or other colours

**Maximum conductor operating temperature:** +90°C

**Lowest ambient temperature for fixed installation (static):** -30°C

**Lowest installation temperature (flexing):** -5°C

**Maximum short-circuit conductor temperature:** +160°C

**Test voltage 50Hz:** 2000V

**Flame propagation:** EN 60332-1-2 (IEC 60332-1)

**Minimum bending radius:** 4 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Fixed protected installation inside appliances and in lighting fittings.

**Standard length cable packing:** 100 m in rings or on spools, or in cardboard boxes. Other forms of packing and delivery are available on request.



H05V2-U 300/500V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 90°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
0,5	0,6	2,0	8	36,0	0,015
0,75	0,6	2,2	10	24,5	0,012
1	0,6	2,3	13	18,1	0,011

H05V2-R 300/500V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 90°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
0,5	0,6	2,1	8	36,0	0,014
0,75	0,6	2,3	11	24,5	0,012
1	0,6	2,5	14	18,1	0,011

H05V2-K 300/500V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 90°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
0,5	0,6	2,2	8	39,0	0,013
0,75	0,6	2,3	11	26,0	0,011
1	0,6	2,5	13	19,5	0,010

## TYPE: H07V-U, H07V-R, H07V-K 450/750 V

PVC insulated non sheathed single core cables for general purposes

**NORM:**  
**HD 21.3, DIN VDE 0281-3, BS 6004**

### CONSTRUCTION:

**Conductor:** annealed copper, class 1 solid (H07V-U), class 2 stranded (H07V-R) or class 5 flexible (H07V-K) conductor acc. to EN 60228

**Insulation:** PVC compound type TI 1

**Colour of insulation:** green/yellow, blue, black, brown, grey, orange, pink, red, violet, white

**Maximum conductor operating temperature:** +70°C

**Lowest ambient temperature for fixed installation (static):** -30°C

**Lowest installation temperature (flexing):** -5°C

**Maximum short-circuit conductor temperature:** +160°C, for cross-section > 300 mm<sup>2</sup> +140°C

**Test voltage 50Hz:** 2500V

**Flame propagation:** EN 60332-1-2 (IEC 60332-1)

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

Minimum bending radius:	For cable diameter D (mm)			
	D ≤ 8	8 < D ≤ 12	12 < D ≤ 20	D > 20
Normal use	4 D	5 D	6 D	6 D
Careful bending at termination	2 D	3 D	4 D	4 D

**Application:** installation in surface mounted or embedded conduits, or similar closed systems. Suitable for fixed protected installation in, or on, lighting or controlgear for voltages up to 1000V a.c. or, up to 750V d.c. to earth.

**Standard length cable packing:** 100 m in rings or on spools, or 500 m on drums. Other forms of packing and delivery are available on request.

H07V-U 450/750V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 70°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
1,5	0,7	2,8	20	12,1	0,011
2,5	0,8	3,3	31	7,41	0,010
4	0,8	3,8	45	4,61	0,0087
6	0,8	4,3	64	3,08	0,0074
10	1,0	5,5	106	1,83	0,0072



H07V-R 450/750V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 70°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
1,5	0,7	2,9	21	12,1	0,010
2,5	0,8	3,6	33	7,41	0,0099
4	0,8	4,1	48	4,61	0,0082
6	0,8	4,5	66	3,08	0,0070
10	1,0	5,8	110	1,83	0,0067
16	1,0	6,8	167	1,15	0,0056
25	1,2	8,4	262	0,727	0,0053
35	1,2	9,5	353	0,524	0,0046
50	1,4	11,1	480	0,387	0,0046
70	1,4	12,8	672	0,268	0,0040
95	1,6	14,7	932	0,193	0,0039
120	1,6	16,5	1158	0,153	0,0035
150	1,8	18,2	1432	0,124	0,0035
185	2,0	20,6	1789	0,0991	0,0035
240	2,2	23,4	2325	0,0754	0,0034
300	2,4	26,1	2908	0,0601	0,0033
400	2,6	30,7	3724	0,0470	0,0031

H07V-K 450/750V					
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Minimum insulation resistance at 70°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km	MΩ·km
1,5	0,7	2,9	20	13,3	0,010
2,5	0,8	3,6	31	7,98	0,0095
4	0,8	4,1	45	4,95	0,0078
6	0,8	4,6	63	3,30	0,0068
10	1,0	6,0	107	1,91	0,0065
16	1,0	7,1	161	1,21	0,0053
25	1,2	8,7	247	0,780	0,0050
35	1,2	9,8	344	0,554	0,0043
50	1,4	11,8	483	0,386	0,0042
70	1,4	13,6	669	0,272	0,0036
95	1,6	16,1	886	0,206	0,0036
120	1,6	17,2	1111	0,161	0,0032
150	1,8	19,4	1389	0,129	0,0032
185	2,0	22,1	1697	0,106	0,0032
240	2,2	24,0	2210	0,0801	0,0031

## TYPE: H07V2-U, H07V2-R, H07V2-K 450/750 V

Heat resisting PVC insulated non sheathed single core cable for internal wiring

**NORM:**

**PN-HD 21.7, DIN VDE 0281-7, BS 6004**

**CONSTRUCTION:**

**Conductor:** annealed copper, class 1 solid (H07V2-U), class 2 stranded (H07V2-R) or class 5 flexible (H07V2-K) conductor acc. to EN 60228

**Insulation:** heat resisting PVC compound type T1 3

**Colour of insulation:** green/yellow, blue, black, brown or other colours

**Maximum conductor operating temperature:** +90°C

**Lowest ambient temperature for fixed installation (static):** -30°C

**Lowest installation temperature (flexing):** -5°C



Maximum short-circuit conductor temperature: +160°C

Test voltage 50Hz: 2500V

Flame propagation: EN 60332-1-2 (IEC 60332-1)

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

Minimum bending radius:	For cable diameter D (mm)			
	D ≤ 8	8 < D ≤ 12	12 < D ≤ 20	D > 20
Normal use	4 D	5 D	6 D	6 D
Careful bending at termination	2 D	3 D	4 D	4 D

**Application:** for internal wiring and fixed protected installation inside appliances and in lighting fittings. Suitable for fixed protected installation in, or on, lighting or controlgear for voltages up to 1000V a.c. or, up to 750V d.c. to earth.

**Standard length cable packing:** 100 m in rings or on spools, or 500 m on drums. Other forms of packing and delivery are available on request.

H07V2-U 450/750V				
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
1,5	0,7	2,8	19	12,1
2,5	0,8	3,3	30	7,41

H07V2-R 450/750V				
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
1,5	0,7	3,0	20	12,1
2,5	0,8	3,6	32	7,41
4	0,8	4,1	47	4,61
6	0,8	4,5	64	3,08
10	1,0	5,8	108	1,83
16	1,0	6,8	164	1,15
25	1,2	8,5	257	0,727
35	1,2	9,6	348	0,524

07V2-R 450/750V				
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
50*	1,4	11,3	473	0,387
70*	1,4	12,6	665	0,268
95*	1,6	15,0	921	0,193
120*	1,6	16,4	1146	0,153
150*	1,8	18,4	1418	0,124
185*	2,0	20,3	1771	0,0991
240*	2,2	23,2	2303	0,0754

H07V2-K 450/750V				
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
1,5	0,7	2,9	19	13,3
2,5	0,8	3,6	30	7,98
4	0,8	4,1	43	4,95
6	0,8	4,6	61	3,30
10	1,0	6,0	104	1,91
16	1,0	7,1	158	1,21
25	1,2	8,7	243	0,780
35	1,2	9,8	338	0,554

07V2-K 450/750V				
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
50*	1,4	11,8	476	0,386
70*	1,4	13,6	661	0,272
95*	1,6	16,1	875	0,206
120*	1,6	17,2	1099	0,161
150*	1,8	19,4	1374	0,129
185*	2,0	22,1	1678	0,106
240*	2,2	24,0	2187	0,0801

\* 07V2-R and 07V2-K adapted to HD 21.3 and HD 21.7

# LOW SMOKE HALOGEN FREE SINGLE CORE NON-SHEATHED CABLES

H05Z-U, H05Z-K, H07Z-U, H07Z-R, H07Z-K

## TYPE: H05Z-U, H05Z-K 300/500 V

Thermosetting insulated, non-sheathed, single core cables with low emission of smoke and corrosive gases

### NORM:

**HD 22.9, DIN VDE 0282-9, BS 7211**

### CONSTRUCTION:

**Conductor:** annealed copper, class 1 solid (H05Z-U), or class 5 flexible (H05Z-K) acc. to EN 60228

**Insulation:** special thermosetting low smoke zero halogen compound type EI5

**Colour of insulation:** green/yellow, black, blue, brown, grey, orange, pink, red, white or other colours.

**Maximum conductor operating temperature:** +90°C

**Lowest installation temperature (flexing):** -5°C

**Maximum short-circuit temperature:** +250°C

**Test voltage 50Hz:** 2000V

**Minimum bending radius:** 4 x D, D – cable overall diameter

### PERFORMANCE UNDER FIRE CONDITIONS

**Flame propagation:** EN 60332-1-2 (IEC 60332-1)

**Smoke emission:** EN 61034-2 (IEC 61034-2)

**Corrosive and acid gas emission of insulation:** EN 50267-2-2 (IEC 60754-2): pH ≥ 4,3; conductivity: ≤ 10 μS/mm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Fixed protected installation inside appliances and in, or on, lighting fittings, particularly for situations in which low emission of smoke and corrosive gases is required in the case of burning. Suitable for installation in surface mounted or embedded conduits, only for signalling or control circuits.

**Standard length cable packing:** 100 m in coils or on spools. Other forms of packing and delivery are available on request.



H05Z-U				
Nominal cross-sectional area of conductor	Thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
0,5	0,6	2,0	8	36,0
0,75	0,6	2,2	11	24,5
1	0,6	2,3	13	18,1
H05Z-K				
Nominal cross-sectional area of conductor	Thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
0,5	0,6	2,1	8	39,0
0,75	0,6	2,3	11	26,0
1	0,6	2,4	13	19,5

# TYPE: H07Z-U, H07Z-R, H07Z-K

## 450/750 V

Thermosetting insulated, non-sheathed, single core cables with low emission of smoke and corrosive gases

### NORM:

**HD 22.9, DIN VDE 0282-9, BS 7211**

### CONSTRUCTION:

- Conductor:** annealed copper, class 1 solid (H07Z-U), class 2 stranded (H07Z-R) or class 5 flexible (H07Z-K) acc. to EN 60228
- Insulation:** special thermosetting low smoke zero halogen compound type EI5
- Colour of insulation:** green/yellow, black, blue, brown, grey, orange, pink, red, white or other colours.
- Maximum conductor operating temperature:** +90°C
- Lowest ambient temperature for fixed installation (static):** -40°C
- Lowest installation temperature (flexing):** -5°C
- Maximum short-circuit temperature:** +250°C
- Test voltage 50Hz:** 2500V

Minimum bending radius:	For cable diameter D (mm)			
	D ≤ 8	8 < D ≤ 12	12 < D ≤ 20	D > 20
Normal use	4 D	5 D	6 D	6 D
Careful bending at termination	2 D	3 D	4 D	4 D

### PERFORMANCE UNDER FIRE CONDITIONS

**Flame propagation:** EN 60332-1-2 (IEC 60332-1)

**Smoke emission:** EN 61034-2 (IEC 61034-2): Light transmittance > 70%

**Corrosive and acid gas emission of insulation:** EN 50267-2-2 (IEC 60754-2): pH ≥ 4,3; conductivity: ≤ 10 μS/mm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

### Application:

Single core, non-sheathed cables are suitable particularly for situations in which low emission of smoke and corrosive gases is required in the case of burning. H07Z-U, H07Z-R, H07Z-K - single core, non-sheathed cables are intended for installation in surface mounted or embedded conduits, or similar closed systems. Suitable for fixed or protected installation in or on, lighting and control gear for voltages up to 1000 V a.c. or, up to 1.5 times higher for d.c. usage.

**Standard length cable packing:** 100 m in coils or on spools, or 500 m on drums. Other forms of packing and delivery are available on request.



H07Z-U 450/750V				
Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
1,5	0,7	2,8	20	12,1
2,5	0,8	3,3	30	7,41
4	0,8	3,8	45	4,61
6	0,8	4,3	63	3,08
10	1,0	5,5	105	1,83

### H07Z-R 450/750V

Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
1,5	0,7	3,0	21	12,1
2,5	0,8	3,6	32	7,41
4	0,8	4,1	48	4,61
6	0,8	4,5	65	3,08
10	1,0	5,8	109	1,83
16	1,0	6,8	165	1,15
25	1,2	8,5	259	0,727
35	1,2	9,6	350	0,524
50	1,4	11,3	476	0,387
70	1,4	12,6	668	0,268
95	1,6	15,0	925	0,193
120	1,6	16,4	1151	0,153
150	1,8	18,4	1424	0,124
185	2,0	20,3	1778	0,0991
240	2,2	23,2	2312	0,0754
300	2,4	25,4	2892	0,0601
400	2,6	29,4	3747	0,0470

### H07Z-K 450/750V

Nominal cross-sectional area of conductor	Radial thickness of insulation	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
mm <sup>2</sup>	mm	mm	kg/km	Ω/km
1,5	0,7	2,9	19	13,3
2,5	0,8	3,6	30	7,98
4	0,8	4,1	44	4,95
6	0,8	4,6	62	3,30
10	1,0	6,0	105	1,91
16	1,0	7,1	159	1,21
25	1,2	8,7	245	0,780
35	1,2	9,4	332	0,554
50	1,4	11,8	479	0,386
70	1,4	13,6	664	0,272
95	1,6	16,1	879	0,206
120	1,6	17,2	1104	0,161
150	1,8	19,4	1380	0,129
185	2,0	22,1	1685	0,106
240	2,2	24,0	2196	0,0801
300*	2,4	28,0	2751	0,0641
400*	2,6	30,3	3587	0,0486

\* Not in standard, type 07V-K



# CHAPTER II

## FIXED INSTALLATION CABLES

# UNSCREENED FIXED INSTALLATION CABLES

NYM-J, NYM-O, CYKY-J, MMJ

## TYPE: NYM-J,O 300/500 V

PVC-sheathed cables for power installation

**NORM:**  
**DIN VDE 0250-204**

### CONSTRUCTION:

Conductor:	solid or stranded plain copper acc. to DIN EN 60228
Insulation:	PVC compound type T11
Filling:	filling compound
Sheath:	PVC compound type TM1
Colour of sheath:	grey RAL 7035
Core identification:	acc to DIN VDE 0293-308

	with protective conductor-J	without protective conductor-0
single-core	green/yellow	black
twin	-	blue, brown
3-core	green/yellow, blue, brown	brown, black, grey
4-core	green/yellow, brown, black, grey	blue, brown, black, grey
5-core	green/yellow, blue, brown, black, grey	blue, brown, black, grey, black
7-core and more	green/yellow, other cores black with white numbering	black with white numbering

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation (static): -30°C

Lowest installation temperature (flexing): -5°C

Maximum short-circuit conductor temperature: +160°C

Flame propagation: DIN EN 60332-1-2

Test voltage 50Hz: 2000V

Minimum bending radius: 6 x cable diameter.

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** For fixed installation. Usable in the open, in dry, damp and wet environments in the open and concealed, as well as in masonry and in concrete, not suitable for imbedding in solidified - or compressed concrete. Outdoor usage is only possible, as long as the cable is protected against direct sunlight..

**Standard length cable packing:** 100 m coils or 500 m on drums. Other forms of packing and delivery are available on request..



## NYM 300/500 V

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
1 x 1,5	0,6	1,4	5,4	45	12,1
1 x 2,5	0,7	1,4	5,9	60	7,41
1 x 4	0,8	1,4	6,6	80	4,61
1 x 6	0,8	1,4	7,1	102	3,08
1 x 10	1,0	1,4	8,3	152	1,83
1 x 16	1,0	1,4	9,6	221	1,15
2 x 1,5	0,6	1,4	8,3	110	12,1
2 x 2,5	0,7	1,4	9,5	150	7,41
2 x 4	0,8	1,4	10,8	207	4,61
2 x 6	0,8	1,4	11,8	263	3,08
2 x 10	1,0	1,6	14,8	424	1,83
2 x 16	1,0	1,6	17,4	618	1,15
2 x 25	1,2	1,6	21,0	930	0,727
2 x 35	1,2	1,8	23,7	1226	0,524
3 x 1,5	0,6	1,4	8,7	128	12,1
3 x 2,5	0,7	1,4	10,0	178	7,41
3 x 4	0,8	1,4	11,4	248	4,61
3 x 6	0,8	1,6	12,8	333	3,08
3 x 10	1,0	1,6	15,6	520	1,83
3 x 16	1,0	1,6	18,6	778	1,15
3 x 25	1,2	1,8	22,7	1182	0,727
3 x 35	1,2	1,8	25,2	1540	0,524
4 x 1,5	0,6	1,4	9,4	151	12,1
4 x 2,5	0,7	1,4	10,8	213	7,41
4 x 4	0,8	1,6	12,8	312	4,61
4 x 6	0,8	1,6	14,2	415	3,08
4 x 10	1,0	1,6	17,0	639	1,83
4 x 16	1,0	1,6	20,4	961	1,15
4 x 25	1,2	1,8	25,1	1479	0,727
4 x 35	1,2	1,8	27,7	1917	0,524
5 x 1,5	0,6	1,4	10,1	180	12,1
5 x 2,5	0,7	1,4	11,7	257	7,41
5 x 4	0,8	1,6	14,1	386	4,61
5 x 6	0,8	1,6	15,4	503	3,08
5 x 10	1,0	1,6	18,6	782	1,83
5 x 16	1,0	1,8	22,8	1202	1,15
5 x 25	1,2	1,8	27,6	1821	0,727
5 x 35	1,2	1,8	30,6	2385	0,524
7 x 1,5	0,6	1,4	10,9	221	12,1
7 x 2,5	0,7	1,6	13,0	331	7,41
8 x 1,5*	0,6	1,4	11,6	246	12,1
10 x 1,5*	0,6	1,4	13,6	317	12,1
12 x 1,5*	0,6	1,4	14,0	355	12,1
12 x 2,5*	0,7	1,6	16,8	534	7,41

\* Adapted to DIN VDE 0250-204.

Current ratings acc. to DIN VDE 0298 Part 4

Installation: - in thermally insulated walls - in insulating tubes								
	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>
Number of loaded cores	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>
Cross-section (mm <sup>2</sup> )	Current ratings in Ampere (A)							
1,5	15,5	13,0	16,5	15,0	19,5	17,5	22	18,5
2,5	18,5	17,5	23	20	27	24	30	25
4	25	23	30	27	36	32	40	34
6	32	29	38	34	46	41	51	43
10	43	39	52	46	63	57	70	60
16	57	52	69	62	85	76	94	80
25	75	68	90	80	112	96	119	101
35	92	83	111	99	138	119	148	126

Permissible operating temperature at conductor: 70°C  
 Ambient temperature: 30°C

Conversion factors for ambient temperature over 30°C

Ambient temperature, °C	30	35	40	45	50	55	60	65
Conversion factors	1,00	0,94	0,87	0,79	0,71	0,61	0,50	0,35

<sup>1)</sup> Conversion factors for multicore cable (≥5 cores)

Number of loaded cores	Conversion factors
5	0,75
7	0,65
10	0,55
14	0,50

## TYPE: CYKY 450/750 V

PVC insulated and PVC sheathed power cables

**NORM:**

**CSN 34 7656 and CSN 34 7615**

**CONSTRUCTION:**

**Conductor:** solid from copper soft wires class 1 - IEC 60228

**Insulation:** PVC type TI1

**Inner covering:** non-vulcanized rubber

**Outer sheath:** PVC type TM1i

**Colour of sheath:** Black

**Identification of conductors:** CSN 33 0165 or HD 308

**Dielectric test voltage 50Hz:** 2,5kV

**Max temperature of conductor during cable operation:** + 70°C

**Operating temperature:** -15°C up to + 70°C

**Min ambient temperature at laying of cables:** -5°C

**Max temperature of conductor at short-circuit:** +150°C

**Min bending radius:** 10 x D – outer diameter of cable

**Resistance to flame propagation:** IEC 60332-1

**Standard packing** Drums 500 or 1000 m. Other lengths and types of packing may be offered on request



CYKY 450/750V						
Number and cross sectional area of conductor	Number of wires in conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
n x mm <sup>2</sup>	mm	mm	mm	mm	kg/km	Ω/km
2 x 1,5	1	0,80	1,00	8,40	114	12,1
2 x 2,5	1	0,90	1,00	9,60	156	7,41
2 x 4	1	1,00	1,00	10,90	213	4,61
3 x 1,5	1	0,80	1,00	8,90	133	12,1
3 x 2,5	1	0,90	1,00	10,10	184	7,41
3 x 4	1	1,00	1,20	11,50	255	4,61
3 x 6	1	1,00	1,20	13,20	350	3,08

CYKY 450/750V						
Number and cross sectional area of conductor	Number of wires in conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at temperature 20°C
n x mm <sup>2</sup>	mm	mm	mm	mm	kg/km	Ω/km
4 x 1,5	1	0,80	1,00	9,60	158	12,1
4 x 2,5	1	0,90	1,00	11,00	222	7,41
4 x 4	1	1,00	1,20	12,60	310	4,61
4 x 6	1	1,00	1,20	14,40	426	3,08
4 x 10	1	1,00	1,20	16,30	613	1,83
4 x 16	1	1,00	1,40	19,40	919	1,15
5 x 1,5	1	0,80	1,00	10,50	192	12,1
5 x 2,5	1	0,90	1,20	12,10	270	7,41
5 x 4	1	1,00	1,20	13,80	379	4,61
5 x 6	1	1,00	1,20	15,80	521	3,08
5 x 10	1	1,00	1,40	17,90	753	1,83
5 x 16	1	1,00	1,40	21,20	1127	1,15
7 x 1,5	1	0,80	1,20	11,40	236	12,1
7 x 2,5	1	0,90	1,20	13,50	348	7,41
12 x 1,5	1	0,80	1,20	15,20	390	12,1
12 x 2,5	1	0,90	1,40	18,00	576	7,41
19 x 1,5	1	0,80	1,40	18,10	577	12,1
19 x 2,5	1	0,90	1,40	21,00	832	7,41
24 x 1,5	1	0,80	1,40	21,10	723	12,1
24 x 2,5	1	0,90	1,60	24,90	1070	7,41
37 x 1,5	1	0,80	1,60	24,40	1046	12,1

## TYPE: MMJ 300/500 V and 450/750 V

PVC-sheathed cables for power installation

### NORM:

HD 21.4 S2 and SFS 2091

### CONSTRUCTION:

Conductor:	solid class 1 for 1,5 and 2,5 mm <sup>2</sup> , the other cross-sectional area stranded class 2 plain copper acc. to EN 60228
Insulation:	special PVC compound type TI1
Filling:	not vulcanized rubber compound
Sheath:	special PVC compound type TM1
Colour of sheath:	white
Core identification:	OCC. to HD 308 S2

	with protective conductor (S)	without protective conductor (N)
twin	-	blue, brown
3-core	green/yellow, blue, brown	brown, black, grey
4-core	green/yellow, brown, black, grey	blue, brown, black, grey
5-core	green/yellow, blue, brown, black, grey	blue, brown, black, grey, black

Maximum conductor operating temperature: +70°C

Lowest recommended temperature during laying: -15°C

Maximum short-circuit conductor temperature: +160°C

Flame retardant: EN 60332-1-2

Minimum bending radius: 10 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** For fixed installation. Usable in the open, in dry, damp and wet environments. The cable can however also be used outdoor, because it fulfil the requirements in SFS 2091 for installation at low temperature.

**Standard length cable packing:** 100 m coils or 500 m on drums. Other forms of packing and delivery are available on request.



### MMJ 300/500V acc. to HD 21.4 and SFS 2091

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2 x 1,5	0,7	1,2	8,7	117	12,1
2 x 2,5	0,8	1,2	9,9	159	7,41
3 x 1,5	0,7	1,2	9,1	135	12,1
3 x 2,5	0,8	1,2	10,4	187	7,41
3 x 4	0,8	1,2	12,1	266	4,61
4 x 1,5	0,7	1,2	9,9	160	12,1
4 x 2,5	0,8	1,2	11,3	224	7,41
4 x 4	0,8	1,4	13,5	333	4,61
5 x 1,5	0,7	1,2	10,7	192	12,1
5 x 2,5	0,8	1,2	12,2	270	7,41
5 x 4	0,8	1,4	15,1	421	4,61
5 x 6	0,8	1,4	16,6	550	3,08
5 x 10	1,0	1,4	19,6	825	1,83
5 x 16	1,0	1,6	23,2	1223	1,15

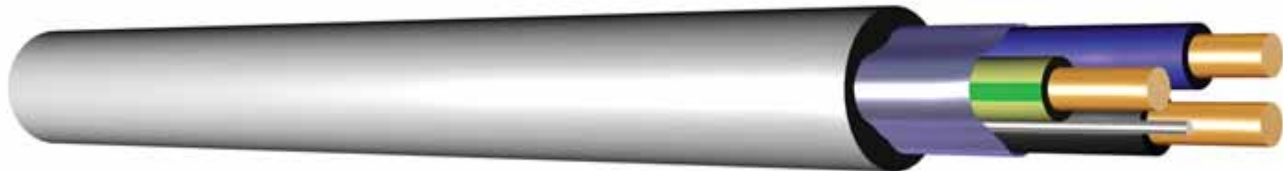
### MMJ 450/750V acc. to SFS 2091

2 x 4	0,8	1,5	12,0	238	4,61
2 x 6	0,8	1,5	12,7	289	3,08
2 x 10	1,0	1,5	15,8	460	1,83
2 x 16	1,0	1,6	18,0	641	1,15
2 x 25	1,2	1,6	21,8	973	0,727
2 x 35	1,2	1,7	24,1	1249	0,524
3 x 4	0,8	1,5	12,7	282	4,61
3 x 6	0,8	1,5	13,4	349	3,08
3 x 10	1,0	1,5	16,7	559	1,83
3 x 16	1,0	1,6	19,4	813	1,15
3 x 25	1,2	1,7	23,3	1216	0,727
3 x 35	1,2	1,7	25,6	1564	0,524
4 x 4	0,8	1,5	13,7	339	4,61
4 x 6	0,8	1,5	15,0	441	3,08
4 x 10	1,0	1,6	18,4	691	1,83
4 x 16	1,0	1,7	21,4	1008	1,15
4 x 25	1,2	1,7	25,9	1532	0,727
4 x 35	1,2	1,8	28,7	1990	0,524
5 x 4	0,8	1,5	15,3	427	4,61
5 x 6	0,8	1,5	16,3	534	3,08
5 x 10	1,0	1,7	20,2	851	1,83
5 x 16	1,0	1,7	23,4	1233	1,15
5 x 25	1,2	1,8	28,6	1892	0,727
5 x 35	1,2	1,8	31,8	2485	0,524

# SCREENED FIXED INSTALLATION CABLES

(N) YM (St)

## TYPE: (N) YM (St) - J, -0 300/500 V



PVC-sheathed screened cables for power installation

### NORM:

**Adapted to DIN VDE 0250-204/ 209**

### CONSTRUCTION:

Conductor:	solid or stranded plain copper acc. to DIN EN 60228
Insulation:	PVC compound type T11
Screen:	coated aluminium foil
Drain wire:	solid tinned copper wire
Sheath:	PVC compound type TM1
Colour of sheath:	grey RAL 7035
Core identification:	acc to DIN VDE 0293-308

twin	blue, brown
3-core	green/yellow, blue, brown
4-core	green/yellow, brown, black, grey
5-core	green/yellow, blue, brown, black, grey
7-core	green/yellow, other cores black with white numbering

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation (static): -30°C

Lowest installation temperature (flexing): -5°C

Maximum short-circuit conductor temperature: +160°C

Flame propagation: DIN EN 60332-1-2 ( IEC 60332-1)

Minimum bending radius: 6 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** These cables with screening are also ideal for installations in the living rooms of those peoples who are extreme sensitive to radiation in computer sector, hospitals etc. The cable is suitable for laying on, in and under plaster in dry and damp places as well as in concrete and masonry.

**Standard length cable packing:** 100 m coils or 500 m on drums. Other forms of packing and delivery are available on request.

### (N) YM (St) 300/500

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2 x 1,5/1,5	0,6	1,4	8,0	96	12,1 / 12,1
2 x 2,5/1,5	0,7	1,4	9,2	125	7,41 / 12,1
2 x 4 /1,5	0,8	1,4	10,5	167	4,61 / 12,1
2 x 6 /1,5	0,8	1,4	11,5	210	3,08 / 12,1
3 x 1,5/1,5	0,6	1,4	8,5	118	12,1 / 12,1
3 x 2,5/1,5	0,7	1,4	9,7	158	7,41 / 12,1
3 x 4 /1,5	0,8	1,4	11,1	216	4,61 / 12,1
3 x 6 /1,5	0,8	1,6	12,5	291	3,08 / 12,1
4 x 1,5/1,5	0,6	1,4	9,2	142	12,1 / 12,1
4 x 2,5/1,5	0,7	1,4	10,5	194	7,41 / 12,1
4 x 4 /1,5	0,8	1,6	12,5	280	4,61 / 12,1
4 x 6 /1,5	0,8	1,6	13,7	364	3,08 / 12,1
5 x 1,5/1,5	0,6	1,4	10,0	171	12,1 / 12,1
5 x 2,5/1,5	0,7	1,4	11,5	236	7,41 / 12,1
5 x 4 /1,5	0,8	1,6	13,6	344	4,61 / 12,1
5 x 6 /1,5	0,8	1,6	14,9	450	3,08 / 12,1
5 x 10/1,5	1,0	1,6	18,1	695	1,83 / 12,1
7 x 1,5/1,5	0,6	1,4	10,8	210	12,1 / 12,1

Current ratings acc. to DIN VDE 0298 Part 4

Installation:	Multicore sheathed cables in insulating tubes, in a thermally insulated walls		Multicore sheathed cables in insulating tubes on e wall		Single or multicore sheathed cables on a wall		Multicore sheathed cables with a space of minimum 0,3 x diameter d to wall	
Number of loaded cores	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>
Cross-section (mm <sup>2</sup> )	Current ratings in Ampere (A)							
1,5	15,5	13,0	16,5	15,0	19,5	17,5	22	18,5
2,5	18,5	17,5	23	20	27	24	30	25
4	25	23	30	27	36	32	40	34
6	32	29	38	34	46	41	51	43
10	43	39	52	46	63	57	70	60

Permissible operating temperature at conductor: 70°C. Ambient temperature: 30°C

<sup>1)</sup> Conversion factors for multicore cable (≥5 cores)

Number of loaded cores	Conversion factors
5	0,75
7	0,65

# LOW SMOKE HALOGEN FREE FIXED INSTALLATION CABLES

NHXMH-J, NHXMH-O

## TYPE: NHXMH 300/500

Halogen-free light sheathed cables with improved fire behaviour

**NORM:**  
**DIN VDE 0250-214**

### CONSTRUCTION:

**Conductor:** solid or stranded plain copper acc. to DIN EN 60228

**Insulation:** cross-linked polyethylene XLPE

**Filling:** halogen-free not vulcanized rubber compound

**Sheath:** special halogen-free thermoplastic compound

**Core identification:** acc to DIN VDE 0293-308

	with protective conductor-J	without protective conductor-0
single-core	green/yellow	black
twin	-	blue, brown
3-core	green/yellow, blue, brown	brown, black, grey
4-core	green/yellow, brown, black, grey	blue, brown, black, grey
5-core	green/yellow, blue, brown, black, grey	blue, brown, black, grey, black
7-core and more	green/yellow, other cores black with white numbering	black with white numbering

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation (static): -30°C

Lowest installation temperature (flexing): -5°C

Maximum short-circuit conductor temperature: +250°C

Flame retardant: DIN VDE 0472-804 C, DIN EN 50266-2-4, IEC 60332-3 Category C

Smoke density: VDE 0482-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: VDE 0482-267, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 100 μS/cm

Minimum bending radius: for single core cables: 15 x cable diameter, for multi-core cables: 10 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Installation cables for industrial complexes, public buildings, hotels, airports, hospitals or industrial plants with high concentration of people and/or property. Usable in the open, in dry, damp and wet environments in the open and concealed, as well as in masonry and in concrete, not suitable for imbedding in solidified – or compressed – concrete.

