YUZHCABLE

XLPE-INSULATED POWER CABLES

for voltages from 6 kV up to 30 kV

Content

About company

- 75 years of experience in the cable industry
- We are among the eight largest producers of cable products in the CIS
- More than 15 000 different brands and sizes of cables and wires
- Member of the international associations Electrocable and Intercable
- About 1000 employees
- 23 hectare area
- ISO 9001 and ISO 14001 management systems implemented
- Among our customers are enterprises of different industries

Cables and cable systems installation and supervising

100% continuous automated testing

Winner of the award Business Initiative Directions - International Gold Star

Testing centre of cable products is accredited in the National agency for accreditation of Ukraine

Recognized supplier of cable products for nuclear power plants

KEMA (Netherlands), VDE (Germany), innogy SE Eurotest (Germany), IEn (Poland) certification

Clients from Armenia, Azerbaijan, Belarus, Bulgaria, France, Georgia, Germany, India, Iran, Israel, Kazakhstan, Kenya, Kyrgyzstan, Lithuania, Moldova, Poland, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

YUZHCABLE

XLPE-insulated power cables produced by YUZHCABLE WORKS PJSC

CONSTRUCTION:

- conductor — compacted copper or aluminum conductor, nominal conductor cross-section from 35 mm² up to 2000 mm² for one-core cables and from 35 mm² up to 300 mm² for three-core cables;
- inner semiconductor layer, insulation, outer semiconductor layer — ultra-smooth semiconductor layers create a uniform electric field and are tightly connected with insulation, which increases the cable's resistance to short-circuit currents and the effects of heating and cooling cycles;
- screen — copper wire and copper tape counter-helix, nominal screen cross-section from 16 mm² up to 185 mm², longitudinal sealing with water swelling tape and radial sealing with aluminum foil;
- outer sheath — depending on the cable laying, it can be made of high-density polyethylene, a flame retardant polymer composition, a halogen free polymer composition or polyvinyl chloride plastic.

CABLES TYPE:

- with compacted conductors sealed of water-blocking yarns;
- with aluminum single-wire conductors;
- with conductor cross-section from 1200 mm² up to 2000 mm² (Milliken);
- with steel tape armor (for three-core cables only);
- with steel wire armor (for three-core cables only);
- with aluminum wire armor (for one-core cables only);
- flame retardant;
- flame retardant with low smoke and corrosive gases;
- with halogen free outer sheath;
- tropical;
- with semiconductor layer on the outer sheath;
- with metal sheath (aluminum or lead);
- optimized constructions (three-core cables with core interstice filling or without filling);
- with aluminum screen;
- three stranded single-core cables including with a supporting rope.

TECHNOLOGY AND MATERIALS:

- the use of vacuum packaging for the transportation of insulating materials and the closed process of their loading and extrusion provides maximum purity of insulation;
- conductive wires are twisted and compacted on a Cortinovis twisting machine. The use of layer compression allows to have a high coefficient of compacting of the conductor and its smooth surface. Water-blocking materials are also laying on a twisting machine, if necessary;
- simultaneous insulating and laying of semiconducting screens are carried out on catenary gas vulcanization lines manufactured by Troester and Maillefer, vulcanization is carrying out in a nitrogen medium at high temperatures and pressures (dry heat vulcanization), which makes it possible to exclude moisture from entering the insulation and obtain a smooth and homogeneous insulation without voids and inclusions, with tightly adhering semiconducting screens. The thickness and eccentricity of the layers are continuously monitored by X-ray inspection devices;
- laying of water swelling tapes, shields of copper wires and tapes, twisting of the core of three-core cables and armouring are made on the universal twisting machine Pourtier Drum Twister;
- extrusion of the outer sheaths of cables and covering with aluminopolymer tapes (if necessary) are made in the extrusion lines manufactured by Troester and Maillefer equipped with diameter measuring instruments, sheath tightness control and a device for marking with a printing tape;
- Hipotronics test equipment complex allows to conduct partial discharge testing of cable insulation, as well as testing of finished cables with increased voltage;
- all of the above mentioned equipment has a computerized control of technological processes and tests based on mathematical, software and technical support developed by Siemens, including recipe managing system and reporting system;

MANUFACTURING MANAGEMENT SYSTEM INCLUDES THE FOLLOWING FUNCTIONS:

- automatic calculation of technological parameters of the lines (for example, for the inclined line of gas vulcanization — the layered temperature ratio as a function of time, based on the calculation of heat transfer between layers, the temperature dependence of the half-life of the peroxide, etc.);
- ensuring full synchronization of all units of lines depending on the parameters of the technological process and their changes;
- alarm and monitoring in the event of the achievement by one or more technological parameters of its critical values;
- monitoring the stability of process parameters and providing an almost instantaneous reaction to their current measurements;

The control system is equipped with modern industrial computers with an interface that allows to create, store, and if necessary, issue technological parameters or test results for making management decisions

TESTS:

The cables pass routine tests, sample tests, type tests.

Routine tests:

- measurement of the electrical resistance of conductors;
- partial discharge test;
- voltage test.

Sample tests:

- conductor examination;
- check of dimensions;
- voltage test for cables of rated voltage above 3,6/6 (7,2) kV;
- hot set test.

Type tests:

- bending test, followed by a partial discharge test;
- tan δ measurement;
- heating cycle test, followed by a partial discharge test;
- impulse test, followed by a voltage test;

- voltage test for 4 h;
- measurements of thicknesses;
- tensile strength and elongation at break;
- hot pressure test;
- behavior at low temperature;
- loss of mass in air oven;
- heat shock test;
- ozone resistance test;
- hot set test;
- flame spread test on single cables;
- water absorption;
- thermal stability;
- shrinkage test;
- carbon black content;
- determination of hardness;
- determination of elastic modulus;
- strippability test;
- water penetration test.

YUZHCABLE WORKS PJSC got the certificates and reports from leading world laboratories: KEMA (Netherlands), VDE (Germany), innogy SE Eurotest (Germany), IEn (Poland), VNIIKP JSC (Russia).

System of cable designation

Outer sheath	X	HDPE outer sheath
	Y	PVC outer sheath
	Xn	fire-retardant PE outer sheath
Water sealing	R	radial watertight cable
	U	longitudinal watertight cable
Cable construction	H	cable with radial electrical field
Conductor material	–	copper conductor
	A	aluminum conductor
Cable type	K	power cable
Insulation	XS	XLPE insulation
Metal sheath	–	no metal sheath
	(PB)	lead alloy sheath
Other	-WTS	watertight conductor
	-«x»T«y»FM	copper screen of cable contains «x» optical modules with «y» multi-mode optical fibers (example: 2T4FM)
	-«x»T«y»FS	copper screen of cable contains «x» optical modules with «y» single-mode optical fibers (example: 2T4FS)
	RMC	round multi-wire compacted conductor (example: 1x400RMC)
	RMS	round multi-wire compacted conductor of Milliken construction (example: 1x1200RMS)

Rated voltages

The rated voltages $U_0/U(U_m)$ of the cables are as follows:

$U_0/U(U_m)$ = 3,6/6 (7,2) – 6/10 (12) – 8,7/15 (17,5) – 12/20 (24) – 18/30 (36) kV

The voltages given above are the correct designations although in some countries other designations are used, e.g.:

3,5/6–5,8/10–11,5/20–17,3/30 kV

In the voltage designation of cables $U_0/U(U_m)$:

U_0 is the rated power frequency voltage between conductor and earth or metallic screen for which the cable is designed;

U is the rated power frequency voltage between conductors for which the cable is designed;

U_m is the maximum value of the «highest system voltage» for which the equipment may be used (see IEC 60038).

The rated voltage of the cable for a given application shall be suitable for the operating conditions in the system in which the cable is used. To facilitate the selection of the cable, systems are divided into three categories:

- category A: this category comprises those systems in which any phase conductor that comes in contact with earth or an earth conductor is disconnected from the system within 1 min;
- category B: this category comprises those systems which, under fault conditions, are operated for a short time with one phase earthed. This period, according to IEC 60183, should not exceed 1 h. For cables covered by this standard, a longer period, not exceeding 8 h on any occasion, can be tolerated. The total duration of earth faults in any year should not exceed 125 h;
- category C: this category comprises all systems which do not fall into category A or B.

It should be realized that in a system where an earth fault is not automatically and promptly isolated, the extra stresses on the insulation of cables during the earth fault reduce the life of the cables to a certain degree. If the system is expected to be operated fairly often with a permanent earth fault, it may be advisable to classify the system in category C.

The values of U_0 recommended for cables to be used in three-phase systems are as follows:

Highest system voltage (U_m), kV	Rated voltage (U_0), kV	
	Categories A and B	Category C
7,2	3,6	6,0
12,0	6,0	8,7
17,5	8,7	12,0
24,0	12,0	18,0
36,0	18,0	–

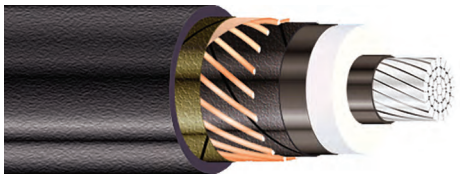
Cable types ratio

Ukraine	Russia	Germany	Poland
Copper core			
ПвЭВ	ПвВ	N2XSY, N2XSEY	YHKXS
ПвЭВнг	ПвВнг	N2XSY, N2XSEY	YnHKXS
ПвЭВнгд	ПвВнг-LS	–	–
ПвЭгП	ПвПг	N2XS(F)2Y	XUHKXS
ПвЭгПу	ПвПуг	N2XS(F)2Y	XUHKXS
ПвЭгаПу	ПвПу2г	N2XS(FL)2Y	XRUHKXS
ПвЭгаП	ПвП2г	N2XS(FL)2Y	XRUHKXS
ПвЭБВ	ПвБВ	–	–
ПвЭБП	ПвБП	–	–
ПвЭКП	ПвКП	–	–
ПвЭАкВ	ПвКаВ	–	–
ПвЭгПнг, ПвЭгПнг-HF	ПвПнг(А)-HF	N2XS(F)H, N2XSE(F)H	XnHKXS
ПвЭгаПнг, ПвЭгаПнг-HF	–	–	XnRUHKXS
Aluminum core			
АПвЭВ	АПвВ	NA2XSY, NA2XSEY	YHAKXS
АПвЭВнг	АПвВнг	NA2XSY, NA2XSEY	YnHAKXS
АПвЭВнгд	АПвВнг-LS	–	–
АПвЭгП	АПвПг	NA2XS(F)2Y	XUHAKXS
АПвЭгПу	АПвПуг	NA2XS(F)2Y	XUHAKXS
АПвЭгаПу	АПвПу2г	NA2XS(FL)2Y	XRUHAKXS
АПвЭгаП	АПвП2г	NA2XS(FL)2Y	XRUHAKXS
АПвЭБВ	АПвБВ	–	–
АПвЭБП	АПвБП	–	–
АПвЭКП	АПвКП	–	–
АПвЭАкВ	АПвКаВ	–	–
АПвЭгПнг, АПвЭгПнг-HF	АПвПнг(А)-HF	NA2XS(F)H, NA2XSE(F)H	XnHAKXS
АПвЭгаПнг, АПвЭгаПнг-HF	–	–	XnRUHAKXS

XUHAKXS

ALUMINUM SINGLE-CORE CABLES WITH PE OUTER SHEATH

IEC 60502



Design
– aluminum compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– non-woven tape
– PE outer sheath

Application	– for laying in the ground (trenches), regardless of the degree of corrosive activity of soils and waters, with protection against mechanical damage
Ambient temperature	from –60 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3,5U_0$, 5 min
Partial discharge level at $1,5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm²
Minimum permissible temperature at installing	–20 °C
Design options	– nominal core cross-section up to 1600 mm² – single-wire core – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	not determined
CPR - reaction to fire class according to EN 50575	Fca

6 kV

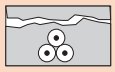
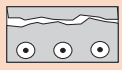
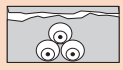
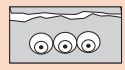
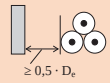
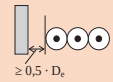
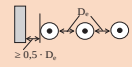
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1×35/16	0,868	1,113	2,5	0,270	0,604	0,448	25	540
1×50/16	0,641	0,822		0,295	0,578	0,421	26	590
1×70/16	0,443	0,568		0,333	0,552	0,391	27	670
1×95/16	0,320	0,411		0,375	0,533	0,370	29	770
1×120/16	0,253	0,325		0,407	0,508	0,342	30	860
1×150/25	0,206	0,264		0,444	0,497	0,329	32	1040
1×185/25	0,164	0,211		0,486	0,482	0,312	33	1180
1×240/25	0,125	0,161	2,6	0,525	0,469	0,296	36	1380
1×300/25	0,100	0,129	2,8	0,546	0,461	0,286	39	1620
1×400/35	0,0778	0,101	3,0	0,590	0,451	0,275	42	2010
1×500/35	0,0605	0,079	3,2	0,619	0,440	0,261	45	2400
1×630/35	0,0469	0,062		0,685	0,427	0,245	49	2850
1×800/35	0,0367	0,049		0,757	0,418	0,234	53	3420
1×1000/70	0,0291	0,037		0,854	0,420	0,236	57	4420

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1×35/16	0,868	1,113	3,4	0,219	0,620	0,465	27	580
1×50/16	0,641	0,822		0,239	0,594	0,437	28	630
1×70/16	0,443	0,568		0,267	0,567	0,407	30	720
1×95/16	0,320	0,411		0,300	0,547	0,386	31	820
1×120/16	0,253	0,325		0,325	0,521	0,357	33	920
1×150/25	0,206	0,264		0,353	0,509	0,343	34	1100
1×185/25	0,164	0,211		0,385	0,494	0,325	36	1240
1×240/25	0,125	0,161		0,429	0,479	0,308	38	1430
1×300/25	0,100	0,129		0,474	0,468	0,294	41	1660
1×400/35	0,0778	0,101		0,527	0,455	0,280	43	2040
1×500/35	0,0605	0,079		0,586	0,442	0,264	46	2400
1×630/35	0,0469	0,062		0,648	0,429	0,247	50	2860
1×800/35	0,0367	0,049		0,716	0,420	0,236	54	3440
1×1000/70	0,0291	0,037		0,807	0,421	0,237	59	4440

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	4,5	0,178	0,637	0,485	29	640
1x50/16	0,641	0,822		0,193	0,611	0,456	30	700
1x70/16	0,443	0,568		0,215	0,583	0,426	32	790
1x95/16	0,320	0,411		0,240	0,563	0,403	33	900
1x120/16	0,253	0,325		0,259	0,536	0,373	35	1000
1x150/25	0,206	0,264		0,281	0,524	0,359	36	1190
1x185/25	0,164	0,211		0,305	0,508	0,341	38	1330
1x240/25	0,125	0,161		0,338	0,492	0,323	40	1540
1x300/25	0,100	0,129		0,373	0,480	0,309	43	1770
1x400/35	0,0778	0,101		0,413	0,467	0,294	45	2160
1x500/35	0,0605	0,079		0,457	0,453	0,277	48	2530
1x630/35	0,0469	0,062		0,504	0,439	0,260	52	3010
1x800/35	0,0367	0,049		0,556	0,429	0,248	56	3600
1x1000/70	0,0291	0,037		0,617	0,429	0,248	61	4600

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	5,5	0,155	0,652	0,501	31	710
1x50/16	0,641	0,822		0,167	0,625	0,472	32	770
1x70/16	0,443	0,568		0,186	0,597	0,441	33	860
1x95/16	0,320	0,411		0,206	0,576	0,418	35	980
1x120/16	0,253	0,325		0,222	0,549	0,387	37	1080
1x150/25	0,206	0,264		0,239	0,536	0,373	38	1270
1x185/25	0,164	0,211		0,260	0,519	0,354	40	1420
1x240/25	0,125	0,161		0,287	0,503	0,336	42	1630
1x300/25	0,100	0,129		0,315	0,490	0,321	44	1870
1x400/35	0,0778	0,101		0,348	0,477	0,305	47	2260
1x500/35	0,0605	0,079		0,384	0,462	0,288	50	2640
1x630/35	0,0469	0,062		0,423	0,447	0,270	54	3140
1x800/35	0,0367	0,049		0,465	0,437	0,258	58	3760
1x1000/70	0,0291	0,037		0,515	0,437	0,258	63	4770

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	38	1010
1x70/16	0,443	0,568		0,143	0,628	0,474	39	1120
1x95/16	0,320	0,411		0,158	0,606	0,451	41	1240
1x120/16	0,253	0,325		0,168	0,577	0,419	42	1360
1x150/25	0,206	0,264		0,181	0,563	0,404	44	1570
1x185/25	0,164	0,211		0,195	0,545	0,384	45	1730
1x240/25	0,125	0,161		0,214	0,528	0,365	48	1960
1x300/25	0,100	0,129		0,234	0,514	0,349	50	2210
1x400/35	0,0778	0,101		0,257	0,500	0,332	53	2640
1x500/35	0,0605	0,079		0,282	0,484	0,314	56	3070
1x630/35	0,0469	0,062		0,309	0,467	0,294	60	3600
1x800/35	0,0367	0,049		0,338	0,456	0,281	64	4240
1x1000/70	0,0291	0,037		0,373	0,459	0,285	69	5290

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	129	134	122	123	154	157	185
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132
1000	736	717	709	702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

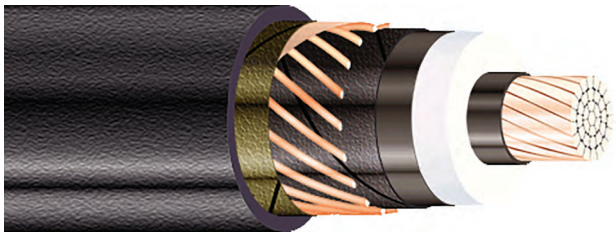
Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

XUHKXS

COPPER SINGLE-CORE CABLES WITH PE OUTER SHEATH

IEC 60502



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– non-woven tape
– PE outer sheath

Application	– for laying in the ground (trenches), regardless of the degree of corrosive activity of soils and waters, with protection against mechanical damage
Ambient temperature	from –60 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3,5U_0$, 5 min
Partial discharge level at $1,5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm²
Minimum permissible temperature at installing	–20 °C
Design options	– nominal core cross-section up to 1600 mm² – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	not determined
CPR - reaction to fire class according to EN 50575	Fca

6 kV

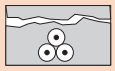
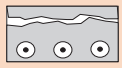
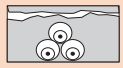
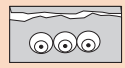
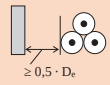
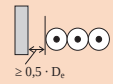
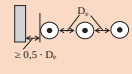
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	25	750
1x50/16	0,387	0,494		0,295	0,578	0,421	26	880
1x70/16	0,268	0,342		0,333	0,552	0,391	27	1090
1x95/16	0,193	0,246		0,375	0,533	0,370	29	1360
1x120/16	0,153	0,196		0,407	0,508	0,342	30	1610
1x150/25	0,124	0,159		0,444	0,497	0,329	32	1970
1x185/25	0,0991	0,127		0,486	0,482	0,312	33	2330
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	36	2890
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	39	3500
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	42	4410
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	45	5460
1x630/35	0,0283	0,038		0,685	0,427	0,245	49	6820
1x800/35	0,0221	0,031		0,757	0,418	0,234	53	8500
1x1000/70	0,0176	0,022		0,854	0,420	0,236	57	10790

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	27	800
1x50/16	0,387	0,494		0,239	0,594	0,437	28	920
1x70/16	0,268	0,342		0,267	0,567	0,407	30	1140
1x95/16	0,193	0,246		0,300	0,547	0,386	31	1410
1x120/16	0,153	0,196		0,325	0,521	0,357	33	1660
1x150/25	0,124	0,159		0,353	0,509	0,343	34	2020
1x185/25	0,0991	0,127		0,385	0,494	0,325	36	2400
1x240/25	0,0754	0,097		0,429	0,479	0,308	38	2950
1x300/25	0,0601	0,078		0,474	0,468	0,294	41	3540
1x400/35	0,0470	0,061		0,527	0,455	0,280	43	4450
1x500/35	0,0366	0,048		0,586	0,442	0,264	46	5480
1x630/35	0,0283	0,038		0,648	0,429	0,247	50	6830
1x800/35	0,0221	0,031		0,716	0,420	0,236	54	8520
1x1000/70	0,0176	0,022		0,807	0,421	0,237	59	10800

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	29	860
1x50/16	0,387	0,494		0,193	0,611	0,456	30	1000
1x70/16	0,268	0,342		0,215	0,583	0,426	32	1200
1x95/16	0,193	0,246		0,240	0,563	0,403	33	1470
1x120/16	0,153	0,196		0,259	0,536	0,373	35	1720
1x150/25	0,124	0,159		0,281	0,524	0,359	36	2070
1x185/25	0,0991	0,127		0,305	0,508	0,341	38	2440
1x240/25	0,0754	0,097		0,338	0,492	0,323	40	2990
1x300/25	0,0601	0,078		0,373	0,480	0,309	43	3610
1x400/35	0,0470	0,061		0,413	0,467	0,294	45	4530
1x500/35	0,0366	0,048		0,457	0,453	0,277	48	5580
1x630/35	0,0283	0,038		0,504	0,439	0,260	52	6940
1x800/35	0,0221	0,031		0,556	0,429	0,248	56	8600
1x1000/70	0,0176	0,022		0,617	0,429	0,248	61	10970

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Cable outer diameter, mm
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	31	930
1x50/16	0,387	0,494		0,167	0,625	0,472	32	1060
1x70/16	0,268	0,342		0,186	0,597	0,441	33	1270
1x95/16	0,193	0,246		0,206	0,576	0,418	35	1550
1x120/16	0,153	0,196		0,222	0,549	0,387	37	1800
1x150/25	0,124	0,159		0,239	0,536	0,373	38	2150
1x185/25	0,0991	0,127		0,260	0,519	0,354	40	2530
1x240/25	0,0754	0,097		0,287	0,503	0,336	42	3080
1x300/25	0,0601	0,078		0,315	0,490	0,321	44	3710
1x400/35	0,0470	0,061		0,348	0,477	0,305	47	4630
1x500/35	0,0366	0,048		0,384	0,462	0,288	50	5690
1x630/35	0,0283	0,038		0,423	0,447	0,270	54	7060
1x800/35	0,0221	0,031		0,465	0,437	0,258	58	8750
1x1000/70	0,0176	0,022		0,515	0,437	0,258	63	11130

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	38	1300
1x70/16	0,268	0,342		0,143	0,628	0,474	39	1530
1x95/16	0,193	0,246		0,158	0,606	0,451	41	1810
1x120/16	0,153	0,196		0,168	0,577	0,419	42	2080
1x150/25	0,124	0,159		0,181	0,563	0,404	44	2440
1x185/25	0,0991	0,127		0,195	0,545	0,384	45	2830
1x240/25	0,0754	0,097		0,214	0,528	0,365	48	3400
1x300/25	0,0601	0,078		0,234	0,514	0,349	50	4050
1x400/35	0,0470	0,061		0,257	0,500	0,332	53	5010
1x500/35	0,0366	0,048		0,282	0,484	0,314	56	6120
1x630/35	0,0283	0,038		0,309	0,467	0,294	60	7520
1x800/35	0,0221	0,031		0,338	0,456	0,281	64	9240
1x1000/70	0,0176	0,022		0,373	0,459	0,285	69	11660

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312
1000	820	835	860	820	1460	1407	1516

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES
XRUHAKXS

ALUMINUM SINGLE-CORE CABLES WITH ALUMINUM WATER BLOCKING FOIL AND PE OUTER SHEATH
IEC 60502

Design
– aluminum compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape
– aluminum water-blocking foil
– PE outer sheath

Application	– for laying in the ground (trenches), regardless of the degree of corrosive activity of soils and waters, with protection against mechanical damage – for laying in damp, partly flooded premises, in non-navigable reservoirs
Ambient temperature	from –60 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3,5U_0$, 5 min
Partial discharge level at $1,5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm²
Minimum permissible temperature at installing	–20 °C
Design options	– nominal core cross-section up to 1600 mm² – single-wire core – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	not determined
CPR - reaction to fire class according to EN 50575	Fca

6 kV

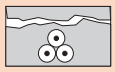
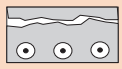
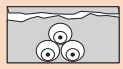
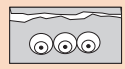
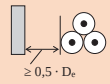
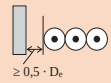
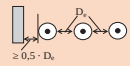
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	2,5	0,270	0,604	0,448	25	570
1x50/16	0,641	0,822		0,295	0,578	0,421	26	620
1x70/16	0,443	0,568		0,333	0,552	0,391	28	700
1x95/16	0,320	0,411		0,375	0,533	0,370	29	810
1x120/16	0,253	0,325		0,407	0,508	0,342	31	910
1x150/25	0,206	0,264		0,444	0,497	0,329	32	1090
1x185/25	0,164	0,211		0,486	0,482	0,312	34	1230
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	36	1430
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	39	1680
1x400/35	0,0778	0,101	3,0	0,590	0,451	0,275	42	2070
1x500/35	0,0605	0,079	3,2	0,619	0,440	0,261	46	2460
1x630/35	0,0469	0,062		0,685	0,427	0,245	49	2930
1x800/35	0,0367	0,049		0,757	0,418	0,234	53	3500
1x1000/70	0,0291	0,037		0,854	0,420	0,236	58	4510

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	3,4	0,219	0,620	0,465	28	620
1x50/16	0,641	0,822		0,239	0,594	0,437	29	670
1x70/16	0,443	0,568		0,267	0,567	0,407	30	760
1x95/16	0,320	0,411		0,300	0,547	0,386	32	860
1x120/16	0,253	0,325		0,325	0,521	0,357	33	960
1x150/25	0,206	0,264		0,353	0,509	0,343	35	1150
1x185/25	0,164	0,211		0,385	0,494	0,325	36	1290
1x240/25	0,125	0,161		0,429	0,479	0,308	39	1490
1x300/25	0,100	0,129		0,474	0,468	0,294	41	1720
1x400/35	0,0778	0,101		0,527	0,455	0,280	44	2110
1x500/35	0,0605	0,079		0,586	0,442	0,264	47	2470
1x630/35	0,0469	0,062		0,648	0,429	0,247	50	2940
1x800/35	0,0367	0,049		0,716	0,420	0,236	55	3520
1x1000/70	0,0291	0,037		0,807	0,421	0,237	59	4520

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	4,5	0,178	0,637	0,485	30	680
1x50/16	0,641	0,822		0,193	0,611	0,456	31	740
1x70/16	0,443	0,568		0,215	0,583	0,426	32	830
1x95/16	0,320	0,411		0,240	0,563	0,403	34	950
1x120/16	0,253	0,325		0,259	0,536	0,373	35	1050
1x150/25	0,206	0,264		0,281	0,524	0,359	37	1240
1x185/25	0,164	0,211		0,305	0,508	0,341	38	1380
1x240/25	0,125	0,161		0,338	0,492	0,323	41	1590
1x300/25	0,100	0,129		0,373	0,480	0,309	43	1830
1x400/35	0,0778	0,101		0,413	0,467	0,294	46	2220
1x500/35	0,0605	0,079		0,457	0,453	0,277	49	2600
1x630/35	0,0469	0,062		0,504	0,439	0,260	53	3090
1x800/35	0,0367	0,049		0,556	0,429	0,248	57	3680
1x1000/70	0,0291	0,037		0,617	0,429	0,248	61	4700

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	5,5	0,155	0,652	0,501	31	750
1x50/16	0,641	0,822		0,167	0,625	0,472	32	810
1x70/16	0,443	0,568		0,186	0,597	0,441	34	910
1x95/16	0,320	0,411		0,206	0,576	0,418	36	1030
1x120/16	0,253	0,325		0,222	0,549	0,387	37	1130
1x150/25	0,206	0,264		0,239	0,536	0,373	38	1320
1x185/25	0,164	0,211		0,260	0,519	0,354	40	1480
1x240/25	0,125	0,161		0,287	0,503	0,336	42	1690
1x300/25	0,100	0,129		0,315	0,490	0,321	45	1930
1x400/35	0,0778	0,101		0,348	0,477	0,305	48	2330
1x500/35	0,0605	0,079		0,384	0,462	0,288	51	2720
1x630/35	0,0469	0,062		0,423	0,447	0,270	54	3220
1x800/35	0,0367	0,049		0,465	0,437	0,258	59	3840
1x1000/70	0,0291	0,037		0,515	0,437	0,258	63	4860

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	38	1060
1x70/16	0,443	0,568		0,143	0,628	0,474	39	1170
1x95/16	0,320	0,411		0,158	0,606	0,451	41	1300
1x120/16	0,253	0,325		0,168	0,577	0,419	43	1420
1x150/25	0,206	0,264		0,181	0,563	0,404	44	1620
1x185/25	0,164	0,211		0,195	0,545	0,384	46	1790
1x240/25	0,125	0,161		0,214	0,528	0,365	48	2020
1x300/25	0,100	0,129		0,234	0,514	0,349	50	2280
1x400/35	0,0778	0,101		0,257	0,500	0,332	53	2720
1x500/35	0,0605	0,079		0,282	0,484	0,314	57	3150
1x630/35	0,0469	0,062		0,309	0,467	0,294	60	3680
1x800/35	0,0367	0,049		0,338	0,456	0,281	65	4340
1x1000/70	0,0291	0,037		0,373	0,459	0,285	69	5390

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	129	134	122	123	154	157	185
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132
1000	736	717	709	702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