**Standard length cable packing:** 100 m coils or 500 m on drums. Other forms of packing and delivery are available on request.







NHXMH 300/500 V						
Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum conductor resistance at 20°C	Caloric load
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km	kWh/m
1 x 1,5	0,5	1,4	5,2	41	12,1	0,33
1 x 2,5	0,5	1,4	5,5	52	7,41	0,36
1 x 4	0,6	1,4	6,2	71	4,61	0,42
1 x 6	0,6	1,4	6,7	92	3,08	0,44
1 x 10	0,7	1,4	7,7	135	1,83	0,53
1 x 16	0,7	1,4	9,0	200	1,15	0,64

## NHXMH 300/500 V

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum conductor resistance at 20°C	Caloric load
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km	kWh/m
2 x 1,5	0,5	1,4	8,1	100	12,1	0,36
2 x 2,5	0,5	1,4	8,9	129	7,41	0,42
2 x 4	0,6	1,4	10,2	180	4,61	0,56
2 x 6	0,6	1,4	11,2	233	3,08	0,64
2 x 10	0,7	1,6	13,7	364	1,83	0,97
2 x 16	0,7	1,6	16,4	546	1,15	1,3
2 x 25	0,9	1,6	19,8	820	0,727	1,8
2 x 35	0,9	1,8	22,5	1097	0,524	2,3
3 x 1,5	0,5	1,4	8,5	116	12,1	0,42
3 x 2,5	0,5	1,4	9,3	153	7,41	0,47
3 x 4	0,6	1,4	10,7	217	4,61	0,61
3 x 6	0,6	1,6	12,2	297	3,08	0,78
3 x 10	0,7	1,6	14,4	452	1,83	1,1
3 x 16	0,7	1,6	17,4	683	1,15	1,5
3 x 25	0,9	1,8	21,4	1054	0,727	2,1
3 x 35	0,9	1,8	24,1	1405	0,524	2,5
4 x 1,5	0,5	1,4	9,1	136	12,1	0,47
4 x 2,5	0,5	1,4	10,0	183	7,41	0,56
4 x 4	0,6	1,6	12,0	274	4,61	0,78
4 x 6	0,6	1,6	13,2	363	3,08	0,94
4 x 10	0,7	1,6	15,6	552	1,83	1,3
4 x 16	0,7	1,6	19,0	848	1,15	1,8
4 x 25	0,9	1,8	23,7	1323	0,727	2,6
4 x 35	0,9	1,8	26,4	1753	0,524	3,1
5 x 1,5	0,5	1,4	9,8	160	12,1	0,56
5 x 2,5	0,5	1,4	10,8	218	7,41	0,64
5 x 4	0,6	1,6	13,0	327	4,61	0,98
5 x 6	0,6	1,6	14,3	436	3,08	1,1
5 x 10	0,7	1,6	17,2	679	1,83	1,5
5 x 16	0,7	1,8	21,1	1051	1,15	2,2
5 x 25	0,9	1,8	25,9	1612	0,727	3,1
5 x 35	0,9	1,8	29,0	2143	0,524	3,7
7 x 1,5	0,5	1,4	10,5	196	12,1	0,64
7 x 2,5	0,5	1,6	12,0	283	7,41	0,81

Current ratings acc. to DIN VDE 0298 Part 4

Installation: - in thermally insulated walls - in insulating tubes								
	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>
Number of loaded cores	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>	2	3 <sup>1)</sup>
Cross-section (mm <sup>2</sup> )	Current ratings in Ampere (A)							
1,5	15,5	13,0	16,5	15,0	19,5	17,5	22	18,5
2,5	18,5	17,5	23	20	27	24	30	25
4	25	23	30	27	36	32	40	34
6	32	29	38	34	46	41	51	43
10	43	39	52	46	63	57	70	60
16	57	52	69	62	85	76	94	80
25	75	68	90	80	112	96	119	101
35	92	83	111	99	138	119	148	126

Permissible operating temperature at conductor: 70°C

Ambient temperature: 30°C

Conversion factors for ambient temperature over 30°C

Ambient temperature, °C	30	35	40	45	50	55	60	65
Conversion factors	1,00	0,94	0,87	0,79	0,71	0,61	0,50	0,35

<sup>1)</sup> Conversion factors for multicore cable (≥5 cores)

Number of loaded cores	Conversion factors
5	0,75
7	0,65

# CHAPTER III

## PVC SHEATHED FLEXIBLE CORDS

# PVC SHEATHED FLEXIBLE CORDS

H03VV-F, H03VVH2-F, H05VV-F, A05VV-F, H05VVH2-F,

## TYPE: H03VV-F 300/300V H03VVH2-F 300/300V

PVC insulated and sheathed flexible cords

**NORM:**

**DIN VDE 0281-5, BS 6500, NFC 32-201-5, PN-HD 21.5**

### CONSTRUCTION:

Conductor: annealed copper, class 5 flexible conductor acc. to EN 60228

Insulation: PVC type Tl2

Sheath: PVC type TM2

<b>Core identification:</b>	twin core	blue and brown
	3-core	green/yellow, blue and brown
	4-core	green/yellow, brown, black, grey

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation (static): -30°C

Lowest installation temperature: +5°C

Maximum short-circuit conductor temperature: +150°C

Test voltage 50Hz: 2000V

Flame retardant: EN 60332-1-21 ( IEC 60332-1)

Minimum bending radius: 6 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** In domestic premises, kitchens, offices; for light duties, for light portable appliances (eg. radio sets, table and standard lamps, office machines).



Number and cross-sectional area of conductor n x mm <sup>2</sup>	Nominal thickness of insulation mm	Nominal thickness of sheath mm	Approximate overall diameter mm	Approximate net weight of cables kg/km	Maximum conductor resistance at 20°C Ω/km
<b>H03VV-F</b>					
2x0,5	0,5	0,6	5,0	34	39,0
2x0,75	0,5	0,6	5,4	41	26,0
3x0,5	0,5	0,6	5,3	40	39,0
3x0,75	0,5	0,6	5,7	50	26,0
4x0,5	0,5	0,6	5,8	49	39,0
4x0,75	0,5	0,6	6,3	61	26,0
<b>H03VVH2-F</b>					
2x0,5	0,5	0,6	3,1x5,0	25	39,0
2x0,75	0,5	0,6	3,3x5,4	31	26,0
Conductor cross-section [mm <sup>2</sup> ]	Current rating [A]				
	Single phase			Three phase	
	0,5	3			3
0,75	6			6	

These values apply to the majority of cases. Further information should be sought in unusual cases eg.:

- when high ambient temperatures are involved, ie. above 30°C
- where long lengths are used
- where ventilation is restricted
- where the cords are used for other purposes, eg. internal wiring of apparatus.

# TYPE: H05VV-F 300/500V H05VVH2-F 300/500V

PVC insulated and sheathed flexible cords

**NORM:**

**DIN VDE 0281-5, BS 6500, BS 7919, NFC 32-201-5, PN-HD 21.5**

## CONSTRUCTION:

Conductor: annealed copper, class 5 flexible conductor acc. to EN 60228

Insulation: PVC type T12

Sheath: PVC type TM2

Core identification:		
twin core	blue and brown	
3-core	green/yellow, blue and brown	
4-core	green/yellow, brown, black, grey	
5-core	green/yellow, blue, brown, black, grey	

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation (static): -30°C

Lowest installation temperature: +5°C

Maximum short-circuit conductor temperature: +150°C

Test voltage 50Hz: 2000V

Flame retardant: EN 60332-1-21 ( IEC 60332-1)

Minimum bending radius: 6 x cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** In domestic premises, kitchens, offices; for household appliances, including in damp premises; for medium duties (eg. washing machines, spin dryers, and refrigerators).



H05VV-F					
Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2x0,75	0,6	0,8	6,2	51	26,0
2x1	0,6	0,8	6,4	57	19,5
2x1,5	0,7	0,8	7,4	79	13,3
2x2,5	0,8	1,0	9,2	122	7,98
2x4	0,8	1,1	10,3	165	4,95
3x0,75	0,6	0,8	6,6	61	26,0
3x1	0,6	0,8	6,7	69	19,5
3x1,5	0,7	0,9	8,0	99	13,3
3x2,5	0,8	1,1	9,9	153	7,98
3x4	0,8	1,2	11,1	209	4,95
4x0,75	0,6	0,8	7,2	74	26,0
4x1	0,6	0,9	7,6	87	19,5
4x1,5	0,7	1,0	9,0	124	13,3
4x2,5	0,8	1,1	10,8	187	7,98
4x4	0,8	1,2	12,2	258	4,95
5x0,75	0,6	0,9	8,0	93	26,0
5x1	0,6	0,9	8,3	107	19,5
5x1,5	0,7	1,1	10,0	156	13,3
5x2,5	0,8	1,2	12,1	236	7,98
5x4	0,8	1,4	13,7	330	4,95
H05VVH2-F					
2x0,75	0,6	0,8	3,9x6,2	39	26,0
2x1	0,6	0,8	4,0x6,5	45	19,5

Conductor cross-section [mm <sup>2</sup> ]	Current rating [A]	
	Single phase	Three phase
0,5	3	3
0,75	6	6
1	10	10
1,5	16	16
2,5	25	20
4	32	25

These values apply to the majority of cases. Further information should be sought in unusual cases eg.:

- when high ambient temperatures are involved, ie. above 30°C
- where long lengths are used
- where ventilation is restricted
- where the cords are used for other purposes, eg. internal wiring of apparatus.

# CHAPTER IV

## CABLES IN RUBBER

# CABLES IN RUBBER

H05RR-F, H07RN-F, NSGAFOU

## TYPE: H05RR-F 300/500V

EPR insulated and EPR sheathed flexible cord

**NORM:**

**DIN VDE 0282-4, BS 6500, BS 7919, NF C 32-102-4, HD 22.4 S3**

**CONSTRUCTION:**

Conductor: tinned annealed copper conductor flexible class 5 acc. to EN 60228

Insulation: EPR rubber type EI4

Sheath: rubber compound type EM3

Colour of sheath: black

Core identification: acc. to HD 308 S2 and BS 6500, BS 7919

twin core	blue and brown
3-core	green/yellow, blue and brown
4-core	green/yellow, brown, black, grey
4 - core*	green/yellow, blue, brown, black
5 - core	green/yellow, blue, brown, black, grey

\* For certain applications only.

Test voltage 50Hz: 2000V

Maximum conductor operating temperature: + 60°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -25°C

Maximum short-circuit conductor temperature: +200°C

Minimum bending radius: 7,5 x D, D – overall diameter of cable

Flame propagation: EN 60332-1-2, (IEC 60332-1)

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

Application: For general use in domestic premises, kitchens, offices and for supplying appliances where the cables are subjected to low mechanical stresses (eg. vacuum cleaners, cooking appliances, soldering irons, toasters).

Standard length cable packing: 100 m in coils and 500 or 1000 m on drums.  
Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2x0,75	0,6	0,8	6,1	54	26,7
2x1	0,6	0,9	6,6	64	20,0
2x1,5	0,8	1,0	8,2	98	13,7
2x2,5	0,9	1,1	9,8	143	8,21
3x0,75	0,6	0,9	6,7	67	26,7
3x1	0,6	0,9	6,9	77	20,0
3x1,5	0,8	1,0	8,7	117	13,7
3x2,5	0,9	1,1	10,3	172	8,21
3x4	1,0	1,2	12,0	242	5,09
3x6	1,0	1,4	13,6	330	3,39
4 x 0,75	0,6	0,9	7,3	80	26,7
4 x 1	0,6	0,9	7,6	92	20,0
4 x 1,5	0,8	1,1	9,7	146	13,7

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
4 x 2,5	0,9	1,2	11,5	215	8,21
4 x 4	1,0	1,3	13,3	303	5,09
4 x 6	1,0	1,5	15,1	412	3,39
5 x 0,75	0,6	1,0	8,1	102	26,7
5 x 1	0,6	1,0	8,5	117	20,0
5 x 1,5	0,8	1,1	10,6	178	13,7
5 x 2,5	0,9	1,3	12,8	269	8,21

#### Current ratings

Ambient air temperature: 30°C; conductor operating temperature: 60°C

Conductor cross-section (mm <sup>2</sup> )	Current ratings in Ampere (A)	
	Single phase	Three phase
0,75	6	6
1	10	10
1,5	16	16
2,5	25	20
4	32	25
6	40	-

These values apply to the majority of cases. Further information should be sought in unusual cases eg.:

- when high ambient temperatures are involved, ie. above 30°C
- where long lengths are used
- where ventilation is restricted
- where the cords are used for other purposes, eg. internal wiring of apparatus.

<sup>1</sup> As defined in HD 516 S2; DIN VDE 0298-4

## TYPE: H07RN-F 450/750V

EPR insulated and neoprene rubber sheathed flexible cords 450/750V

### NORM:

DIN VDE 0282-4, BS 7919, HD 22.4

### CONSTRUCTION:

Conductor: tinned or bare annealed copper conductor flexible class 5 acc. to EN 60228

Insulation: EPR rubber type EI4

Sheath: oil resisting and flame retardant rubber compound type EM2

Colour of sheath: black

Core identification: acc. to HD 308 S2 or BS 7919

Test voltage 50Hz: 2500V

Maximum conductor operating temperature: + 60°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -25°C

Maximum short-circuit conductor temperature: +200°C

Minimum bending radius: 7,5 x D, D – overall diameter of cable

Flame propagation: EN 60332-1-2 (IEC 60332-1)

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Heavy-duty flexible cables are suited for use for medium mechanical stress in dry, damp and wet areas as well as in open air in agriculture plants, eg. for industrial and agricultural workshop appliances, large boiling installations, heating plates, inspections lamps, electrical tools such as drills, circular saws, domestic electric tools, and also for transportable motors or machines on building sites or in agricultural workings etc. Use up to 1000V AC is permitted for fixed, protected installation (in conduit or appliances) and also for motor connections of hoisting motors and the like.

**Standard length cable packing:** 500 or 1000 m on drums. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor	Maximum diameter of wires	Nominal thickness of insulation	Nominal thickness of sheath			Approximate overall diameter	Approximate net weight
			Single layer	Two layers			
				Inner	Outer		
n x mm <sup>2</sup>	mm	mm	mm	mm	mm	mm	kg/km
1 x 1,5	0,26	0,8	1,4	—	—	5,9	50
1 x 2,5	0,26	0,9	1,4	—	—	6,6	66
1 x 4	0,31	1,0	1,5	—	—	7,6	91
1 x 6	0,31	1,0	1,6	—	—	8,4	118
1 x 10	0,41	1,2	1,8	—	—	10,1	180
1 x 16	0,41	1,2	1,9	—	—	11,5	250
1 x 25	0,41	1,4	2,0	—	—	13,3	357
1 x 35	0,41	1,4	2,2	—	—	14,4	465
1 x 50	0,41	1,6	2,4	—	—	17,2	653
1 x 70	0,51	1,6	—	1,0	1,6	19,3	875
1 x 95	0,51	1,8	—	1,1	1,7	22,2	1142
1 x 120	0,51	1,8	—	1,2	1,8	23,7	1402
1 x 150	0,51	2,0	—	1,3	1,9	26,3	1736
1 x 185	0,51	2,2	—	1,4	2,0	29,4	2109
1 x 240	0,51	2,4	—	1,4	2,1	31,5	2665
1 x 300	0,51	2,6	—	1,4	2,2	35,7	3305
1 x 400	0,51	2,8	—	1,5	2,3	38,4	4216
1 x 500	0,51	3,0	—	1,6	2,4	43,8	5299
1 x 630	0,51	3,0	—	1,6	2,5	48,4	6852
2 x 1	0,21	0,8	1,3	—	—	8,2	90
2 x 1,5	0,26	0,8	1,5	—	—	9,2	115
2 x 2,5	0,26	0,9	1,7	—	—	11,0	169
2 x 4	0,31	1,0	1,8	—	—	12,9	239
2 x 6	0,31	1,0	2,0	—	—	14,4	310
2 x 10	0,41	1,2	—	1,2	1,9	19,4	554
2 x 16	0,41	1,2	—	1,3	2,0	22,1	757
2 x 25	0,41	1,4	—	1,4	2,2	25,8	1074
2 x 35*	0,41	1,4	—	1,5	2,30	27,7	1332
2 x 50*	0,41	1,6	—	1,7	2,70	33,7	1932
3 x 1	0,21	0,8	1,4	—	—	8,8	108
3 x 1,5	0,26	0,8	1,6	—	—	9,9	140
3 x 2,5	0,26	0,9	1,8	—	—	11,7	204
3 x 4	0,31	1,0	1,9	—	—	13,8	288
3 x 6	0,31	1,0	2,1	—	—	15,4	379
3 x 10	0,41	1,2	—	1,3	2,0	20,8	677
3 x 16	0,41	1,2	—	1,4	2,1	23,7	932
3 x 25	0,41	1,4	—	1,5	2,3	27,7	1333
3 x 35	0,41	1,4	—	1,6	2,5	29,8	1689
3 x 50	0,41	1,6	—	1,8	2,7	35,8	2398
3 x 70	0,51	1,6	—	1,9	2,9	40,1	3169
3 x 95	0,51	1,8	—	2,1	3,2	46,5	4185
3 x 120	0,51	1,8	—	2,2	3,4	49,4	5051
3 x 150	0,51	2,0	—	2,4	3,6	55,1	6267
3 x 185	0,51	2,2	—	2,5	3,9	61,6	7661
3 x 240	0,51	2,4	—	2,8	4,3	67,0	9692
4 x 1	0,21	0,8	1,5	—	—	9,7	133
4 x 1,5	0,26	0,8	1,7	—	—	10,9	171
4 x 2,5	0,26	0,9	1,9	—	—	12,9	250
4 x 4	0,31	1,0	2,0	—	—	15,2	354
4 x 6	0,31	1,0	2,3	—	—	17,2	474
4 x 10	0,41	1,2	—	1,4	2,0	22,7	833
4 x 16	0,41	1,2	—	1,4	2,2	25,9	1155
4 x 25	0,41	1,4	—	1,6	2,5	30,7	1687
4 x 35	0,41	1,4	—	1,7	2,7	33,0	2144
4 x 50	0,41	1,6	—	1,9	2,9	39,6	3041
4 x 70	0,51	1,6	—	2,0	3,2	44,6	4048
4 x 95	0,51	1,8	—	2,3	3,6	52,0	5381

Number and cross-sectional area of conductor	Maximum diameter of wires	Nominal thickness of insulation	Nominal thickness of sheath			Approximate overall diameter	Approximate net weight
			Single layer	Two layers			
				Inner	Outer		
n x mm <sup>2</sup>	mm	mm	mm	mm	mm	mm	kg/km
4 x 120	0,51	1,8	—	2,4	3,6	54,8	6453
4 x 150	0,51	2,0	—	2,6	3,9	61,3	8031
4 x 185	0,51	2,2	—	2,8	4,2	68,6	9830
4 x 240	0,51	2,4	—	3,1	4,6	74,6	12444
5 x 1	0,21	0,8	1,6	—	—	10,7	164
5 x 1,5	0,26	0,8	1,8	—	—	12,0	211
5 x 2,5	0,26	0,9	2,0	—	—	14,2	307
5 x 4	0,31	1,0	2,2	—	—	16,9	444
5 x 6	0,31	1,0	2,5	—	—	19,1	592
5 x 10	0,41	1,2	—	1,4	2,2	25,0	1018
5 x 16	0,41	1,2	—	1,5	2,4	28,7	1426
5 x 25	0,41	1,4	—	1,7	2,7	33,9	2079
5 x 35*	0,41	1,4	—	1,8	2,80	36,3	2627
5 x 50*	0,41	1,6	—	2,0	3,20	44,0	3766
5 x 70*	0,51	1,6	—	2,2	3,40	49,4	5010
5 x 95*	0,51	1,8	—	2,6	3,90	58,0	6695
5 x 120*	0,51	1,8	—	2,6	4,20	61,5	8087
5 x 150*	0,51	2,0	—	2,8	4,20	68,0	9950
6 x 1*	0,21	0,8	2,4	—	—	13,6	245
6 x 1,5	0,26	0,8	2,5	—	—	14,7	298
6 x 2,5	0,26	0,9	2,7	—	—	17,2	422
6 x 4	0,31	1,0	2,9	—	—	20,1	595
7 x 1*	0,21	0,8	2,4	—	—	14,4	277
7 x 1,5	0,26	0,8	2,5	—	—	15,7	339
7 x 2,5	0,26	0,9	2,7	—	—	18,3	482
7 x 4	0,31	1,0	2,9	—	—	21,5	684
7 x 6*	0,31	1,0	3,1	—	—	23,8	887
7 x 10*	0,41	1,2	3,4	—	—	29,0	1378
8 x 1,5	0,26	0,8	2,6	—	—	17,1	409
8 x 2,5	0,26	0,9	2,8	—	—	20,2	591
8 x 4	0,31	1,0	3,1	—	—	23,8	839
9 x 1,5	0,26	0,8	2,7	—	—	18,4	471
9 x 2,5	0,26	0,9	3,0	—	—	21,6	670
10 x 1*	0,21	0,8	2,6	—	—	17,0	366
10 x 1,5	0,26	0,8	2,8	—	—	18,4	447
10 x 2,5	0,26	0,9	3,0	—	—	21,8	646
10 x 4	0,31	1,0	3,3	—	—	25,8	925
12 x 1*	0,21	0,8	2,7	—	—	17,4	397
12 x 1,5	0,26	0,8	2,9	—	—	19,1	497
12 x 2,5	0,26	0,9	3,1	—	—	22,3	708
12 x 4	0,31	1,0	3,5	—	—	26,7	1028
14 x 1*	0,21	0,8	2,8	—	—	18,4	446
14 x 1,5	0,26	0,8	2,9	—	—	20,1	559
14 x 2,5	0,26	0,9	3,2	—	—	23,5	798
15 x 2,5	0,26	0,9	3,3	—	—	25,0	888
16 x 1*	0,21	0,8	2,8	—	—	19,4	502
16 x 1,5	0,26	0,8	3,0	—	—	21,2	629
16 x 2,5	0,26	0,9	3,3	—	—	25,0	910
18 x 1*	0,21	0,8	2,9	—	—	20,4	560
18 x 1,5	0,26	0,8	3,2	—	—	22,3	701
18 x 2,5	0,26	0,9	3,5	—	—	26,3	1017
18 x 4	0,31	1,0	3,9	—	—	31,4	1473
19 x 1,5	0,26	0,8	3,1	—	—	23,3	752
19 x 2,5	0,26	0,9	3,4	—	—	27,5	1091
24 x 1*	0,21	0,8	3,2	—	—	23,8	727
24 x 1,5	0,26	0,8	3,5	—	—	26,0	909
24 x 2,5	0,26	0,9	3,9	—	—	30,9	1333

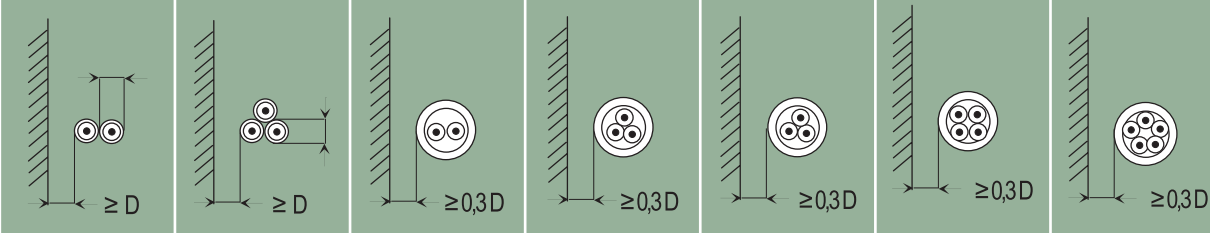
Number and cross-sectional area of conductor	Maximum diameter of wires	Nominal thickness of insulation	Nominal thickness of sheath			Approximate overall diameter	Approximate net weight
			Single layer	Two layers			
				Inner	Outer		
n x mm <sup>2</sup>	mm	mm	mm	mm	mm	mm	kg/km
27 x 1,5	0,26	0,8	3,5	—	—	26,5	976
27 x 2,5	0,26	0,9	3,9	—	—	31,5	1432
36 x 1,5	0,26	0,8	3,8	—	—	29,7	1261
36 x 2,5	0,26	0,9	4,3	—	—	35,5	1868

\* Not in standard.

#### CURRENT RATINGS FOR HEAVY DUTY RUBBER INSULATED H07RN-F

Conductor cross-section, mm <sup>2</sup>	Current rating, A	
	Single phase	Three phase
1	10	10
1,5	16	16
2,5	25	20
4	32	25
6	40	-
10	63	-

Cables for use as power supply for industrial uses; ambient air temperature 30°C. The tabulated ratings are for cables run in free air. Single core cables are bunched (2 cables touching side by side and 3 cables in trefoil).

Conductor cross-section (mm <sup>2</sup> )									
	single core	2 cores loaded	3 cores loaded	2 cores loaded	2 cores loaded	3 cores loaded*	3 cores loaded	4-core	5-core
	CURRENT RATINGS (A)								
4	34	30	34	35	29	30	30	30	
6	43	38	43	44	36	37	38	38	
10	60	53	60	62	51	52	54	54	
16	79	71	79	82	67	69	71	71	
25	104	94	105	109	89	92	94	94	
35	129	117	-	135	110	114	-	-	
50	162	148	-	169	138	143	-	-	
70	202	185	-	211	172	178	-	-	
95	240	222	-	250	204	210	-	-	
120	280	260	-	292	238	246	-	-	
150	321	300	-	335	273	282	-	-	
185	363	341	-	378	309	319	-	-	
240	433	407	-	447	365	377	-	-	
300	497	468	-	509	415	430	-	-	
400	586	553	-	-	-	-	-	-	
500	670	634	-	-	-	-	-	-	

#### Temperature correction factors

Ambient air temperature, °C	30	35	40	45	50	55
Correction factor	1,00	0,91	0,82	0,71	0,58	0,41

#### Conversion factors for multicore cable (> 5 cores) valid for cross-section to 10 mm<sup>2</sup>

Number of loaded cores	5	7	10	14	19	24	40
Correction factor	0,75	0,65	0,55	0,50	0,45	0,40	0,35

Current ratings acc to: DIN VDE 0298-4 and HD 516 S2.

# TYPE: NSGAFOU 1,8/3 kV



**Single conductor rubber insulated and sheathed flexible power cables**

**NORM:**  
**DIN VDE 0250 p. 602**

## CONSTRUCTION:

- Separator:** Semi-conducting tape under insulation
- Conductor:** Annealed tinned copper conductor class 5 acc. to IEC 60228
- Insulation:** EPR thermosetting compound type 3GI3 to DIN VDE 0207 p. 20
- Outer sheath:** chloroprene rubber type 5GM3 to DIN VDE 0207 p. 21
- Colour of outer sheath:** black
- Features:** Oil resisting, chemicals, flame retardant and weather resistant.
- Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.
- Bending radius:** For flexible use : 10 x cable diameter . fixed installation : 6 x cable diameter.
- Temperature range:** For flexible -25 up to 90 °C , for installation -40 up to 90 °C.
- Tests:** DIN VDE 0250

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal Thickness of sheath	Approximate overall diameter	Approximate net weight of cables
mm <sup>2</sup>	mm	mm	mm	kg/km
1x1.5	1.3	0.8	6,0	44
1x2.5	1.3	0.8	6,2	57
1x4	1.3	0.8	6,7	74
1x6	1.3	0.8	7,3	99
1x10	1.5	0.8	8,6	150
1x16	1.5	0.8	10,1	215
1x25	1.8	1,0	12,3	323
1x35	1.8	1,0	13,0	413
1x50	1.8	1,0	15,0	566
1x70	1.8	1,0	16,8	761
1x95	2.2	1,0	19,7	1006
1x120	2.2	1,0	20,8	1235
1x150	2.2	1,2	23,6	1576
1x185	2.4	1,2	25,7	1853
1x240	2.6	1,2	27,6	2376
1x300	2.8	1,2	31,4	2953
1x400*	3.1	1,4	34,4	3850
1x500*	3.4	1,6	43,2	5120

\* Behind of standard

# WELDING CABLES

H01N2-D, H01N2-E

## TYPE: H01N2-D, H01N2-E 100/100 V

Neoprene insulated welding cables

### NORM:

HD 22.6, DIN VDE 0282-6, BS 638, NFC 32-510

### CONSTRUCTION:

Conductor: tinned or plain annealed copper stranded wires

Insulation: flame retardant oil resistant rubber

Colour of sheath: black

Test voltage 50Hz: 1000V

Maximum conductor operating temperature: + 85°C

Lowest ambient temperature for fixed installation: -40°C

Lowest installation temperature: -20°C

Maximum short-circuit conductor temperature: +250°C

Pulling strength: the maximum static pulling strength may not exceed 15 N/mm<sup>2</sup>

Minimum bending radius:	D – overall diameter of cable (mm)		
	8 < D ≤ 12	12 < D ≤ 20	D > 20
Free movement	4 D	5 D	6 D
Under mechanical load	6 D	6 D	8 D

Flame propagation: EN 60332-1-2 (IEC 60332-1)

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

Application: Designed for welding equipment and accessories; retain their high flexibility even under influence of ozone, light, oxygen, protective gases, oil and petrol; resistant to flame propagation, suitable for use in dry and damp conditions, outdoors and indoors.