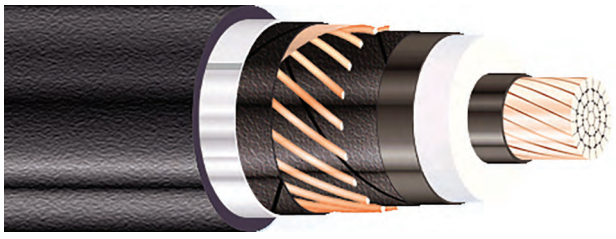
Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

XRUHKXS

COPPER SINGLE-CORE CABLES WITH ALUMINUM WATER BLOCKING FOIL AND PE OUTER SHEATH

IEC 60502



Design
– copper compacted conductor RMC, cl. 2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape
– aluminum water-blocking foil
– PE outer sheath

Application	– for laying in the ground (trenches), regardless of the degree of corrosive activity of soils and waters, with protection against mechanical damage – for laying in damp, partly flooded premises, in non-navigable reservoirs
Ambient temperature	from –60 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3,5U_0$, 5 min
Partial discharge level at 1,5·U_0 A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm²
Minimum permissible temperature at installing	–20 °C
Design options	– nominal core cross-section up to 1600 mm² – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	not determined
CPR - reaction to fire class according to EN 50575	Fca

6 kV

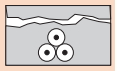
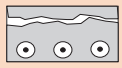
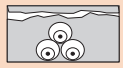
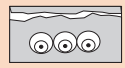
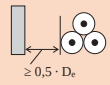
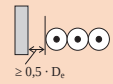
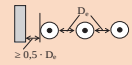
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	25	780
1x50/16	0,387	0,494		0,295	0,578	0,421	26	910
1x70/16	0,268	0,342		0,333	0,552	0,391	28	1110
1x95/16	0,193	0,246		0,375	0,533	0,370	29	1380
1x120/16	0,153	0,196		0,407	0,508	0,342	31	1620
1x150/25	0,124	0,159		0,444	0,497	0,329	32	1970
1x185/25	0,0991	0,127		0,486	0,482	0,312	34	2340
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	36	2880
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	39	3520
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	42	4440
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	46	5510
1x630/35	0,0283	0,038		0,685	0,427	0,245	49	6850
1x800/35	0,0221	0,031		0,757	0,418	0,234	53	8500
1x1000/70	0,0176	0,022		0,854	0,420	0,236	58	10870

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	28	830
1x50/16	0,387	0,494		0,239	0,594	0,437	29	960
1x70/16	0,268	0,342		0,267	0,567	0,407	30	1170
1x95/16	0,193	0,246		0,300	0,547	0,386	32	1430
1x120/16	0,153	0,196		0,325	0,521	0,357	33	1680
1x150/25	0,124	0,159		0,353	0,509	0,343	35	2030
1x185/25	0,0991	0,127		0,385	0,494	0,325	36	2400
1x240/25	0,0754	0,097		0,429	0,479	0,308	39	2940
1x300/25	0,0601	0,078		0,474	0,468	0,294	41	3560
1x400/35	0,0470	0,061		0,527	0,455	0,280	44	4480
1x500/35	0,0366	0,048		0,586	0,442	0,264	47	5520
1x630/35	0,0283	0,038		0,648	0,429	0,247	50	6860
1x800/35	0,0221	0,031		0,716	0,420	0,236	55	8510
1x1000/70	0,0176	0,022		0,807	0,421	0,237	59	10890

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	30	900
1x50/16	0,387	0,494		0,193	0,611	0,456	31	1030
1x70/16	0,268	0,342		0,215	0,583	0,426	32	1240
1x95/16	0,193	0,246		0,240	0,563	0,403	34	1520
1x120/16	0,153	0,196		0,259	0,536	0,373	35	1760
1x150/25	0,124	0,159		0,281	0,524	0,359	37	2120
1x185/25	0,0991	0,127		0,305	0,508	0,341	38	2490
1x240/25	0,0754	0,097		0,338	0,492	0,323	41	3040
1x300/25	0,0601	0,078		0,373	0,480	0,309	43	3670
1x400/35	0,0470	0,061		0,413	0,467	0,294	46	4590
1x500/35	0,0366	0,048		0,457	0,453	0,277	49	5650
1x630/35	0,0283	0,038		0,504	0,439	0,260	53	7010
1x800/35	0,0221	0,031		0,556	0,429	0,248	57	8680
1x1000/70	0,0176	0,022		0,617	0,429	0,248	61	11070

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	31	970
1x50/16	0,387	0,494		0,167	0,625	0,472	32	1100
1x70/16	0,268	0,342		0,186	0,597	0,441	34	1320
1x95/16	0,193	0,246		0,206	0,576	0,418	36	1590
1x120/16	0,153	0,196		0,222	0,549	0,387	37	1850
1x150/25	0,124	0,159		0,239	0,536	0,373	38	2200
1x185/25	0,0991	0,127		0,260	0,519	0,354	40	2590
1x240/25	0,0754	0,097		0,287	0,503	0,336	42	3140
1x300/25	0,0601	0,078		0,315	0,490	0,321	45	3770
1x400/35	0,0470	0,061		0,348	0,477	0,305	48	4700
1x500/35	0,0366	0,048		0,384	0,462	0,288	51	5770
1x630/35	0,0283	0,038		0,423	0,447	0,270	54	7140
1x800/35	0,0221	0,031		0,465	0,437	0,258	59	8830
1x1000/70	0,0176	0,022		0,515	0,437	0,258	63	11220

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	38	1350
1x70/16	0,268	0,342		0,143	0,628	0,474	39	1580
1x95/16	0,193	0,246		0,158	0,606	0,451	41	1870
1x120/16	0,153	0,196		0,168	0,577	0,419	43	2130
1x150/25	0,124	0,159		0,181	0,563	0,404	44	2500
1x185/25	0,0991	0,127		0,195	0,545	0,384	46	2900
1x240/25	0,0754	0,097		0,214	0,528	0,365	48	3470
1x300/25	0,0601	0,078		0,234	0,514	0,349	50	4130
1x400/35	0,0470	0,061		0,257	0,500	0,332	53	5090
1x500/35	0,0366	0,048		0,282	0,484	0,314	57	6200
1x630/35	0,0283	0,038		0,309	0,467	0,294	60	7600
1x800/35	0,0221	0,031		0,338	0,456	0,281	65	9340
1x1000/70	0,0176	0,022		0,373	0,459	0,285	69	11760

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312
1000	820	835	860	820	1460	1407	1516

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143,0

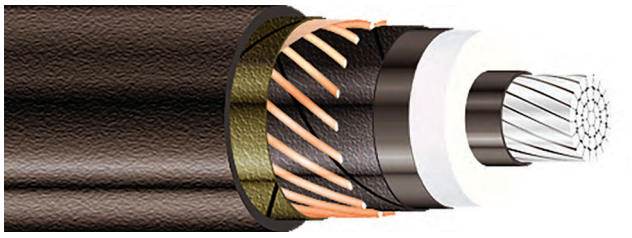
Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

YHAKXS

ALUMINUM SINGLE-CORE CABLES WITH PVC OUTER SHEATH

IEC 60502



Design
– aluminum compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– non-woven tape
– PVC outer sheath

Application	– for laying in premises, tunnels, cable channels, mines, dry ground and outdoors under a canopy with protection against mechanical damage
Ambient temperature	from –50 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3,5U_0$, 5 min
Partial discharge level at 1,5·U_0 A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm²
Minimum permissible temperature at installing	–15 °C
Design options	– nominal core cross-section up to 1600 mm² – single-wire core – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	EN 60332-1-2
CPR - reaction to fire class according to EN 50575	Eca

6 kV

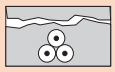
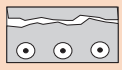
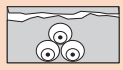
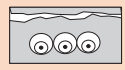
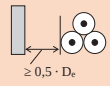
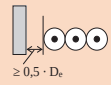
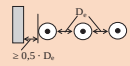
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	2,5	0,270	0,604	0,448	25	620
1x50/16	0,641	0,822		0,295	0,578	0,421	26	670
1x70/16	0,443	0,568		0,333	0,552	0,391	27	770
1x95/16	0,320	0,411		0,375	0,533	0,370	29	870
1x120/16	0,253	0,325		0,407	0,508	0,342	30	980
1x150/25	0,206	0,264		0,444	0,497	0,329	32	1160
1x185/25	0,164	0,211		0,486	0,482	0,312	33	1300
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	36	1510
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	39	1770
1x400/35	0,0778	0,101	3,0	0,590	0,451	0,275	42	2170
1x500/35	0,0605	0,079	3,2	0,619	0,440	0,261	45	2570
1x630/35	0,0469	0,062		0,685	0,427	0,245	49	3040
1x800/35	0,0367	0,049		0,757	0,418	0,234	53	3630
1x1000/70	0,0291	0,037		0,854	0,420	0,236	57	4670

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	3,4	0,219	0,620	0,465	27	670
1x50/16	0,641	0,822		0,239	0,594	0,437	28	730
1x70/16	0,443	0,568		0,267	0,567	0,407	30	810
1x95/16	0,320	0,411		0,300	0,547	0,386	31	930
1x120/16	0,253	0,325		0,325	0,521	0,357	33	1030
1x150/25	0,206	0,264		0,353	0,509	0,343	34	1220
1x185/25	0,164	0,211		0,385	0,494	0,325	36	1370
1x240/25	0,125	0,161		0,429	0,479	0,308	38	1580
1x300/25	0,100	0,129		0,474	0,468	0,294	41	1810
1x400/35	0,0778	0,101		0,527	0,455	0,280	43	2200
1x500/35	0,0605	0,079		0,586	0,442	0,264	46	2580
1x630/35	0,0469	0,062		0,648	0,429	0,247	50	3050
1x800/35	0,0367	0,049		0,716	0,420	0,236	54	3650
1x1000/70	0,0291	0,037		0,807	0,421	0,237	59	4690

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	4,5	0,178	0,637	0,485	29	780
1x50/16	0,641	0,822		0,193	0,611	0,456	30	840
1x70/16	0,443	0,568		0,215	0,583	0,426	32	940
1x95/16	0,320	0,411		0,240	0,563	0,403	33	1070
1x120/16	0,253	0,325		0,259	0,536	0,373	35	1180
1x150/25	0,206	0,264		0,281	0,524	0,359	36	1380
1x185/25	0,164	0,211		0,305	0,508	0,341	38	1470
1x240/25	0,125	0,161		0,338	0,492	0,323	40	1680
1x300/25	0,100	0,129		0,373	0,480	0,309	43	1930
1x400/35	0,0778	0,101		0,413	0,467	0,294	45	2330
1x500/35	0,0605	0,079		0,457	0,453	0,277	48	2710
1x630/35	0,0469	0,062		0,504	0,439	0,260	52	3210
1x800/35	0,0367	0,049		0,556	0,429	0,248	56	3830
1x1000/70	0,0291	0,037		0,617	0,429	0,248	61	4850

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	5,5	0,155	0,652	0,501	31	810
1x50/16	0,641	0,822		0,167	0,625	0,472	32	880
1x70/16	0,443	0,568		0,186	0,597	0,441	33	980
1x95/16	0,320	0,411		0,206	0,576	0,418	35	1100
1x120/16	0,253	0,325		0,222	0,549	0,387	37	1210
1x150/25	0,206	0,264		0,239	0,536	0,373	38	1400
1x185/25	0,164	0,211		0,260	0,519	0,354	40	1570
1x240/25	0,125	0,161		0,287	0,503	0,336	42	1790
1x300/25	0,100	0,129		0,315	0,490	0,321	44	2030
1x400/35	0,0778	0,101		0,348	0,477	0,305	47	2440
1x500/35	0,0605	0,079		0,384	0,462	0,288	50	2830
1x630/35	0,0469	0,062		0,423	0,447	0,270	54	3350
1x800/35	0,0367	0,049		0,465	0,437	0,258	58	4000
1x1000/70	0,0291	0,037		0,515	0,437	0,258	63	5040

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	38	1150
1x70/16	0,443	0,568		0,143	0,628	0,474	39	1260
1x95/16	0,320	0,411		0,158	0,606	0,451	41	1400
1x120/16	0,253	0,325		0,168	0,577	0,419	42	1520
1x150/25	0,206	0,264		0,181	0,563	0,404	44	1720
1x185/25	0,164	0,211		0,195	0,545	0,384	45	1890
1x240/25	0,125	0,161		0,214	0,528	0,365	48	2130
1x300/25	0,100	0,129		0,234	0,514	0,349	50	2400
1x400/35	0,0778	0,101		0,257	0,500	0,332	53	2850
1x500/35	0,0605	0,079		0,282	0,484	0,314	56	3290
1x630/35	0,0469	0,062		0,309	0,467	0,294	59	3840
1x800/35	0,0367	0,049		0,338	0,456	0,281	64	4540
1x1000/70	0,0291	0,037		0,373	0,459	0,285	69	5620

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	129	134	122	123	154	157	185
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132
1000	736	717	709	702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

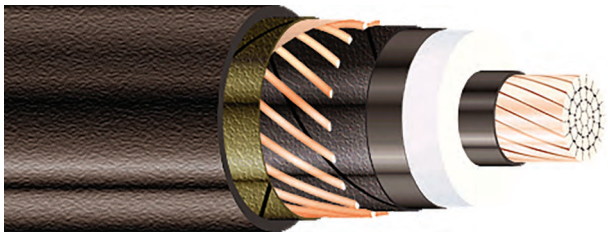
Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES
YHKXS

COPPER SINGLE-CORE CABLES WITH PVC OUTER SHEATH
IEC 60502



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– non-woven tape
– PVC outer sheath

Application	– for laying in premises, tunnels, cable channels, mines, dry ground and outdoors under a canopy with protection against mechanical damage
Ambient temperature	from –50 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3,5U_0$, 5 min
Partial discharge level at 1,5·U_0 A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–15 °C
Design options	– nominal core cross-section up to 1600 mm^2 – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	EN 60332-1-2
CPR - reaction to fire class according to EN 50575	Eca

6 kV

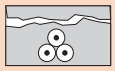
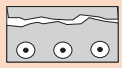
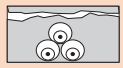
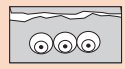
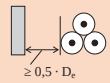
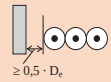
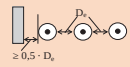
Number of cores × nom. cross-section area of core/ screen, mm^2	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙	⊚		
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	25	860
1x50/16	0,387	0,494		0,295	0,578	0,421	26	1000
1x70/16	0,268	0,342		0,333	0,552	0,391	27	1210
1x95/16	0,193	0,246		0,375	0,533	0,370	29	1490
1x120/16	0,153	0,196		0,407	0,508	0,342	30	1750
1x150/25	0,124	0,159		0,444	0,497	0,329	32	2120
1x185/25	0,0991	0,127		0,486	0,482	0,312	33	2490
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	36	3060
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	39	3680
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	42	4610
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	45	5680
1x630/35	0,0283	0,038		0,685	0,427	0,245	49	7060
1x800/35	0,0221	0,031		0,757	0,418	0,234	53	8770
1x1000/70	0,0176	0,022		0,854	0,420	0,236	57	11090

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙	⁂		
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	27	910
1x50/16	0,387	0,494		0,239	0,594	0,437	28	1040
1x70/16	0,268	0,342		0,267	0,567	0,407	30	1270
1x95/16	0,193	0,246		0,300	0,547	0,386	31	1560
1x120/16	0,153	0,196		0,325	0,521	0,357	33	1810
1x150/25	0,124	0,159		0,353	0,509	0,343	34	2190
1x185/25	0,0991	0,127		0,385	0,494	0,325	36	2560
1x240/25	0,0754	0,097		0,429	0,479	0,308	38	3130
1x300/25	0,0601	0,078		0,474	0,468	0,294	41	3730
1x400/35	0,0470	0,061		0,527	0,455	0,280	43	4650
1x500/35	0,0366	0,048		0,586	0,442	0,264	46	5700
1x630/35	0,0283	0,038		0,648	0,429	0,247	50	7070
1x800/35	0,0221	0,031		0,716	0,420	0,236	54	8790
1x1000/70	0,0176	0,022		0,807	0,421	0,237	59	11110

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙	⁂		
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	29	960
1x50/16	0,387	0,494		0,193	0,611	0,456	30	1100
1x70/16	0,268	0,342		0,215	0,583	0,426	32	1310
1x95/16	0,193	0,246		0,240	0,563	0,403	33	1590
1x120/16	0,153	0,196		0,259	0,536	0,373	35	1840
1x150/25	0,124	0,159		0,281	0,524	0,359	36	2200
1x185/25	0,0991	0,127		0,305	0,508	0,341	38	2580
1x240/25	0,0754	0,097		0,338	0,492	0,323	40	3130
1x300/25	0,0601	0,078		0,373	0,480	0,309	43	3770
1x400/35	0,0470	0,061		0,413	0,467	0,294	45	4700
1x500/35	0,0366	0,048		0,457	0,453	0,277	48	5760
1x630/35	0,0283	0,038		0,504	0,439	0,260	52	7140
1x800/35	0,0221	0,031		0,556	0,429	0,248	56	8830
1x1000/70	0,0176	0,022		0,617	0,429	0,248	61	11220

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	31	1030
1x50/16	0,387	0,494		0,167	0,625	0,472	32	1170
1x70/16	0,268	0,342		0,186	0,597	0,441	33	1390
1x95/16	0,193	0,246		0,206	0,576	0,418	35	1670
1x120/16	0,153	0,196		0,222	0,549	0,387	37	1930
1x150/25	0,124	0,159		0,239	0,536	0,373	38	2290
1x185/25	0,0991	0,127		0,260	0,519	0,354	40	2670
1x240/25	0,0754	0,097		0,287	0,503	0,336	42	3230
1x300/25	0,0601	0,078		0,315	0,490	0,321	44	3870
1x400/35	0,0470	0,061		0,348	0,477	0,305	47	4810
1x500/35	0,0366	0,048		0,384	0,462	0,288	50	5880
1x630/35	0,0283	0,038		0,423	0,447	0,270	54	7270
1x800/35	0,0221	0,031		0,465	0,437	0,258	58	9000
1x1000/70	0,0176	0,022		0,515	0,437	0,258	63	11400

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	38	1430
1x70/16	0,268	0,342		0,143	0,628	0,474	39	1660
1x95/16	0,193	0,246		0,158	0,606	0,451	41	1960
1x120/16	0,153	0,196		0,168	0,577	0,419	42	2230
1x150/25	0,124	0,159		0,181	0,563	0,404	44	2600
1x185/25	0,0991	0,127		0,195	0,545	0,384	45	3000
1x240/25	0,0754	0,097		0,214	0,528	0,365	48	3590
1x300/25	0,0601	0,078		0,234	0,514	0,349	50	4240
1x400/35	0,0470	0,061		0,257	0,500	0,332	53	5220
1x500/35	0,0366	0,048		0,282	0,484	0,314	56	6340
1x630/35	0,0283	0,038		0,309	0,467	0,294	59	7770
1x800/35	0,0221	0,031		0,338	0,456	0,281	64	9540
1x1000/70	0,0176	0,022		0,373	0,459	0,285	69	11990

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312
1000	820	835	860	820	1460	1407	1516

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143,0

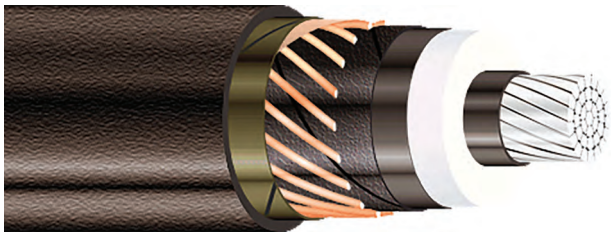
Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor ($1/\sqrt{t}$)

YnHAKXS

ALUMINUM SINGLE-CORE CABLES WITH PVC FLAME-RETARDANT OUTER SHEATH

IEC 60502



Design
– aluminum compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– glass wool tape
– PVC flame-retardant outer sheath

Application	– in premises, tunnels, canals, mines, dry ground and outdoors under a canopy with protection against mechanical damage – for group laying in cable structures, premises (including those in fire hazardous areas) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering: nuclear power plants, power stations, subways, high-rise buildings, large industrial facilities, etc.
Ambient temperature	from –50 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–15 °C
Design options	– nominal core cross-section up to 1600 mm^2 – single-wire core – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath – conductor sealed of water-blocking yarns
Flame resistance	EN 60332-1-2
CPR - reaction to fire class according to EN 50575	Eca

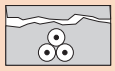
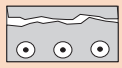
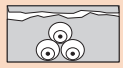
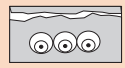
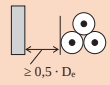
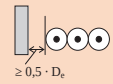
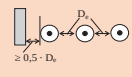
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	2,5	0,270	0,604	0,448	25	660
1x50/16	0,641	0,822		0,295	0,578	0,421	26	720
1x70/16	0,443	0,568		0,333	0,552	0,391	27	810
1x95/16	0,320	0,411		0,375	0,533	0,370	29	930
1x120/16	0,253	0,325		0,407	0,508	0,342	30	1030
1x150/25	0,206	0,264		0,444	0,497	0,329	32	1220
1x185/25	0,164	0,211		0,486	0,482	0,312	34	1370
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	36	1590
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	39	1810
1x400/35	0,0778	0,101	3,0	0,590	0,451	0,275	42	2210
1x500/35	0,0605	0,079	3,2	0,619	0,440	0,261	45	2620
1x630/35	0,0469	0,062		0,685	0,427	0,245	49	3100
1x800/35	0,0367	0,049		0,757	0,418	0,234	53	3700
1x1000/70	0,0291	0,037		0,854	0,420	0,236	57	4750

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	3,4	0,219	0,620	0,465	27	720
1x50/16	0,641	0,822		0,239	0,594	0,437	28	780
1x70/16	0,443	0,568		0,267	0,567	0,407	30	870
1x95/16	0,320	0,411		0,300	0,547	0,386	31	990
1x120/16	0,253	0,325		0,325	0,521	0,357	33	1090
1x150/25	0,206	0,264		0,353	0,509	0,343	34	1290
1x185/25	0,164	0,211		0,385	0,494	0,325	36	1430
1x240/25	0,125	0,161		0,429	0,479	0,308	38	1650
1x300/25	0,100	0,129		0,474	0,468	0,294	40	1850
1x400/35	0,0778	0,101		0,527	0,455	0,280	43	2250
1x500/35	0,0605	0,079		0,586	0,442	0,264	46	2630
1x630/35	0,0469	0,062		0,648	0,429	0,247	50	3110
1x800/35	0,0367	0,049		0,716	0,420	0,236	54	3720
1x1000/70	0,0291	0,037		0,807	0,421	0,237	58	4770

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	4,5	0,178	0,637	0,485	29	800
1x50/16	0,641	0,822		0,193	0,611	0,456	30	860
1x70/16	0,443	0,568		0,215	0,583	0,426	32	960
1x95/16	0,320	0,411		0,240	0,563	0,403	33	1080
1x120/16	0,253	0,325		0,259	0,536	0,373	35	1200
1x150/25	0,206	0,264		0,281	0,524	0,359	36	1390
1x185/25	0,164	0,211		0,305	0,508	0,341	38	1540
1x240/25	0,125	0,161		0,338	0,492	0,323	40	1760
1x300/25	0,100	0,129		0,373	0,480	0,309	42	1980
1x400/35	0,0778	0,101		0,413	0,467	0,294	45	2380
1x500/35	0,0605	0,079		0,457	0,453	0,277	48	2770
1x630/35	0,0469	0,062		0,504	0,439	0,260	52	3280
1x800/35	0,0367	0,049		0,556	0,429	0,248	56	3900
1x1000/70	0,0291	0,037		0,617	0,429	0,248	60	4940

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,868	1,113	5,5	0,155	0,652	0,501	31	870
1x50/16	0,641	0,822		0,167	0,625	0,472	32	940
1x70/16	0,443	0,568		0,186	0,597	0,441	34	1040
1x95/16	0,320	0,411		0,206	0,576	0,418	35	1170
1x120/16	0,253	0,325		0,222	0,549	0,387	37	1280
1x150/25	0,206	0,264		0,239	0,536	0,373	38	1480
1x185/25	0,164	0,211		0,260	0,519	0,354	40	1640
1x240/25	0,125	0,161		0,287	0,503	0,336	42	1870
1x300/25	0,100	0,129		0,315	0,490	0,321	44	2080
1x400/35	0,0778	0,101		0,348	0,477	0,305	47	2500
1x500/35	0,0605	0,079		0,384	0,462	0,288	50	2890
1x630/35	0,0469	0,062		0,423	0,447	0,270	54	3420
1x800/35	0,0367	0,049		0,465	0,437	0,258	58	4070
1x1000/70	0,0291	0,037		0,515	0,437	0,258	62	5120

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	38	1210
1x70/16	0,443	0,568		0,143	0,628	0,474	39	1330
1x95/16	0,320	0,411		0,158	0,606	0,451	41	1470
1x120/16	0,253	0,325		0,168	0,577	0,419	42	1600
1x150/25	0,206	0,264		0,181	0,563	0,404	44	1800
1x185/25	0,164	0,211		0,195	0,545	0,384	45	1990
1x240/25	0,125	0,161		0,214	0,528	0,365	48	2220
1x300/25	0,100	0,129		0,234	0,514	0,349	50	2460
1x400/35	0,0778	0,101		0,257	0,500	0,332	53	2920
1x500/35	0,0605	0,079		0,282	0,484	0,314	56	3370
1x630/35	0,0469	0,062		0,309	0,467	0,294	60	3930
1x800/35	0,0367	0,049		0,338	0,456	0,281	64	4600
1x1000/70	0,0291	0,037		0,373	0,459	0,285	68	5720

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	129	134	122	123	154	157	185
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132
1000	736	717	709	702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

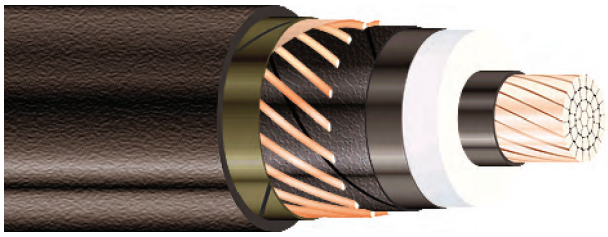
Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

YnHKXS

COPPER SINGLE-CORE CABLES WITH PVC FLAME-RETARDANT OUTER SHEATH

IEC 60502



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– glass wool tape
– PVC flame-retardant outer sheath

Application	– in premises, tunnels, canals, mines, dry ground and outdoors under a canopy with protection against mechanical damage – for group laying in cable structures, premises (including those in fire hazardous areas) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering: nuclear power plants, power stations, subways, high-rise buildings, large industrial facilities, etc.
Ambient temperature	from –50 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–15 °C
Design options	– nominal core cross-section up to 1600 mm^2 – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath
Flame resistance	EN 60332-1-2
CPR - reaction to fire class according to EN 50575	Eca

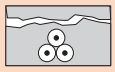
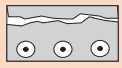
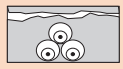
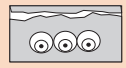
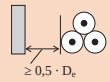
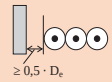
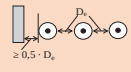
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	25	880
1x50/16	0,387	0,494		0,295	0,578	0,421	26	1010
1x70/16	0,268	0,342		0,333	0,552	0,391	27	1240
1x95/16	0,193	0,246		0,375	0,533	0,370	29	1520
1x120/16	0,153	0,196		0,407	0,508	0,342	30	1780
1x150/25	0,124	0,159		0,444	0,497	0,329	32	2150
1x185/25	0,0991	0,127		0,486	0,482	0,312	34	2520
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	36	3100
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	39	3690
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	42	4620
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	45	5690
1x630/35	0,0283	0,038		0,685	0,427	0,245	49	7070
1x800/35	0,0221	0,031		0,757	0,418	0,234	53	8780
1x1000/70	0,0176	0,022		0,854	0,420	0,236	57	11110

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	27	720
1x50/16	0,387	0,494		0,239	0,594	0,437	28	780
1x70/16	0,268	0,342		0,267	0,567	0,407	30	870
1x95/16	0,193	0,246		0,300	0,547	0,386	31	990
1x120/16	0,153	0,196		0,325	0,521	0,357	33	1090
1x150/25	0,124	0,159		0,353	0,509	0,343	34	1290
1x185/25	0,0991	0,127		0,385	0,494	0,325	36	1430
1x240/25	0,0754	0,097		0,429	0,479	0,308	38	1650
1x300/25	0,0601	0,078		0,474	0,468	0,294	40	1850
1x400/35	0,0470	0,061		0,527	0,455	0,280	43	2250
1x500/35	0,0366	0,048		0,586	0,442	0,264	46	2630
1x630/35	0,0283	0,038		0,648	0,429	0,247	50	3110
1x800/35	0,0221	0,031		0,716	0,420	0,236	54	3720
1x1000/70	0,0176	0,022		0,807	0,421	0,237	58	4770