Nominal cross-sectional area of conductor	Maximum diameter of wires in conductor	Nominal thickness of insulation	Approximate overall diameter	Approximate weight	Maximum conductor resistance at temperature 20°C	
					tinned	plain
mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km	
<b>H01N2-D</b>						
10	0,21	2,0	8,1	138	1,95	1,91
16	0,21	2,0	9,0	194	1,24	1,21
25	0,21	2,0	10,4	282	0,795	0,780
35	0,21	2,0	11,7	380	0,565	0,554
50	0,21	2,2	13,5	529	0,393	0,386
70	0,21	2,4	15,8	741	0,277	0,272
95	0,21	2,6	17,6	950	0,210	0,206
120	0,51	2,8	19,8	1200	0,164	0,161
150	0,51	3,0	21,9	1484	0,132	0,129
185	0,51	3,2	24,4	1801	0,108	0,106
<b>H01N2-E</b>						
10	0,16	1,2	6,6	113	1,95	1,91
16	0,16	1,2	7,7	166	1,24	1,21
25	0,16	1,2	8,9	245	0,795	0,780
35	0,16	1,2	10,3	336	0,565	0,554
50	0,16	1,5	12,3	484	0,393	0,386
70	0,16	1,5	14,0	668	0,277	0,272
95	0,16	1,8	16,6	891	0,210	0,206
120	0,21	1,8	18,1	1118	0,164	0,161
150	0,21	1,8	20,0	1377	0,132	0,129
185	0,21	1,8	21,3	1654	0,108	0,106

## Current ratings and voltage drop for Arc Welding Cables – HD 516 S2

### Current rating for single cycle operation over a maximum period of five minutes

Nominal cross-sectional area, copper conductor (mm <sup>2</sup> )	Current rating for specified percentage duty cycle			
	100 %	85 %	60 %	35 %
	A	A	A	A
10	100	103	108	122
16	135	145	175	230
25	180	195	230	300
35	225	245	290	375
50	285	305	365	480
70	355	385	460	600
95	430	470	560	730
120	500	540	650	850
150	580	630	750	980
185	665	720	860	1120

### Current rating for repeat cycle operation based on a five minute repeat period

Nominal cross-sectional area, copper conductor (mm <sup>2</sup> )	Current rating for specified percentage duty cycle						
	100 %	85 %	80 %	60 %	35 %	20 %	8 %
	A	A	A	A	A	A	A
10	100	101	102	106	119	143	206
16	135	138	140	148	173	212	314
25	180	186	189	204	244	305	460
35	225	235	239	260	317	400	608
50	285	299	305	336	415	529	811
70	355	375	383	426	531	682	1053
95	430	456	467	523	658	850	1319
120	500	532	545	613	776	1006	1565
150	580	619	634	716	911	1184	1845
185	665	711	729	826	1054	1374	2145

### Current rating for repeat cycle operation based on a 10 minute repeat period

Nominal cross-sectional area, copper conductor (mm <sup>2</sup> )	Current rating for specified percentage duty cycle						
	100 %	85 %	80 %	60 %	35 %	20 %	8 %
	A	A	A	A	A	A	A
10	100	100	100	101	106	118	158
16	135	136	136	139	150	174	243
25	180	182	183	190	213	254	366
35	225	229	231	243	279	338	497
50	285	293	296	316	371	457	681
70	355	367	373	403	482	602	908
95	430	448	456	498	606	765	1164
120	500	524	534	587	721	917	1404
150	580	610	622	689	853	1090	1676
185	665	702	717	797	995	1277	1971

For cables in free air at an ambient temperature of 25 °C and conductor temperature of 85 °C

### Voltage drop at normal and elevated temperatures

Nominal cross-sectional area, copper conductor (mm <sup>2</sup> )	d.c. voltage drop per 100A per 10 m of cable at		
	20 °C V	60 °C V	85 °C V
10	1,95	2,26	2,450
16	1,24	1,430	1,560
25	0,795	0,920	0,998
35	0,565	0,654	0,709
50	0,393	0,455	0,493
70	0,277	0,321	0,348
95	0,210	0,243	0,264
120	0,164	0,190	0,206
150	0,132	0,153	0,166
185	0,108	0,125	0,136



# CHAPTER V

## HEAT RESISTING SILICONE CABLES

# RUBBER, HEAT RESISTING SINGLE CORE NON-SHEATHED CABLES

SIF

## TYPE: SIF 300/500 V

Single core silicone rubber insulated cable, halogen-free

### NORM:

Adapted to DIN VDE 0250, HD 22

### CONSTRUCTION:

Conductor: tinned annealed copper, class 5 flexible conductor acc. to DIN EN 60228

Insulation: special silicone compound type EI2

Core identification: natural, green/yellow, blue, black, brown or others colours

Maximum conductor operating temperature: +180°C

Lowest ambient temperature for fixed installation (static): -60°C

Lowest installation temperature (flexing): -25°C

Maximum short-circuit conductor temperature: +350°C

Test voltage 50Hz: 2000V

Minimum bending radius: 4 x cable diameter

Flame retardant: EN 60332-1-2

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

Features:

- flexibility and elasticity unaltered at extremely low temperatures (-60°C)
- preservation of mechanical characteristics within a wide range of temperatures (-60°C to +180°C)
- high auto ignition temperature
- flame resistant, during combustion emits a very low level of non-toxic and non-corrosive fumes
- very good low temperature flexibility
- good electrical properties with insignificant variations at a wide level of temperatures
- sunlight and weather resistant
- resistant to: oxygen, ozone, fats from vegetables and animals, soap dilutions, alcohols, ammonium, diluted acids and alkalis, sea water

Application: Silicone rubber insulated cables are intended for use wherever insulation is subjected to extreme temperature changes. These cables are highly flexible and their electrical and mechanical properties remain unaltered with time both at high and low temperatures, heat-resistant up to 180°C. Specially recommended for: household appliances, cooking surfaces, heating apparatus, industrial converters, radiators, ovens and ventilators, electric motors, lighting (halogen lamps etc.), high voltage electrical cabins and circuits, civil and industrial plant, the automobile industry, metallurgical facilities, steel mills, hot rolling mills and casting houses.

Standard length cable packing: 500 and 1000 m on spools. Other forms of packing and delivery are available on request.



Conductor cross-section	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C	Current ratings*
mm <sup>2</sup>	mm	kg/km	Ω/km	A
0,5	2,1	8	40,1	10
0,75	2,3	10	26,7	15
1	2,4	13	20,0	19
1,5	2,7	17	13,7	24
2,5	3,4	28	8,21	32
4	4,1	43	5,09	42
6	4,6	61	3,39	54
10	6,1	103	1,95	73
16	7,2	157	1,24	98
25	10,3	270	0,795	129
35	11,6	372	0,565	158
50	13,9	524	0,393	198
70	16,0	724	0,277	245
95	18,4	944	0,210	292
120	20,0	1193	0,164	344

\*As defined in DIN VDE 0298-4. Single core cables laid in open air with a spacing at least equal to cable diameter.

Power ratings for ambient temperature over 150°C. The following conversion factors are valid:

Ambient temperature °C	150	155	160	165	170	175
Correction factors	1,0	0,91	0,82	0,71	0,58	0,41

# RUBBER, HEAT RESISTING SHEATHED CABLES

SIHF

## TYPE: SIHF 300/500 V

Silicone multicore cable, flexible halogen-free

**NORM:**

**Adapted to DIN VDE 0250-816**

### CONSTRUCTION:

Conductor: tinned annealed copper, class 5 flexible conductor acc. to DIN EN 60228

Insulation: special silicone compound type EI2

Core identification: DIN VDE 0293-308

twin core	blue, brown
3-core	green-yellow, blue, brown,
4-core	green-yellow, brown, black, grey
5 - core	green-yellow, blue, brown, black, grey

Outer sheath: special silicone compound type EI2

Colour of sheath: Redbrown, white or black

Maximum conductor operating temperature: +180°C

Lowest ambient temperature for fixed installation (static): -60°C

Lowest installation temperature (flexing): -25°C

Maximum short-circuit conductor temperature: +350°C

Test voltage 50Hz: 2000V

Minimum bending radius: 7,5 x cable diameter

Maximum permissible load: 15 N/mm<sup>2</sup> of the total copper cross-sectional area

Flame retardant: EN 60332-1-2

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

Features:

- flexibility and elasticity unaltered at extremely low temperatures (-60°C)
- preservation of mechanical characteristics within a wide range of temperatures (-60°C to +180°C)
- high auto ignition temperature
- flame resistant, during combustion emits a very low level of non-toxic and non-corrosive fumes
- very good low temperature flexibility
- good electrical properties with insignificant variations at a wide level of temperatures
- sunlight and weather resistant
- resistant to: oxygen, ozone, fats from vegetables and animals, soap dilutions, alcohols, ammonium, diluted acids and alkalis, sea water

Application: Silicone rubber insulated cables are intended for use wherever insulation is subjected to extreme temperature changes. These cables are highly flexible and their electrical and mechanical properties remain unaltered with time both at high and low temperatures, heat-resistant up to 180°C. Specially recommended for: household appliances, cooking surfaces, heating apparatus, industrial converters, radiators, ovens and ventilators, electric motors, lighting (halogen lamps etc.), high voltage electrical cabins and circuits, civil and industrial plant, the automobile industry, metallurgical facilities, steel mills, hot rolling mills and casting houses.

Standard length cable packing: 100 m in rings or 500 m on spools. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight	Maximum resistance of conductor at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2 x 0,5	0,6	0,8	5,8	39	40,1
2 x 0,75	0,6	0,8	6,2	47	26,7
2 x 1	0,6	0,9	6,6	55	20,0
2 x 1,5	0,6	1,0	7,4	72	13,7
2 x 2,5	0,7	1,1	9,0	109	8,21
2 x 4	1,0	1,2	11,3	174	5,09
2 x 6	1,0	1,3	12,7	231	3,39
2 x 10	1,2	2,0	16,9	406	1,95
2 x 16	1,2	2,2	19,6	577	1,24
3 x 0,5	0,6	0,8	6,1	47	40,1
3 x 0,75	0,6	0,9	6,8	59	26,7
3 x 1	0,6	0,9	6,9	67	20,0
3 x 1,5	0,6	1,0	7,8	89	13,7
3 x 2,5	0,7	1,1	9,5	135	8,21
3 x 4	1,0	1,2	12,0	216	5,09
3 x 6	1,0	1,4	13,6	295	3,39
3 x 10	1,2	2,2	18,3	520	1,95
3 x 16	1,2	2,3	21,0	737	1,24
4 x 0,5	0,6	0,9	6,9	58	40,1
4 x 0,75	0,6	0,9	7,4	71	26,7
4 x 1	0,6	1,0	7,8	84	20,0
4 x 1,5	0,6	1,1	8,7	111	13,7
4 x 2,5	0,7	1,2	10,6	170	8,21
4 x 4	1,0	1,3	13,3	272	5,09
4 x 6	1,0	1,5	15,1	371	3,39
4 x 10	1,2	2,2	20,0	642	1,95
4 x 16	1,2	2,3	23,0	917	1,24
4 x 25	1,4	2,7	27,6	1369	0,795
4 x 35	1,4	2,9	29,7	1779	0,565
5 x 0,5			6,9	64	40,1
5 x 0,75	0,6	1,0	8,2	90	26,7
5 x 1	0,6	1,1	8,7	107	20,0
5 x 1,5	0,6	1,2	9,7	140	13,7
5 x 2,5	0,7	1,3	11,7	214	8,21
5 x 4	1,0	1,4	14,8	342	5,09
5 x 6	1,0	1,6	16,8	466	3,39

#### Current ratings for multicore silicone cables

Nominal cross-sectional area of conductor	Current ratings*		Nominal cross-sectional area of conductor	Current ratings*	
	current-carrying capacity	protective fuse		current-carrying capacity	protective fuse
mm <sup>2</sup>	A	A	mm <sup>2</sup>	A	A
0,5	7	-	6	44	50
0,75	12	6	10	61	63
1	15	10	16	82	80
1,5	18	16	25	108	100
2,5	26	25	35	135	-
4	34	35			

\*As defined in DIN VDE 0298-4. Multi core cables laid in open air.

Power ratings for ambient temperature over 150°C. The following conversion factors are valid:

Ambient temperature °C	150	155	160	165	170	175
Correction factors	1,0	0,91	0,82	0,71	0,58	0,41



# CHAPTER VI

## POWER AND CONTROL CABLES

# LV PVC INSULATED POWER AND CONTROL CABLES

NYY, MMO

## TYPE: NYY 0,6/1 kV

PVC insulated and PVC sheathed power and control cable

**NORM:**

**DIN VDE 0276-603, DIN VDE 0276-627**

### CONSTRUCTION:

<b>Conductor:</b>	annealed copper solid class 1(RE), circular or circular compacted stranded conductor class 2 (RM) or stranded sector – shaped conductor class 2 (SM) acc. to DIN EN 60228
<b>Insulation:</b>	special PVC compound type DIV4 acc. to HD 603.1
<b>Inner covering:</b>	filling compound
<b>Sheath:</b>	special PVC compound type DMV5 acc. to HD 603.1
<b>Colour of sheath:</b>	black

**Core identification:** DIN VDE 0293-308, HD 308 S2

Number of core:	with protective conductor-J	without protective conductor-0
single-core	green/yellow	black
twin	-	blue, brown
3-core	green/yellow, blue, brown	brown, black, grey
4-core	green/yellow, brown, black, grey	blue, brown, black, grey
5-core	green/yellow, blue, brown, black, grey	blue, brown, black, grey, black
7-core and more	green/yellow, other cores black with white numbering	black with white numbering

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: + 160°C for cross-sectional area of conductor  $\leq 300 \text{ mm}^2$   
and + 140°C for cross-sectional area of conductor  $> 300 \text{ mm}^2$

Minimum bending radius: 15 x D single core cables, 12 x D multicore cables, D – overall diameter

Max. permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

Flame retardant: DIN EN 60332-1-2

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** PVC insulated and sheathed power and auxiliary control cables for the supply of electrical energy. Special for installations in the open air, in underground and water, indoors, in cable ducts.

**Standard length cable packing:** 500 or 100 m on drums. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	$\Omega/\text{km}$
1 x 1,5RE	0,8	1,8	6,6	62	12,1
1 x 1,5RM	0,8	1,8	6,8	65	12,1
1 x 2,5RE	0,8	1,8	6,9	74	7,41
1 x 4RE	1,0	1,8	7,8	100	4,61
1 x 6RE	1,0	1,8	8,3	123	3,08
1 x 10RE	1,0	1,8	10,1	190	1,83
1 x 10RMC	1,0	1,8	9,4	174	1,83







Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
1 x 16RE	1,0	1,8	11,2	258	1,15
1 x 16RMC	1,0	1,8	10,4	239	1,15
1 x 25RMC	1,2	1,8	12,1	348	0,727
1 x 35RMC	1,2	1,8	13,2	448	0,524
1 x 50RMC	1,4	1,8	15,1	596	0,387
1 x 70RMC	1,4	1,8	16,2	792	0,268
1 x 95RMC	1,6	1,8	18,6	1071	0,193
1 x 120RMC	1,6	1,8	20,2	1318	0,153
1 x 150RMC	1,8	1,8	22,2	1610	0,124
1 x 185RMC	2,0	1,8	24,1	1983	0,0991
1 x 240RMC	2,2	1,8	27,2	2557	0,0754
1 x 300RMC	2,4	1,9	29,2	3146	0,0601
1 x 400RM	2,6	2,0	34,4	4020	0,0470
1 x 500RM	2,8	2,1	38,3	5106	0,0366
2 x 1,5RE	0,8	1,8	11,1	181	12,1
2 x 2,5RE	0,8	1,8	11,9	218	7,41
2 x 2,5RM	0,8	1,8	12,4	234	7,41
2 x 4RE	1,0	1,8	13,6	297	4,61
2 x 4RM	1,0	1,8	14,2	320	4,61
2 x 6RE	1,0	1,8	14,6	362	3,08
2 x 6RM	1,0	1,8	15,3	392	3,08
2 x 10RE	1,0	1,8	16,2	484	1,83
2 x 10RMC	1,0	1,8	16,8	510	1,83
2 x 16RE	1,0	1,8	18,0	649	1,15
2 x 16RMC	1,0	1,8	18,8	689	1,15
2 x 25RM	1,2	1,8	22,2	1004	0,727
2 x 50RM	1,4	1,8	27,7	1680	0,387
3 x 1,5RE	0,8	1,8	11,6	203	12,1
3 x 1,5RM	0,8	1,8	12,0	215	12,1
3 x 2,5RE	0,8	1,8	12,4	249	7,41
3 x 2,5RM	0,8	1,8	12,9	265	7,41
3 x 4RE	1,0	1,8	14,2	343	4,61
3 x 6RE	1,0	1,8	15,3	426	3,08
3 x 6RM	1,0	1,8	16,1	459	3,08
3 x 10RE	1,0	1,8	17,0	582	1,83
3 x 10RM	1,0	1,8	17,7	611	1,83
3 x 16RE	1,0	1,8	19,1	807	1,15
3 x 25RM	1,2	1,8	23,5	1237	0,727
3 x 35SM	1,2	1,8	23,5	1354	0,524
3 x 50SM	1,4	1,8	26,3	1775	0,387
3 x 70SM	1,4	2,0	30,2	2474	0,268
3 x 95SM	1,6	2,1	34,2	3332	0,193
3 x 120SM	1,6	2,2	36,8	4079	0,153
3 x 150SM	1,8	2,3	41,0	5028	0,124
3 x 185SM	2,0	2,5	45,1	6216	0,0991
3 x 240SM	2,2	2,7	50,9	8095	0,0754
4 x 1,5RE	0,8	1,8	12,3	233	12,1
4 x 1,5RM	0,8	1,8	12,8	248	12,1
4 x 2,5RE	0,8	1,8	13,3	291	7,41
4 x 2,5RM	0,8	1,8	13,9	311	7,41
4 x 4RE	1,0	1,8	15,3	406	4,61
4 x 4RM	1,0	1,8	16,1	436	4,61
4 x 6RE	1,0	1,8	16,5	509	3,08
4 x 6RM	1,0	1,8	17,4	548	3,08
4 x 10RE	1,0	1,8	18,4	706	1,83
4 x 10RM	1,0	1,8	19,2	740	1,83
4 x 16RE	1,0	1,8	20,6	977	1,15

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
4 x 16RM	1,0	1,8	21,6	1029	1,15
4 x 25RM	1,2	1,8	25,7	1524	0,727
4 x 35RM	1,2	1,8	28,3	1989	0,524
4 x 35SM	1,2	1,8	26,3	1762	0,524
4 x 50SM	1,4	1,9	30,2	2374	0,387
4 x 70SM	1,4	2,1	34,0	3246	0,268
4 x 95SM	1,6	2,2	38,7	4391	0,193
4 x 120SM	1,6	2,3	42,5	5432	0,153
4 x 150SM	1,8	2,5	46,5	6640	0,124
4 x 185SM	2,0	2,7	51,6	8273	0,0991
4 x 240SM	2,2	2,9	57,8	10696	0,0754
3 x 16RE/10RE	1,0 / 1,0	1,8	20,0	915	1,15 / 1,83
3 x 25RM/16RE	1,2 / 1,0	1,8	24,4	1405	0,727 / 1,15
3 x 35RM/16RE	1,2 / 1,0	1,8	26,3	1774	0,524 / 1,15
3 x 50SM/25RM	1,4 / 1,2	1,9	30,2	2174	0,387 / 0,727
3 x 70SM/35SM	1,4 / 1,2	2,0	32,6	2879	0,268 / 0,524
3 x 95SM/50SM	1,6 / 1,4	2,2	37,4	3905	0,193 / 0,387
3 x 120SM/70SM	1,6 / 1,4	2,3	40,3	4873	0,153 / 0,268
3 x 150SM/70SM	1,8 / 1,4	2,4	44,7	5814	0,124 / 0,268
3 x 185SM/95SM	2,0 / 1,6	2,6	49,1	7301	0,0991 / 0,193
3 x 240SM/120SM	2,2 / 1,6	2,8	56,2	9544	0,0754 / 0,153
5 x 1,5RE	0,8	1,8	13,2	273	12,1
5 x 1,5RM	0,8	1,8	13,7	290	12,1
5 x 2,5RE	0,8	1,8	14,2	342	7,41
5 x 2,5RM	0,8	1,8	14,9	367	7,41
5 x 4RE	1,0	1,8	16,5	484	4,61
5 x 4RM	1,0	1,8	17,4	521	4,61
5 x 6RE	1,0	1,8	17,9	612	3,08
5 x 10RE	1,0	1,8	20,0	855	1,83
5 x 10RMC	1,0	1,8	20,8	895	1,83
5 x 16RE	1,0	1,8	22,4	1191	1,15
5 x 16RMC	1,0	1,8	23,6	1256	1,15
5 x 25RMC	1,2	1,8	28,2	1870	0,727
5 x 35RMC	1,2	1,9	31,2	2436	0,524
5 x 50RMC	1,4	2,0	36,4	3304	0,387
5 x 70RMC	1,4	2,2	40,4	4460	0,268
5 x 95RMC	1,6	2,4	47,4	6137	0,193
6 x 1,5RE	0,8	1,8	14,1	313	12,1
6 x 2,5RE	0,8	1,8	15,2	395	7,41
6 x 2,5RM	0,8	1,8	16,0	425	7,41
7 x 1,5RE	0,8	1,8	14,1	323	12,1
7 x 1,5RM	0,8	1,8	14,7	343	12,1
7 x 2,5RE	0,8	1,8	15,2	412	7,41
7 x 2,5RM	0,8	1,8	16,0	441	7,41
7 x 4RE	1,0	1,8	17,8	591	4,61
7 x 6RE	1,0	1,8	19,3	756	3,08
7 x 10RE	1,0	1,8	21,6	1075	1,83
8 x 1,5RE	0,8	1,8	15,0	364	12,1
8 x 1,5RM	0,8	1,8	15,6	387	12,1
8 x 2,5RE	0,8	1,8	16,2	467	7,41
8 x 2,5RM	0,8	1,8	17,0	500	7,41
9 x 1,5RE	0,8	1,8	16,2	429	12,1
9 x 2,5RE	0,8	1,8	17,6	551	7,41
10 x 1,5RE	0,8	1,8	17,0	442	12,1
10 x 2,5RE	0,8	1,8	18,6	571	7,41
10 x 2,5RM	0,8	1,8	19,6	612	7,41
10 x 4RE	1,0	1,8	22,0	828	4,61

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
12 x 1,5RE	0,8	1,8	17,5	487	12,1
12 x 1,5RM	0,8	1,8	18,3	518	12,1
12 x 2,5RE	0,8	1,8	19,1	635	7,41
12 x 2,5RM	0,8	1,8	20,1	679	7,41
12 x 6RE	1,0	1,8	24,7	1201	3,08
14 x 1,5RE	0,8	1,8	18,3	540	12,1
14 x 2,5RE	0,8	1,8	19,9	707	7,41
14 x 4RE	1,0	1,8	23,7	1040	4,61
16 x 1,5RE	0,8	1,8	19,1	600	12,1
16 x 2,5RE	0,8	1,8	20,9	791	7,41
19 x 1,5RE	0,8	1,8	20,0	671	12,1
19 x 1,5RM	0,8	1,8	21,0	715	12,1
19 x 2,5RE	0,8	1,8	21,9	892	7,41
19 x 2,5RM	0,8	1,8	23,1	953	7,41
19 x 4RE	1,0	1,8	26,2	1324	4,61
20 x 2,5RE	0,8	1,8	22,9	949	7,41
21 x 1,5RE	0,8	1,8	20,9	727	12,1
21 x 2,5RE	0,8	1,8	22,9	969	7,41
24 x 1,5RE	0,8	1,8	23,0	833	12,1
24 x 1,5RM	0,8	1,8	24,1	887	12,1
24 x 2,5RE	0,8	1,8	25,2	1111	7,41
24 x 2,5RM	0,8	1,8	26,7	1189	7,41
25 x 1,5RE	0,8	1,8	23,4	865	12,1
27 x 1,5RE	0,8	1,8	23,4	899	12,1
27 x 2,5RE	0,8	1,8	25,8	1208	7,41
30 x 1,5RE	0,8	1,8	24,2	974	12,1
30 x 1,5RM	0,8	1,8	25,4	1036	12,1
30 x 2,5RE	0,8	1,8	26,6	1312	7,41
31 x 1,5RE	0,8	1,8	25,0	1020	12,1
31 x 2,5RE	0,8	1,8	27,6	1374	7,41
33 x 1,5RE	0,8	1,8	25,0	1055	12,1
37 x 1,5RE	0,8	1,8	25,9	1148	12,1
40 x 1,5RE	0,8	1,8	26,8	1225	12,1
40 x 2,5RE	0,8	1,9	29,8	1681	7,41
40 x 2,5RM	0,8	1,9	31,6	1795	7,41
52 x 1,5RE	0,8	1,9	30,7	1587	12,1
52 x 2,5RE	0,8	2,0	34,1	2175	7,41
61 x 1,5RE	0,8	2,0	32,6	1822	12,1
61 x 2,5RE	0,8	2,1	36,3	2506	7,41

Current ratings\*

Operating temperature at conductor 70°C; ambient air temperature 30°C, ground temperature 20°C

Installation	 1)			 1)		
Number of loaded cores	1	3	3	1	3	3
Cross-section, mm <sup>2</sup>	laying in ground			laying in air		
	Current ratings in Ampere (A)					
1,5	41	27	30	27	19,5	21
2,5	55	36	39	35	25	28
4	71	47	50	47	34	37
6	90	59	62	59	43	47
10	124	79	83	81	59	64
16	160	102	107	107	79	84
25	208	133	138	144	106	114
35	250	159	164	176	129	139
50	296	188	195	214	157	169
70	365	232	238	270	199	213
95	438	280	286	334	246	264
120	501	318	325	389	285	307
150	563	359	365	446	326	352
185	639	406	413	516	374	406
240	746	473	479	618	445	483
300	848	535	541	717	511	557
400	975	613	614	843	597	646
500	1125	687	693	994	669	747

<sup>1)</sup> Rated current for direct current systems with a far-distanced return conductor.

The values are referred to the following basic conditions:

Laying in ground		Laying in air	
Ground temperature at installation depth:	20°C	Ambient temperature:	30°C
Load factor:	0,7	Load factor:	1,0
Soil-thermal resistivity of moist area:	1,0 k · m/W	Arrangement: free in air, protection against direct solar radiation, no external heat sources, unrestricted dissipation of heat.	
Soil-thermal resistivity of dry area:	2,5 k · m/W		
Laying depth:	0,7 m		

Correction factors for various ambient air temperatures

Ambient temperature, °C)	10	15	20	25	30	35	40	45	50
Rating factor	1,22	1,17	1,12	1,06	1,00	0,94	0,87	0,79	0,71

Current ratings for control cables – HD 627 S1

Number of loaded cores	3	3
	laying in ground	laying in air
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)	
1,5	27	19,5
2,5	36	25
4	47	34

Conversion factors for multicore cable (≥ 5 cores)

The conversion factors are to be used for laying the cables in ground or in air, to the values given in above tables

Number of loaded cores	Laying in ground	Laying in air
5	0,70	0,75
7	0,60	0,65
10	0,50	0,55
14	0,45	0,50
19	0,40	0,45
24	0,35	0,40
40	0,30	0,35
61	0,25	0,30

Note: valid for cross-section 1,5 to 10 mm<sup>2</sup>.

\* As defined in DIN VDE 0276-603, DIN VDE 0276-627, HD 603 S1, HD 627 S1.

Conversion factors for deviating ambient temperature defined in DIN VDE 0298 part 4.

# TYPE: MMO 450/750 V



PVC insulated and PVCsheathed control cable

**NORM:**  
**SFS 3714, HD 627-4D**

## CONSTRUCTION:

**Conductor:** plain annealed copper circular solid class 1 acc. to EN 60228  
**Insulation:** black lead free PVC compound type T11  
**Core identification:** numbering ( if required one yellow/green core)  
**Separator:** polyester tape  
**Sheath:** white lead free PVC compound type TM1

**Maximum continuous conductor operating temperature:** +70°C

**Lowest ambient temperature for fixed installation:** -30°C

**Lowest installation temperature (flexing):** -15°C

**Maximum short-circuit conductor temperature:** + 160°C

**Flame propagation:** EN 60332-1-2

**Minimum bending radius:** 12 x D multicore cables, D – overall diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** PVC insulated and sheathed control cables for fixed installations in measuring, control and signalling circuits. Special for installations indoor and outdoors. Not to be laid in soil.

**Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.

Number and cross-sectional area of conductor	Nominal thickness of insulation	Minimum thickness of sheath	Approximate overall diameter	Approximate net weight of cables
n x mm <sup>2</sup>	mm	mm	mm	kg/km
7 x 1,5	0,7	1,6	11,6	212
12 x 1,5	0,7	1,6	14,8	335
19 x 1,5	0,7	1,6	17,1	493
27 x 1,5	0,7	1,7	20,5	686
37 x 1,5	0,7	1,8	23,1	914
7 x 2,5	0,8	1,6	13,4	302
12 x 2,5	0,8	1,6	17,2	486
19 x 2,5	0,8	1,7	20,2	734
27 x 2,5	0,8	1,8	24,3	1024
37 x 2,5	0,8	2,0	27,5	1383

# LV XLPE INSULATED POWER AND CONTROL CABLES

N2XY, AXMK

## TYPE: N2XY 0,6/1 kV

XLPE insulated and PVC sheathed power and control cable

**NORM:**

**DIN VDE 0276-603, DIN VDE 0276-627, IEC 60502-1**

**CONSTRUCTION:**

<b>Conductor:</b>	annealed copper solid class 1(RE), circular or circular compacted stranded conductor class 2 (RM) or stranded sector – shaped conductor class 2 (SM) acc. to HD 383
<b>Insulation:</b>	special XLPE compound type DXI3 acc. to HD 603.1
<b>Inner covering:</b>	filling compound
<b>Sheath:</b>	special PVC compound type DMV6 acc. to HD 603.1
<b>Colour of sheath:</b>	black UV resistant
<b>Core identification:</b>	DIN VDE 0276-603

Number of core:	with protective conductor-J	without protective conductor-0
single-core	green/yellow	black
twin	green-yellow, black 1)	blue, brown
3-core	green/yellow, blue, brown	brown, black, grey
4-core	green/yellow, brown, black, grey	blue, brown, black, grey
5-core	green/yellow, blue, brown, black, grey	blue, brown, black, grey, black
7-core and more	green/yellow, other cores black with white numbering	black with white numbering

<sup>1)</sup> Only for cable with cross-sectional area of conductor  $\geq 10 \text{ mm}^2$

**Maximum conductor operating temperature:** +90°C

**Lowest ambient temperature for fixed installation:** -30°C

**Lowest installation temperature:** -5°C

**Maximum short-circuit conductor temperature:** + 250°C

**Minimum bending radius:** 15 x D single core cables, 12 x D multicore cables, D – overall diameter

**Max. permissible tensile stress with cable grip for Cu-conductor:** 50 N/mm<sup>2</sup>

**Flame retardant:** DIN EN 60332-1-2

**Flame retardant:** test method B according to DIN VDE 0472 part 804 and IEC 60332-1

**Application:** XLPE insulated and PVC sheathed power and auxiliary control cables for the supply of electrical energy. Special for installations in the open air, in underground and water, indoors, in cable ducts.

**Standard length cable packing:** 1000 or 500 m on drums. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor	Minimum number of wires in conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C
n x mm <sup>2</sup>	n	mm	mm	mm	kg/km	Ω/km
1 x 1,5 RE	1	0,7	1,8	6,4	56	12,1
1 x 1,5 RM	7	0,7	1,8	6,6	59	12,1
1 x 2,5 RE	1	0,7	1,8	6,7	68	7,41
1 X 2,5 RM	7	0,7	1,8	7,0	72	7,41
1 x 4 RE	1	0,7	1,8	7,2	86	4,61
1 x 4 RM	7	0,7	1,8	7,5	90	4,61
1 x 6 RE	1	0,7	1,8	7,7	108	3,08







Number and cross-sectional area of conductor	Minimum number of wires in conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C
n x mm <sup>2</sup>	n	mm	mm	mm	kg/km	Ω/km
1 x 6 RM	7	0,7	1,8	8,1	114	3,08
1 x 10 RE	1	0,7	1,8	8,5	150	1,83
1 x 10 RM	7	0,7	1,8	9,0	159	1,83
1 x 16 RE	1	0,7	1,8	9,4	209	1,15
1 x 16 RM	7	0,7	1,8	9,8	217	1,15
1 x 25 RM	7	0,9	1,8	11,5	319	0,727
1 x 35 RM	7	0,9	1,8	12,6	415	0,524
1 x 50 RM	19	1,0	1,8	14,1	544	0,387
1 x 70 RM	19	1,1	1,8	15,6	747	0,268
1 x 95 RM	19	1,1	1,8	17,6	1001	0,193
1 x 120 RM	37	1,2	1,8	19,2	1239	0,153
1 x 150 RM	37	1,4	1,8	21,2	1516	0,124
1 x 185 RM	37	1,6	1,8	23,1	1872	0,0991
1 x 240 RM	61	1,7	1,8	25,8	2404	0,0754
1 x 300 RM	61	1,8	1,8	27,8	2975	0,0601
1 x 300 RM	61	1,8	1,8	29,5	2987	0,0601
1 x 400 RM	61	2,0	1,9	33,0	3795	0,0470
1 x 500 RM	61	2,2	2,0	36,9	4838	0,0366
2 x 1,5 RE	1	0,7	1,8	10,1	141	12,1
2 x 1,5 RM	7	0,7	1,8	10,5	150	12,1
2 x 2,5 RE	1	0,7	1,8	10,9	174	7,41
2 x 2,5 RM	7	0,7	1,8	11,4	187	7,41
2 x 4 RE	1	0,7	1,8	11,8	220	4,61
2 x 4 RM	7	0,7	1,8	12,4	237	4,61
2 x 6 RE	1	0,7	1,8	-	-	3,08
2 x 6 RM	7	0,7	1,8	13,5	299	3,08
2 x 10 RE	1	0,7	1,8	14,4	386	1,83
2 x 10 RM	7	0,7	1,8	15,0	406	1,83
2 x 16 RE	1	0,7	1,8	16,2	535	1,15
2 x 16 RM	7	0,7	1,8	17,0	566	1,15
2 x 25 RM	7	0,9	1,8	20,4	844	0,727
2 x 35 RM	7	0,9	1,8	22,5	1090	0,524
2 x 50 RM	19	1,0	1,8	25,5	1434	0,387
2 x 70 RM	19	1,1	1,8	28,6	1945	0,268
2 x 95 RM	19	1,1	2,0	33,1	2650	0,193
2 x 120 RM	37	1,2	2,1	36,5	3285	0,153
2 x 150 RM	37	1,4	2,2	40,8	4062	0,124
2 x 185 RM	37	1,6	2,3	45,0	5032	0,0991
2 x 240 RM	61	1,7	2,5	50,8	6482	0,0754
3 x 1,5RE	1	0,7	1,8	10,5	159	12,1
3 x 1,5RM	7	0,7	1,8	11,0	169	12,1
3 x 2,5RE	1	0,7	1,8	11,4	201	7,41
3 x 2,5RM	7	0,7	1,8	11,9	213	7,41
3 x 4RE	1	0,7	1,8	12,4	260	4,61
3 x 4RM	7	0,7	1,8	13,0	277	4,61
3 x 6RE	1	0,7	1,8	13,4	332	3,08
3 x 6RM	7	0,7	1,8	14,2	356	3,08
3 x 10RE	1	0,7	1,8	15,1	474	1,83
3 x 10RM	7	0,7	1,8	16,2	510	1,83
3 x 16RE	1	0,7	1,8	17,1	672	1,15
3 x 16RM	7	0,7	1,8	18,0	706	1,15
3 x 25RM	7	0,9	1,8	21,6	1061	0,727
3 x 35RM	7	0,9	1,8	23,9	1387	0,524
4 x 1,5RE	1	0,7	1,8	11,3	185	12,1
4 x 1,5RM	7	0,7	1,8	11,7	195	12,1
4 x 2,5RE	1	0,7	1,8	12,2	236	7,41
4 x 2,5RM	7	0,7	1,8	12,8	251	7,41

Number and cross-sectional area of conductor	Minimum number of wires in conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C
n x mm <sup>2</sup>	n	mm	mm	mm	kg/km	Ω/km
4 x 4RE	1	0,7	1,8	13,3	309	4,61
4 x 4RM	7	0,7	1,8	14,0	329	4,61
4 x 6RE	1	0,7	1,8	14,5	401	3,08
4 x 6RM	7	0,7	1,8	15,4	429	3,08
4 x 10RE	1	0,7	1,8	16,4	582	1,83
4 x 10RM	7	0,7	1,8	17,1	606	1,83
4 x 16RE	1	0,7	1,8	18,6	832	1,15
4 x 16RM	7	0,7	1,8	19,6	872	1,15
4 x 25RM	7	0,9	1,8	23,7	1319	0,727
4 x 35RM	7	0,9	1,8	26,2	1735	0,524
5 x 1,5RE	1	0,7	1,8	12,1	214	12,1
5 x 1,5RM	7	0,7	1,8	12,6	227	12,1
5 x 2,5RE	1	0,7	1,8	13,1	276	7,41
5 x 2,5RM	7	0,7	1,8	13,7	293	7,41
5 x 4RE	1	0,7	1,8	14,3	366	4,61
5 x 6RE	1	0,7	1,8	15,6	479	3,08
5 x 10RE	1	0,7	1,8	17,8	701	1,83
5 x 10RMC	7	0,7	1,8	18,6	730	1,83
5 x 16RE	1	0,7	1,8	20,2	1010	1,15
5 x 16RMC	7	0,7	1,8	21,3	1057	1,15
5 x 25RMC	7	0,9	1,8	25,9	1608	0,727
5 x 35RMC	7	0,9	1,8	28,8	2125	0,524
5 x 50RMC	19	1,0	2,0	33,4	2872	0,387
5 x 70RMC	19	1,1	2,1	37,8	3987	0,268
5 x 95RMC	19	1,1	2,3	43,7	5442	0,193
5 x 120RMC	37	1,2	2,4	48,2	6775	0,153
5 x 150RMC	37	1,4	2,6	54,1	8383	0,124
5 x 185RMC	37	1,6	2,8	59,9	10443	0,0991
6 x 1,5RE	1	0,7	1,8	12,9	245	12,1
7 x 1,5RE	1	0,7	1,8	12,9	256	12,1
7 x 1,5RM	7	0,7	1,8	13,5	271	12,1
7 x 2,5RE	1	0,7	1,8	14,0	337	7,41
7 x 2,5RM	7	0,7	1,8	14,8	358	7,41
7 x 4RE	1	0,7	1,8	15,4	455	4,61
9 x 1,5RE	1	0,7	1,8	14,8	324	12,1
10 x 1,5RE	1	0,7	1,8	15,6	351	12,1
10 x 1,5RM	7	0,7	1,8	16,4	372	12,1
10 x 2,5RE	1	0,7	1,8	17,2	468	7,41
10 x 2,5RM	7	0,7	1,8	18,2	498	7,41
10 x 4RE	1	0,7	1,8	19,0	637	4,61
12 x 1,5RE	1	0,7	1,8	16,1	388	12,1
12 x 1,5RM	7	0,7	1,8	16,9	410	12,1
12 x 2,5RE	1	0,7	1,8	17,6	521	7,41
12 x 2,5RM	7	0,7	1,8	18,7	554	7,41
12 x 4RE	1	0,7	1,8	19,6	719	4,61
14 x 1,5RE	1	0,7	1,8	16,8	430	12,1
14 x 1,5RM	7	0,7	1,8	17,6	454	12,1
14 x 2,5RE	1	0,7	1,8	18,5	584	7,41
14 x 2,5RM	7	0,7	1,8	19,6	619	7,41
14 x 4RE	1	0,7	1,8	20,5	809	4,61
15 x 2,5RE	1	0,7	1,8	19,4	634	7,41
16 x 1,5RE	1	0,7	1,8	17,6	477	12,1
16 x 1,5RM	7	0,7	1,8	18,5	504	12,1
17 x 4RE	1	0,7	1,8	22,6	976	4,61
19 x 1,5RE	1	0,7	1,8	18,4	537	12,1
19 x 1,5RM	7	0,7	1,8	19,4	566	12,1
19 x 2,5RE	1	0,7	1,8	20,3	738	7,41

Number and cross-sectional area of conductor	Minimum number of wires in conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at temperature 20°C
n x mm <sup>2</sup>	n	mm	mm	mm	kg/km	Ω/km
19 x 2,5RM	7	0,7	1,8	21,5	781	7,41
19 x 4RE	1	0,7	1,8	22,6	1035	4,61
20 x 2,5RE	1	0,7	1,8	21,2	784	7,41
24 x 1,5RE	1	0,7	1,8	21,2	666	12,1
24 x 1,5RM	7	0,7	1,8	22,3	703	12,1
24 x 2,5RE	1	0,7	1,8	23,4	920	7,41
24 x 2,5RM	7	0,7	1,8	24,9	974	7,41
30 x 1,5RE	1	0,7	1,8	22,3	780	12,1
30 x 1,5RM	7	0,7	1,8	23,6	823	12,1
30 x 2,5RE	1	0,7	1,8	24,7	1090	7,41
30 x 2,5RM	7	0,7	1,8	26,3	1152	7,41
37 x 1,5RE	1	0,7	1,8	23,9	921	12,1
40 x 1,5RE	1	0,7	1,8	24,7	983	12,1
40 x 2,5RE	1	0,7	1,8	27,5	1390	7,41
48 x 1,5RE	1	0,7	1,8	27,1	1157	12,1
52 x 1,5RE	1	0,7	1,9	28,0	1248	12,1
62 x 1,5RE	1	0,7	1,9	30,7	1469	12,1
3 x 35SM	19	0,9	1,8	22,7	1218	0,524
3 x 50SM	19	1,0	1,8	25,3	1595	0,387
3 x 70SM	19	1,1	1,9	29,5	2244	0,268
3 x 95SM	19	1,1	2,0	32,8	3016	0,193
3 x 120SM	19	1,2	2,2	36,2	3764	0,153
3 x 150SM	19	1,4	2,3	40,6	4644	0,124
3 x 185SM	37	1,6	2,4	44,7	5753	0,0991
3 x 240SM	37	1,7	2,6	50,2	7483	0,0754
3 x 25RM/16RE	7 / 1	0,9 / 0,7	1,8	22,4	1213	0,727 / 1,15
3 x 35RM/16RE	7 / 1	0,9 / 0,7	1,8	24,3	1534	0,524 / 1,15
3 x 50SM/25RM	19 / 7	1,0 / 0,9	1,8	28,1	1866	0,387 / 0,727
3 x 70SM/35SM	19 / 7	1,1 / 0,9	2,0	31,7	2608	0,268 / 0,524
3 x 95SM/50SM	19 / 7	1,1 / 1,0	2,1	35,7	3514	0,193 / 0,387
3 x 120SM/70SM	19 / 19	1,2 / 1,1	2,2	39,2	4445	0,153 / 0,268
3 x 150SM/70SM	19 / 19	1,4 / 1,1	2,3	43,7	5329	0,124 / 0,268
3 x 185SM/95SM	37 / 19	1,6 / 1,1	2,5	48,3	6710	0,0991 / 0,193
3 x 240SM/120SM	37 / 19	1,7 / 1,2	2,7	54,5	8691	0,0754 / 0,153
4 x 35SM	19	0,9	1,8	26,2	1585	0,524
4 x 50SM	19	1,0	1,9	29,4	2098	0,387
4 x 70SM	19	1,1	2,0	34,2	2953	0,268
4 x 95SM	19	1,1	2,2	38,6	3999	0,193
4 x 120SM	19	1,2	2,3	42,8	4994	0,153
4 x 150SM	19	1,4	2,5	47,4	6143	0,124
4 x 185SM	37	1,6	2,6	52,2	7617	0,0991
4 x 240Sm	37	1,7	2,8	58,8	9908	0,0754
4 x 25RM/16RE	7 / 1	0,9 / 0,7	1,8	24,8	1482	0,727 / 1,15
4 x 35RM/16RE	7 / 1	0,9 / 0,7	1,8	27,1	1897	0,524 / 1,15
4 x 50RM/25RM	19 / 7	1,0 / 0,9	1,8	31,4	2565	0,387 / 0,727
4 x 70RM/35RM	19 / 7	1,1 / 0,9	1,9	35,8	3574	0,268 / 0,524
4 x 95RM/50RM	19 / 19	1,1 / 1,0	2,1	41,2	4854	0,193 / 0,387
4 x 120RM/70RM	37 / 19	1,2 / 1,1	2,2	45,7	6128	0,153 / 0,268

Current ratings\*

Operating temperature at conductor 90°C; ambient air temperature 30°C, ground temperature 20°C

Installation	 <sup>1)</sup>			 <sup>1)</sup>		
Number of loaded cores	1	3	3	1	3	3
	laying in ground			laying in air		
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)					
1,5	48	31	33	33	24	26
2,5	63	40	42	43	32	34
4	82	52	54	57	42	44
6	102	64	67	72	53	56
10	136	86	89	99	74	77
16	176	112	115	131	98	102
25	229	145	148	177	133	138
35	275	174	177	217	162	170
50	326	206	209	265	197	207
70	400	254	256	336	250	263
95	480	305	307	415	308	325
120	548	348	349	485	359	380
150	616	392	393	557	412	437
185	698	444	445	646	475	507
240	815	517	517	774	564	604
300	927	-	583	901	-	697
400	1064	-	663	1060	-	811
500	1227	-	749	1252	-	940

<sup>1)</sup> Rated current for direct current systems with a far-distanced return conductor.

#### Current ratings for control cables – HD 627 S1

Number of loaded cores	3	3
	laying in ground	laying in air
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)	
1,5	31	25
2,5	41	33
4	53	43

The values are referred to the following basic conditions:

Laying in ground		Laying in air	
Ground temperature at installation depth:	20°C	Ambient temperature:	30°C
Load factor:	0,7	Load factor:	1,0
Soil-thermal resistivity of moist area:	1,0 k · m/W	Arrangement: free in air, protection against direct solar radiation, no external heat sources, unrestricted dissipation of heat.	
Soil-thermal resistivity of dry area:	2,5 k · m/W		
Laying depth:	0,7 m		

#### Correction factors for various ambient air temperatures

Ambient temperature, °C	10	15	20	25	30	35	40	45	50
Rating factor	1,15	1,12	1,08	1,04	1,00	0,96	0,91	0,87	0,82

#### Conversion factors for multicore cable (≥ 5 cores)

The conversion factors are to be used for laying the cables in ground or in air, to the values given in above tables

Number of loaded cores	Laying in ground	Laying in air
5	0,70	0,75
7	0,60	0,65
10	0,50	0,55
14	0,45	0,50
19	0,40	0,45
24	0,35	0,40
40	0,30	0,35
61	0,25	0,30

Note: valid for cross-section 1,5 to 10 mm<sup>2</sup>.

\* As defined in DIN VDE 0276-603, DIN VDE 0276-627, HD 603 S1, HD 627 S1.  
Conversion factors for deviating ambient temperature defined in DIN VDE 0298 part 4.

# TYPE: AXMK 0,6/1 kV

XLPE insulated and PVC sheathed power cables

## NORM:

SFS 4879, HD 603-5D, IEC 60502-1

## CONSTRUCTION:

Conductor:	16 mm <sup>2</sup> : Sector shaped, solid aluminium conductor, 25 ÷ 300 mm <sup>2</sup> : Sector shaped, stranded and compacted aluminium conductor.
Insulation:	XLPE compound
Outer Sheath:	PVC compound,
Colour of sheath:	black
Core identification:	yellow and green – black – black – brown

Maximum conductor operating temperature: + 90°C

Lowest installation temperature: -15°C

Maximum short-circuit conductor temperature: +250°C

Application: Laying in air and ground



DESCRIPTION	UNIT	DETAILS					
		4 x 16	4 x 25	4 x 35	4 x 50 <sup>1)</sup>	4 x 70	4 x 95 <sup>1)</sup>
Number and nominal cross-section of the conductors	n x mm <sup>2</sup>						
<b>CONSTRUCTION DATA</b>							
Conductor		Solid	Stranded and compacted sector shaped aluminium conductor				
Insulation (XLPE) thickness:	mm	0.7	0.9	0.9	1.0	1.1	1.1
- minimum average (nominal)	mm	0.53	0.71	0.71	0.80	0.89	0.89
- minimum at a point	mm						
Outer sheath (extruded PVC) thickness:	mm	1.8	1.8	1.8	1.8	2.1	2.1
- minimum average (nominal),	mm	1.43	1.43	1.43	1.43	1.68	1.68
- minimum at a point	mm						
Approximate overall diameter of completed cable	mm	18.1	21.8	24.1	27.7	33.2	36.3
Approximate weight of:	kg/km	352	514	646	840	1 182	1 514
- complete cable	kg/km	167	262	362	492	713	986
- aluminium							
<b>DELIVERY DATA</b>							
Length per drum	m	1 000	1 000	1 000	1 000	1 000	1 000
Diameter of wooden drum	mm	1 200	1 400	1 400	1 600	2 000	2 000
Type of drum	-	12	14	14	16	20	20
Weight of heaviest reel, including cable	kg	463	678	810	1 072	1 645	1 977
<b>ELECTRICAL DATA</b>							
Maximum D.C. resistance of phase conductor at 20°C	Ω/km	1.910	1.200	0.868	0.641	0.443	0.320
A.C. resistance of phase conductor at 65°C	Ω/km	2.257	1.418	1.026	0.058	0.524	0.378
A.C. resistance of phase conductor at 90°C	Ω/km	2.449	1.539	0.113	0.822	0.568	0.411
Operating inductance	mH/km	0.31	0.29	0.28	0.24	0.23	0.22
Induction reactance	Ω/km	0.097	0.091	0.090	0.075	0.072	0.070
Mutual capacitance	μF/km	0.22	0.29	0.38	0.42	0.46	0.52
Charging current	A/km	0.04	0.05	0.07	0.08	0.08	0.09
Earth fault current	A/km	0.07	0.08	0.12	0.13	0.14	0.16
<b>MECHANICAL DATA</b>							
Recommended min. bending radius:							
during installation	m	0.22	0.26	0.29	0.33	0.40	0.44
during final bending, when made carefully and smoothly as a single bend to the same direction	m	0.07	0.08	0.09	0.10	0.12	0.13
Maximum permissible pulling force:							
by pulling-head	N	960	1 500	2 100	3 000	4 200	5 700
by cable stocking	N	960	1 500	2 100	3 000	4 200	5 700

DESCRIPTION	UNIT	DETAILS					
Number and nominal cross-section of the conductors	n x mm <sup>2</sup>	4 x 16	4 x 25	4 x 35	4 x 50 <sup>1)</sup>	4 x 70	4 x 95 <sup>1)</sup>
<b>SHORT CIRCUIT CURRENTS</b>							
Maximum permissible thermal short-circuit Current for 1 sec. Phase conductor 90 °C → 250 °C	kA	1.5	2.3	3.3	4.7	6.6	8.9
<b>AMPACITY<sup>2)</sup></b>							
In air	A	77	97	120	146	187	227
In earth	A	91	116	139	165	203	244
DESCRIPTION	UNIT	DETAILS					
Number and nominal cross-section of the conductors	n x mm <sup>2</sup>	4 x 120	4 x 150 <sup>1)</sup>	4 x 185	4 x 240	4 x 300	
<b>CONSTRUCTION DATA</b>							
Conductor	-	Stranded and compacted sector shaped aluminium conductor					
Insulation (XLPE) thickness:							
- minimum average (nominal)	mm	1.2	1.4	1.6	1.7	1.8	
- minimum at a point	mm	0.98	1.16	1.34	1.43	1.52	
Outer sheath (extruded PVC) thickness:							
- minimum average (nominal),	mm	2.3	2.4	2.7	2.9	3.1	
- minimum at a point	mm	1.85	1.94	2.19	2.37	2.53	
Approximate overall diameter of completed cable	mm	39.8	44.0	49.3	55.3	60.9	
Approximate weight of:							
- complete cable	kg/km	1 884	2 299	2 897	3 698	4 533	
- aluminium	kg/km	1 249	1 534	1 927	2 520	3 144	
<b>DELIVERY DATA</b>							
Length per drum	m	500	500	500	500	500	
Diameter of wooden drum	mm	1 600	1 800	2 000	2 200	2 200	
Type of drum	-	16	18	20	22M	22M	
Weight of heaviest reel, including cable	kg	1 174	1 498	1 912	2 439	2 857	
<b>ELECTRICAL DATA</b>							
Maximum D.C. resistance of phase conductor at 20°C	Ω/km	0.253	0.206	0.164	0.125	0.100	
A.C. resistance of phase conductor at 65°C	Ω/km	0.230	0.244	0.194	0.148	0.119	
A.C. resistance of phase conductor at 90°C	Ω/km	0.325	0.265	0.211	0.161	0.129	
Operating inductance	mH/km	0.22	0.22	0.22	0.22	0.22	
Induction reactance	Ω/km	0.070	0.070	0.070	0.070	0.070	
Mutual capacitance	μF/km	0.53	0.54	0.56	0.58	0.61	
Charging current	A/km	0.10	0.10	0.10	0.10	0.11	
Earth fault current	A/km	0.16	0.16	0.17	0.18	0.19	
<b>MECHANICAL DATA</b>							
Recommended min. bending radius:							
during installation	m	0.48	0.53	0.59	0.66	0.73	
during final bending, when made carefully and smoothly as a single bend to the same direction	m	0.14	0.16	0.18	0.20	0.22	
Maximum permissible pulling force:							
by pulling-head	N	7 200	9 000	11100	14400	18000	
by cable stocking	N	7 200	8 500	500	8 500	8 500	
<b>SHORT CIRCUIT CURRENTS</b>							
Maximum permissible thermal short-circuit Current for 1 sec. Phase conductor 90 °C → 250 °C	kA	11.3	14.1	17.4	22.6	28.2	
<b>AMPACITY<sup>2)</sup></b>							
In air	A	263	304	347	409	471	
In earth	A	278	311	353	409	461	

<sup>1)</sup> Acc. to IEC 60502-1 standard only.

<sup>2)</sup> Current rating guideline (Calculated according to IEC Publ. 287 and the following conditions)

Ground temperature max. 20 °C  
Ambient air temperature max. 25 °C  
Laying depth 0.70m  
Ground thermal resistivity 1.0 K•m/W

# LV POWER CABLES WITH CONCENTRIC COPPER CONDUCTOR

NYCY, MCMK, AMCMK, MCMO

## TYPE: NYCY 0,6/1 kV

PVC insulated and PVC sheathed power and control cable with concentric copper conductor

### NORM:

**DIN VDE 0276-603 and DIN VDE 0276-627**

### CONSTRUCTION:

Conductor:	plain annealed copper circular solid class 1(RE), circular or circular compacted stranded conductor class 2 (RM) acc. to DIN EN 60228
Insulation:	special PVC compound type DIV4 acc. to HD 603.1
Inner sheath:	special thermoplastic compound
Concentric conductor:	round copper wires and copper tape
Sheath:	special PVC compound type DMV5 acc. to HD 603.1
Colour of sheath:	black
Core identification:	DIN VDE 0293-308, HD 308 S2

twin	blue, brown
3-core	brown, black, grey
3 core:*	blue, brown, black
4-core	blue, brown, black, grey
5-core	blue, brown, black, grey, black
more 5-core:	black with numbering

\* For certain application only.

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: + 160°C

Minimum bending radius: 12 x D multicore cables, D – overall diameter

Max. permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>, calculated for the nominal sum of cross-sections of the inner conductors; the cross-section of the concentric conductors not be considered.

Flame retardant: DIN EN 60332-1-2

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** PVC insulated and sheathed power and auxiliary control cables for the supply of electrical energy. Special for installations in the open air, in underground and water, indoors, in cable ducts. The concentric conductor is allowed to use as neutral, protective or earthed conductor. Simultaneously, this also is permitted to apply as a screen for example earth-connected protection against contact.

**Standard length cable packing:** 500 or 1000 m on drums. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2 x 1,5RE / 1,5	0,8	1,8	12,3	209	12,1 / 12,1
2 x 2,5RE / 2,5	0,8	1,8	13,1	253	7,41 / 7,41
2 x 4RE / 4	1,0	1,8	15,2	352	4,61 / 4,61
2 x 6RE / 6	1,0	1,8	16,5	436	3,08 / 3,08
2 x 10RE / 10	1,0	1,8	18,2	593	1,83 / 1,83
2 x 16RE / 16	1,0	1,8	20,5	818	1,15 / 1,15
2 x 25RM / 16	1,2	1,8	25,1	1165	0,727 / 1,15
2 x 35RM / 16	1,2	1,8	27,2	1427	0,524 / 1,15
3 x 1,5RE / 1,5	0,8	1,8	12,8	232	12,1 / 12,1
3 x 2,5RE / 2,5	0,8	1,8	13,6	284	7,41 / 7,41
3 x 4RE / 4	1,0	1,8	15,8	399	4,61 / 4,61
3 x 6RE / 6	1,0	1,8	17,2	500	3,08 / 3,08
3 x 10RE / 10	1,0	1,8	19,2	701	1,83 / 1,83
3 x 16RE / 16	1,0	1,8	21,4	966	1,15 / 1,15
3 x 25RM / 16	1,2	1,8	26,4	1404	0,727 / 1,15
3 x 35RM / 16	1,2	1,8	28,7	1753	0,524 / 1,15
4 x 1,5RE / 1,5	0,8	1,8	13,5	269	12,1 / 12,1
4 x 2,5RE / 2,5	0,8	1,8	14,5	326	7,41 / 7,41
4 x 4RE / 4	1,0	1,8	16,9	462	4,61 / 4,61
4 x 6RE / 6	1,0	1,8	18,4	583	3,08 / 3,08
4 x 10RE / 10	1,0	1,8	20,4	816	1,83 / 1,83
4 x 16RE / 16	1,0	1,8	23,3	1158	1,15 / 1,15
4 x 25RM / 16	1,2	1,8	28,6	1693	0,727 / 1,15
4 x 35RM / 16	1,2	1,9	31,2	2154	0,524 / 1,15
5 x 1,5RE / 1,5	0,8	1,8	14,4	308	12,1 / 12,1
5 x 2,5RE / 2,5	0,8	1,8	15,4	377	7,41 / 7,41
5 x 4RE / 4	1,0	1,8	18,1	539	4,61 / 4,61
5 x 6RE / 6	1,0	1,8	19,8	686	3,08 / 3,08
5 x 10RE / 10	1,0	1,8	22,0	965	1,83 / 1,83
5 x 16RE / 16	1,0	1,8	24,9	1361	1,15 / 1,15
5 x 25RM / 16	1,2	1,8	31,1	2041	0,727 / 1,15
7 x 1,5RE / 2,5	0,8	1,8	15,3	358	12,1 / 7,41
7 x 2,5RE / 2,5	0,8	1,8	16,4	447	7,41 / 7,41
7 x 4RE / 4	1,0	1,8	19,4	646	4,61 / 4,61
8 x 1,5RE / 2,5	0,8	1,8	16,2	393	12,1 / 7,41
9 x 1,5RE / 2,5	0,8	1,8	17,4	444	12,1 / 7,41
10 x 1,5RE / 2,5	0,8	1,8	18,2	477	12,1 / 7,41
10 x 2,5RE / 4	0,8	1,8	20,2	626	7,41 / 4,61
10 x 4RE / 6	1,0	1,8	23,6	898	4,61 / 3,08
12 x 1,5RE / 2,5	0,8	1,8	18,7	522	12,1 / 7,41
12 x 2,5RE / 4	0,8	1,8	20,7	690	7,41 / 4,61
12 x 4RE / 6	1,0	1,8	24,2	996	4,61 / 3,08
14 x 1,5RE / 2,5	0,8	1,8	19,5	575	12,1 / 7,41
14 x 2,5RE / 6	0,8	1,8	21,8	781	7,41 / 3,08
14 x 4RE / 6	1,0	1,8	25,3	1109	4,61 / 3,08
16 x 1,5RE / 4	0,8	1,8	20,7	655	12,1 / 4,61
16 x 2,5RE / 6	0,8	1,8	22,8	864	7,41 / 3,08
19 x 1,5RE / 4	0,8	1,8	21,6	727	12,1 / 4,61
19 x 2,5RE / 6	0,8	1,8	23,5	962	7,41 / 3,08
19 x 4RE / 10	1,0	1,8	28,2	1433	4,61 / 1,83
21 x 1,5RE / 6	0,8	1,8	22,8	801	12,1 / 3,08
21 x 2,5RE / 10	0,8	1,8	24,9	1079	7,41 / 1,83
24 x 1,5RE / 6	0,8	1,8	24,6	903	12,1 / 3,08
24 x 2,5RE / 10	0,8	1,8	27,2	1220	7,41 / 1,83
30 x 1,5RE / 6	0,8	1,8	25,8	1044	12,1 / 3,08
30 x 2,5RE / 10	0,8	1,8	28,6	1421	7,41 / 1,83
37 x 1,5RE / 10	0,8	1,8	27,9	1257	12,1 / 1,83
40 x 1,5RE / 10	0,8	1,8	28,8	1335	12,1 / 1,83
40 x 2,5RE / 10	0,8	1,9	31,8	1791	7,41 / 1,83

Current ratings\*

Operating temperature at conductor 70°C; ambient air temperature 30°C, ground temperature 20°C

Number of loaded cores	3	3
	Laying in ground	Laying in air
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)	
1,5	27	19,5
2,5	36	26
4	47	34
6	59	44
10	79	60
16	102	80
25	133	108
35	159	132

The values are referred to the following basic conditions:

Laying in ground		Laying in air	
Ground temperature at installation depth:	20°C	Ambient temperature:	30°C
Load factor:	0,7	Load factor:	1,0
Soil-thermal resistivity of moist area:	1,0 k . m/W	Arrangement: free in air, protection against direct solar radiation, no external heat sources, unrestricted dissipation of heat.	
Soil-thermal resistivity of dry area:	2,5 k . m/W		
Laying depth:	0,7 m		

Correction factors for various ambient air temperatures

Ambient temperature, °C)	10	15	20	25	30	35	40	45	50
Rating factor	1,22	1,17	1,12	1,06	1,00	0,94	0,87	0,79	0,71

Current ratings for control cables – HD 627 S1

Number of loaded cores	3	3
	Laying in ground	Laying in air
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)	
1,5	27	19,5
2,5	36	26
4	47	34

Conversion factors for multicore cable (≥ 5 cores)

The conversion factors are to be used for laying the cables in ground or in air, to the values given in above tables

Number of loaded cores	Laying in ground	Laying in air
5	0,70	0,75
7	0,60	0,65
10	0,50	0,55
14	0,45	0,50
19	0,40	0,45
24	0,35	0,40
40	0,30	0,35
61	0,25	0,30

\* As defined in DIN VDE 0276-603, DIN VDE 0276-627, HD 603 S1, HD 627 S1.

Conversion factors for deviating ambient temperature defined in DIN VDE 0298 part 4.

# TYPE: MCMK 0,6/1 kV

PVC insulated and PVC sheathed power cable with concentric copper conductor

## NORM:

**SFS 4880, HD 603 S1-3F**

## CONSTRUCTION:

Conductor:	plain annealed copper circular solid class 1(RE), circular or circular compacted stranded conductor class 2 (RM) or stranded sector – shaped conductor class 2 (SM) acc. to EN 60228
Insulation:	special PVC compound type DIV6 acc. to HD 603.1
Inner sheath:	special thermoplastic compound
Concentric conductor:	round copper wires and copper tape
Sheath:	special PVC compound type DMV9 acc. to HD 603.1
Colour of sheath:	black
Colour code:	to SFS 4880

Maximum conductor operating temperature: +70°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -15°C

Maximum short-circuit conductor temperature: + 160°C

Minimum bending radius: 15 x D for single core cables and 12 x D for multicore cables, D – overall cable diameter

Max. permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>, calculated for the nominal sum of cross-sections of the inner conductors; the cross-section of the concentric conductors not be considered.

Flame retardant: EN 60332-1-2 (HD 405.1), IEC 60332-1

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** PVC insulated and sheathed power cables for the supply of electrical energy. Special for fixed installations in the open air, in underground, indoors, in cable ducts. The concentric conductor is allowed to use as neutral, PE-conductor, PEN-conductor, or as a screen, in accordance with national regulations.

**Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor n x mm <sup>2</sup>	Nominal thickness of insulation mm	Nominal thickness of sheath mm	Approximate overall diameter mm	Approximate net weight of cables kg/km	Maximum conductor resistance at temperature 20°C Ω/km
2 x 1,5RE / 1,5	0,8	1,8	12,3	204	12,1 / 12,1
2 x 2,5RE / 2,5	0,8	1,8	13,1	247	7,41 / 7,41
2 x 4RE / 4*	1,0	1,8	14,8	338	4,61 / 4,61
2 x 6RE / 6	1,0	1,8	16,0	418	3,08 / 3,08
2 x 10RE / 10	1,0	1,8	17,6	571	1,83 / 1,83
3 x 1,5RE / 1,5	0,8	1,8	12,8	227	12,1 / 12,1
3 x 2,5RE / 2,5	0,8	1,8	13,6	279	7,41 / 7,41
3 x 4RE / 4*	1,0	1,8	15,4	386	4,61 / 4,61
3 x 6RE / 6	1,0	1,8	16,7	484	3,08 / 3,08
3 x 10RE / 10	1,0	1,8	18,4	673	1,83 / 1,83
3 x 16RE / 16	1,0	1,8	20,6	937	1,15 / 1,15
3 x 25RM / 16	1,2	1,8	25,6	1397	0,727 / 1,15
3 x 35RM / 16	1,2	1,8	27,9	1739	0,524 / 1,15
3 x 50SM / 25	1,4	1,9	28,5	2048	0,367 / 0,727
3 x 70SM / 35	1,4	2,0	32,4	2818	0,268 / 0,524
3 x 95SM / 50	1,6	2,2	37,3	3824	0,193 / 0,387
3 x 120SM / 70	1,6	2,3	39,9	4761	0,153 / 0,268
3 x 150SM / 70	1,8	2,4	44,3	5729	0,124 / 0,268
3 x 185SM / 95	2,0	2,6	49,2	7166	0,0991 / 0,193
3 x 240SM / 120	2,2	2,9	55,0	9265	0,0754 / 0,153

4 x 1,5RE / 1,5	0,8	1,8	13,5	259	12,1 / 12,1
4 x 2,5RE / 2,5	0,8	1,8	14,5	322	7,41 / 7,41
4 x 4RE / 4*	1,0	1,8	16,5	446	4,61 / 4,61
4 x 6RE / 6	1,0	1,8	17,9	568	3,08 / 3,08
4 x 10RE / 10	1,0	1,8	19,8	795	1,83 / 1,83
4 x 16RE / 16	1,0	1,8	22,3	1117	1,15 / 1,15
4 x 25RM / 16*	1,2	1,8	27,8	1683	0,727 / 1,15
4 x 35RM / 16*	1,2	1,9	30,6	2139	0,524 / 1,15
4 x 50SM / 25*	1,4	2,0	32,4	2639	0,367 / 0,727

\* Adapted to SFS 4880

## TYPE: AMCMK 0,6/1 kV

PVC insulated cables with concentric conductor and PVC sheath

**NORM:**

**SFS 4880, HD 603-3F**

**CONSTRUCTION:**

**Conductors:** Aluminium stranded sector – shaped class 2 (SM) acc. to HD 383

**Insulation:** PVC compound type DIV6

**Core identification:** According to HD 308.S2

4-core: blue, black, black, brown

**Laying up:** Insulated conductors are stranded together

**Inner covering:** Lapped

**Concentric conductor:** Copper wires and copper tape helically wounded

**Outer sheath:** Black PVC compound type DMV9

**Flame retardant:** IEC60332-1

**Maximum conductor operating temperature:** +70 °C

**Maximum short-circuit conductor temperature:** +160 °C for cross-sectional area  $\leq 300 \text{ mm}^2$  and +140 °C for cross-sectional area  $> 300 \text{ mm}^2$

**Minimum bending radius:** 12 x D for multi conductor cables; D – overall diameter of the cable

**Test voltage of complete cable:** 4 kV AC 50Hz , 5 min.



Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of outer sheath	Approximate overall diameter	Approximate weight of cables	Maximum conductor resistance at 20 °C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
4x35SM / 16	1,2	1,8	28,0	1015	0,868 / 1,15
4x50SM / 15	1,4	2,0	31,9	1270	0,641 / 1,20
4x70SM / 21	1,4	2,1	37,2	1675	0,443 / 0,868
4x95SM / 29	1,6	2,3	41,1	2215	0,320 / 0,641
4x120SM / 41	1,6	2,4	44,3	2700	0,253 / 0,443
4x150SM / 41	1,8	2,6	48,4	3180	0,206 / 0,443
4x185SM / 57	2,0	2,7	55,3	4115	0,164 / 0,320
4x240SM / 72	2,2	3,0	62,1	5220	0,125 / 0,253

# TYPE: MCMO 450/750 kV

PVC insulated and PVC sheathed control cable with a protecting concentric copper conductor

**NORM:**  
**HD 627-4D\***

## CONSTRUCTION:

Conductors:	plain annealed copper circular solid class 1 acc. to EN 60228
Insulation:	black lead free PVC compound type T11
Core identification:	numbering
Inner covering:	filling compound
Concentric conductor:	layer of round copper wires with a copper tape
Separator:	polyester tape
Sheath:	black lead free PVC compound type TM1

Maximum conductor operating temperature: +70°C

Lowest installation temperature (flexing): -15°C

Lowest ambient temperature for fixed installation: -30°C

Maximum short-circuit conductor temperature: + 160°C

Max. permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>, calculated for the nominal sum of cross-sections of the inner conductors; the cross-section of the concentric conductors not be considered.

Flame propagation: EN 60332-1-2

Minimum bending radius: 12 x D for multicore cables, D – overall cable diameter

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** PVC insulated and sheathed control cables with a protecting concentric conductor for fixed installations in measuring, control and signalling circuits.

**Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.



Number and cross-sectional area of conductor / concentric conductor	Nominal thickness of insulation	Minimum thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum resistance of concentric conductor at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
7 x 1,5 / 6	0,7	1,5	14,5	348	3,08
12 x 1,5 / 6	0,7	1,5	18,3	517	3,08
19 x 1,5 / 6	0,7	1,6	21,0	706	3,08
27 x 1,5 / 6	0,7	1,7	24,6	939	3,08
37 x 1,5 / 10	0,7	1,8	27,5	1236	1,83
7 x 2,5 / 6	0,8	1,5	16,0	447	3,08
12 x 2,5 / 6	0,8	1,6	20,1	669	3,08
19 x 2,5 / 6	0,8	1,7	23,1	932	3,08
27 x 2,5 / 10	0,8	1,8	27,3	1292	1,83
37 x 2,5 / 10	0,8	1,9	30,4	1657	1,83

\* We can also produce cable MCMO with protecting concentric copper conductor 1,5 mm<sup>2</sup> and 2,5 mm<sup>2</sup>

# HALOGEN-FREE LOW SMOKE POWER CABLES

N2XH, N2XCH

## TYPE: N2XH 0,6/1 kV

Halogen- free low smoke power cables

**NORM:**

**DIN VDE 0276-604**

### CONSTRUCTION:

<b>Conductor:</b>	bare annealed copper conductor, circular solid class 1 (RE) or circular or circular compacted stranded class 2 (RM) or stranded sector - shaped conductor class 2 (SM) acc. to EN 60228
<b>Insulation:</b>	cross-linked polyethylene
<b>Inner covering:</b>	special flame-retardant and halogen-free compound
<b>Sheath:</b>	thermoplastic halogen - free compound type HM4 acc. to HD 604 S1
<b>Colour of sheath:</b>	black
<b>Core identification:</b>	DIN VDE 0293-308, HD 308 S2



	without protective conductor	with protective conductor
1-core	black	green-yellow
2-core	blue, brown	—
3-core	brown, black, grey	green-yellow, blue, brown
3 core*	blue, brown, black	—
4-core	blue, brown, black, grey	green-yellow, brown, black, grey
4-core*	—	green-yellow, blue, brown, black
5-core	blue, brown, black, grey, black	green-yellow, blue, brown, black, grey
more 5-core	black with numbering	green-yellow, others cores black with numbering

\* For certain application only.

Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

Flame retardant: VDE 0482-266-2-4, IEC 60332-3-24 Category C

Smoke density: VDE 0482-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: DIN EN 50267, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 100 μS/cm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** XLPE insulated and halogen-free thermoplastic compound sheathed power and auxiliary control cables for the supply of electrical energy. Special for installations where fire and emissions of smoke and toxic fumes create a potential threat (hotels, airports, underground stations, railway stations, hospitals, banks, theaters etc.) Not suitable for use in water.

**Standard length cable packing:** 500 or 1000m on drums. Other forms of packing and delivery are available on request.




Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
1 x 1,5RE	0,7	1,2	5,2	40	12,1
1 x 2,5RE	0,7	1,2	5,5	51	7,41
1 x 4RE	0,7	1,2	6,0	67	4,61
1 x 6RE	0,7	1,2	6,5	88	3,08

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
1 x 10RE	0,7	1,2	7,3	128	1,83
1 x 16RE	0,7	1,2	8,2	185	1,15
1 x 25RM	0,9	1,2	10,3	289	0,727
1 x 35RM	0,9	1,2	11,4	382	0,524
1 x 50RM	1,0	1,2	12,9	506	0,387
1 x 70RM	1,1	1,2	14,4	705	0,268
1 x 95RM	1,1	1,3	16,6	962	0,193
1 x 120RM	1,2	1,3	18,2	1197	0,153
1 x 150RM	1,4	1,3	20,2	1469	0,124
1 x 185RM	1,6	1,4	22,3	1832	0,0991
1 x 240RM	1,7	1,4	25,0	2358	0,0754
1 x 300RM	1,8	1,5	28,9	2948	0,0601
1 x 400RM	2,0	1,5	32,2	3736	0,0470
1 x 500RM	2,2	1,6	36,1	4773	0,0366
2 x 1,5RE	0,7	1,2	8,9	116	12,1
2 x 2,5RE	0,7	1,2	9,7	147	7,41
2 x 4RE	0,7	1,2	10,6	190	4,61
2 x 6RE	0,7	1,2	11,6	245	3,08
2 x 10RE	0,7	1,2	13,2	350	1,83
2 x 16RE	0,7	1,3	15,2	502	1,15
3 x 1,5RE	0,7	1,2	9,3	132	12,1
3 x 2,5RE	0,7	1,2	10,2	172	7,41
3 x 4RE	0,7	1,2	11,2	228	4,61
3 x 6RE	0,7	1,2	12,2	298	3,08
3 x 10RE	0,7	1,2	13,9	436	1,83
3 x 16RE	0,7	1,3	16,1	636	1,15
3 x 25RM	0,9	1,3	20,6	1015	0,727
3 x 35RM	0,9	1,4	23,1	1349	0,524
3 x 35SM	0,9	1,4	20,8	1166	0,524
3 x 50SM	1,0	1,5	23,3	1546	0,387
3 x 70SM	1,1	1,5	27,1	2180	0,268
3 x 95SM	1,1	1,6	30,2	2941	0,193
3 x 120SM	1,2	1,7	33,3	3670	0,153
3 x 150SM	1,4	1,7	37,2	4525	0,124
3 x 185SM	1,6	1,8	41,2	5621	0,0991
3 x 240SM	1,7	1,9	46,1	7306	0,0754
3 x 25RM/16RE	0,9 / 0,7	1,4	21,6	1175	0,727 / 1,15
3 x 35RM/16RE	0,9 / 0,7	1,4	23,5	1503	0,524 / 1,15
3 x 50SM/25RM	1,0 / 0,9	1,5	26,4	1824	0,387 / 0,727
3 x 70SM/35SM	1,1 / 0,9	1,5	29,4	2538	0,268 / 0,524
3 x 95SM/50SM	1,1 / 1,0	1,6	33,0	3425	0,193 / 0,387
3 x 120SM/70SM	1,2 / 1,4	1,7	36,2	4349	0,153 / 0,268
3 x 150SM/70SM	1,4 / 1,4	1,8	40,8	5233	0,124 / 0,268
3 x 185SM/95SM	1,6 / 1,1	1,9	44,8	6570	0,0991 / 0,193
3 x 240SM/120SM	1,7 / 1,2	2,0	50,4	8501	0,0754 / 0,153
4 x 1,5RE	0,7	1,2	10,1	156	12,1
4 x 2,5RE	0,7	1,2	11,0	205	7,41
4 x 4RE	0,7	1,2	12,1	275	4,61
4 x 6RE	0,7	1,2	13,3	364	3,08
4 x 10RE	0,7	1,3	15,4	547	1,83
4 x 16RE	0,7	1,3	17,6	794	1,15
4 x 25RM	0,9	1,4	22,9	1279	0,727
4 x 35RM	0,9	1,4	25,4	1700	0,524
4 x 35SM	0,9	1,4	23,4	1524	0,524
4 x 50SM	1,0	1,5	26,4	2030	0,387
4 x 70SM	1,1	1,6	30,8	2877	0,268
4 x 95SM	1,1	1,7	34,4	3889	0,193
4 x 120SM	1,2	1,7	38,3	4863	0,153
4 x 150SM	1,4	1,8	42,4	5985	0,124
4 x 185SM	1,6	1,9	46,8	7432	0,0991
4 x 240SM	1,7	2,0	52,5	9670	0,0754
5 x 1,5RE	0,7	1,2	10,9	183	12,1

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
5 x 2,5RE	0,7	1,2	11,9	243	7,41
5 x 4RE	0,7	1,2	13,1	329	4,61
5 x 6RE	0,7	1,2	14,4	439	3,08
5 x 10RE	0,7	1,3	16,8	664	1,83
5 x 16RE	0,7	1,3	19,2	968	1,15
7 x 1,5RE	0,7	1,2	11,7	223	12,1
7 x 2,5RE	0,7	1,2	12,8	301	7,41
7 x 4RE	0,7	1,2	14,2	416	4,61
9 x 1,5RE	0,7	1,2	13,6	286	12,1
10 x 1,5RE	0,7	1,2	14,4	311	12,1
10 x 2,5RE	0,7	1,3	16,2	431	7,41
10 x 4RE	0,7	1,3	18,0	597	4,61
12 x 1,5RE	0,7	1,2	14,9	346	12,1
12 x 2,5RE	0,7	1,3	16,6	484	7,41
12 x 4RE	0,7	1,3	18,6	677	4,61
14 x 1,5RE	0,7	1,3	15,8	394	12,1
14 x 2,5RE	0,7	1,3	17,5	544	7,41
14 x 4RE	0,7	1,3	19,5	765	4,61
15 x 2,5RE	0,7	1,3	18,4	592	7,41
16 x 1,5RE	0,7	1,3	17,5	464	12,1
17 x 4RE	0,7	1,4	21,8	938	4,61
19 x 1,5RE	0,7	1,3	17,4	497	12,1
19 x 2,5RE	0,7	1,3	19,3	695	7,41
19 x 4RE	0,7	1,4	21,8	997	4,61
20 x 2,5RE	0,7	1,4	20,4	748	7,41
24 x 1,5RE	0,7	1,4	20,4	630	12,1
24 x 2,5RE	0,7	1,4	22,6	881	7,41
30 x 1,5RE	0,7	1,4	21,5	742	12,1
30 x 2,5RE	0,7	1,4	23,9	1048	7,41
37 x 1,5RE	0,7	1,4	23,1	880	12,1
40 x 1,5RE	0,7	1,4	23,9	941	12,1
40 x 2,5RE	0,7	1,5	26,9	1355	7,41

### Current ratings\*

Operating temperature at conductor 70°C; ambient air temperature 30°C

Installation	 <sup>1)</sup>		
Number of loaded cores	1	3	3
	laying in air		
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)		
1,5	33	24	26
2,5	43	32	34
4	57	42	44
6	72	53	56
10	99	74	77
16	131	98	102
25	177	133	138
35	217	162	170
50	265	197	207
70	336	250	263
95	415	308	325
120	485	359	380
150	557	412	437
185	646	475	507
240	774	564	604
300	901	649	697
400	1060	761	811
500	1252	866	940

<sup>1)</sup> Rated current for direct current systems with a far-distanced return conductor.

Correction factors for various ambient air temperatures

Ambient temperature, °C)	10	15	20	25	30	35	40	45	50
Rating factor	1,22	1,17	1,12	1,06	1,00	0,94	0,87	0,79	0,71

Current ratings for control cables – HD 627 S1

Number of loaded cores	3
Cross-section, mm <sup>2</sup>	laying in air Current ratings in Ampere (A)
1,5	24
2,5	32
4	42

Conversion factors for multicore cable (≥ 5 cores)

The conversion factors are to be used for laying the cables in ground or in air, to the values given in above tables

Number of loaded cores	Laying in air
5	0,75
7	0,65
10	0,55
14	0,50
19	0,45
24	0,40
40	0,35
61	0,30

## TYPE: N2XCH 0,6/1 kV

Halogen- free low smoke power cables with copper concentric conductor

**NORM:**

**DIN VDE 0276-604**

**CONSTRUCTION:**

<b>Conductor:</b>	bare annealed copper conductor, circular solid class 1 (RE) or circular or circular compacted stranded class 2 (RM) or stranded sector - shaped conductor class 2 (SM) acc. to EN 60228
<b>Insulation:</b>	cross-linked polyethylene
<b>Inner covering:</b>	special flame-retardant and halogen-free compound
<b>Separator:</b>	tape
<b>Sheath:</b>	thermoplastic halogen - free compound type HM4 acc. to HD 604 S1
<b>Colour of sheath:</b>	black
<b>Core identification:</b>	acc. to HD 308 S2 or HD 186

	without protective conductor
2-core	blue, brown
3-core	brown, black, grey
3 core*	blue, brown, black
4-core	blue, brown, black, grey
5-core	blue, brown, black, grey, black
≥ 7-core	black with numbering

\* For certain application only.

Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

Flame retardant: VDE 0482-266-2-4, IEC 60332-3-24 Category C



Smoke density: VDE 0482-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: DIN EN 50267, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 100 µS/cm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:**

XLPE insulated and halogen-free thermoplastic compound sheathed power and auxiliary control cables for the supply of electrical energy. Special for installations where fire and emissions of smoke and toxic fumes create a potential threat (hotels, airports, underground stations, railway stations, hospitals, banks, theaters etc.). The concentric conductor with a traverse spiral of copper serves as a screen and can be used as PE or PEN conductor. Not suitable for use in water.




**Standard length cable packing:** 500 or 100 m on drums. Other forms of packing and delivery are available on request.

Number and cross-sectional area of conductor	Nominal thickness of insulation	Nominal thickness of sheath	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	mm	mm	kg/km	Ω/km
2 x 1.5RE/1,5	0,7	1,2	10,7	157	12,1 / 12,1
2 x 2.5RE/2,5	0,7	1,2	11,5	196	7,41 / 7,41
2 x 4RE/4	0,7	1,2	12,8	261	4,61 / 4,61
2 x 6RE/6	0,7	1,2	14,1	335	3,08 / 3,08
2 x 10RE/10	0,7	1,2	15,8	479	1,83 / 1,83
2 x 16RE/16	0,7	1,3	18,3	695	1,15 / 1,15
2 x 16RM/16	0,7	1,3	19,1	726	1,15 / 1,15
2 x 25RM/16	0,9	1,3	22,9	1025	0,727 / 1,15
3 x 1,5RE/1,5	0,7	1,2	11,1	174	12,1 / 12,1
3 x 2,5RE/2,5	0,7	1,2	12,0	222	7,41 / 7,41
3 x 4RE/4	0,7	1,2	13,4	300	4,61 / 4,61
3 x 6RE/6	0,7	1,2	14,7	389	3,08 / 3,08
3 x 10RE/10	0,7	1,3	16,7	574	1,83 / 1,83
3 x 16RE/16	0,7	1,3	19,2	831	1,15 / 1,15
3 x 16RM/16	0,7	1,3	20,1	865	1,15 / 1,15
3 x 25RM/16	0,9	1,4	24,3	1253	0,727 / 1,15
3 x 35RM/16	0,9	1,4	26,6	1584	0,524 / 1,15
3 x 50 SM /25	1,0	1,5	29,4	1881	0,367 / 0,727
3 x 70 SM /35	1,1	1,6	34,5	2656	0,268 / 0,524
3 x 95 SM /50	1,1	1,6	37,9	3527	0,193 / 0,387
3 x 120 SM /70	1,2	1,7	42,3	4476	0,153 / 0,268
3 x 150 SM /70	1,4	1,8	46,8	5384	0,124 / 0,268
3 x 185 SM /95	1,6	1,9	51,2	6734	0,0991 / 0,193
3 x 240 SM /120	1,7	2,0	56,9	8688	0,0754 / 0,153
4 x 1,5RE/1,5	0,7	1,2	11,9	206	12,1 / 12,1
4 x 2,5RE/2,5	0,7	1,2	12,8	256	7,41 / 7,41
4 x 4RE/4	0,7	1,2	14,3	348	4,61 / 4,61
4 x 6RE/6	0,7	1,2	15,8	457	3,08 / 3,08
4 x 10RE/10	0,7	1,3	18,0	681	1,83 / 1,83
4 x 16RE/16	0,7	1,3	20,7	991	1,15 / 1,15
4 x 16RM/16	0,7	1,3	21,7	1031	1,15 / 1,15
4 x 25RM/16	0,9	1,4	26,4	1513	0,727 / 1,15
4 x 35RM/16	0,9	1,5	29,1	1955	0,524 / 1,15
4 x 35 SM /16	0,9	1,5	26,8	1745	0,524 / 1,15
4 x 50 SM /25	1,0	1,5	29,4	2324	0,367 / 0,727
4 x 70 SM /35	1,1	1,6	34,5	3290	0,268 / 0,524
4 x 95 SM /50	1,1	1,7	38,1	4419	0,193 / 0,387
4 x 120 SM /70	1,2	1,8	42,9	5634	0,153 / 0,268
4 x 150 SM /70	1,4	1,9	47,0	6769	0,124 / 0,268
4 x 185 SM /95	1,6	2,0	51,4	8464	0,0991 / 0,193
4 x 240 SM /120	1,7	2,1	57,1	10948	0,0754 / 0,153
7 x 1,5RE/2,5	0,7	1,2	13,5	276	12,1 / 7,41
7 x 2,5RE/2,5	0,7	1,2	14,6	356	7,41 / 7,41
7 x 4RE/4	0,7	1,3	16,6	500	4,61 / 4,61
10 x 1,5RE/2,5	0,7	1,3	16,4	376	12,1 / 7,41
10 x 2,5RE/4	0,7	1,3	18,4	512	7,41 / 4,61
10 x 4RE/6	0,7	1,3	20,5	699	4,61 / 3,08
12 x 1,5RE/2,5	0,7	1,3	16,9	412	12,1 / 7,41
12 x 2,5RE/4	0,7	1,3	18,8	565	7,41 / 4,61
12 x 4RE/6	0,7	1,3	21,1	780	4,61 / 3,08

14 x 1,5RE/2,5	0,7	1,3	17,6	454	12,1 / 7,41
14 x 2,5RE/4	0,7	1,3	19,7	627	7,41 / 4,61
14 x 4RE/6	0,7	1,4	22,2	880	4,61 / 3,08
15 x 1,5RE/2,5	0,7	1,3	18,4	490	12,1 / 7,41
16 x 1,5RE/4	0,7	1,3	18,8	521	12,1 / 7,41
16 x 2,5RE/6	0,7	1,3	20,9	712	7,41 / 3,08
19 x 1,5RE/4	0,7	1,3	19,6	579	12,1 / 4,61
19 x 2,5RE/6	0,7	1,4	22,0	809	7,41 / 3,08
19 x 4RE/10	0,7	1,4	24,4	1143	4,61 / 1,83
24 x 1,5RE/6	0,7	1,4	22,6	734	12,1 / 3,08
24 x 2,5RE/10	0,7	1,4	25,2	1027	7,41 / 1,83
30 x 1,5RE/6	0,7	1,4	23,7	848	12,1 / 3,08
30 x 1,5RE/10	0,7	1,4	24,1	887	12,1 / 1,83
30 x 2,5RE/10	0,7	1,5	26,7	1210	7,41 / 1,83
40 x 1,5RE/10	0,7	1,5	26,7	1102	12,1 / 1,83
40 x 2,5RE/10	0,7	1,5	29,5	1510	7,41 / 1,83

### Current ratings\*

Operating temperature at conductor 70°C; ambient air temperature 30°C

Installation	 	
Number of loaded cores	3	3
	<b>laying in air</b>	
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)	
1,5	25	27
2,5	33	36
4	43	47
6	54	59
10	75	81
16	100	109
25	136	146
35	165	179
50	201	218
70	255	275
95	314	336
120	364	388
150	416	438
185	480	501
240	565	580
300	643	654
400	737	733
500	807	825

<sup>1)</sup> Rated current for direct current systems with a far-distanced return conductor.

Correction factors for various ambient air temperatures

Ambient temperature, °C)	10	15	20	25	30	35	40	45	50
Rating factor	1,22	1,17	1,12	1,06	1,00	0,94	0,87	0,79	0,71

### Current ratings for control cables – HD 627 S1

Number of loaded cores	3
	<b>laying in air</b>
Cross-section, mm <sup>2</sup>	Current ratings in Ampere (A)
1,5	25
2,5	33
4	43

Conversion factors for multicore cable (≥ 5 cores)

The conversion factors are to be used for laying the cables in ground or in air, to the values given in above tables

Number of loaded cores	Laying in air
5	0,75
7	0,65
10	0,55
14	0,50
19	0,45
24	0,40
40	0,35
61	0,30

# HALOGEN-FREE LOW SMOKE FIRE RESISTANT POWER CABLES

(N)HXH FE180/E 30, (N)HXCH FE180/E 30, (N)HXH FE180/E 90, (N)HXCH FE180/E 90

## TYPE: FLAME-X 950, (N)HXH FE180/E 30 0,6/1 kV

Halogen - free low smoke fire resistant security power cables

**NORM:**

**DIN VDE 0266, DIN 4102-12**

### CONSTRUCTION:

<b>Conductor:</b>	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) acc. to EN 60228
<b>Insulation:</b>	special fire resistant cross-linked compound
<b>Inner covering:</b>	special flame-retardant and halogen-free compound
<b>Sheath:</b>	thermoplastic halogen- free compound type HM4 acc. to HD 604 S1
<b>Colour of sheath:</b>	orange
<b>Core identification:</b>	DIN VDE 0293-308, HD 308 S2



	without protective conductor (-O)	with protective conductor (-J)
1-core	black	green-yellow
2-core	blue, brown	—
3-core	brown, black, grey	green-yellow, blue, brown
3 core*	blue, brown, black	—
4-core	blue, brown, black, grey	green-yellow, brown, black, grey
4-core*	—	green-yellow, blue, brown, black
5-core	blue, brown, black, grey, black	green-yellow, blue, brown, black, grey
more 5-core	black with numbering	green-yellow, others cores black with numbering

\* For certain application only.

Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21

System integrity E30: DIN 4102-12 (30 min.)

Flame retardant: DIN VDE 0472-804 C, IEC 60332-3 Category A

Smoke density: VDE 0482-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 μS/mm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.

**Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
1 x 1,5 RE	6,4	57	12,1
1 x 2,5 RE	6,7	69	7,41
1 x 4 RE	7,2	87	4,61
1 x 6 RE	7,7	109	3,08

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
1 x 10 RE	8,5	152	1,83
1 x 16 RM	9,8	219	1,15
1 x 25 RM	11,5	323	0,727
1 x 35 RM	12,6	420	0,524
1 x 50 RM	14,5	561	0,387
1 x 70 RM	15,8	761	0,268
1 x 95 RM	18,4	1041	0,193
1 x 120 RM	20,0	1285	0,153
1 x 150 RM	22,0	1570	0,124
1 x 185 RM	24,1	1946	0,0991
1 x 240 RM	27,2	2511	0,0754
1 x 300 RM	29,6	3118	0,0601
2 x 1,5 RE	11,5	181	12,1
2 x 2,5 RE	12,3	217	7,41
2 x 4 RE	13,2	267	4,61
2 x 6 RE	14,2	328	3,08
2 x 10 RE	15,8	444	1,83
2 x 16 RM	18,4	636	1,15
2 x 25 RM	22,0	943	0,727
3 x 1,5 RE	12,1	204	12,1
3 x 2,5 RE	12,9	249	7,41
3 x 4 RE	13,9	312	4,61
3 x 6 RE	14,9	389	3,08
3 x 10 RE	16,6	539	1,83
3 x 16 RM	19,7	796	1,15
3 x 25 RM	23,3	1173	0,727
3 x 35 RM	25,6	1514	0,524
3 x 50 RM	29,9	2051	0,387
3 x 70 RM	33,2	2769	0,268
3 x 95 RM	38,5	3768	0,193
3 x 120 RM	41,7	4605	0,153
3 x 150 RM	46,7	5707	0,124
3 x 185 RM	51,0	7016	0,0991
3 x 240 RM	57,8	9077	0,0754
4 x 1,5 RE	13,0	239	12,1
4 x 2,5 RE	13,9	294	7,41
4 x 4 RE	15,0	374	4,61
4 x 6 RE	16,2	473	3,08
4 x 10 RE	18,3	674	1,83
4 x 16 RM	21,5	986	1,15
4 x 25 RM	25,6	1466	0,727
4 x 35 RM	28,1	1901	0,524
4 x 50 RM	33,3	2613	0,387
4 x 70 RM	36,8	3521	0,268
4 x 95 RM	43,1	4841	0,193
4 x 120 RM	46,6	5920	0,153
4 x 150 RM	51,8	7275	0,124
4 x 185 RM	57,0	9016	0,0991
4 x 240 RM	64,4	11625	0,0754
5 x 1,5 RE	14,0	279	12,1
5 x 2,5 RE	15,0	347	7,41
5 x 4 RE	16,3	445	4,61
5 x 6 RE	17,6	565	3,08
5 x 10 RE	19,9	811	1,83
5 x 10 RM	20,7	846	1,83
5 x 16 RM	23,5	1194	1,15
5 x 25 RM	28,1	1785	0,727
5 x 35 RM	31,3	2354	0,524
5 x 50 RM	36,9	3212	0,387
5 x 70 RM	40,7	4334	0,268
5 x 95 RM	47,6	5957	0,193
5 x 120 RM	51,8	7320	0,153
5 x 150 RM	57,8	9028	0,124

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
5 x 185 RM	63,3	11145	0,0991
5 x 240 RM	71,7	14410	0,0754
7 x 1,5 RE	15,1	331	12,1
7 x 2,5 RE	16,2	419	7,41
7 x 4 RM	18,5	581	4,61
10 x 1,5 RM	19,6	498	12,1
10 x 2,5 RM	21,4	637	7,41
12 x 1,5 RM	20,2	548	12,1
12 x 2,5 RM	22,0	707	7,41
14 x 1,5 RM	21,2	609	12,1
14 x 2,5 RM	23,1	789	7,41
16 x 1,5 RM	22,3	679	12,1
16 x 2,5 RM	24,3	885	7,41
19 x 1,5 RM	23,4	760	12,1
19 x 2,5 RM	25,5	996	7,41
24 x 1,5 RM	27,1	947	12,1
24 x 2,5 RM	29,9	1261	7,41
30 x 1,5 RE	28,7	1108	12,1
30 x 2,5 RE	31,9	1504	7,41
3 x 25RM/16RM	24,5	1361	0,727 / 1,15
3 x 35RM/16RM	26,4	1699	0,524 / 1,15
3 x 50RM/25RM	31,3	2356	0,387 / 0,727
3 x 70RM/35RM	34,6	3157	0,268 / 0,524
3 x 95RM/50RM	40,4	4318	0,193 / 0,387
3 x 120RM/70RM	44,1	5382	0,153 / 0,268
3 x 150RM/70RM	48,0	6443	0,124 / 0,268
3 x 185RM/95RM	53,3	8056	0,0991 / 0,193
3 x 240RM/120RM	59,9	10365	0,0754 / 0,153
4 x 50RMC+25RMC	35,1	2955	0,387 / 0,727
4 x 70RMC+35RMC	38,9	3987	0,268 / 0,524
4 x 95RMC+50RMC	45,4	5456	0,193 / 0,387
4 x 120RMC+70RMC	49,6	6782	0,153 / 0,268
4 x 150RMC+70RMC	54,4	8194	0,124 / 0,268

## TYPE: FLAME-X 950, (N)HXCH FE180/E 30 0,6/1 kV

Halogen- free low smoke fire resistant security power cables with copper concentric conductor

**NORM:**

**DIN VDE 0266, DIN 4102-12**

### CONSTRUCTION:

<b>Conductor:</b>	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) acc. to EN 60228
<b>Insulation:</b>	special fire resistant cross-linked compound
<b>Inner covering:</b>	special flame-retardant and halogen-free compound
<b>Concentric conductor:</b>	inner layer - round copper wires, outer layer - copper tape
<b>Separator:</b>	tape
<b>Sheath:</b>	thermoplastic halogen- free compound type HM4 acc. to HD 604 S1
<b>Colour of sheath:</b>	orange
<b>Core identification:</b>	DIN VDE 0293-308, HD 308 S2

2-core	blue, brown
3-core	brown, black, grey
3 core*	blue, brown, black
4-core	blue, brown, black, grey
more 7-core	black with numbering

\* For certain application only.



Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21

System integrity E30: DIN VDE 4102-12 (30 min.)

Flame retardant: DIN VDE 0472-804 C, IEC 60332-3 Category A

Smoke density: DIN VDE 0472-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: DIN EN 50267-2-2 (VDE 0482-276), IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 μS/mm

The product is conformed with the RoHS Directive 2002/95/CE, Low-Voltage Directive 73/23/EEC and 93/68/EEC

**Application:** Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.

**Standard length cable packing:** 500 m or 1000m on drums. Other forms of packing and delivery are available on request.

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
2 x 1,5 RE/1,5	13,9	255	12,1 / 12,1
2 x 2,5 RE/2,5	14,7	299	7,41 / 7,41
2 x 4 RE/4	15,6	366	4,61 / 4,61
2 x 6 RE/6	16,8	451	3,08 / 3,08
2 x 10 RE/10	18,3	608	1,83 / 1,83
2 x 16 RM/16	21,3	866	1,15 / 1,15
3 x 1,5 RE/1,5	14,5	279	12,1 / 12,1
3 x 2,5 RE/2,5	15,3	333	7,41 / 7,41
3 x 4 RE/4	16,5	415	4,61 / 4,61
3 x 6 RE/6	17,5	516	3,08 / 3,08
3 x 10 RE/10	19,2	708	1,83 / 1,83
3 x 16 RM/16	22,3	1019	1,15 / 1,15
3 x 25 RM/16	26,0	1408	0,727 / 1,15
3 x 35 RM/16	28,3	1754	0,524 / 1,15
3 x 50 RM/25	32,9	2395	0,387 / 0,727
3 x 70 RM/35	36,8	3236	0,268 / 0,524
3 x 95 RM/50	42,9	4409	0,193 / 0,387
3 x 120 RM/70	46,1	5447	0,135 / 0,268
3 x 150 RM/70	51,4	6600	0,124 / 0,268
3 x 185 RM/95	56,5	8184	0,0991 / 0,193
3 x 240 RM/120	63,5	10538	0,0754 / 0,153
4 x 1,5 RE/1,5	15,4	318	12,1 / 12,1
4 x 2,5 RE/2,5	16,3	383	7,41 / 7,41
4 x 4 RE/4	17,6	482	4,61 / 4,61
4 x 6 RE/6	19,7	641	3,08 / 3,08
4 x 10 RE/10	20,7	838	1,83 / 1,83
4 x 16 RM/16	24,2	1215	1,15 / 1,15
4 x 25 RM/16	28,3	1706	0,727 / 1,15
4 x 35 RM/16	31,0	2165	0,524 / 1,15
4 x 50 RM/25	36,5	2989	0,387 / 0,727
4 x 70 RM/35	40,6	4022	0,268 / 0,524
4 x 95 RM/50	47,5	5506	0,193 / 0,387
4 x 120 RM/70	51,3	6814	0,153 / 0,268
4 x 150 RM/70	56,4	8195	0,124 / 0,268
4 x 185 RM/95	61,8	10234	0,0991 / 0,193
4 x 240 RM/120	70,0	13125	0,0754 / 0,153
7 x 1,5 RE/2,5	17,5	429	12,1 / 7,41
7 x 2,5 RE/2,5	18,6	521	7,41 / 7,41
8 x 1,5 RM/2,5	19,2	487	12,5 / 7,41
8 x 2,5 RM/4	20,8	615	7,41 / 4,61
10 x 1,5 RM/2,5	21,8	596	12,1 / 7,41
10 x 2,5 RM/4	23,7	754	7,41 / 4,61

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
12 x 1,5 RM/2,5	22,4	650	12,1 / 7,41
12 x 2,5 RM/4	24,4	826	7,41 / 4,61
14 x 1,5 RM/2,5	23,4	712	12,1 / 7,41
16 x 1,5 RM/4	24,4	797	12,1 / 4,61
19 x 1,5 RM/4	25,8	884	12,1 / 4,61
21 x 1,5 RM/6	26,9	969	12,1 / 3,08
21 x 2,5 RM/10	29,5	1275	7,41 / 1,83
24 x 1,5 RM/6	29,5	1101	12,1 / 3,08
24 x 2,5 RM/10	32,6	1465	7,41 / 1,83
30 x 1,5 RM/6	31,3	1282	12,1 / 3,08
30 x 2,5 RM/10	34,9	1749	7,41 / 1,83

## TYPE: FLAME-X 950, (N)HXH FE180/E 90 0,6/1 kV

Halogen- free low smoke fire resistant security power cables

**NORM:**

**DIN VDE 0266, DIN 4102-12**

**CONSTRUCTION:**

<b>Conductor:</b>	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) acc. to EN 60228
<b>Insulation:</b>	special fire resistant cross-linked compound
<b>Inner covering:</b>	special flame-retardant and halogen-free compound
<b>Sheath:</b>	thermoplastic halogen- free compound type HM4 acc. to HD 604 S1
<b>Colour of sheath:</b>	orange
<b>Core identification:</b>	DIN VDE 0293-308, HD 308 S2



	without protective conductor (-O)	with protective conductor (-J)
1-core	black	green-yellow
2-core	blue, brown	—
3-core	brown, black, grey	green-yellow, blue, brown
3 core*	blue, brown, black	—
4-core	blue, brown, black, grey	green-yellow, brown, black, grey
4-core*	—	green-yellow, blue, brown, black
5-core	blue, brown, black, grey, black	green-yellow, blue, brown, black, grey
more 5-core	black with numbering	green-yellow, others cores black with numbering

\* For certain application only.

Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

**Insulation integrity FE 180:** DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21

**System integrity E90:** DIN VDE 4102-12 (90 min.)

Flame retardant: DIN VDE 0472-804 C, IEC 60332-3 Category A

Smoke density: DIN VDE 0482-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: VDE 0482-267-2-2, IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 μS/mm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.

**Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
1 x 1,5RE	7,4	71	12,1
1 x 2,5RE	7,7	84	7,41
1 x 4RE	8,2	102	4,61
1 x 6RE	8,7	125	3,08
1 x 10RE	9,5	170	1,83
1 x 16RMC	10,8	240	1,15
1 x 25RMC	12,5	346	0,727
1 x 35RMC	13,6	446	0,524
1 x 50RMC	15,5	590	0,387
1 x 70RMC	17,0	801	0,268
1 x 95RMC	19,8	1094	0,193
1 x 120RMC	21,2	1333	0,153
1 x 150RMC	23,6	1642	0,124
1 x 185RMC	25,7	2023	0,0991
1 x 240RMC	29,0	2609	0,0754
1 x 300RMC	31,6	3237	0,0601
2 x 1,5RE	14,1	262	12,1
2 x 2,5RE	14,9	303	7,41
2 x 4RE	15,8	359	4,61
2 x 6RE	16,8	426	3,08
2 x 10RE	18,4	551	1,83
2 x 16RMC	21,0	760	1,15
2 x 25RMC	24,4	1077	0,727
3 x 1,5RE	14,8	291	12,1
3 x 2,5RE	15,6	340	7,41
3 x 4RE	16,6	410	4,61
3 x 6RE	17,7	495	3,08
3 x 10RE	19,4	655	1,83
3 x 16RMC	22,2	918	1,15
3 x 25RMC	25,9	1319	0,727
3 x 35RMC	28,2	1672	0,524
3 x 50RMC	32,8	2266	0,387
3 x 70RMC	36,0	2989	0,268
3 x 95RMC	41,6	4058	0,193
3 x 120RMC	45,1	4945	0,153
3 x 150RMC	50,3	6107	0,124
3 x 185RMC	55,4	7558	0,0991
3 x 240RMC	62,5	9717	0,0754
4 x 1,5RE	16,0	339	12,1
4 x 2,5RE	16,9	401	7,41
4 x 4RE	18,0	488	4,61
4 x 6RE	19,2	594	3,08
4 x 10RE	21,1	799	1,83
4 x 16RMC	24,3	1131	1,15
4 x 25RMC	28,4	1636	0,727
4 x 35RMC	31,2	2103	0,524
4 x 50RMC	36,3	2848	0,387
4 x 70RMC	39,8	3779	0,268
4 x 95RMC	46,6	5191	0,193
4 x 120RMC	50,1	6297	0,153
4 x 150RMC	56,2	7807	0,124
4 x 185RMC	61,4	9597	0,0991
4 x 240RMC	69,5	12383	0,0754
5 x 1,5RE	17,3	396	12,1
5 x 2,5RE	18,3	472	7,41
5 x 4RE	19,6	578	4,61
5 x 6RE	20,9	708	3,08
5 x 10RE	23,0	959	1,83
5 x 16RMC	26,6	1366	1,15
5 x 25RMC	31,4	2002	0,727
5 x 35RMC	34,6	2595	0,524
5 x 50RMC	40,2	3493	0,387
5 x 70RMC	44,2	4666	0,268

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
5 x 95RMC	51,5	6376	0,193
5 x 120RMC	55,9	7805	0,153
5 x 150RMC	62,3	9626	0,124
5 x 185RMC	68,4	11878	0,0991
5 x 240RMC	77,4	15328	0,0754
7 x 1,5RE	18,7	466	12,1
7 x 2,5RE	19,8	562	7,41
7 x 4RM	22,1	742	4,61
8 x 1,5RM	20,7	542	12,1
10 x 1,5RM	24,0	683	12,1
10 x 2,5RM	25,8	836	7,41
12 x 1,5RM	24,8	749	12,1
12 x 2,5RM	26,6	923	7,41
14 x 1,5RM	26,0	829	12,1
14 x 2,5RM	27,9	1027	7,41
19 x 1,5RM	28,8	1032	12,1
19 x 2,5RM	31,3	1321	7,41
24 x 1,5RM	34,1	1340	12,1
24 x 2,5RM	36,9	1688	7,41
30 x 1,5RM	36,3	1573	12,1
30 x 2,5RM	39,1	1975	7,41
3 x 25RMC+16RMC	27,6	1542	0,727 / 1,15
3 x 35RMC+16RMC	29,5	1895	0,524 / 1,15
3 x 50RMC+25RMC	34,5	2600	0,387 / 0,727
3 x 70RMC+35RMC	37,8	3424	0,268 / 0,524
3 x 95RMC+50RMC	44,1	4692	0,193 / 0,387
3 x 120RMC+70RMC	47,7	5764	0,153 / 0,268
3 x 150RMC+70RMC	51,9	6908	0,124 / 0,268
3 x 185RMC+95RMC	57,9	8658	0,0991 / 0,193
3 x 240RMC+120RMC	64,7	11067	0,0754 / 0,153
4 x 50RMC+25RMC	38,56	3246	0,387 / 0,727
4 x 70RMC+35RMC	42,45	4310	0,268 / 0,524
4 x 95RMC+50RMC	49,58	5905	0,193 / 0,387
4 x 120RMC+70RMC	53,53	7244	0,153 / 0,268
4 x 150RMC+70RMC	58,99	8787	0,124 / 0,268

## TYPE: FLAME-X 950, (N)HXCH FE180/E 90 0,6/1 kV

Halogen- free low smoke fire resistant security power cables with copper concentric conductor

NORM:

DIN VDE 0266, DIN 4102-12

CONSTRUCTION:

Conductor:	bare copper conductor, circular solid class 1 (RE) or stranded circular or circular compacted class 2 (RM) acc. to EN 60228
Insulation:	special fire resistant cross-linked compound
Inner covering:	special flame-retardant and halogen-free compound
Concentric conductor:	inner layer - round copper wires, outer layer - copper tape
Separator:	tape
Sheath:	thermoplastic halogen- free compound type HM4 acc. to HD 604 S1
Colour of sheath:	orange
Core identification:	DIN VDE 0293-308, HD 308 S2

2-core	blue, brown
3-core	brown, black, grey
3 core*	blue, brown, black
4-core	blue, brown, black, grey
more 7-core	black with numbering

\* For certain application only.



Maximum conductor operating temperature: +90°C

Lowest ambient temperature for fixed installation: -30°C

Lowest installation temperature: -5°C

Maximum short-circuit conductor temperature: +250°C

Minimum bending radius: 15 x D - for single core cable; 12 x D - for multicore cable (D is the overall diameter of the cable)

Maximum permissible tensile stress with cable grip for Cu-conductor: 50 N/mm<sup>2</sup>

Insulation integrity FE 180: DIN VDE 0472-814 (800°C, 180 min.), IEC 60331-21

System integrity E90: DIN VDE 4102-12 (90 min.)

Flame retardant: DIN VDE 0472-804 C, IEC 60332-3 Category A

Smoke density: DIN VDE 0472-1034-2, IEC 61034-2: light transmittance values > 70%

Gases evolved during combustion: DIN EN 50267-2-2 (VDE 0482-276), IEC 60754-2: pH ≥ 4,3; conductivity ≤ 2,5 μS/mm

The product is conformed with the RoHS Direktive 2002/95/CE, Low-Voltage Direktive 73/23/EEC and 93/68/ECC

**Application:** Fire resistant security cables for installation everywhere where high safety requirements have a special significance e.g., in industrial complexes, power stations, public buildings, hotels, underground railway systems, hospitals etc.

**Standard length cable packing:** 500 m on drums. Other forms of packing and delivery are available on request.

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
2 x 1,5 RE/1,5	15,9	323	12,1 / 12,1
2 x 2,5 RE/2,5	16,7	369	7,41 / 7,41
2 x 4 RE/4	17,8	442	4,61 / 4,61
2 x 6 RE/6	18,8	530	3,08 / 3,08
2 x 10 RE/10	20,3	694	1,83 / 1,83
2 x 16 RM/16	23,3	965	1,15 / 1,15
2 x 25 RM/16	26,7	1287	0,727 / 1,15
2 x 35 RM/16	28,8	1561	0,524 / 1,15
3 x 1,5 RE/1,5	16,6	353	12,1 / 12,1
3 x 2,5 RE/2,5	17,4	409	7,41 / 7,41
3 x 4 RE/4	18,6	495	4,61 / 4,61
3 x 6 RE/6	19,7	601	3,08 / 3,08
3 x 10 RE/10	21,4	801	1,83 / 1,83
3 x 16 RM/16	24,5	1125	1,15 / 1,15
3 x 25 RM/16	28,2	1531	0,727 / 1,15
3 x 35 RM/16	30,4	1889	0,524 / 1,15
3 x 50 RM/25	35,7	2603	0,387 / 0,727
3 x 70 RM/35	39,1	3428	0,268 / 0,524
3 x 95 RM/50	45,7	4669	0,193 / 0,387
3 x 120 RM/70	49,3	5778	0,153 / 0,268
3 x 150 RM/70	54,6	6963	0,124 / 0,268
3 x 185 RM/95	59,7	8678	0,0991 / 0,193
4 x 1,5 RE/1,5	17,8	405	12,1 / 12,1
4 x 2,5 RE/2,5	18,7	471	7,41 / 7,41
4 x 4 RE/4	20,0	576	4,61 / 4,61
4 x 6 RE/6	21,5	706	3,08 / 3,08
4 x 10 RE/10	23,1	948	1,83 / 1,83
4 x 16 RM/16	26,6	1341	1,15 / 1,15
4 x 25 RM/16	30,7	1855	0,727 / 1,15
4 x 35 RM/16	33,4	2328	0,524 / 1,15
4 x 50 RM/25	39,1	3197	0,387 / 0,727
4 x 70 RM/35	43,0	4230	0,268 / 0,524
4 x 95 RM/50	49,9	5800	0,193 / 0,268
4 x 120 RM/70	54,4	7153	0,153 / 0,268
4 x 150 RM/70	60,6	8719	0,124 / 0,268
4 x 185 RM/95	65,9	10774	0,0991 / 0,193
4 x 240 RM/120	74,1	13820	0,0754 / 0,153
7 x 1,5 RE/2,5	20,5	539	12,1 / 7,41
7 x 2,5 RE/2,5	21,6	639	7,41 / 7,41
7 x 4 RE/4	24,1	837	4,61 / 4,61
10 x 1,5 RM/2,5	25,8	771	12,1 / 7,41
10 x 2,5 RM/4	27,5	935	7,41 / 4,61

Number and cross-sectional area of conductor	Approximate overall diameter	Approximate net weight of cables	Maximum conductor resistance at 20°C
n x mm <sup>2</sup>	mm	kg/km	Ω/km
12 x 1,5 RM/2,5	26,5	839	12,1 / 7,41
12 x 2,5 RM/4	28,3	1023	7,41 / 4,61
16 x 2,5 RM/6	31,6	1294	7,41 / 3,08
19 x 1,5 RM/4	30,8	1153	12,1 / 4,61
19 x 2,5 RM/6	33,5	1473	7,41 / 3,08
21 x 1,5 RM/6	32,4	1264	12,1 / 3,08
21 x 2,5 RM/10	35,3	1642	7,41 / 1,83
24 x 1,5 RM/6	36,3	1500	12,1 / 3,08
24 x 2,5 RM/10	39,1	1894	7,41 / 1,83



# CHAPTER VII

## MEDIUM AND HIGH VOLTAGE POWER CABLES

# MEDIUM VOLTAGE XLPE INSULATED POWER CABLES

AHXAMK-W, TSLE, AXCEL, AHXCMK-WTC, MV\_HV\_EHVP

## TYPE: AHXAMK-W 6/10/(12) kV

Completely Watertight Power Cable

**NORM:**

**SFS 5636, HD 620 5F, IEC 60502**

### CONSTRUCTION:

1. - Round, stranded and compacted watertight aluminium conductor
2. - Three cores are stranded around the centre copper conductor
3. - Semi-conductive XLPE
4. - XLPE compound
5. - Semi-conductive XLPE and water swellable semi-conductive tape
6. - Aluminium foil bonded tightly to sheath providing radial watertightness
7. - Black weather resistant PE

**Application:**

- Laying in ground
- Laying in air

**Highest permissible conductor temperature:**

- Continuous operation 90°C
- Short circuit (duration max 5 s) 250°C

**Lowest recommended temperature during laying:**

- 20°C



DESCRIPTION	UNIT	DETAILS						
		3x70+35	3x95+35	3x120+35	3x150+35	3x185+35	3x240+70	3x300+70
<b>CONSTRUCTION DATA</b>								
Conductor								
Nominal cross sectional area	sqmm	70	95	120	150	185	240	300
Conductor diameter and tolerance	mm	9.5 <sup>+0.2</sup>	11.3 <sup>+0.2</sup>	12.5 <sup>+0.2</sup>	14.7 <sup>+0.2</sup>	15.8 <sup>+0.2</sup>	17.8 <sup>+0.1</sup>	20.3 <sup>+0.4</sup>
Minimum thickness semi-conducting XLPE on conductor	mm	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Insulation thickness: minimum average XLPE	mm	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Insulation thickness: minimum at a point	mm	2.96	2.96	2.96	2.96	2.96	2.96	2.96
Diameter over insulation	mm	17.80	19.60	20.80	23.00	24.10	26.00	29.00
Metallising screen	Aluminium foil bonded tightly to sheath providing radial watertightness							
Oversheath thickness nominal PE	mm	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Approximate overall diameter								
- completed cable (De)	mm	54.8	58.7	61.3	66.0	68.4	72.4	79.4
Centre conductor	Round, stranded and compacted copper conductor							
Weight of complete cable (Approx.)	kg/km	2220	2560	2840	3220	3640	4540	5340
<b>DELIVERY DATA</b>								
Diameter of wooden drum	mm	2000	2200	2200	2400	2400	2400	2400
- type		K20	K22	K22	K24	K24	K24	K24
Maximum length per drum	m	500	500	500	500	500	400	400
Weight of heaviest reel, including cable	kg	1860	1850	1990	2240	2450	2450	2770
<b>ELECTRICAL DATA</b>								
Maximum D.C. resistance of phase conductor at 20°C	Ω/km	0.4430	0.3200	0.2530	0.2060	0.1640	0.1250	0.1000
A.C. resistance of phase conductor at 90°C	Ω/km	0.5690	0.4110	0.3250	0.2650	0.2110	0.1650	0.1300
Induction reactance	Ω/km	0.1214	0.1150	0.1115	0.1062	0.1032	0.0997	0.0959
Capacitance reactance	kΩ/km	12.40	10.95	10.20	9.00	8.50	7.80	6.90

MECHANICAL DATA								
Recommended min. bending radius for laying								
- phase	m	0.63	0.68	0.71	0.76	0.79	0.84	0.91
- cable	m	0.75	0.80	0.83	0.90	0.93	1.00	1.07
Recommended permissible bending radius at final installation								
- phase	m	0.47	0.50	0.53	0.57	0.60	0.63	0.68
- cable	m	0.56	0.60	0.62	0.67	0.69	0.75	0.80
SHORT CIRCUIT CURRENTS								
Maximum permissible thermal short-circuit Current for 1 sec. (IEC 949)								
Phase conductor 90 → 250°C	kA	6.80	9.20	11.60	14.50	17.80	23.10	28.90
AMPACITY								
in earth	A	210	250	285	315	360	415	470
in air	A	230	280	320	360	420	500	570

Current rating guideline (Calculated according to IEC Publ. 287 and the following conditions)

Ground temperature max. 20°C

Ambient air temperature max. 25°C

Laying depth 0.70m

Ground thermal resistivity 1.0 K·m/W

## TYPE: AHXAMK-W 12/20/(24) kV

Completely Watertight Power Cable

**NORM:**

**SFS 5636, HD 620 5F, IEC 60502**

### CONSTRUCTION:

1. Round, stranded and compacted watertight aluminium conductor
2. Three cores are stranded around the centre copper conductor
3. Semi-conductive XLPE
4. XLPE compound
5. Semi-conductive XLPE and water swellable semi-conductive tape
6. Aluminium foil bonded tightly to sheath providing radial watertightness
7. Black weather resistant PE

**Application:**

- Laying in ground
- Laying in air

**Highest permissible conductor temperature:**

- Continuous operation 90°C
- Short circuit (duration max 5 s) 250°C

**Lowest recommended temperature during laying:** -20°C



DESCRIPTION	UNIT	DETAILS						
CONSTRUCTION DATA		3x70+35	3x95+35	3x120+35	3x150+35	3x185+35	3x240+70	3x300+70
Conductor								
Nominal cross sectional area	sqmm	70	95	120	150	185	240	300
Conductor diameter and tolerance	mm	9.5 <sup>+0.2</sup>	11.3 <sup>+0.2</sup>	12.5 <sup>+0.2</sup>	14.7 <sup>+0.2</sup>	15.8 <sup>+0.2</sup>	17.8 <sup>+0.1</sup>	20.3 <sup>+0.4</sup>
Minimum thickness semi-conducting XLPE on conductor	mm	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Insulation thickness: minimum average XLPE	mm	5.50	5.50	5.50	5.50	5.50	5.50	5.50
Insulation thickness: minimum at a point	mm	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Diameter over insulation	mm	22.00	23.80	25.00	27.20	28.30	30.20	33.20
Metalling screen	Aluminium foil bonded tightly to sheath providing radial watertightness							
Oversheath thickness nominal PE	mm	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Approximate overall diameter								
- completed cable (De)	mm	63.8	67.4	70.3	75.0	77.4	81.5	88.4
Centre conductor	Round, stranded and compacted copper conductor							
Weight of complete cable (Approx.)	kg/km	2730	3120	3430	3850	4280	5220	6080

DELIVERY DATA								
Diameter of wooden drum	mm	2400	2400	2400	2400	2400	2400	2400
- type		K24	K24	K24	K24	K24	K24	K24
Maximum length per drum	m	500	500	500	400	400	300	300
Weight of heaviest reel, including cable	kg	2000	2200	2350	2170	2350	2200	2460
ELECTRICAL DATA								
Maximum D.C. resistance of phase conductor at 20°C	Ω/km	0.4430	0.3200	0.2530	0.2060	0.1640	0.1250	0.1000
A.C. resistance of phase conductor at 90°C	Ω/km	0.5690	0.4110	0.3250	0.2650	0.2110	0.1650	0.1300
Induction reactance	Ω/km	0.1311	0.1241	0.1202	0.1143	0.1109	0.1071	0.1026
Capacitance reactance	kΩ/km	17.75	15.85	14.80	13.20	12.55	11.55	10.25
MECHANICAL DATA								
Recommended min. bending radius for laying								
- phase	m	0.74	0.78	0.81	0.87	0.90	0.94	1.00
- cable	m	0.87	0.90	0.95	1.00	1.05	1.10	1.15
Recommended permissible bending radius at final installation								
- phase	m	0.56	0.58	0.60	0.65	0.67	0.70	0.75
- cable	m	0.65	0.68	0.72	0.75	0.78	0.82	0.86
SHORT CIRCUIT CURRENTS								
Maximum permissible thermal short-Circuit Current for 1 sec. (IEC 949)								
Phase conductor 90 → 250°C	kA	6.80	9.20	11.60	14.50	17.80	23.10	28.90
AMPACITY								
in earth	A	210	250	285	320	360	420	475
in air	A	240	290	335	375	430	515	585

Current rating guideline (Calculated according to IEC Publ. 287 and the following conditions)

Ground temperature max. 20°C

Ambient air temperature max. 25°C

Laying depth 0.70m

Ground thermal resistivity 1.0 K·m/W

## TYPE: TSLE 6/10 kV \*

Completely Watertight Power Cable

**NORM:**

**SFS 5636, HD 620 5F, IEC 60502**

### CONSTRUCTION:

1. Round, stranded and compacted aluminium conductor. Class B. Longitudinally watertight
2. Extruded semi-conducting conductor screen
3. Insulation XLPE - Dry cured
4. Extruded semi-conducting insulation screen – fully bonded
5. Semi-conducting swelling tape
6. Metallic screen: copper wires helix and copper counter helix tape
7. Semi-conducting swelling tape
8. Laminated aluminium foil
9. Sheath: MDPE

**Application:**

- Laying in ground
- Laying in ducts
- Laying in air

**Highest permissible conductor temperature:**

- Continuous operation 90°C
- Overload 130°C
- Short circuit (duration max 5 s) 250°C

**Lowest recommended temperature during laying:**

- 20°C

\* We offer also: 7/12 kV, 14/24 kV





- at formation (*)	mH/km	0,607	0,583	0,563	0,551	0,532	0,525	0,514	0,503	0,493	0,484	0,477	0,470
Induction reactance													
- trefoil formation	Ω/km	0,133	0,125	0,119	0,115	0,109	0,107	0,104	0,100	0,097	0,094	0,092	0,090
- flat formation (*)	Ω/km	0,191	0,183	0,177	0,173	0,167	0,165	0,162	0,158	0,155	0,152	0,150	0,148
Mutual capacitance	μF/km	0,236	0,257	0,291	0,314	0,355	0,376	0,411	0,467	0,514	0,567	0,642	0,720
Capacitance reactance	kΩ/km	13,50	12,40	10,95	10,20	9,00	8,45	7,75	6,85	6,20	5,65	4,95	4,45
<b>MECHANICAL DATA</b>													
Recommended min. bending radius for laying	m	0,64	0,67	0,72	0,75	0,81	0,84	0,89	0,98	1,04	1,12	1,24	1,35
Recommended permissible bending radius at final installation	m	0,52	0,54	0,58	0,60	0,65	0,68	0,72	0,80	0,84	0,90	1,00	1,08
Maximum permissible pulling force with a pulling:	kN	1,5	2,1	2,85	3,6	4,5	5,55	7,2	9,0	12	15	18,9	24
<b>SHORT CIRCUIT CURRENTS</b>													
Maximum permissible thermal short-circuit Current for 1 sec. (IEC949)													
Phase conductor 90 → 250°C	kA	4,9	6,8	9,2	11,6	14,5	17,8	23,1	28,8	38,3	47,9	60,2	76,4
<b>AMPACITY</b>													
in earth													
- trefoil formation	A	171	208	248	283	315	357	413	466	529	602	665	745
- flat formation (*)	A	194	236	281	318	350	394	452	506	558	627	690	770
in air													
- trefoil formation	A	183	228	278	321	364	418	494	568	660	767	855	970
- flat formation (*)	A	219	273	333	384	432	496	583	666	755	868	960	1180

Current rating guideline (Calculated according to IEC Publ. 287 and the following conditions)

\* Distance between cable axes laid in flat formation De+70mm

Ground temperature 20°C

Ambient air temperature 30°C

Load factor 0.7

Ground thermal resistivity 1.0 K·m/W

Laying depth 0.7

# TYPE: AXCEL 7/12 kV \*\*



Longitudinally Watertight Power Cable

**NORM:**

**SS 424 14 16, IEC 60502**

## CONSTRUCTION:

1. Round, stranded and compacted aluminium. Conductor class B. Longitudinally watertight
2. Extruded semi-conducting conductor screen
3. Insulation XLPE - dry cured
4. Extruded semi-conducting insulation screen
5. Separate screen ( semi-conductive band for each conductor )
6. Metallic screen: copper wires with copper equalizing tape
7. Separator
8. Sheath: black PE

**Application:** - Laying in ground  
- Laying in air

**Highest permissible conductor temperature:** - Continuous operation 90°C  
- Short circuit (duration max 5 s) 250°C

**Lowest recommended temperature during laying:** -20°C

\*\* We offer also: 12/24 kV

DESCRIPTION	UNIT	DETAILS			
		3x50/16	3x95/16	3x150/25	3x240/35
<b>CONSTRUCTION DATA</b>					
Conductor		Aluminium			
Nominal cross sectional area		50	95	150	240
Conductor diameter and tolerance	m	9.6 <sup>+0,1</sup>	11.3 <sup>+0,2</sup>	14.7 <sup>+0,2</sup>	17.8 <sup>+0,1</sup>
Minimum thickness semi-conducting XLPE on conductor	mm	0.30	0.30	0.30	0.30
Insulation thickness: minimum average XLPE	mm	3.40	3.40	3.40	3.40
Insulation thickness: minimum at a point	mm	2.96	2.96	2.96	2.96
Diameter over insulation	mm	15.00	19.50	22.90	25.90
Minimum thickness semi-conducting XLPE on insulation	mm	0.30	0.30	0.30	0.30
Thickness semi-conductove tape	mm	0.50	0.50	0.50	0.50
Diameter over stranded cable core	mm	36.50	46.20	53.20	60.00
Thickness semi-conductove tape	mm	0.50	0.50	0.50	0.50
Metalling screen					
Copper Wires	No x mm	22 x 0.95	22 x 0.95	36 x 0.95	50 x 0.95
with copper equalizing tape	Noxmmxmm	1 x 10 x 0.10	1 x 10 x 0.10	1 x 10 x 0.10	1 x 10 x 0.10
Thickness of separate tape	mm	0.30	0.30	0.30	0.30
Oversheath thickness minimum at a point	mm	1.94	2.19	2.45	2.62
Oversheath thickness nominal PE	mm	2.40	2.70	3.00	3.20
Approximate overall diameter completed cable (De)	mm	44.60	54.90	62.80	69.70
Weight of complete cable (Approx.)	kg/km	1290	2100	2870	3970
<b>DELIVERY DATA</b>					
Diameter of wooden drum	m	1.8	2.0	2.4	2.4
- type		K18	K20	K24	K24
Maximum length per drum	m	500	500	500	500
Weight of heaviest reel, including cable	kg	970	1540	2060	2610