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	29	1010
1x50/16	0,387	0,494		0,193	0,611	0,456	30	1150
1x70/16	0,268	0,342		0,215	0,583	0,426	32	1370
1x95/16	0,193	0,246		0,240	0,563	0,403	33	1650
1x120/16	0,153	0,196		0,259	0,536	0,373	35	1910
1x150/25	0,124	0,159		0,281	0,524	0,359	36	2270
1x185/25	0,0991	0,127		0,305	0,508	0,341	38	2650
1x240/25	0,0754	0,097		0,338	0,492	0,323	40	3210
1x300/25	0,0601	0,078		0,373	0,480	0,309	42	3810
1x400/35	0,0470	0,061		0,413	0,467	0,294	45	4750
1x500/35	0,0366	0,048		0,457	0,453	0,277	48	5810
1x630/35	0,0283	0,038		0,504	0,439	0,260	52	7200
1x800/35	0,0221	0,031		0,556	0,429	0,248	56	8900
1x1000/70	0,0176	0,022		0,617	0,429	0,248	60	11300

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	31	1090
1x50/16	0,387	0,494		0,167	0,625	0,472	32	1230
1x70/16	0,268	0,342		0,186	0,597	0,441	34	1450
1x95/16	0,193	0,246		0,206	0,576	0,418	35	1740
1x120/16	0,153	0,196		0,222	0,549	0,387	37	2000
1x150/25	0,124	0,159		0,239	0,536	0,373	38	2370
1x185/25	0,0991	0,127		0,260	0,519	0,354	40	2750
1x240/25	0,0754	0,097		0,287	0,503	0,336	42	3320
1x300/25	0,0601	0,078		0,315	0,490	0,321	44	3930
1x400/35	0,0470	0,061		0,348	0,477	0,305	47	4860
1x500/35	0,0366	0,048		0,384	0,462	0,288	50	5940
1x630/35	0,0283	0,038		0,423	0,447	0,270	54	7340
1x800/35	0,0221	0,031		0,465	0,437	0,258	58	9070
1x1000/70	0,0176	0,022		0,515	0,437	0,258	62	11490

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	38	1510
1x70/16	0,268	0,342		0,143	0,628	0,474	39	1740
1x95/16	0,193	0,246		0,158	0,606	0,451	41	2040
1x120/16	0,153	0,196		0,168	0,577	0,419	42	2310
1x150/25	0,124	0,159		0,181	0,563	0,404	44	2690
1x185/25	0,0991	0,127		0,195	0,545	0,384	45	3090
1x240/25	0,0754	0,097		0,214	0,528	0,365	48	3680
1x300/25	0,0601	0,078		0,234	0,514	0,349	50	4300
1x400/35	0,0470	0,061		0,257	0,500	0,332	53	5290
1x500/35	0,0366	0,048		0,282	0,484	0,314	56	6410
1x630/35	0,0283	0,038		0,309	0,467	0,294	60	7850
1x800/35	0,0221	0,031		0,338	0,456	0,281	64	9600
1x1000/70	0,0176	0,022		0,373	0,459	0,285	68	12080

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312
1000	820	835	860	820	1460	1407	1516

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

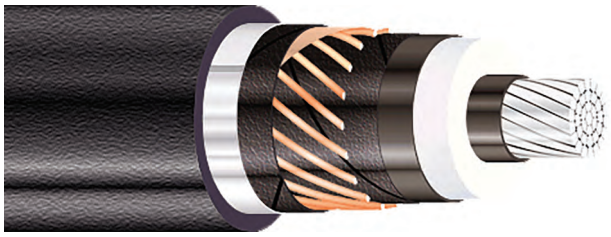
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES

XnHAKXS, XnRUHAKXS, XnHAKXS-HF, XnRUHAKXS-HF

ALUMINUM SINGLE-CORE CABLES WITH POLYMER COMPOSITION FLAME-RETARDANT OUTER SHEATH

IEC 60502



Design
– aluminum compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape (XnRUHAKXS, XnRUHAKXS-HF) or glass wool tape (XnHAKXS, XnHAKXS-HF)
– aluminum water-blocking foil (XnRUHAKXS, XnRUHAKXS-HF)
– polymer composition flame-retardant outer sheath (XnHAKXS, XnRUHAKXS) or halogen free outer sheath (XnHAKXS-HF, XnRUHAKXS-HF)

Application	– in premises, tunnels, canals, mines, dry ground and outdoors under a canopy with protection against mechanical damage – for group laying in cable structures, premises (including those in fire hazardous areas) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering: nuclear power plants, power stations, subways, high-rise buildings, large industrial facilities, etc. (XnHAKXS-HF, XnRUHAKXS-HF) – for laying in damp, partly flooded premises (XnRUHAKXS, XnRUHAKXS-HF))
Ambient temperature	from –60 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–15 °C
Design options	– nominal core cross-section up to 1600 mm^2 – single-wire core – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A or B category)
Flame resistance	EN 60332-1-2
CPR - reaction to fire class according to EN 50575	Eca

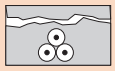
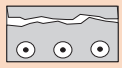
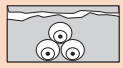
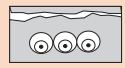
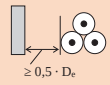
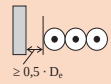
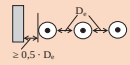
6 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF	XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF
1x35/16	0,868	1,113	2,5	0,270	0,604	0,448	26	28	700	820
1x50/16	0,641	0,822		0,295	0,578	0,421	27	29	760	880
1x70/16	0,443	0,568		0,333	0,552	0,391	28	31	840	980
1x95/16	0,320	0,411		0,375	0,533	0,370	30	32	970	1110
1x120/16	0,253	0,325		0,407	0,508	0,342	31	34	1060	1210
1x150/25	0,206	0,264		0,444	0,497	0,329	33	35	1250	1410
1x185/25	0,164	0,211		0,486	0,482	0,312	35	37	1400	1570
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	37	39	1620	1800
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	40	42	1850	2080
1x400/35	0,0778	0,101	3,0	0,590	0,451	0,275	43	45	2260	2500
1x500/35	0,0605	0,079	3,2	0,619	0,440	0,261	46	49	2670	2930
1x630/35	0,0469	0,062		0,685	0,427	0,245	50	52	3200	3430
1x800/35	0,0367	0,049		0,757	0,418	0,234	54	56	3800	4030
1x1000/70	0,0291	0,037		0,854	0,420	0,236	59	60	4850	5050

10 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF	XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF
1x35/16	0,868	1,113	3,4	0,219	0,620	0,465	28	31	750	880
1x50/16	0,641	0,822		0,239	0,594	0,437	29	32	800	940
1x70/16	0,443	0,568		0,267	0,567	0,407	31	33	910	1050
1x95/16	0,320	0,411		0,300	0,547	0,386	32	35	1020	1170
1x120/16	0,253	0,325		0,325	0,521	0,357	34	36	1130	1280
1x150/25	0,206	0,264		0,353	0,509	0,343	35	38	1330	1490
1x185/25	0,164	0,211		0,385	0,494	0,325	37	39	1470	1640
1x240/25	0,125	0,161		0,429	0,479	0,308	39	42	1690	1870
1x300/25	0,100	0,129		0,474	0,468	0,294	41	44	1900	2120
1x400/35	0,0778	0,101		0,527	0,455	0,280	44	47	2300	2540
1x500/35	0,0605	0,079		0,586	0,442	0,264	47	50	2710	2940
1x630/35	0,0469	0,062		0,648	0,429	0,247	51	53	3210	3440
1x800/35	0,0367	0,049		0,716	0,420	0,236	55	57	3820	4050
1x1000/70	0,0291	0,037		0,807	0,421	0,237	60	61	4870	5060

15 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF	XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF
1x35/16	0,868	1,113	4,5	0,178	0,637	0,485	30	33	830	970
1x50/16	0,641	0,822		0,193	0,611	0,456	31	34	890	1040
1x70/16	0,443	0,568		0,215	0,583	0,426	33	35	1000	1140
1x95/16	0,320	0,411		0,240	0,563	0,403	34	37	1120	1280
1x120/16	0,253	0,325		0,259	0,536	0,373	36	38	1230	1390
1x150/25	0,206	0,264		0,281	0,524	0,359	37	40	1420	1600
1x185/25	0,164	0,211		0,305	0,508	0,341	39	41	1590	1760
1x240/25	0,125	0,161		0,338	0,492	0,323	41	44	1800	1990
1x300/25	0,100	0,129		0,373	0,480	0,309	43	46	2020	2260
1x400/35	0,0778	0,101		0,413	0,467	0,294	46	49	2420	2680
1x500/35	0,0605	0,079		0,457	0,453	0,277	49	52	2840	3090
1x630/35	0,0469	0,062		0,504	0,439	0,260	53	55	3390	3600
1x800/35	0,0367	0,049		0,556	0,429	0,248	58	59	4000	4220
1x1000/70	0,0291	0,037		0,617	0,429	0,248	62	63	5040	5250

20 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF	XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF
1x35/16	0,868	1,113	5,5	0,155	0,652	0,501	32	34	910	1060
1x50/16	0,641	0,822		0,167	0,625	0,472	33	35	980	1130
1x70/16	0,443	0,568		0,186	0,597	0,441	35	37	1080	1240
1x95/16	0,320	0,411		0,206	0,576	0,418	36	39	1200	1370
1x120/16	0,253	0,325		0,222	0,549	0,387	38	40	1320	1500
1x150/25	0,206	0,264		0,239	0,536	0,373	39	41	1530	1700
1x185/25	0,164	0,211		0,260	0,519	0,354	41	43	1680	1870
1x240/25	0,125	0,161		0,287	0,503	0,336	43	45	1910	2110
1x300/25	0,100	0,129		0,315	0,490	0,321	45	48	2130	2380
1x400/35	0,0778	0,101		0,348	0,477	0,305	48	51	2570	2810
1x500/35	0,0605	0,079		0,384	0,462	0,288	51	54	3000	3230
1x630/35	0,0469	0,062		0,423	0,447	0,270	55	57	3520	3750
1x800/35	0,0367	0,049		0,465	0,437	0,258	60	61	4190	4370
1x1000/70	0,0291	0,037		0,515	0,437	0,258	64	65	5230	5420

30 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF	XnHAKXS, XnHAKXS-HF	XnRUHAKXS, XnRUHAKXS-HF
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	39	41	1260	1440
1x70/16	0,443	0,568		0,143	0,628	0,474	40	42	1380	1560
1x95/16	0,320	0,411		0,158	0,606	0,451	42	44	1520	1710
1x120/16	0,253	0,325		0,168	0,577	0,419	43	46	1640	1840
1x150/25	0,206	0,264		0,181	0,563	0,404	45	47	1860	2060
1x185/25	0,164	0,211		0,195	0,545	0,384	46	49	2030	2240
1x240/25	0,125	0,161		0,214	0,528	0,365	49	51	2300	2500
1x300/25	0,100	0,129		0,234	0,514	0,349	51	53	2560	2790
1x400/35	0,0778	0,101		0,257	0,500	0,332	54	56	3020	3240
1x500/35	0,0605	0,079		0,282	0,484	0,314	57	59	3470	3690
1x630/35	0,0469	0,062		0,309	0,467	0,294	61	63	4040	4240
1x800/35	0,0367	0,049		0,338	0,456	0,281	65	67	4710	4890
1x1000/70	0,0291	0,037		0,373	0,459	0,285	70	71	5830	5960

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	129	134	122	123	154	157	185
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132
1000	736	717	709	702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

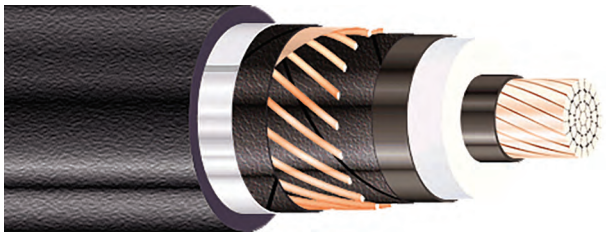
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES

XnHKXS, XnRUHKXS, XnHKXS-HF, XnRUHKXS-HF

COPPER SINGLE-CORE CABLES WITH POLYMER COMPOSITION FLAME-RETARDANT OUTER SHEATH

IEC 60502



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape (XnRUHKXS, XnRUHKXS-HF) or glass wool tape (XnHKXS, XnHKXS-HF)
– aluminum water-blocking foil (XnRUHKXS, XnRUHKXS-HF)
– polymer composition flame-retardant outer sheath (XnHKXS, XnRUHKXS) or halogen free outer sheath (XnHKXS-HF, XnRUHKXS-HF)

Application	– in premises, tunnels, canals, mines, dry ground and outdoors under a canopy with protection against mechanical damage – for group laying in cable structures, premises (including those in fire hazardous areas) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering: nuclear power plants, power stations, subways, high-rise buildings, large industrial facilities, etc. (XnHKXS-HF, XnRUHKXS-HF) – for laying in damp, partly flooded premises (XnRUHKXS, XnRUHKXS-HF)
Ambient temperature	from –60 °C up to +50 °C
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–15 °C
Design options	– nominal core cross-section up to 1600 mm^2 – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A or B category)
Flame resistance	EN 60332-1-2
CPR - reaction to fire class according to EN 50575	Eca

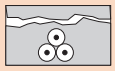
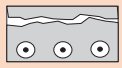
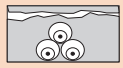
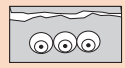
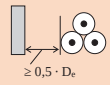
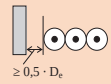
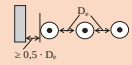
6 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF	XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	26	28	910	1030
1x50/16	0,387	0,494		0,295	0,578	0,421	27	29	1040	1170
1x70/16	0,268	0,342		0,333	0,552	0,391	28	31	1270	1390
1x95/16	0,193	0,246		0,375	0,533	0,370	30	32	1560	1670
1x120/16	0,153	0,196		0,407	0,508	0,342	31	34	1810	1930
1x150/25	0,124	0,159		0,444	0,497	0,329	33	35	2190	2290
1x185/25	0,0991	0,127		0,486	0,482	0,312	35	37	2560	2680
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	37	39	3140	3250
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	40	42	3740	3920
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	43	45	4670	4870
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	46	49	5740	5980
1x630/35	0,0283	0,038		0,685	0,427	0,245	50	52	7170	7350
1x800/35	0,0221	0,031		0,757	0,418	0,234	54	56	8880	9030
1x1000/70	0,0176	0,022		0,854	0,420	0,236	59	60	11210	11410

10 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF	XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	28	31	970	1090
1x50/16	0,387	0,494		0,239	0,594	0,437	29	32	1100	1230
1x70/16	0,268	0,342		0,267	0,567	0,407	31	33	1330	1460
1x95/16	0,193	0,246		0,300	0,547	0,386	32	35	1610	1740
1x120/16	0,153	0,196		0,325	0,521	0,357	34	36	1880	2000
1x150/25	0,124	0,159		0,353	0,509	0,343	35	38	2250	2370
1x185/25	0,0991	0,127		0,385	0,494	0,325	37	39	2630	2750
1x240/25	0,0754	0,097		0,429	0,479	0,308	39	42	3200	3320
1x300/25	0,0601	0,078		0,474	0,468	0,294	41	44	3790	3970
1x400/35	0,0470	0,061		0,527	0,455	0,280	44	47	4710	4910
1x500/35	0,0366	0,048		0,586	0,442	0,264	47	50	5780	5990
1x630/35	0,0283	0,038		0,648	0,429	0,247	51	53	7180	7360
1x800/35	0,0221	0,031		0,716	0,420	0,236	55	57	8900	9050
1x1000/70	0,0176	0,022		0,807	0,421	0,237	60	61	11230	11430