ELECTRICAL DATA					
Maximum D.C. conductor resistance at 20°C	Ω/km	0.6410	0.3200	0.2060	0.1250
A.C. conductor resistance at 90°C	Ω/km	0.8230	0.4110	0.2650	0.1610
Maximum D.C. screen resistance at 20°C	Ω/km	1.06	1.06	0.72	0.51
A.C. screen resistance at 80°C	Ω/km	1.32	1.32	0.89	0.63
Operating inductance	mH/km	0.3872	0.3250	0.3022	0.2713
Induction reactance	Ω/km	0.1216	0.1021	0.0949	0.0852
Mutual capacitance	μF/km	0.2055	0.2907	0.3545	0.4106
Capacitance reactance	kΩ/km	15.50	10.95	9.00	7.75
MECHANICAL DATA					
Recommended min. bending radius for laying	m	0.54	0.66	0.75	0.84
Recommended permissible bending radius at final installation	m	0.45	0.55	0.60	0.68
Maximum permissible pulling force with a pulling:	kN	4.50	8.55	13.50	21.60
SHORT CIRCUIT CURRENTS					
Maximum permissible thermal short-circuit Current for 1 sec. (IEC 949)					
Phase conductor 90 → 250°C	kA	4.90	9.25	14.50	23.10
Metallic screen 80 → 350°C	kA	3.15	3.15	5.00	7.10
AMPACITY					
in earth	A	165	240	310	410
in air	A	165	250	325	440

• Ground temperature	20°C
• Ambient air temperature	25°C
• Load factor	0.7
• Ground thermal resistivity	1.0 K·m/W

## TYPE: AHXCMK-WTC 6/10/(12) kV

**NORM:**  
**HD620-5F**



### CONSTRUCTION:

1. Round, stranded, strand filled and compacted aluminium conductor. Class 2.
2. Extruded semi-conducting conductor screen
3. Insulation XLPE
4. Extruded semi-conducting insulation screen, fully bonded
5. Semi-conducting tape
6. Metallic screen of copper wires and copper counter tape
7. Polyester tape
8. Outer sheath of black PVC

<b>Application</b>	Laying in ground Laying in air
<b>Highest permissible conductor temperature</b>	Continuous operation 90 C Overload 130 C Short circuit 250 C (duration max 5 s)

Laying is possible without any special measures at natural cable temperatures not lower than -5 C

DESCRIPTION	UNIT	AHXCMK-WTC	AHXCMK-WTC
		1x150RM/25 6/10/(12) kV	1x240RM/35 6/10/(12) kV
CONSTRUCTION DATA		DETAILS	
		6/10/(12) kV	6/10/(12) kV
Conductor			
-material	-	aluminium	aluminium
-number of wires	No	19	34
Nominal cross sectional area	sqmm	150	240
Conductor diameter	mm	14.4	14.4
Minimum thickness of semi-conducting XLPE on conductor	mm	0.3	0.3
Insulation thickness: minimum average	mm	3.40	3.40
Insulation thickness: minimum at a point	mm	2.96	2.96

DESCRIPTION	UNIT	AHXCMK-WTC	AHXCMK-WTC
		1x150RM/25 6/10/(12) kV	1x240RM/35 6/10/(12) kV
<b>DETAILS</b>			
Approximate diameter over insulation	mm	22.6	26.1
Nominal thickness of semi-conducting tape	mm	0.41	0.41
<b>Metallic screen</b>			
- nominal cross sectional area	sqmm	25	35
- copper wires	No x mm	36 x 0.95	50 x 0.95
- copper equalizing tape	No x mm x mm	1 x 10 x 0.1	1 x 10 x 0.1
Nominal thickness of polyester tape	mm	0.08	0.08
Nominal thickness of outer sheath	mm	1.9	2.0
Approximate overall diameter of complete cable	mm	31	35
Approximate weight of complete cable	kg/km	1192	1639
<b>DELIVERY DATA</b>			
Diameter and max. size of wooden drum	m x m	2.2 x 1.33	2.2 x 1.33
-type		22A	22A
Maximum length per drum	m	1500	1500
Approximate weight of heaviest reel, including cable	kg	2378	3010
<b>MECHANICAL DATA</b>			
Recommended min. bending radius for laying	mm	463	519
Maximum permissible pulling force with a pulling eye on conductor	kN	4.5	7.2
<b>ELECTRICAL DATA</b>			
Maximum D.C. conductor resistance at 20°C	Ω/km	0.206	0.125
Maximum A.C. conductor resistance at 90°C	Ω/km	0.265	0.161
Star reactance at 50 Hz	Ω/km	0.107	0.114
Capacity reactance 50 Hz	Ω/km	9234	7778
<b>SHORT CIRCUIT CURRENTS</b>			
Maximum permissible thermal short-circuit current for 1 sec.			
Phase conductor 90 → 250°C	kA	14.2	22.7
Metallic screen 70 → 350°C	kA	5.1	7.1
<b>AMPACITY (both ends)</b>			
in earth - trefoil formation	A	336	441
in duct - trefoil formation	A	286	375
in air - trefoil formation	A	373	504

## TYPE: AHXCMK-WTC 12/20/(24) kV

**NORM:**  
**HD620-5F**

### CONSTRUCTION:

1. Round, stranded, strand filled and compacted aluminium conductor. Class 2.
2. Extruded semi-conducting conductor screen
3. Insulation XLPE
4. Extruded semi-conducting insulation screen, fully bonded
5. Semi-conducting tape
6. Metallic screen of copper wires and copper counter tape
7. Polyester tape
8. Outer sheath of black PVC

<b>Application</b>	Laying in ground
	Laying in air
<b>Highest permissible conductor temperature</b>	Continuous operation 90 C
	Overload 130 C
	Short circuit 250 C(duration max 5 s)

Laying is possible without any special measures at natural cable temperatures not lower than -5 C

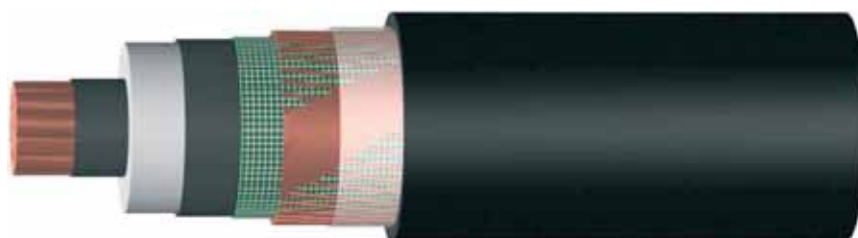


		AHXCМК-WTC 1x50RM/16 12/20/(24) kV	AHXCМК-WTC 1x95RM/25 12/20/(24) kV	AHXCМК-WTC 1x150RM/25 12/20/(24) kV	AHXCМК-WTC 1x240RM/35 12/20/(24) kV
DESCRIPTION	UNIT	DETAILS			
CONSTRUCTION DATA		12/20/(24) kV	12/20/(24) kV	12/20/(24) kV	12/20/(24) kV
<b>Conductor</b>					
-material	-	alluminium	alluminium	alluminium	alluminium
-number of wires	No	7	18	19	34
Nominal cross sectional area	sqmm	50	95	150	240
Conductor diameter	mm	8.25	11.5	14.4	17.9
Minimum thickness of semi-conducting XLPE on conductor	mm	0.3	0.3	0.3	0.3
Insulation thickness: minimum average	mm	5.50	5.50	5.50	5.50
Insulation thickness: minimum at a point	mm	4.85	4.85	4.85	4.85
Approximate diameter over insulation	mm	20.65	23.9	26.8	30.3
Nominal thickness of semi-conducting tape	mm	0.41	0.41	0.41	0.41
<b>Metallic screen</b>					
- nominal cross sectional area	sqmm	16	25	25	35
- copper wires	No x mm	22 x 0.95	36 x 0.95	36 x 0.95	50 x 0.95
- copper equalizing tape	No x mm x mm	1 x 10 x 0.1	1 x 10 x 0.1	1 x 10 x 0.1	1 x 10 x 0.1
Nominal thickness of polyester tape	mm	0.08	0.08	0.08	0.08
Nominal thickness of outer sheath	mm	1.8	1.9	2.0	2.1
Approximate overall diameter of complete cable	mm	29	32	35	39
Approximate weight of complete cable	kg/km	836	1165	1407	1880
<b>DELIVERY DATA</b>					
Diameter and max. size of wooden drum	m x m	2 x 1.11	2.2 x 1.33	2.2 x 1.33	2.4 x 1.45
-type		20	22	22	24
Maximum length per drum	m	1250	1500	1500	1500
Approximate weight of heaviest reel, including cable	kg	1508	2338	2662	3572
<b>MECHANICAL DATA</b>					
Recommended min. bending radius for laying	mm	431	483	529	585
Maximum permissible pulling force with a pulling eye on conductor	kN	1.5	2.85	4.5	7.2
<b>ELECTRICAL DATA</b>					
Maximum D.C. conductor resistance at 20°C	Ω/km	0.641	0.320	0.206	0.125
Maximum A.C. conductor resistance at 90°C	Ω/km	0.822	0.411	0.265	0.161
Star reactance at 50 Hz	Ω/km	0.138	0.124	0.116	0.108
Capacity reactance 50 Hz	Ω/km	19473	15751	13480	11496
<b>SHORT CIRCUIT CURRENTS</b>					
Maximum permissible thermal short-circuit current for 1 sec.					
Phase conductor 90 → 250°C	kA	4.7	9	14.2	22.7
Metallic screen 70 → 350°C	kA	3.2	5.1	5.1	7.1
<b>AMPACITY (both ends)</b>					
in earth - trefoil formation	A	172	263	336	441
in duct -trefoil formation	A	146	223	286	375
in air - trefoil formation	A	185	284	373	504

•Ground temperature	20°C
• Ambient air temperature	30°C
• Laying depth	0.7 m
• Ground thermal resistivity	1 K•m/W

# TYPE: HXCMK-WTC 6/10/(12) kV

**NORM:**  
**HD620-5F**



## CONSTRUCTION:

1. Round, stranded, strand filled and compacted copper conductor. Class 2.
2. Extruded semi-conducting conductor screen
3. Insulation XLPE
4. Extruded semi-conducting insulation screen, fully bonded
5. Semi-conducting tape
6. Metallic screen of copper wires and copper counter tape
7. Polyester tape
8. Outer sheath of black PVC

<b>Application</b>	Laying in ground
	Laying in air
<b>Highest permissible conductor temperature</b>	Continuous operation 90 C
	Overload 130 C
	Short circuit 250 C(duration max 5 s)

Laying is possible without any special measures at natural cable temperatures not lower than -5 C

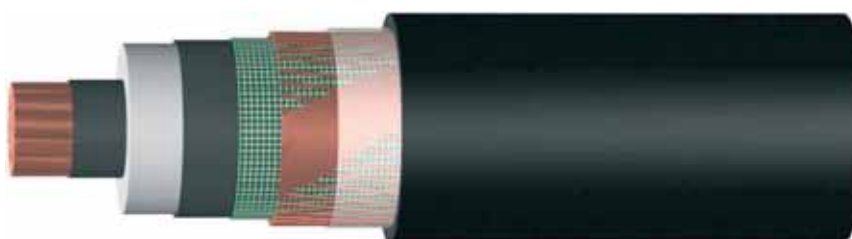
DESCRIPTION	UNIT	HXCMK-WTC	HXCMK-WTC	HXCMK-WTC
		1x35RM/16 6/10/(12) kV	1x300RM/25 6/10/(12) kV	1x500RM/35 6/10/(12) kV
<b>CONSTRUCTION DATA</b>				
Conductor		<b>6/10/(12) kV</b>	<b>6/10/(12) kV</b>	<b>6/10/(12) kV</b>
- material	-	copper	copper	copper
- number of wires	No	7	58	60
Nominal cross sectional area	sqmm	35	300	500
Conductor diameter	mm	7.15	20.8	26.9
Minimum thickness of semi-conducting XLPE on conductor	mm	0.3	0.3	0.3
Insulation thickness: minimum average	mm	3.40	3.40	3.40
Insulation thickness: minimum at a point	mm	2.96	2.96	2.96
Approximate diameter over insulation	mm	15.35	29	35.2
Nominal thickness of semi-conducting tape	mm	0.41	0.41	0.41
Metallic screen				
- nominal cross sectional area	sqmm	16	25	35
- copper wires	No x mm	22 x 0.95	36 x 0.95	50 x 0.95
- copper equalizing tape	No x mm x mm	1 x 10 x 0.1	1 x 10 x 0.1	1 x 10 x 0.1
Nominal thickness of polyester tape	mm	0.08	0.08	0.08
Nominal thickness of outer sheath	mm	1.6	2.1	2.3
Approximate overall diameter of complete cable	mm	23	38	44
Approximate weight of complete cable	kg/km	805	3660	5714
<b>DELIVERY DATA</b>				
Diameter and max. size of wooden drum	m x m	1.6 x 1.08	2.4 x 1.45	2.8 x 1.7
-type		16	24	28
Maximum length per drum	m	1500	1500	1500
Approximate weight of heaviest reel, including cable	kg	1439	6242	9941
<b>MECHANICAL DATA</b>				
Recommended min. bending radius for laying	mm	345	565	664
Maximum permissible pulling force with a pulling eye on conductor	kN	1.75	15	25
<b>ELECTRICAL DATA</b>				
Maximum D.C. conductor resistance at 20°C	Ω/km	0.524	0.060	0.037
Maximum A.C. conductor resistance at 90°C	Ω/km	0.668	0.079	0.050
Star reactance at 50 Hz	Ω/km	0.133	0.097	0.091
Capacity reactance 50 Hz	Ω/km	15167	6882	5612

SHORT CIRCUIT CURRENTS				
Maximum permissible thermal short-circuit current for 1 sec.				
Phase conductor 90 → 250°C	kA	5	42.9	71.5
Metallic screen 70 → 350°C	kA	3.2	5.1	7.1
AMPACITY (both ends)				
in earth - trefoil formation	A	187	630	798
in duct - trefoil formation	A	159	536	678
in air - trefoil formation	A	197	730	961

• Ground temperature	20°C
• Ambient air temperature	30°C
• Laying depth	0.7 m
• Ground thermal resistivity	1 K·m/W

## TYPE: HXCMK-WTC 12/20/(24) kV

**NORM:**  
**HD620-5F**



### CONSTRUCTION:

1. Round, stranded, strand filled and compacted copper conductor. Class 2.
2. Extruded semi-conducting conductor screen
3. Insulation XLPE
4. Extruded semi-conducting insulation screen, fully bonded
5. Semi-conducting tape
6. Metallic screen of copper wires and copper counter tape
7. Polyester tape
8. Outer sheath of black PVC

<b>Application</b>	Laying in ground Laying in air
<b>Highest permissible conductor temperature</b>	Continuous operation 90 C Overload 130 C Short circuit 250 C(duration max 5 s)

Laying is possible without any special measures at natural cable temperatures not lower than -5 C

DESCRIPTION	UNIT	HXCMK-WTC 1x35RM/16 12/20/(24) kV	HXCMK-WTC 1x150RM/25 12/20/(24) kV
		DETAILS	
CONSTRUCTION DATA		12/20/(24) kV	12/20/(24) kV
Conductor			
- material	-	copper	copper
- number of wires	No	7	36
Nominal cross sectional area	sqmm	35	150
Conductor diameter	mm	7.15	14.8
Minimum thickness of semi-conducting XLPE on conductor	mm	0.3	0.3
Insulation thickness: minimum average	mm	5.50	5.50
Insulation thickness: minimum at a point	mm	4.85	4.85
Approximate diameter over insulation	mm	19.55	27.2
Nominal thickness of semi-conducting tape	mm	0.41	0.41
Metallic screen			
- nominal cross sectional area	sqmm	16	25
- copper wires	No x mm	22 x 0.95	36 x 0.95
- copper equalizing tape	No x mm x mm	1 x 10 x 0.1	1 x 10 x 0.1
Nominal thickness of polyester tape	mm	0.08	0.08
Nominal thickness of outer sheath	mm	1.8	2.0
Approximate overall diameter of complete cable	mm	28	36
Approximate weight of complete cable	kg/km	978	2361

DELIVERY DATA			
Diameter and max. size of wooden drum	m x m	2 x 1.11	2.2 x 1.33
-type		20	22
Maximum length per drum	m	1300	1500
Approximate weight of heaviest reel, including cable	kg	1734	4094
MECHANICAL DATA			
Recommended min. bending radius for laying	mm	414	535
Maximum permissible pulling force with a pulling eye on conductor	kN	1.75	7.5
ELECTRICAL DATA			
Maximum D.C. conductor resistance at 20°C	Ω/km	0.524	0.124
Maximum A.C. conductor resistance at 90°C	Ω/km	0.668	0.159
Star reactance at 50 Hz	Ω/km	0.144	0.115
Capacity reactance 50 Hz	Ω/km	21192	13219
SHORT CIRCUIT CURRENTS			
Maximum permissible thermal short-circuit current for 1 sec.			
Phase conductor 90 → 250°C	kA	5	21.5
Metallic screen 70 → 350°C	kA	3.2	5.1
AMPACITY (both ends)			
in earth - trefoil formation	A	189	431
in duct - trefoil formation	A	161	366
in air - trefoil formation	A	200	478

• Ground temperature	20°C
• Ambient air temperature	30°C
• Laying depth	0.7 m
• Ground thermal resistivity	1 K·m/W

## TYPE: AHXCMK-WTC 6/10/(12) kV



**NORM:**  
**HD-620 6F**

### CONSTRUCTION:

1. Round, stranded and compacted WTC aluminium conductor. Class 2.
2. Extruded semi-conducting conductor screen
3. Insulation XLPE, dry cured
4. Extruded semi-conducting insulation screen, fully bonded
5. Semiconducting tape
6. Assembly of cores
7. Semi-conducting tape
8. Metallic screen of copper wires and counter copper tape
9. Polyester tape
10. Outer sheath of black PE

<b>Application</b>	Laying in ground Laying in air
<b>Highest permissible conductor temperature</b>	Continuous operation 90 C Overload 130 C Short circuit 250 C (duration max 5 s)

Laying is possible without any special measures at natural cable temperatures not lower than -20 C

DESCRIPTION	UNIT	AHXCMK-WTC	AHXCMK-WTC
		3x150RM/25 6/10/(12) kV	3x240RM/35 6/10/(12) kV
		<b>DETAILS</b>	
<b>CONSTRUCTION DATA</b>		<b>6/10/(12) kV</b>	<b>6/10/(12) kV</b>
Conductor			
- material	-	aluminium	aluminium
- number of wires	No	19	34
Nominal cross sectional area	sqmm	150	240
Conductor diameter	mm	14.4	18
Minimum thickness of semi-conducting XLPE on conductor	mm	0.3	0.3
Insulation thickness: minimum average	mm	3.30	3.30
Insulation thickness: minimum at a point	mm	2.87	2.87
Approximate diameter over insulation	mm	22	25.6
Nominal thickness of semi-conducting tape	mm	0.4	0.4
Metallic screen			
- nominal cross sectional area	sqmm	25	35
- copper wires	No x mm	36 x 0.95	50 x 0.95
- copper equalizing tape	No x mm x mm	1 x 10 x 0.1	1 x 10 x 0.1
Nominal thickness of polyester tape	mm	0.08	0.08
Nominal thickness of outer sheath	mm	2.8	3.1
Approximate overall diameter of complete cable	mm	62	71
Approximate weight of complete cable	kg/km	2886.4	4048.9
<b>DELIVERY DATA</b>			
Diameter and max. size of wooden drum	m x m	2.8 x 1.7	2.4 x 1.45
-type		28 A	24 A
Maximum length per drum	m	800	560
Approximate weight of heaviest reel, including cable	kg	3679	2977
<b>MECHANICAL DATA</b>			
Recommended min. bending radius for laying	mm	936	1058
Maximum permissible pulling force with a pulling eye on conductor	kN	4.5	7.2
<b>ELECTRICAL DATA</b>			
Maximum D.C. conductor resistance at 20°C	Ω/km	0.206	0.125
Maximum A.C. conductor resistance at 90°C	Ω/km	0.265	0.162
Star reactance at 50 Hz	Ω/km	0.088	0.084
Capacity reactance 50 Hz	Ω/km	19595	17254
<b>SHORT CIRCUIT CURRENTS</b>			
Maximum permissible thermal short-circuit current for 1 sec.			
Phase conductor 90 → 250°C	kA	14.2	22.7
Metallic screen 70 → 350°C	kA	5.1	7.1
<b>AMPACITY (both ends)</b>			
in earth - trefoil formation	A	310	404
in duct - trefoil formation	A	264	343
in air - trefoil formation	A	330	440

• Ground temperature	20°C
• Ambient air temperature	25°C
• Laying depth	0.7 m
• Ground thermal resistivity	1 K·m/W

# TYPE: AHXCMK-WTC 12/20/(24) kV



**NORM:**  
**HD-620 6F**

## CONSTRUCTION:

1. Round, stranded and compacted WTC aluminium conductor. Class 2.
2. Extruded semi-conducting conductor screen
3. Insulation XLPE, dry cured
4. Extruded semi-conducting insulation screen, fully bonded
5. Semiconducting tape
6. Assembly of cores
7. Semi-conducting tape
8. Metallic screen of copper wires and counter copper tape
9. Polyester tape
10. Outer sheath of black PE

<b>Application</b>	Laying in ground
	Laying in air
<b>Highest permissible conductor temperature</b>	Continuous operation 90 C
	Overload 130 C
	Short circuit 250 C(duration max 5 s)

Laying is possible without any special measures at natural cable temperatures not lower than -20 C

DESCRIPTION	UNIT	AHXCMK-WTC	AHXCMK-WTC	AHXCMK-WTC	AHXCMK-WTC
		3x50RM/16 12/20/(24) kV	3x95RM/25 12/20/(24) kV	3x150RM/25 12/20/(24) kV	3x240RM/35 12/20/(24) kV
<b>DETAILS</b>					
<b>CONSTRUCTION DATA</b>		<b>12/20/(24) kV</b>	<b>12/20/(24) kV</b>	<b>12/20/(24) kV</b>	<b>12/20/(24) kV</b>
Conductor					
-material	-	aluminium	aluminium	aluminium	aluminium
-number of wires	No	7	18	19	34
Nominal cross sectional area	sqmm	50	95	150	240
Conductor diameter	mm	8.25	11.5	14.4	17.9
Minimum thickness of semi-conducting XLPE on conductor	mm	0.3	0.3	0.3	0.3
Insulation thickness: minimum average	mm	5.40	5.40	5.40	5.60
Insulation thickness: minimum at a point	mm	4.76	4.76	4.76	4.94
Approximate diameter over insulation	mm	20.15	23.3	26.2	30.5
Nominal thickness of semi-conducting tape	mm	0.4	0.4	0.4	0.4
Metallic screen					
- nominal cross sectional area	sqmm	16	25	25	35
- copper wires	No x mm	42 x 0.7	52 x 0.8	52 x 0.8	50 x 0.95
- copper equalizing tape	No x mm x mm	1 x 10 x 0.1	1 x 10 x 0.1	1 x 10 x 0.1	1 x 10 x 0.1
Nominal thickness of polyester tape	mm	0.08	0.08	0.08	0.08
Nominal thickness of outer sheath	mm	2.8	3.0	3.2	3.6
Approximate overall diameter of complete cable	mm	58	65	72	81
Approximate weight of complete cable	kg/km	2050	2840.3	3552.8	4832.0
<b>DELIVERY DATA</b>					
Diameter and max. size of wooden drum	m x m	2.8 x 1.7	2.8 x 1.7	2.8 x 1.7	3 x 2.025
-type		28	28	28	30
Maximum length per drum	m	840	780	580	550
Approximate weight of heaviest reel, including cable	kg	3092	3585	3431	4583
<b>MECHANICAL DATA</b>					
Recommended min. bending radius for laying	mm	865	979	1079	1215
Maximum permissible pulling force with a pulling eye on conductor	kN	1.5	2.85	4.5	7.2

ELECTRICAL DATA					
Maximum D.C. conductor resistance at 20°C	Ω/km	0.641	0.320	0.206	0.125
Maximum A.C. conductor resistance at 90°C	Ω/km	0.822	0.411	0.265	0.161
Star reactance at 50 Hz	Ω/km	0.118	0.106	0.099	0.095
Capacity reactance 50 Hz	Ω/km	31298	26323	23287	20938
SHORT CIRCUIT CURRENTS					
Maximum permissible thermal short-circuit current for 1 sec.					
Phase conductor 90 → 250°C	kA	4.7	9	14.2	22.7
Metallic screen 70 → 350°C	kA	3.2	5.1	5.1	7.1
AMPACITY (both ends)					
in earth - trefoil formation	A	168	242	310	404
in duct - trefoil formation	A	143	206	264	343
in air - trefoil formation	A	182	253	330	440
• Ground temperature		20°C			
• Ambient air temperature		25°C			
• Laying depth		0.7 m			
• Ground thermal resistivity		1 K•m/W			

## MV, HV, EHV POWER CABLES



XLPE insulated power cables, rated voltage 6/10(12); 12/20(24);18/30(36) kV

**type: N2XSY, N2XS2Y, NA2XSY, NA2XS2Y**

\* we offer also single core cables in triplex formation



XLPE insulated longitudinally sealed power cables, rated voltage 6/10(12); 12/20(24);18/30(36) kV

**type: N2XS(F)2Y, NA2XS(F)2Y**

\* we offer also single core cables in triplex formation



XLPE insulated longitudinally and radial sealed power cables, rated voltage 6/10(12); 12/20(24);18/30(36) kV

**type: N2XS(FL)2Y, NA2XS(FL)2Y**

\* we offer also single core cables in triplex formation



XLPE insulated power cables, rated voltage 6/10(12)

**type: N2XSEY, NA2XSEY, N2XSE2Y, NA2XSE2Y**



Power cables with copper or aluminium conductors, extruded XLPE insulation, longitudinally and radial sealed or lead sheathed with PE outer sheath for rated voltage above 36 kV up to 230/400 kV

**type: XRUH(A)KXS, N(A)2XS(FL)2Y, TSLE, AXLJ-TT, Cu/XLPE/CWS/LT/PE**



# CHAPTER VIII

# SPECIAL CABLES

# XLPE-COVERED OVERHEAD CONDUCTORS

PAS

## TYPE: PAS-W 6/10 kV



Medium voltage covered overhead conductor

**NORM:**

**Adapted to SFS 5790**

### CONSTRUCTION:

Conductor:	Round stranded aluminium alloy conductor water blocking system
Insulation:	XLPE (cross-linked polyethylene)
References standards:	IEC 60104 Aluminium - magnesium - silicon alloy wire for overhead line conductor IEC 60207 - Aluminium stranded conductor IEC 60287 - Calculation of the continuous current rating of cables IEC 60502 - Extruded solid dielectric insulated power cables voltages from 1 kv to 30 kV 1 kv to 30 kV SFS 5790 - Electrical and mechanical design of PAS - line

Medium voltage covered overhead conductor and accesories (such as: Insulation Piercing Conector, Arcing protection device, Dead - end Clamp, Suspension Pulley Clamp) were tested in ENSTO SEKKO Laboratory. All tests complies with the requirements in the standard SFS 5790 § 5.1

No.	Parameter	Nominal cross-section [mm <sup>2</sup> ]						
		35	50	70	95	120	150	240
1.	Conductor material	AlMgSi Alloy						
2.	Insulation material	Flame retardant XLPE						
3.	Insulation thickness[mm]	2,0						
4.	Cable outer dia. [mm]	10,9	12,5	13,9	15,3	16,8	18,3	22,2
5.	Cable conductor dia. [mm]	6,9	8,5	9,9	11,3	12,8	14,2	18,1
6.	Cable weight [kg/km]	152	199	265	333	421	486	760
7.	Breaking load [kN]	10,3	14,2	20,6	28,2	35,2	43,0	71,0
8.	Permissible normal tensile stress [MPa]	120						
9.	Permissible reduced tensile stress [MPa]	84						
10.	Permissible normal critical stress [MPa]	240						
11.	Permissible reduced critical stress [MPa]	168						
12.	Thermal expansion coefficient [1/K]	23 x 10 <sup>-6</sup>						
13.	Elasticity coefficient $\beta$ initial [1/MPa] x 10 <sup>-6</sup>	14,9	14,9	14,9	15,2	15,2	15,4	15,4
14.	Elasticity coefficient $\beta$ final [1/MPa] x 10 <sup>-6</sup>	15,6	15,6	15,6	15,9	15,9	16	16,1
15.	Recommended min. cable loading [kN]	0,7	1,0	1,4	1,9	2,4	2,7	3,1
16.	Creep resistance for 25 % R <sub>m</sub> loading [mm/m]	0,5						
17.	Continuous rating at ambient temp (A)	150	245	310	370	430	485	620

# TYPE: PAS-W 12/20 kV



Medium voltage covered overhead conductor

**NORM:**  
**SFS 5790**

## CONSTRUCTION:

- Conductor:** Round stranded aluminium alloy conductor water blocking system
- Insulation:** XLPE (cross-linked polyethylene)
- References standards:** IEC 60104 Aluminium - magnesium - silicon alloy wire for overhead line conductor  
IEC 60207 - Aluminium stranded conductor  
IEC 60287 - Calculation of the continuous current rating of cables  
IEC 60502 - Extruded solid dielectric insulated power cables voltages from 1 kv to 30 kV  
1 kV to 30 kV  
SFS 5790 - Electrical and mechanical design of PAS - line

Medium voltage covered overhead conductor and accessories (such as: Insulation Piercing Conector, Arcing protection device, Dead - end Clamp, Suspension Pulley Clamp) were tested in ENSTO SEKKO Laboratory. All tests complies with the requirements in the standard SFS 5790 § 5.1

No.	Parameter	Nominal cross-section [mm <sup>2</sup> ]						
		35	50	70	95	120	150	240
1.	Conductor material	AlMgSi Alloy						
2.	Insulation material	Flame retardant XLPE						
3.	Insulation thickness[mm]	2,3						
4.	Cable outer dia. [mm]	11,5	13,1	14,5	15,9	17,4	18,9	22,8
5.	Cable conductor dia. [mm]	6,9	8,5	9,9	11,3	12,8	14,2	18,1
6.	Cable weight [kg/km]	168	201	278	352	435	510	780
7.	Breaking load [kN]	10,2	14,6	20,7	28,2	35,9	43,0	71,0
8.	Permissible normal tensile stress [MPa]	120						
9.	Permissible reduced tensile stress [MPa]	84						
10.	Permissible normal critical stress [MPa]	240						
11.	Permissible reduced critical stress [MPa]	168						
12.	Thermal expansion coefficient [1/K]	23 x 10 <sup>-6</sup>						
13.	Elasticity coefficient $\beta$ initial [1/MPa] x 10 <sup>-6</sup>	14,9	14,9	14,9	15,2	15,2	15,4	15,4
14.	Elasticity coefficient $\beta$ final [1/MPa] x 10 <sup>-6</sup>	15,6	15,6	15,6	15,9	15,9	16	16,1
15.	Recommended min. cable loading [kN]	0,7	1,0	1,4	1,9	2,4	2,7	3,1
16.	Creep resistance for 25 % R <sub>m</sub> loading [mm/m]	0,5						
17.	Continuous rating at ambient temp (A)	150	245	310	370	430	485	620

# AERIAL BUNDLED CONDUCTORS

EX, AMKA

## TYPE: EX 0,6/1 kV



Self-supporting, bundle assembled, aerial cables with aluminium conductors and polyethylene insulation for overhead power lines

### NORM:

**NEN 73.77**

### CONSTRUCTION:

**Conductor:** phase, neutral conductors are made as stranded, compacted conductors with 7 or 19 aluminium wires

**Insulation:** is made with sun radiation resistant thermoplastic polyethylene and is applied by extrusion method

#### Core identification:

- phase cores: Longitudinal, embossed ribs on insulation in amount 1, 2, 3, visible with the naked eye and checked by touch
- neutral core: Embedded print, giving type of cable, cross-section area of phase and neutral conductors, manufacturer name, production year, nominal voltage (0.6/1 kV) or thread under insulation identifying of manufacturer- kind of marking subject to agreement with customer

#### Aluminium wires properties

Parameter	Unit	Value
Resistivity at 20°C	nΩm	max. 28.3
Elongation at break	%	min. 1.3
Tensile strength	MPa	min. 160
Coefficient of linear expansion - α	1/°C	23x10 <sup>-6</sup>
Temperature coefficient of resistance	1/°C	4.03x10 <sup>-3</sup>

#### Insulation properties

Parameter	Unit	Value
Permissible long-lasting operation temperature of cable	°C	70
Tensile strength before and after ageing	MPa	min. 10.0
Elongation at break before ageing	%	min. 350
Elongation at break after ageing	kV	min. 300
Resistance of insulation for testing voltage after 24h immersion in water	kV	4
Minimum permissible ambient temperature during cable installation	°C	- 20

#### Parameters of cores

Nominal cross-sectional area of conductor	mm <sup>2</sup>	16	25	35	50	95
Nominal diameter of conductor	mm	4.7	5.8	7.0	8.2	11.3
Nominal diameter over insulation	mm	7.1	8.5	9.8	11.1	14.7
Permissible continuous current ratings	A	74	90	110	135	210
Calculated minimum tensile strength	kN	2.5	4.1	5.6	7.3	13.7
Conductor dc resistance at 20 °C	Ω/km	1.91	1.20	0.868	0.641	0.320
Coefficient of elastic elongation, β	1/MPa	18.2 x 10 <sup>-6</sup>				

Parameters of bundle assembled cables

Number of cores & cross-section area	Approximate diameter of bundle	Approximate weight	Calculated minimum tensile strength of bundle
n x mm <sup>2</sup>	mm	kg/km	kN
2x16	14,2	130	4,8
2x25	17,2	194	8,0
2x35	19,6	250	10,6
2x50	22,4	331	14,3
2x95	29,8	625	26,8
3x16	15,3	195	7,1
3x25	18,6	291	12,1
3x35	21,2	375	16,0
3x50	24,2	497	21,5
3x95	32,2	938	40,3
4x16	17,6	257	9,5
4x25	20,3	388	16,1
4x35	23,7	500	21,3
4x50	27,1	662	28,6
4x95	36,1	1250	53,7

## TYPE: AMKA 0,6/1 kV

Low overhead voltage cable

**NORM:**  
**SFS 2200**

### CONSTRUCTION:

**Conductor:** 16 mm<sup>2</sup>: Round and solid aluminium conductor  
25-120 mm<sup>2</sup>: Round stranded aluminium conductor

**Supporting conductor:** Round stranded aluminium alloy conductor

**Insulation:** Black PE

**Highest permissible conductor temperature:**

- continuous operation 70 °C
- short circuit ( up to 1s) 135 °C

**Identification of cores** Phase conductors: 2, 3, or 4 longitudinal ridges

**References standards:** SFS 2200 - Self-supporting overhead cable AMKA  
IEC 60104 - Aluminium - magnesium - silicon alloy wire for overhead line conductors conductor  
IEC 60207 - Aluminium stranded conductor  
IEC 60287 - Calculation of the continuous current rating of cables  
IEC 60502 - Extruded solid dielectric insulated power cables voltages from 1 kv to 30 kv  
HD 626 S1/A2 - Overhead distribution cables of rated voltage U<sub>0</sub>/U<sub>m</sub>: 0,6/1/1,2 kV



No.	Parameter of phase conductor	Nominal cross-section [mm <sup>2</sup> ]					
		16	25	35	50	70	120
1.	Conductor bare diameter (min). [mm]	4,4	5,9	7,0	8,2	9,6	13,0
2.	Insulation thickness [mm]	1,4	1,4	1,6	1,6	1,8	2,0
3.	Resistance max (at 20 °C, DC) [Ω/km]	1,91	1,20	0,868	0,641	0,443	0,253
4.	Resistance max (at 70 °C, DC) [Ω/km]	2,29	1,44	1,04	0,770	0,532	0,304
5.	Tensile strength [N/mm <sup>2</sup> ]	120					

Parameter of supporting conductor		Nominal cross-section [mm <sup>2</sup> ]				
		25	35	50	70	95
6.	Supporting conductor material	AlMgSi Alloy				
7.	Conductor diameter (min). [mm]	6,1	7,0	8,2	9,9	11,5
8.	Resistance max (at 20 °C, DC)	1,380	0,986	0,720	0,493	0,363
9.	Calculated strength of conductor [kN]	7.4	10,3	14,2	20,6	27,9
10.	Tensile strength [N/mm <sup>2</sup> ]	<b>294</b>				

Parameter of cable		Size of cable [no of cores x mm <sup>2</sup> ]						
		1x16+25	3x16+25	3x25+35	3x35+50	3x50+70	3x70+95	3x120+95
11.	Cable weight [kg/km]	135	271	393	541	710	988	1478
12.	Outer diameter [mm]	15	18	21	25	28	32	41
13.	Approximate current carrying capacity [A]	78	69	92	115	138	176	245
14.	Modulus of elasticity [N/mm <sup>2</sup> ]	64 000						
15.	Coefficient of linear expansion [1/K]	23,0x10 <sup>-6</sup>						
16.	Cable weight [kg/km]	334	459	607	776	1054	1543	???
17.	Outer diameter [mm]	20	23	27	30	34	43	???

# ENAMELLED COPPER WIRES

H 180, CX 200, C 200

## TYPE: ENAMELLED COPPER WIRE H 180

### NORM:

IEC 60317-8, DIN EN 60317-8, NEMA MW 30-C, MW 74-C,

UL approval File No E 129934

### CONSTRUCTION:

Production range	Grade 1 - 0,03 – 2,00 mm Grade 2 - 0,03 – 2,00 mm
Insulation:	THEIC modified polyesterimide
Features	Temperature index of 180, good resistance to heat shock and thermal overloads
Applications	Used for the motors for household appliances, hermetic motors, transformers



Typical values for H 180 dia 1,00 mm Grade 2, testing according to IEC 60851.1...6

Mechanical properties	Overall diameter	max 1,094
	Flexibility	10% 1 d
	Pencil hardness	4/5 H
	Elongation	≥30 %
Thermal properties	Temperature index	>180
	Cut through	≥ 300°C
	Heat shock at 200°C	1xd
Electrical properties	Breakdown voltage	> 1,5 IEC
	Tangent delta /TD 300/	>180
Chemical properties	Resistance to standard solvents	good
	Resistance to refrigerants	good
	Resistance to transformer oils	good

## TYPE: ENAMELLED COPPER WIRE CX 200

### NORM:

IEC 60317-13, DIN EN 60317-13, NEMA MW 35C

### CONSTRUCTION:

Production range	Grade 1 - 0,15 – 2,00 mm Grade 2 - 0,15 – 2,00 mm
Insulation:	THEIC modified polyesterimide overcoated with polyamideimide
Features	High temperature index of 200, good resistance to high temperature overload, excellent mechanical and chemical characteristics
Applications	Used in motors, transformers, ballasts, and hermetic motors, coils designed for class H, windings produced on high speed automatic machines



Typical values for CX 200 dia 1,00 mm Grade 2, testing according to IEC 60851.1...6

Mechanical properties	Overall diameter	max 1,094
	Flexibility	10% 1 d
	Pencil hardness	6 H
	Elongation	≥30 %
Thermal properties	Temperature index	>200
	Cut through	≥ 340°C
	Heat shock at 220°C	1xd
Electrical properties	Breakdown voltage	> 1,5 IEC
	Tangent delta /TD 300/	≥ 185
Chemical properties	Resistance to standard solvents	very good
	Resistance to transformer oils	very good
	Resistance to refrigerants	very good

## TYPE: ENAMELLED COPPER WIRE C 200

### NORM:

IEC 60317-13, DIN EN 60317-13, NEMA MW 35C,

UL approval File No E 129934

### CONSTRUCTION:

Production range	Grade 1 - 0,71 – 4,00 mm Grade 2 - 0,71 – 4,00 mm
Insulation:	THEIC modified polyesterimide overcoated with polyamideimide
Features	Very high thermal properties and high adhesion to copper, excellent mechanical and chemical characteristics
Applications	Used in motors, transformers, windings for the automotive industry and severe winding conditions



### Typical values for C 200 dia 1,00 mm Grade 2, testing according to IEC 60851.1...6

Mechanical properties	Overall diameter	max 1,094
	Flexibility	10% 1 d
	Pencil hardness	6 H
	Elongation	≥30 %
Thermal properties	Temperature index	>200
	Cut through	≥ 350°C
	Heat shock at 220°C	1xd
Electrical properties	Breakdown voltage	> 1,5 IEC
	Tangent delta /TD 300/	≥160
Chemical properties	Resistance to standard solvents	very good
	Resistance to transformer oils	very good

# CHAPTER IX

# TELECOMMUNICATION CABLES

# TELECOMMUNICATION LOCAL UNIT CABLES PE INSULATED AND SHEATHED

VMOHBU

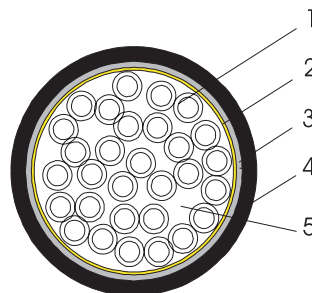
## TYPE: VMOHBU TELECOMMUNICATION CABLE



### CONSTRUCTION:

Description:

1. Insulated wires twisted into pairs
2. Polyester tape
3. Aluminium tape
4. PE – outer sheath
5. Jelly filling



Colours

- of conductors insulation

pair	a wire	b wire
1	white	blue
2	white	orange
3	white	green
4	white	brown
5	white	grey
6	black	blue
7	black	orange
8	black	green
9	black	brown
10	black	grey

- of outer sheath: black

### Cable weight and diameter (approximately)

Cable	Cable weight	Cable diameter	Sheath thickness
	[kg/km]	[mm]	[mm]
3x2x0,5	73,2	8,8	1,8
5x2x0,5	96,3	10,0	1,8
10x2x0,5	145,4	12,3	1,8
20x2x0,5	236,2	15,5	1,8
30x2x0,5	322,5	18,0	1,8
50x2x0,5	491,3	22,0	1,8
100x2x0,5	905,9	29,8	2,0
200x2x0,5	1686,2	40,3	2,2
400x2x0,5	3192,7	55,2	2,4
5x2x0,6	117,4	11,1	1,8
10x2x0,6	185,4	13,7	1,8
20x2x0,6	307,0	17,5	1,8
30x2x0,6	423,3	20,4	1,8
50x2x0,6	660,4	25,2	1,8
100x2x0,6	1223,1	34,1	2,0
10x2x0,8	268,5	16,3	1,8
20x2x0,8	467,6	21,1	1,8
30x2x0,8	658,0	24,8	1,8
50x2x0,8	1059,2	31,3	2,0
100x2x0,8	2047,1	44,6	2,2

# TELECOMMUNICATION LOCAL CABLES PAIRED

MHS

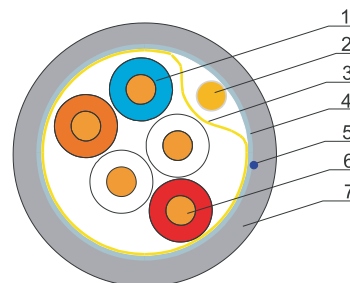
## TYPE: MHS TELECOMMUNICATION CABLE



### CONSTRUCTION:

Description:

1. Insulated wires, twisted into pairs (quad for 1x4x0,5)
2. Drain wire
3. Polyester tape
4. Al./Pet tape
5. Rip-cord
6. Control wire
7. PVC – outer sheath



Colours

- of insulation

quad	first pair		second pair	
	wire a	wire b	wire c	wire d
1	blue	white	orange	white
pair	wire a	wire b		
1	blue	white		
2	orange	white		
3	green	white		
4	brown	white		
5	grey	white		
6	blue	black		
7	orange	black		
8	green	black		
9	brown	black		
10	grey	black		

- of control wire: red

- of outer sheath: black

### Cable weight and diameter (approximately)

Cable	Cable weight	Cable diameter	Sheath thickness
	[kg/km]	[mm]	[mm]
1x4x0,5	32,77	5,1	0,8
3x2x0,5	39,91	5,6	0,8
5x2x0,5	52,77	6,4	0,8
10x2x0,5	81,83	7,9	0,8
20x2x0,5	136,21	10,1	0,8
30x2x0,5	193,26	12,0	0,9
50x2x0,5	295,36	14,7	0,9
100x2x0,5	550,03	19,9	1,0

# TELECOMMUNICATION INDOOR CABLES MANUFACTURED ACC. TO INTERNATIONAL STANDARDS

KLM, KLMA

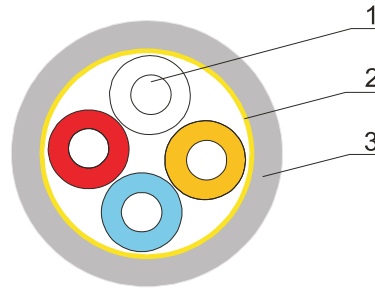
## TYPE: KLM TELECOMMUNICATION CABLE



### CONSTRUCTION:

Description:

1. Insulated conductors
2. Polyester tape
3. PVC sheath



Colours

- of insulation

Number of wire	Colour
1	blue
2	yellow
3	white
4	red

- of outer sheath: grey

### Cable weight and diameter (approximately)

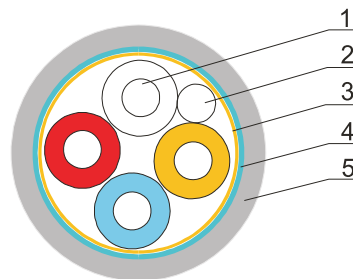
Cable	Sheath thickness	Cable weight	Cable diameter
	[mm] nominal	[kg/km] approx.	[mm] approx.
2x0,8	0,5	26,7	4,6
4x0,8	0,6	46,7	6,0

## TYPE: KLMA TELECOMMUNICATION CABLE

### CONSTRUCTION:

Description:

1. Insulated conductors
2. Drain wire
3. Polyester tape
4. Al/Pet type
5. PVC sheath



Colours

- of insulation

Number of wire	Colour
1	blue
2	yellow
3	white
4	red

- of outer sheath: grey

### Cable weight and diameter (approximately)

Cable	Sheath thickness	Cable weight	Cable diameter
	[mm] nominal	[kg/km] approx.	[mm] approx.
2x0,8+0,8	0,5	33,5	5,0
4x0,8+0,8	0,6	54,1	6,3

# ADDITIONAL INFORMATION

WE PRODUSE ALSO...

## 1. SINGLE CORE NON-SHEATHED CABLES

### • RUBBER, HEAT RESISTING SINGLE CORE NON-SHEATHED CABLES

H05G-U; H05G-K; H07G-U; H07G-R; H07G-K

## 2. FIXED INSTALLATION CABLES

### • UNSCREENED FIXED INSTALLATION CABLES

YDY; YLY; EKK, FKK; FR-N05VV-U; FR-N05VV-R; PFXP; VMvK; PVC-insulated and PVC-sheathed cables with circuit protective conductor; PVC-insulated and PVC-sheathed cables

### • SCREENED LOW SMOKE HALOGEN FREE FIXED INSTALLATION CABLES

(N)HXMH(St)

### • HALOGEN-FREE LOW SMOKE FIRE RESISTANT FIXED INSTALLATION CABLES

FLAME-X 950; HDGs; HLGs; HLgGs; HDGsekwf; HLGsekwf; HlgGsekwf; FLAME-X 950 ENHANCED

## 3. PVC SHEATHED FLEXIBLE CORDS

H03V2V2-F; H03V2V2H2-F; H05V2V2-F; H05V2V2H2-F

## 4. HALOGEN-FREE THERMOPLASTIC INSULATED AND SHEATHED FLEXIBLE CORDS

H03Z1Z1-F; H03Z1Z1H2-F; H05Z1Z1-F; H05Z1Z1H2-F

## 5. CABLES IN RUBBER

Type 4; H05RNH2-F; H05RN-F; H05RN-F; H05BB-F; H07BB-F; H05BN4-F; H07BN4-F; 05SN4-F; H07ZZ-F; H07RN8-F; NSHTOU; NSGAFCOU; NSSHOU; NSSHCOU; (N)TSCGEWOU

## 6. HEAT RESISTING SILICONE CABLES

### • RUBBER, HEAT RESISTING SINGLE CORE NON-SHEATHED CABLES

SID; H05S-U; H05S-K

### • RUBBER, HEAT RESISTING SHEATHED CABLES

H05SS-F

## 7. PUR - SHEATHED CABLES

H05BQ-F; 05BQ-F; H07BQ-F; 07BQ-F; NYMH11YO

## 8. POWER AND CONTROL

### • LV PVC INSULATED POWER AND CONTROL CABLES

NAYY; NYK; NYKY; NFYw; YKY; 1-CYKY; CBT; YAKY; 1-YAKY, CABT,

### • LV XLPE INSULATED POWER AND CONTROL CABLES

NI2XY; NA2XY; U-1000 R2V; YmvK; XVB-F2; XLPE/PVC; TXXP; TFXP; XMK; VO-YmvKas

### • LV POWER CABLES WITH CONCENTRIC COPPER CONDUCTOR

NAYCY; NYCWY; NAYCWY; PFSP; TFSP; EKKJFKKJ; AKKJ; Single-phase split concentric cables; Single-phase helical concentric cables; XLPE/CWW/ PVC

### • LV ARMoured POWER CABLES

NYRY; NYRGY; NYFGY; NAYFGY; NYBY; Cu/PVC/AWA/PVC; Cu/PVC/SWA/PVC; Cu/XLPE/PVC/AWA/PVC; Cu/XLPE/PVC/SWA/PVC

### • ARMoured HALOGEN-FREE LOW SMOKE POWER CABLES

Cu/XLPE/LS0H/AWA/LS0H; Cu/XLPE/LS0H/SWA/LS0H

## 9. MEDIUM and HIGH VOLTAGE POWER CABLES

### • MEDIUM VOLTAGE XLPE INSULATED POWER CABLES

Cu/XLPE/CWS/PVC; Cu/XLPE/CTS/PVC; Cu/XLPE/CWS/MDPE; Cu/XLPE/CTS/MDPE; Al/XLPE/CWS/PVC; Al/XLPE/CTS/PVC; Al/XLPE/CWS/MDPE; Al/XLPE/CTS/MDPE; Cu/XLPE/CWS/PVC/AWA/PVC; Cu/XLPE/CTS/PVC/AWA/PVC; Cu/XLPE/CWS/PVC/AWA/MDPE; Cu/XLPE/CTS/PVC/AWA/MDPE; Al/XLPE/CWS/PVC/AWA/PVC; Al/XLPE/CTS/PVC/AWA/PVC; Al/XLPE/CWS/PVC/AWA/MDPE; Al/XLPE/CTS/PVC/AWA/MDPE; Cu/XLPE/CWS/PVC; Cu/XLPE/CTS/PVC; Cu/XLPE/CWS/MDPE; Cu/XLPE/CTS/MDPE; Al/XLPE/CWS/PVC; Al/XLPE/CTS/PVC; Al/XLPE/CWS/MDPE; Al/XLPE/CTS/MDPE; Cu/XLPE/CWS/PVC/SWA/PVC; Cu/XLPE/CTS/PVC/SWA/PVC; Cu/XLPE/CWS/

PVC/SWA/MDPE; Cu/XLPE/CTS/PVC/SWA /MDPE; Al/XLPE/CWS/PVC/SWA/PVC; Al/XLPE/CTS/PVC/SWA/PVC; Al/XLPE/CWS/PVC/SWA /MDPE; Al/XLPE/CTS/PVC/SWA /MDPE; Cu/XLPE/CWS/MDPE; Al/XLPE/CWS/MDPE; Cu/XLPE/CWS/LW/MDPE; Al/XLPE/CWS/LW/MDPE

#### • **SABS MEDIUM VOLTAGE POWER CABLES**

XLPE/PVC/AWA/PVC type A1; XLPE/PVC type A2; XLPE/PVC type B; XLPE/PVC/SWA/PVC type A; XLPE/PVC type B

#### • **MEDIUM VOLTAGE PAPER INSULATED POWER CABLES**

NKBA; NKBY; NAKBA; NAKBY; NKRA; NAKRA; NKFA; NAKFA; NKFY; NAKFY; NKRY; NAKRY; NHHBA; NAHKBA; NHKY; NAHKY

### **10. CONTROL AND INSTRUMENTATION**

#### • **FLEXIBLE CONTROL CABLES**

NYSLY; NYSLYCY; H05VV5-F (NYSLYO); H05VVC4V5-K (NYSLYCO); SY; CY; LIYY; LIYCY

#### • **INSTRUMENTATION CABLES**

Polyethylene insulated instrumentation cables Type 1 and Type 2; PVC insulated instrumentation cables Type 1 and Type 2

### **11. SHIPBOARD CABLES**

#### • **XLPE INSULATED POWER SHIPBOARD CABLES**

YKOXS; YKOXSek; YKOXSuy

#### • **HALOGEN FREE LOW SMOKE POWER SHIPBOARD CABLES**

NKOXS; NKOXSekw; 657(\*)TQ SW2; 657(\*)TQ SW4; 658(\*)TQ SW2; 658(\*)TQ SW4

#### • **HALOGEN-FREE LOW SMOKE FIRE RESISTANT POWER SHIPBOARD CABLES**

FLAME-X 950 NKOXS; FLAME-X 950; NKOGsek

#### • **XLPE INSULATED TELECOMMUNICATION SHIPBOARD CABLES**

YTKOXSekw

#### • **HALOGEN-FREE LOW SMOKE TELECOMMUNICATION SHIPBOARD CABLES**

NTKOXSekw

#### • **HALOGEN-FREE LOW SMOKE FIRE RESISTANT TELECOMMUNICATION SHIPBOARD CABLES**

FLAME-X 950 NTKOGsek

### **12. CABLES ACCORDING TO UL STANDARDS**

UL 1007; UL 1569; UL 1015; THW; TW; UF, UF-B; Submersible pump cable (flat and twisted); Submersible pump cable; RHH, RHW-2; XHHW-2; TC Tray Cables FR-XLPE/PVC; TC Tray Cables FR-EP/CPE; Telephone Central Office Power Cable EPR/CPE Low smoke; SPT-1, SPT-2, SPT-3; SJTW, SJT; ST, STW; SO, SOW; SO; SEOOW; SJ, SJO, SJOW; SJOW BREATHING CABLE; SOOW; Type S.C Stage & Lighting Cable; Welding cable; DLO; RHW; RHW-2; RHW-2/LS;

Type W; Type W Flat; Type G; Type G Flat; G-GC; G-GC Flat; SHD-GC; JUMPER CABLE; MV-90, MV-105; URD (XLPE)

### **13. SPECIAL CABLES**

#### • **ENAMELLED COPPER WIRES**

E 120; FL 155; FLN 155; HL 180; HLN 180; C 220; FLS 155; HLS 155; HXS 180; CXS 200

#### • **VEHICLE CABLES**

FLRY – A; FLRY – B; FLY; FLYW; FLYK; FL2G; CU-P; CU-PR; AV; AVS; AVSS; 48 AU; Vehicle cable

#### • **IGNITION CABLES**

FZLY; FZL2G; FZL2GF2G; FZL2G2G; FZLW2GF2G; FZLW2G2G

#### • **COAXIAL CABLES**

RG 6/U; RG 8A/U; RG 11U; RG 11A/U; RG 58/U; RG 58C/U; RG 59B/U; RG 59B/U; RG 213/U; SAT1 – 1.65/7.0; SAT4 – 1.15/5.0; SAT5 – 1.0/4.8; Semi air-spaced TV coaxial cable 1,0/4,5

#### • **SPEAKER CABLES**

Speaker cables

#### • **HEATING CABLES**

NH2GMY; NH2GYQUY; 800 IEC 20/PVC/PVC; NOVITERM R

#### • **MINING CABLES**

Type 41; Type 61 A; Type 61 B; Type 63; Type 66; Type 611; Type 66 ECC; Type 241.1; Type 7; Type 2S

#### • **PVC-COVERED OVERHEAD CONDUCTORS**

PVC-covered stranded hard drawn copper conductors Type 8, Type 16; PVC-covered aluminium stranded conductors Type 8; PVC-

covered aluminium conductors, steel reinforced Type 16

- **PLAIN AND TINNED COPPER WIRES**

Round copper wires (soft and hard); Round tinned copper wires; Rectangular copper wires (soft and hard)

- **PLAIN AND TINNED COPPER CONDUCTORS**

Flexible copper bunched conductors, plain or tinned; Round and shaped copper conductors for power cables

- **COPPER TROLLEY WIRES**

Round contact wires; Profile trolley

- **BARE CONDUCTORS FOR OVERHEAD POWER TRANSMISSION**

Copper stranded conductors; AAC; AAAC; ACSR

- **WINDING WIRES**

Double glass yarn covered, varnish bonded with polyester enamel (155oC) or polyestermide (180oC) round winding copper wires;

Double glass yarn covered, varnish bonded with polyester enamel (155oC) rectangular winding copper wires; Enamelled and glass yarn covered, varnish bonded with polyester (155oC) or polyestermide (180oC) round winding copper wires

## 14. TELECOMMUNICATION CABLES

- **TELECOMMUNICATION LOCAL UNIT CABLES PE INSULATED AND SHEATHED**

XzTKMXw; XzTKMXpw; XzTKMXwFtlx; XzTKMXwFtly; XzTKMXpwFtlx; XzTKMXpwFtly; XzTKMXwFfx; XzTKMXpwFfx; XzTKMXwAlfFfx; XzTKMXpwAlfFfx; XzTKMXwFox; XzTKMXwFoy; XzTKMXpwFox; XzTKMXwn; XzTKMXpwn; CW 1128; TPP

- **TELECOMMUNICATION INDOOR CABLES MANUFACTURED ACC. TO INTERNATIONAL STANDARDS**

A-2Y(L)2Y...Bd; A-2Y(L)2Y...Bd; A-02Y(L)2Y...Bd

- **TELECOMMUNICATION LOCAL CABLES PAIRED**

XTKMXw; XTKMXpw; XzTKMXw; XzTKMXpw; XzTKMXwn; XzTKMXpwn; XzTKMXwn; XzTKMXpwn; TKMXn; NTKMXfIN; TKSy; YTKSY; YnTKSY; YTKSYekw; YnTKSYekw; TCB (A) B

- **TELECOMMUNICATION INDOOR CABLES MANUFACTURED ACC. TO INTERNATIONAL STANDARDS**

J-YY...Bd; J-Y(St)Y...Bd; J-H(St)H...Bd; J-Y(St)Y...Lg

- **TELECOMMUNICATIONS LOW FREQUENCY INDOOR CABLES**

YTKSYekw; YnTKSYekw; YTKSYlekw

- **TELECOMMUNICATIONS LOW FREQUENCY INDOOR CABLES, SCREENED PAIRS**

YTKSYekp

- **TELECOMMUNICATIONS LOW FREQUENCY INDOOR CABLES UP TO 2 Mbit/s**

YTKSXpek; YnTKSXpek; YTKSXpek; YTKSXek; YnTKSXek; YnTKSXpek; Y-YTKSXek; Yn-YTKSXek; Y-YTKSXpek; Yn-YTKSXpek; YTKSXpekt; NTKSXpekt

- **TELECOMMUNICATIONS LOW FREQUENCY INDOOR CABLES IN FLAME RETARDANT INSULATION**

NTKSXekw; NzTKX; YnTKSXekw

- **DATA TELECOMMUNICATIONS LOW FREQUENCY TERMINATING CABLES**

YTKZYekw

- **BUILDING CORDS**

TDY; TDX

- **TELECOMMUNICATION BUILDING CORDS FOR WRAPPED CONNECTIONS**

TDYo

- **TELECOMMUNICATION BUILDING CORDS**

Y; J-FY

- **BROADCASTING CORDS**

RPX; YRPX; YnRPX

## 15. DATA COMMUNICATION CABLES

UTP Cat. 5, 5e; UTP DUAL Cat. 5, 5e; FTP, S-FTP Cat. 5, 5e; STP, S-STP Cat. 5, 5e; UTP FLEX Cat. 5, 5e; FTP FLEX Cat. 5, 5e; UTP OUT DOOR, UTPf OUT DOOR Cat. 5; FTP OUT DOOR, FTPf OUT DOOR, FTPn OUT DOOR, FTPnf OUT DOOR Cat. 5

## 16. OPTICAL FIBRE CABLES

- **OPTICAL FIBRE OUTDOOR CABLE OF LOOSE TUBE CONSTRUCTION**

Z-XOTKtsd; Z-XzOTKs; Z-XOTKtsd; Z-XXOTKtsd; Z-XzOTKtsD; Z-XXzOTKtsD; Z-XOTKtsdD; Z-XOTKtsd; ZW-NOTKtsdD; ZW-NOTKtsd; Z-(VX)OTKtsd; Z-(XV)OTKtsd; Z-(XV)OTKtsD; Z-(VX)OTKtsD; Z-XOTKtsdp; Z-XXOTKtsFtl; ZKS-XXOTKtsFo; ZKS-XXOTKtsFf

- **OPTICAL FIBRE MINING CABLES**

YOTKGtsFoyN; NOTKGtsFoN; YOTKGtsFfyn; NOTKGtsFfN; YOTKGtsDFoyN; NOTKGtsDFoN; YOTKGtsDFfyn; NOTKGtsDFfN

- **OPTICAL FIBRE OUTDOOR, SELF-SUPPORTING CABLE OF LOOSE TUBE CONSTRUCTION**

ADSS-XXOTKtsdD; ADSS; S-XOTKtsd; S-XOTKtsdD; S-XzOTKts; S-XzOTKtsD

- **OPTICAL FIBRE INDOOR CABLES OF LOOSE TUBE CONSTRUCTION**

W-YOTKtsd; W-YOTKtsdD; W-YYOTKtsdD; W-(YV)OTKtsd; W(YV)OTKtsdD

- **OPTICAL FIBRE INDOOR-OUTDOOR CABLES OF LOOSE TUBE CONSTRUCTION**

ZW-NOTKtsd; ZW-NOTKtsdD; ZW-NXOTKtsdD; ZW-NNOTKtsdD; ZW-(NV)OTKtsd; ZW-(NV)OTKtsdD; ZW-NOTKtsdp

- **OPTICAL FIBRE INDOOR ASSEMBLE CABLES**

W-NOTKSd; W-YOTKSd

- **OPTICAL FIBRE INDOOR BREAKOUT CABLES**

W-NNOTKSd; W-YYOTKSd

- **OPTICAL FIBRE CABLES FOR MILITARY**

PSKD

- **OPTICAL FIBRE CABLES CERTIFICATED – VDE**

A-DQ(ZN)2Y; J-D(ZN)H, J-D(ZN)Y; J-V(ZN)H; J-V(ZN)H simplex

- **OPTICAL FIBRE CABLES CERTIFICATED – UKRSEPRO (Ukraine)**

Z-XOTKt(s)d; Z-XOTKt(s)dD; Z-XXOTKt(s)dD; ZKS-XXOTKtsFf

- **OPTICAL FIBRE CABLES VDE CERTIFICATED – UKRSEPRO (Ukraine)**

W-YOTKS; W-YnOTKS; W-NOTKS