15 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF	XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	30	33	1040	1180
1x50/16	0,387	0,494		0,193	0,611	0,456	31	34	1190	1330
1x70/16	0,268	0,342		0,215	0,583	0,426	33	35	1400	1550
1x95/16	0,193	0,246		0,240	0,563	0,403	34	37	1690	1850
1x120/16	0,153	0,196		0,259	0,536	0,373	36	38	1950	2110
1x150/25	0,124	0,159		0,281	0,524	0,359	37	40	2310	2480
1x185/25	0,0991	0,127		0,305	0,508	0,341	39	41	2690	2870
1x240/25	0,0754	0,097		0,338	0,492	0,323	41	44	3250	3450
1x300/25	0,0601	0,078		0,373	0,480	0,309	43	46	3860	4100
1x400/35	0,0470	0,061		0,413	0,467	0,294	46	49	4800	5050
1x500/35	0,0366	0,048		0,457	0,453	0,277	49	52	5890	6130
1x630/35	0,0283	0,038		0,504	0,439	0,260	53	55	7300	7520
1x800/35	0,0221	0,031		0,556	0,429	0,248	58	59	9000	9220
1x1000/70	0,0176	0,022		0,617	0,429	0,248	62	63	11410	11610

20 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF	XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	32	34	1130	1270
1x50/16	0,387	0,494		0,167	0,625	0,472	33	35	1260	1420
1x70/16	0,268	0,342		0,186	0,597	0,441	35	37	1490	1650
1x95/16	0,193	0,246		0,206	0,576	0,418	36	39	1780	1940
1x120/16	0,153	0,196		0,222	0,549	0,387	38	40	2040	2210
1x150/25	0,124	0,159		0,239	0,536	0,373	39	41	2400	2580
1x185/25	0,0991	0,127		0,260	0,519	0,354	41	43	2800	2980
1x240/25	0,0754	0,097		0,287	0,503	0,336	43	45	3370	3560
1x300/25	0,0601	0,078		0,315	0,490	0,321	45	48	3980	4220
1x400/35	0,0470	0,061		0,348	0,477	0,305	48	51	4940	5180
1x500/35	0,0366	0,048		0,384	0,462	0,288	51	54	6040	6270
1x630/35	0,0283	0,038		0,423	0,447	0,270	55	57	7440	7670
1x800/35	0,0221	0,031		0,465	0,437	0,258	60	61	9190	9370
1x1000/70	0,0176	0,022		0,515	0,437	0,258	64	65	11600	11780

30 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF	XnHKXS, XnHKXS-HF	XnRUHKXS, XnRUHKXS-HF
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	39	41	1550	1730
1x70/16	0,268	0,342		0,143	0,628	0,474	40	42	1790	1970
1x95/16	0,193	0,246		0,158	0,606	0,451	42	44	2090	2280
1x120/16	0,153	0,196		0,168	0,577	0,419	43	46	2360	2560
1x150/25	0,124	0,159		0,181	0,563	0,404	45	47	2740	2940
1x185/25	0,0991	0,127		0,195	0,545	0,384	46	49	3140	3350
1x240/25	0,0754	0,097		0,214	0,528	0,365	49	51	3750	3950
1x300/25	0,0601	0,078		0,234	0,514	0,349	51	53	4400	4630
1x400/35	0,0470	0,061		0,257	0,500	0,332	54	56	5390	5610
1x500/35	0,0366	0,048		0,282	0,484	0,314	57	59	6520	6730
1x630/35	0,0283	0,038		0,309	0,467	0,294	61	63	7960	8160
1x800/35	0,0221	0,031		0,338	0,456	0,281	65	67	9710	9890
1x1000/70	0,0176	0,022		0,373	0,459	0,285	70	71	12200	12330

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312
1000	820	835	860	820	1460	1407	1516

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

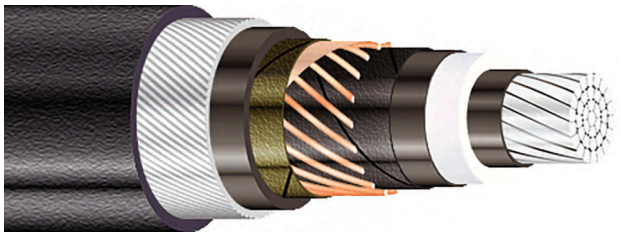
Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor ($1/\sqrt{t}$)

Aluminum single-core cables with aluminum wire armor

ALUMINUM SINGLE-CORE CABLES WITH ALUMINUM WIRE ARMOR
IEC 60502-2



Design
– aluminum compacted conductor RMC, cl. 2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– non-woven tape
– extruded bedding
– armour of flat or round aluminium wires
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –60 °C up to +50 °C (for PE or halogen-free flame-retardant sheathed cables) from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (PE sheathed cables) –15 °C (the rest types)
Design options	– nominal core cross-section up to 1600 mm^2 – single-wire core – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A or B category)
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

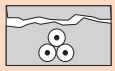
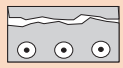
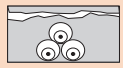
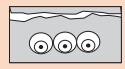
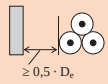
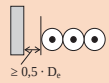
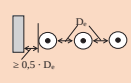
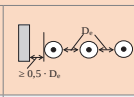
6 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,868	1,113	2,5	0,270	0,604	0,448	31	32	1020	1240
1x50/16	0,641	0,822		0,295	0,578	0,421	32	33	1090	1330
1x70/16	0,443	0,568		0,333	0,552	0,391	34	35	1200	1440
1x95/16	0,320	0,411		0,375	0,533	0,370	36	37	1340	1600
1x120/16	0,253	0,325		0,407	0,508	0,342	37	38	1460	1730
1x150/25	0,206	0,264		0,444	0,497	0,329	38	39	1660	1950
1x185/25	0,164	0,211		0,486	0,482	0,312	40	41	1830	2130
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	44	45	2160	2480
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	46	48	2460	2820
1x400/35	0,0778	0,101	3,0	0,590	0,451	0,275	48	50	2880	3290
1x500/35	0,0605	0,079	3,2	0,619	0,440	0,261	53	55	3400	3860
1x630/35	0,0469	0,062		0,685	0,427	0,245	58	59	4170	4690
1x800/35	0,0367	0,049		0,757	0,418	0,234	63	64	4940	5530
1x1000/70	0,0291	0,037		0,854	0,420	0,236	67	68	6060	6720

10 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,868	1,113	3,4	0,219	0,620	0,465	33	34	1110	1350
1x50/16	0,641	0,822		0,239	0,594	0,437	34	35	1190	1430
1x70/16	0,443	0,568		0,267	0,567	0,407	36	37	1300	1560
1x95/16	0,320	0,411		0,300	0,547	0,386	37	38	1440	1710
1x120/16	0,253	0,325		0,325	0,521	0,357	39	40	1570	1850
1x150/25	0,206	0,264		0,353	0,509	0,343	40	41	1780	2070
1x185/25	0,164	0,211		0,385	0,494	0,325	42	43	1950	2250
1x240/25	0,125	0,161		0,429	0,479	0,308	45	46	2270	2620
1x300/25	0,100	0,129		0,474	0,468	0,294	48	49	2550	2920
1x400/35	0,0778	0,101		0,527	0,455	0,280	49	51	2940	3360
1x500/35	0,0605	0,079		0,586	0,442	0,264	55	55	3620	3900
1x630/35	0,0469	0,062		0,648	0,429	0,247	58	60	4200	4730
1x800/35	0,0367	0,049		0,716	0,420	0,236	63	64	4980	5570
1x1000/70	0,0291	0,037		0,807	0,421	0,237	67	69	6100	6760

15 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,868	1,113	4,5	0,178	0,637	0,485	35	36	1200	1460
1x50/16	0,641	0,822		0,193	0,611	0,456	36	37	1280	1550
1x70/16	0,443	0,568		0,215	0,583	0,426	37	38	1400	1670
1x95/16	0,320	0,411		0,240	0,563	0,403	39	40	1550	1830
1x120/16	0,253	0,325		0,259	0,536	0,373	41	42	1670	1980
1x150/25	0,206	0,264		0,281	0,524	0,359	42	43	1890	2200
1x185/25	0,164	0,211		0,305	0,508	0,341	45	46	2140	2470
1x240/25	0,125	0,161		0,338	0,492	0,323	47	48	2400	2770
1x300/25	0,100	0,129		0,373	0,480	0,309	49	51	2680	3100
1x400/35	0,0778	0,101		0,413	0,467	0,294	51	53	3090	3540
1x500/35	0,0605	0,079		0,457	0,453	0,277	56	58	3790	4290
1x630/35	0,0469	0,062		0,504	0,439	0,260	60	62	4390	4950
1x800/35	0,0367	0,049		0,556	0,429	0,248	65	66	5190	5800
1x1000/70	0,0291	0,037		0,617	0,429	0,248	69	71	6320	7000

20 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,868	1,113	5,5	0,155	0,652	0,501	37	38	1310	1580
1x50/16	0,641	0,822		0,167	0,625	0,472	38	39	1390	1660
1x70/16	0,443	0,568		0,186	0,597	0,441	39	40	1510	1800
1x95/16	0,320	0,411		0,206	0,576	0,418	41	42	1660	1960
1x120/16	0,253	0,325		0,222	0,549	0,387	42	43	1800	2100
1x150/25	0,206	0,264		0,239	0,536	0,373	45	46	2080	2410
1x185/25	0,164	0,211		0,260	0,519	0,354	46	48	2270	2630
1x240/25	0,125	0,161		0,287	0,503	0,336	49	50	2530	2940
1x300/25	0,100	0,129		0,315	0,490	0,321	51	53	2830	3280
1x400/35	0,0778	0,101		0,348	0,477	0,305	53	54	3230	3700
1x500/35	0,0605	0,079		0,384	0,462	0,288	58	60	3970	4500
1x630/35	0,0469	0,062		0,423	0,447	0,270	62	64	4560	5140
1x800/35	0,0367	0,049		0,465	0,437	0,258	67	68	5390	6040
1x1000/70	0,0291	0,037		0,515	0,437	0,258	71	73	6520	7220

30 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C					PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	44	45	1810	2140
1x70/16	0,443	0,568		0,143	0,628	0,474	46	47	1950	2320
1x95/16	0,320	0,411		0,158	0,606	0,451	48	49	2120	2500
1x120/16	0,253	0,325		0,168	0,577	0,419	49	50	2260	2680
1x150/25	0,206	0,264		0,181	0,563	0,404	50	52	2490	2920
1x185/25	0,164	0,211		0,195	0,545	0,384	52	54	2710	3170
1x240/25	0,125	0,161		0,214	0,528	0,365	56	57	3190	3680
1x300/25	0,100	0,129		0,234	0,514	0,349	58	60	3520	4050
1x400/35	0,0778	0,101		0,257	0,500	0,332	60	61	3950	4490
1x500/35	0,0605	0,079		0,282	0,484	0,314	64	66	4540	5160
1x630/35	0,0469	0,062		0,309	0,467	0,294	68	70	5170	5830
1x800/35	0,0367	0,049		0,338	0,456	0,281	73	74	6050	6790
1x1000/70	0,0291	0,037		0,373	0,459	0,285	77	79	7210	8010

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
								
35	129	134	122		123	154	157	185
50	152	157	144		146	184	189	222
70	186	192	176		178	230	236	278
95	221	229	210		213	280	287	338
120	252	260	240		242	324	332	391
150	281	288	267		271	368	376	440
185	317	324	303		307	424	432	504
240	367	373	351		356	502	511	593
300	414	419	397		402	577	586	677
400	470	466	451		457	673	676	769
500	526	522	505		512	786	785	881
630	593	584	569		572	907	899	1001
800	664	647	637		634	1041	1024	1132
1000	736	717	709		702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

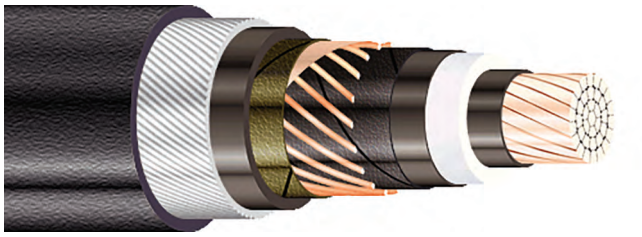
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor ($1/\sqrt{t}$)

6–30 kV | SINGLE-CORE CABLES

Copper single-core cables with aluminum wire armor

COPPER SINGLE-CORE CABLES WITH ALUMINUM WIRE ARMOR

IEC 60502-2



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– non-woven tape
– extruded bedding
– armour of flat or round aluminium wires
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –60 °C up to +50 °C (for PE or halogen-free flame-retardant sheathed cables) from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5{\cdot}U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (PE sheathed cables) –15 °C (the rest types)
Design options	– nominal core cross-section up to 1600 mm^2 – conductor sealed of water-blocking yarns – screen of aluminum or aluminum alloy – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A or B category)
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

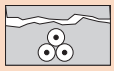
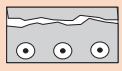
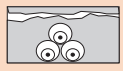
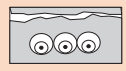
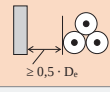
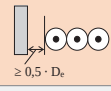
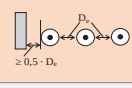
6 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	31	32	1230	1460
1x50/16	0,387	0,494		0,295	0,578	0,421	32	33	1390	1610
1x70/16	0,268	0,342		0,333	0,552	0,391	34	35	1610	1850
1x95/16	0,193	0,246		0,375	0,533	0,370	36	37	1910	2170
1x120/16	0,153	0,196		0,407	0,508	0,342	37	38	2180	2440
1x150/25	0,124	0,159		0,444	0,497	0,329	38	39	2550	2820
1x185/25	0,0991	0,127		0,486	0,482	0,312	40	41	2950	3240
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	44	45	3600	3930
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	46	48	4300	4670
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	48	50	5250	5660
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	53	55	6450	6910
1x630/35	0,0283	0,038		0,685	0,427	0,245	58	59	8080	8610
1x800/35	0,0221	0,031		0,757	0,418	0,234	63	64	9940	10530
1x1000/70	0,0176	0,022		0,854	0,420	0,236	67	68	12420	13080

10 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	33	34	1330	1570
1x50/16	0,387	0,494		0,239	0,594	0,437	34	35	1470	1720
1x70/16	0,268	0,342		0,267	0,567	0,407	36	37	1710	1970
1x95/16	0,193	0,246		0,300	0,547	0,386	37	38	2000	2280
1x120/16	0,153	0,196		0,325	0,521	0,357	39	40	2280	2570
1x150/25	0,124	0,159		0,353	0,509	0,343	40	41	2650	2950
1x185/25	0,0991	0,127		0,385	0,494	0,325	42	43	3060	3370
1x240/25	0,0754	0,097		0,429	0,479	0,308	45	46	3720	4080
1x300/25	0,0601	0,078		0,474	0,468	0,294	48	49	4390	4770
1x400/35	0,0470	0,061		0,527	0,455	0,280	49	51	5310	5730
1x500/35	0,0366	0,048		0,586	0,442	0,264	55	55	6670	6950
1x630/35	0,0283	0,038		0,648	0,429	0,247	58	60	8120	8650
1x800/35	0,0221	0,031		0,716	0,420	0,236	63	64	9980	10570
1x1000/70	0,0176	0,022		0,807	0,421	0,237	67	69	12470	13130

15 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	35	36	1420	1680
1x50/16	0,387	0,494		0,193	0,611	0,456	36	37	1580	1830
1x70/16	0,268	0,342		0,215	0,583	0,426	37	38	1810	2080
1x95/16	0,193	0,246		0,240	0,563	0,403	39	40	2120	2400
1x120/16	0,153	0,196		0,259	0,536	0,373	41	42	2400	2690
1x150/25	0,124	0,159		0,281	0,524	0,359	42	43	2770	3080
1x185/25	0,0991	0,127		0,305	0,508	0,341	45	46	3250	3590
1x240/25	0,0754	0,097		0,338	0,492	0,323	47	48	3840	4220
1x300/25	0,0601	0,078		0,373	0,480	0,309	49	51	4520	4940
1x400/35	0,0470	0,061		0,413	0,467	0,294	51	53	5460	5910
1x500/35	0,0366	0,048		0,457	0,453	0,277	56	58	6830	7340
1x630/35	0,0283	0,038		0,504	0,439	0,260	60	62	8300	8870
1x800/35	0,0221	0,031		0,556	0,429	0,248	65	66	10180	10800
1x1000/70	0,0176	0,022		0,617	0,429	0,248	69	71	12680	13380

20 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	37	38	1530	1800
1x50/16	0,387	0,494		0,167	0,625	0,472	38	39	1680	1960
1x70/16	0,268	0,342		0,186	0,597	0,441	39	40	1920	2200
1x95/16	0,193	0,246		0,206	0,576	0,418	41	42	2220	2530
1x120/16	0,153	0,196		0,222	0,549	0,387	42	43	2510	2820
1x150/25	0,124	0,159		0,239	0,536	0,373	45	46	2970	3300
1x185/25	0,0991	0,127		0,260	0,519	0,354	46	48	3380	3750
1x240/25	0,0754	0,097		0,287	0,503	0,336	49	50	3980	4400
1x300/25	0,0601	0,078		0,315	0,490	0,321	51	53	4680	5120
1x400/35	0,0470	0,061		0,348	0,477	0,305	53	54	5600	6070
1x500/35	0,0366	0,048		0,384	0,462	0,288	58	60	7010	7550
1x630/35	0,0283	0,038		0,423	0,447	0,270	62	64	8480	9060
1x800/35	0,0221	0,031		0,465	0,437	0,258	67	68	10390	11040
1x1000/70	0,0176	0,022		0,515	0,437	0,258	71	73	12880	13590

30 kV										
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	HF-compound sheathed cables	PE sheathed cables	HF-compound sheathed cables
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	44	45	2100	2430
1x70/16	0,268	0,342		0,143	0,628	0,474	46	47	2360	2730
1x95/16	0,193	0,246		0,158	0,606	0,451	48	49	2680	3060
1x120/16	0,153	0,196		0,168	0,577	0,419	49	50	2980	3400
1x150/25	0,124	0,159		0,181	0,563	0,404	50	52	3380	3800
1x185/25	0,0991	0,127		0,195	0,545	0,384	52	54	3820	4270
1x240/25	0,0754	0,097		0,214	0,528	0,365	56	57	4630	5130
1x300/25	0,0601	0,078		0,234	0,514	0,349	58	60	5370	5900
1x400/35	0,0470	0,061		0,257	0,500	0,332	60	61	6320	6860
1x500/35	0,0366	0,048		0,282	0,484	0,314	64	66	7590	8200
1x630/35	0,0283	0,038		0,309	0,467	0,294	68	70	9090	9760
1x800/35	0,0221	0,031		0,338	0,456	0,281	73	74	11040	11790
1x1000/70	0,0176	0,022		0,373	0,459	0,285	77	79	13580	14380

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35	166	172	157	159	198	203	238
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312
1000	820	835	860	820	1460	1407	1516

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143,0

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

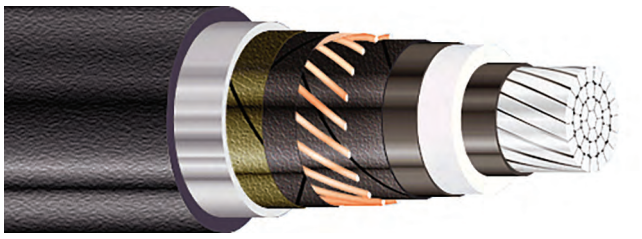
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor ($1/\sqrt{t}$)

6–30 kV | SINGLE-CORE CABLES

Aluminum single-core cables with lead sheath

ALUMINUM SINGLE-CORE CABLES WITH LEAD SHEATH

IEC 60502-2



Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape
– semiconducting tape
– extruded lead alloy sheath
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in damp, partly flooded premises, in non-navigable reservoirs (halogen-free flame-retardant cables) – for laying in very wet soils, in marshy areas, with high corrosivity of soil and water (PE sheathed cables) – in premises, tunnels, canals, mines and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (PVC and flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	210 °C
Minimum bending radius	25·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (PE sheathed cables) –15 °C (the rest types)
Design options	– nominal core cross-section up to 1600 mm2 – single-wire core – conductor sealed of water-blocking yarns – without copper wires screen – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A category)
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

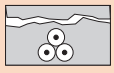
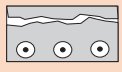
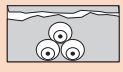
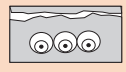
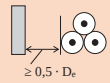
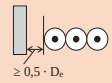
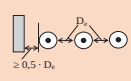
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	2,5	0,295	0,578	0,421	29	1950
1x70/16	0,443	0,568		0,333	0,552	0,391	31	2170
1x95/16	0,320	0,411		0,375	0,533	0,370	33	2450
1x120/16	0,253	0,325		0,407	0,508	0,342	34	2670
1x150/25	0,206	0,264		0,444	0,497	0,329	36	3010
1x185/25	0,164	0,211		0,486	0,482	0,312	38	3340
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	40	3830
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	43	4420
1x400/25	0,0778	0,101	3,0	0,590	0,451	0,275	47	5120
1x500/25	0,0605	0,079	3,2	0,619	0,440	0,261	51	6030
1x630/25	0,0469	0,062		0,685	0,427	0,245	54	7000
1x800/25	0,0367	0,049		0,757	0,418	0,234	58	8160
1x1000/25	0,0291	0,037		0,854	0,420	0,236	62	9400

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	3,4	0,239	0,594	0,437	31	2130
1x70/16	0,443	0,568		0,267	0,567	0,407	33	2360
1x95/16	0,320	0,411		0,300	0,547	0,386	34	2640
1x120/16	0,253	0,325		0,325	0,521	0,357	36	2870
1x150/25	0,206	0,264		0,353	0,509	0,343	37	3230
1x185/25	0,164	0,211		0,385	0,494	0,325	39	3560
1x240/25	0,125	0,161		0,429	0,479	0,308	42	4040
1x300/25	0,100	0,129		0,474	0,468	0,294	44	4570
1x400/25	0,0778	0,101		0,527	0,455	0,280	47	5240
1x500/25	0,0605	0,079		0,586	0,442	0,264	51	6070
1x630/25	0,0469	0,062		0,648	0,429	0,247	55	7040
1x800/25	0,0367	0,049		0,716	0,420	0,236	59	8200
1x1000/25	0,0291	0,037		0,807	0,421	0,237	62	9450

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	4,5	0,193	0,611	0,456	33	2400
1x70/16	0,443	0,568		0,215	0,583	0,426	35	2630
1x95/16	0,320	0,411		0,240	0,563	0,403	36	2930
1x120/16	0,253	0,325		0,259	0,536	0,373	38	3170
1x150/25	0,206	0,264		0,281	0,524	0,359	39	3550
1x185/25	0,164	0,211		0,305	0,508	0,341	41	3890
1x240/25	0,125	0,161		0,338	0,492	0,323	44	4390
1x300/25	0,100	0,129		0,373	0,480	0,309	46	4950
1x400/25	0,0778	0,101		0,413	0,467	0,294	50	5650
1x500/25	0,0605	0,079		0,457	0,453	0,277	53	6510
1x630/25	0,0469	0,062		0,504	0,439	0,260	57	7490
1x800/25	0,0367	0,049		0,556	0,429	0,248	61	8690
1x1000/25	0,0291	0,037		0,617	0,429	0,248	64	9960

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	5,5	0,167	0,625	0,472	35	2640
1x70/16	0,443	0,568		0,186	0,597	0,441	37	2910
1x95/16	0,320	0,411		0,206	0,576	0,418	38	3210
1x120/16	0,253	0,325		0,222	0,549	0,387	40	3470
1x150/25	0,206	0,264		0,239	0,536	0,373	41	3840
1x185/25	0,164	0,211		0,260	0,519	0,354	43	4190
1x240/25	0,125	0,161		0,287	0,503	0,336	46	4720
1x300/25	0,100	0,129		0,315	0,490	0,321	48	5330
1x400/25	0,0778	0,101		0,348	0,477	0,305	52	6040
1x500/25	0,0605	0,079		0,384	0,462	0,288	55	6910
1x630/25	0,0469	0,062		0,423	0,447	0,270	59	7930
1x800/25	0,0367	0,049		0,465	0,437	0,258	63	9140
1x1000/25	0,0291	0,037		0,515	0,437	0,258	66	10440

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	41	3520
1x70/16	0,443	0,568		0,143	0,628	0,474	42	3800
1x95/16	0,320	0,411		0,158	0,606	0,451	44	4150
1x120/16	0,253	0,325		0,168	0,577	0,419	46	4440
1x150/25	0,206	0,264		0,181	0,563	0,404	47	4860
1x185/25	0,164	0,211		0,195	0,545	0,384	49	5270
1x240/25	0,125	0,161		0,214	0,528	0,365	52	5860
1x300/25	0,100	0,129		0,234	0,514	0,349	55	6500
1x400/25	0,0778	0,101		0,257	0,500	0,332	58	7280
1x500/25	0,0605	0,079		0,282	0,484	0,314	61	8240
1x630/25	0,0469	0,062		0,309	0,467	0,294	65	9350
1x800/25	0,0367	0,049		0,338	0,456	0,281	69	10630
1x1000/25	0,0291	0,037		0,373	0,459	0,285	73	12030

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132
1000	736	717	709	702	1214	1182	1315

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	50	70	95	120	150	185	240	300	400	500	630	800	1000
1-second short-circuit conductor capacity*, kA	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2	94,0

Nominal cross-section area of core/screen (equivalent), mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

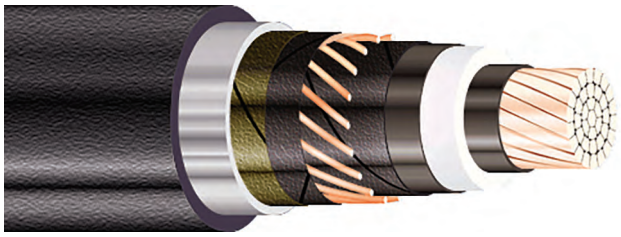
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES

Copper single-core cables with lead sheath

COPPER SINGLE-CORE CABLES WITH LEAD SHEATH

IEC 60502-2



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape
– semiconducting tape
– extruded lead alloy sheath
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in damp, partly flooded premises, in non-navigable reservoirs (halogen-free flame-retardant cables) – for laying in very wet soils, in marshy areas, with high corrosivity of soil and water (PE sheathed cables) – in premises, tunnels, canals, mines and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (PVC and flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	210 °C
Minimum bending radius	25·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (PE sheathed cables) –15 °C (the rest types)
Design options	– nominal core cross-section up to 1600 mm^2 – conductor sealed of water-blocking yarns – without copper wires screen – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A category)
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

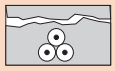
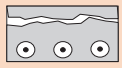
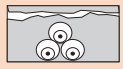
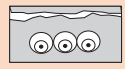
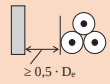
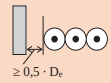
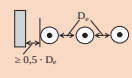
6 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			PE sheathed cables	PE sheathed cables
1x35/16	0,524	0,668	2,5	0,270	0,604	0,448	28	2030	2180
1x50/16	0,387	0,494		0,295	0,578	0,421	29	2250	2410
1x70/16	0,268	0,342		0,333	0,552	0,391	31	2620	2790
1x95/16	0,193	0,246		0,375	0,533	0,370	33	3070	3250
1x120/16	0,153	0,196		0,407	0,508	0,342	34	3450	3640
1x150/25	0,124	0,159		0,444	0,497	0,329	36	3910	4110
1x185/25	0,0991	0,127		0,486	0,482	0,312	38	4470	4680
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	40	5370	5590
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	43	6300	6540
1x400/35	0,0470	0,061	3,0	0,590	0,451	0,275	46	7560	7830
1x500/35	0,0366	0,048	3,2	0,619	0,440	0,261	50	9160	9460
1x630/50	0,0283	0,038		0,685	0,427	0,245	54	10980	11310
1x800/50	0,0221	0,031		0,757	0,418	0,234	59	13370	13750
1x1000/50	0,0176	0,022		0,854	0,420	0,236	65	16640	17100
1x1200/95	0,0151	0,020		1,081	0,425	0,242	78	21520	22120
1x1400/95	0,0129	0,018		1,161	0,419	0,235	83	24340	25010
1x1600/95	0,0113	0,016		1,201	0,416	0,231	85	26740	27450

10 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			PE sheathed cables	PE sheathed cables
1x35/16	0,524	0,668	3,4	0,219	0,620	0,465	30	2210	2370
1x50/16	0,387	0,494		0,239	0,594	0,437	31	2440	2600
1x70/16	0,268	0,342		0,267	0,567	0,407	32	2800	2980
1x95/16	0,193	0,246		0,300	0,547	0,386	34	3270	3460
1x120/16	0,153	0,196		0,325	0,521	0,357	36	3680	3880
1x150/25	0,124	0,159		0,353	0,509	0,343	37	4120	4320
1x185/25	0,0991	0,127		0,385	0,494	0,325	39	4690	4910
1x240/25	0,0754	0,097		0,429	0,479	0,308	41	5560	5790
1x300/25	0,0601	0,078		0,474	0,468	0,294	44	6450	6700
1x400/35	0,0470	0,061		0,527	0,455	0,280	47	7680	7950
1x500/35	0,0366	0,048		0,586	0,442	0,264	50	9210	9510
1x630/50	0,0283	0,038		0,648	0,429	0,247	54	11020	11370
1x800/50	0,0221	0,031		0,716	0,420	0,236	59	13400	13790
1x1000/50	0,0176	0,022		0,807	0,421	0,237	65	14620	17160
1x1200/95	0,0151	0,020		1,021	0,427	0,245	79	21500	22130
1x1400/95	0,0129	0,018		1,096	0,421	0,237	83	24380	25060
1x1600/95	0,0113	0,016		1,134	0,418	0,234	85	26790	27500

15 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			PE sheathed cables	PE sheathed cables
1x35/16	0,524	0,668	4,5	0,178	0,637	0,485	32	2470	2640
1x50/16	0,387	0,494		0,193	0,611	0,456	33	2700	2880
1x70/16	0,268	0,342		0,215	0,583	0,426	34	3080	3270
1x95/25	0,193	0,246		0,240	0,563	0,403	36	3570	3770
1x120/35	0,153	0,196		0,259	0,536	0,373	38	3990	4190
1x150/35	0,124	0,159		0,281	0,524	0,359	39	4440	4650
1x185/35	0,0991	0,127		0,305	0,508	0,341	41	5020	5250
1x240/25	0,0754	0,097		0,338	0,492	0,323	44	5910	6150
1x300/35	0,0601	0,078		0,373	0,480	0,309	46	6830	7100
1x400/35	0,0470	0,061		0,413	0,467	0,294	49	8080	8380
1x500/35	0,0366	0,048		0,457	0,453	0,277	53	9640	9970
1x630/50	0,0283	0,038		0,504	0,439	0,260	56	11470	11830
1x800/50	0,0221	0,031		0,556	0,429	0,248	61	13900	14310
1x1000/70	0,0176	0,022		0,617	0,429	0,248	68	15230	17800
1x1200/95	0,0151	0,020		0,786	0,434	0,254	81	22210	22850
1x1400/95	0,0129	0,018		0,843	0,428	0,246	86	25070	25780
1x1600/95	0,0113	0,016		0,872	0,425	0,243	88	27490	28420

20 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			PE sheathed cables	PE sheathed cables
1x35/16	0,524	0,668	5,5	0,155	0,652	0,501	34	2710	2890
1x50/16	0,387	0,494		0,167	0,625	0,472	35	2950	3140
1x70/25	0,268	0,342		0,186	0,597	0,441	36	3350	3550
1x95/25	0,193	0,246		0,206	0,576	0,418	38	3840	4050
1x120/25	0,153	0,196		0,222	0,549	0,387	40	4270	4490
1x150/25	0,124	0,159		0,239	0,536	0,373	41	4730	4960
1x185/25	0,0991	0,127		0,260	0,519	0,354	43	5320	5560
1x240/35	0,0754	0,097		0,287	0,503	0,336	46	6260	6520
1x300/35	0,0601	0,078		0,315	0,490	0,321	48	7180	7470
1x400/35	0,0470	0,061		0,348	0,477	0,305	51	8480	8790
1x500/50	0,0366	0,048		0,384	0,462	0,288	55	10040	10390
1x630/50	0,0283	0,038		0,423	0,447	0,270	59	11910	12300
1x800/50	0,0221	0,031		0,465	0,437	0,258	63	14350	14780
1x1000/70	0,0176	0,022		0,515	0,437	0,258	70	17730	18240
1x1200/95	0,0151	0,020		0,654	0,440	0,261	83	22750	23420
1x1400/95	0,0129	0,018		0,701	0,434	0,254	88	25700	26430
1x1600/95	0,0113	0,016		0,724	0,430	0,249	90	28140	28900

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙			PE sheathed cables	PE sheathed cables
1x50/35	0,387	0,494	8,0	0,130	0,657	0,506	41	3820	4050
1x70/25	0,268	0,342		0,143	0,628	0,474	42	4250	4480
1x95/35	0,193	0,246		0,158	0,606	0,451	44	4790	5040
1x120/70	0,153	0,196		0,168	0,577	0,419	46	5260	5530
1x150/35	0,124	0,159		0,181	0,563	0,404	47	5760	6030
1x185/35	0,0991	0,127		0,195	0,545	0,384	49	6410	6700
1x240/35	0,0754	0,097		0,214	0,528	0,365	52	7380	7700
1x300/50	0,0601	0,078		0,234	0,514	0,349	55	8380	8730
1x400/50	0,0470	0,061		0,257	0,500	0,332	58	9720	10100
1x500/50	0,0366	0,048		0,282	0,484	0,314	61	11380	11790
1x630/50	0,0283	0,038		0,309	0,467	0,294	65	13310	13760
1x800/70	0,0221	0,031		0,338	0,456	0,281	69	15840	16340
1x1000/70	0,0176	0,022		0,373	0,459	0,285	76	19390	19970
1x1200/95	0,0151	0,020		0,468	0,459	0,284	89	24660	25430
1x1400/120	0,0129	0,018		0,500	0,452	0,275	94	27820	28660
1x1600/120	0,0113	0,016		0,516	0,448	0,270	96	30280	31140

Nominal cross-section area of core/screen, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
35/16	166	172	157	159	198	203	238
50/16	196	203	186	188	238	243	286
70/16	239	246	227	229	296	303	356
95/16	285	293	271	274	361	369	434
120/16	323	332	308	311	417	426	500
150/25	361	366	343	347	473	481	559
185/25	406	410	387	391	543	550	637
240/25	469	470	447	453	641	647	745
300/25	526	524	510	510	735	739	846
400/35	590	572	571	571	845	837	938
500/35	651	630	631	617	980	957	1056
630/35	724	694	702	680	1113	1077	1182
800/35	795	756	771	741	1255	1203	1312
1000/35	820	835	860	820	1460	1407	1516
1200/50	980	846	950	829	1647	1509	1509
1400/50	1039	886	1007	868	1779	1613	1597
1600/50	1084	913	1051	894	1872	1682	1653

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300	400	500	630	800	1000	1200	1400	1600
1-second short-circuit conductor capacity*, kA	5,0	7,2	10	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4	143	172	200	229

Nominal cross-section area of core/screen (equivalent), mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

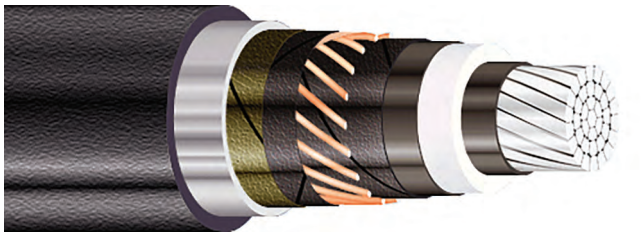
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES

Aluminum single-core cables with aluminum sheath

ALUMINUM SINGLE-CORE CABLES WITH ALUMINUM SHEATH

IEC 60502-2



Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape
– semiconducting tape
– extruded aluminium sheath
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in damp, partly flooded premises, in non-navigable reservoirs (halogen-free flame-retardant cables) – for laying in very wet soils, in marshy areas, with high corrosivity of soil and water (PE sheathed cables) – in premises, tunnels, canals, mines and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (PVC and flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	180 °C
Minimum bending radius	25·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (PE sheathed cables) –15 °C (the rest types)
Design options	– nominal core cross-section up to 1600 mm^2 – single-wire core – conductor sealed of water-blocking yarns – without copper wires screen – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A category)
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

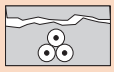
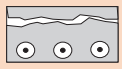
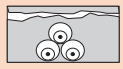
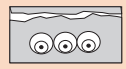
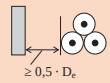
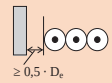
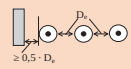
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	2,5	0,295	0,578	0,421	29	960
1x70/16	0,443	0,568		0,333	0,552	0,391	31	1070
1x95/16	0,320	0,411		0,375	0,533	0,370	32	1210
1x120/16	0,253	0,325		0,407	0,508	0,342	34	1320
1x150/25	0,206	0,264		0,444	0,497	0,329	35	1550
1x185/25	0,164	0,211		0,486	0,482	0,312	37	1730
1x240/25	0,125	0,161	2,6	0,525	0,469	0,296	40	2000
1x300/25	0,100	0,129	2,8	0,546	0,461	0,286	43	2320
1x400/25	0,0778	0,101	3,0	0,590	0,451	0,275	46	2720
1x500/25	0,0605	0,079	3,2	0,619	0,440	0,261	50	3250
1x630/25	0,0469	0,062		0,685	0,427	0,245	54	3940
1x800/25	0,0367	0,049		0,757	0,418	0,234	58	4660

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	3,4	0,239	0,594	0,437	31	1030
1x70/16	0,443	0,568		0,267	0,567	0,407	32	1140
1x95/16	0,320	0,411		0,300	0,547	0,386	34	1280
1x120/16	0,253	0,325		0,325	0,521	0,357	35	1410
1x150/25	0,206	0,264		0,353	0,509	0,343	37	1650
1x185/25	0,164	0,211		0,385	0,494	0,325	39	1820
1x240/25	0,125	0,161		0,429	0,479	0,308	41	2080
1x300/25	0,100	0,129		0,474	0,468	0,294	43	2380
1x400/35	0,0778	0,101		0,527	0,455	0,280	47	2770
1x500/35	0,0605	0,079		0,586	0,442	0,264	50	3260
1x630/35	0,0469	0,062		0,648	0,429	0,247	54	3960
1x800/35	0,0367	0,049		0,716	0,420	0,236	58	4680

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	4,5	0,193	0,611	0,456	33	1140
1x70/16	0,443	0,568		0,215	0,583	0,426	34	1270
1x95/16	0,320	0,411		0,240	0,563	0,403	36	1410
1x120/16	0,253	0,325		0,259	0,536	0,373	37	1550
1x150/25	0,206	0,264		0,281	0,524	0,359	39	1770
1x185/25	0,164	0,211		0,305	0,508	0,341	41	1960
1x240/25	0,125	0,161		0,338	0,492	0,323	43	2240
1x300/25	0,100	0,129		0,373	0,480	0,309	46	2560
1x400/35	0,0778	0,101		0,413	0,467	0,294	49	2980
1x500/35	0,0605	0,079		0,457	0,453	0,277	52	3560
1x630/35	0,0469	0,062		0,504	0,439	0,260	56	4190

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	5,5	0,167	0,625	0,472	35	1250
1x70/16	0,443	0,568		0,186	0,597	0,441	36	1370
1x95/16	0,320	0,411		0,206	0,576	0,418	38	1530
1x120/16	0,253	0,325		0,222	0,549	0,387	39	1660
1x150/25	0,206	0,264		0,239	0,536	0,373	41	1910
1x185/25	0,164	0,211		0,260	0,519	0,354	43	2100
1x240/25	0,125	0,161		0,287	0,503	0,336	45	2390
1x300/25	0,100	0,129		0,315	0,490	0,321	48	2740
1x400/35	0,0778	0,101		0,348	0,477	0,305	51	3240
1x500/35	0,0605	0,079		0,384	0,462	0,288	55	3760
1x630/35	0,0469	0,062		0,423	0,447	0,270	58	4380

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,641	0,822	8,0	0,130	0,657	0,506	40	1620
1x70/16	0,443	0,568		0,143	0,628	0,474	42	1760
1x95/16	0,320	0,411		0,158	0,606	0,451	44	1940
1x120/16	0,253	0,325		0,168	0,577	0,419	45	2100
1x150/25	0,206	0,264		0,181	0,563	0,404	47	2360
1x185/25	0,164	0,211		0,195	0,545	0,384	49	2610
1x240/25	0,125	0,161		0,214	0,528	0,365	52	3030
1x300/25	0,100	0,129		0,234	0,514	0,349	54	3380
1x400/35	0,0778	0,101		0,257	0,500	0,332	57	3830

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
50	152	157	144	146	184	189	222
70	186	192	176	178	230	236	278
95	221	229	210	213	280	287	338
120	252	260	240	242	324	332	391
150	281	288	267	271	368	376	440
185	317	324	303	307	424	432	504
240	367	373	351	356	502	511	593
300	414	419	397	402	577	586	677
400	470	466	451	457	673	676	769
500	526	522	505	512	786	785	881
630	593	584	569	572	907	899	1001
800	664	647	637	634	1041	1024	1132

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	50	70	95	120	150	185	240	300	400	500	630	800
1-second short-circuit conductor capacity*, kA	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2	37,6	47,0	59,0	75,2

Nominal cross-section area of core/screen (equivalent), mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

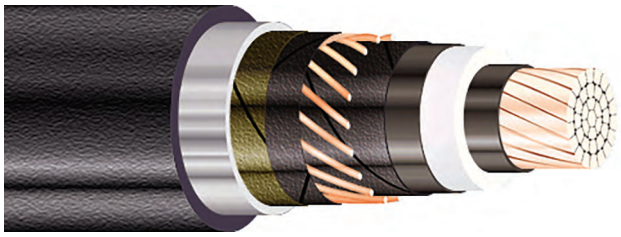
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | SINGLE-CORE CABLES

Copper single-core cables with aluminum sheath

COPPER SINGLE-CORE CABLES WITH ALUMINUM SHEATH

IEC 60502-2



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen and copper tape counter-helix
– semiconducting water-blocking tape
– semiconducting tape
– extruded aluminium sheath
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in damp, partly flooded premises, in non-navigable reservoirs (halogen-free flame-retardant cables) – for laying in very wet soils, in marshy areas, with high corrosivity of soil and water (PE sheathed cables) – in premises, tunnels, canals, mines and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (PVC and flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	180 °C
Minimum bending radius	25·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (PE sheathed cables) –15 °C (the rest types)
Design options	– nominal core cross-section up to 1600 mm^2 – conductor sealed of water-blocking yarns – without copper wires screen – semiconductor layer on the outer sheath – resistance to vertical flame spread of vertically-mounted bunched cables (A category)
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

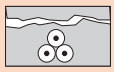
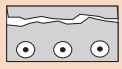
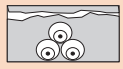
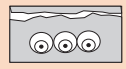
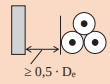
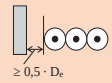
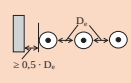
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,387	0,494	2,5	0,295	0,578	0,421	29	1230
1x70/16	0,268	0,342		0,333	0,552	0,391	31	1470
1x95/16	0,193	0,246		0,375	0,533	0,370	33	1785
1x120/16	0,153	0,196		0,407	0,508	0,342	34	2035
1x150/25	0,124	0,159		0,444	0,497	0,329	35	2445
1x185/25	0,0991	0,127		0,486	0,482	0,312	37	2830
1x240/25	0,0754	0,097	2,6	0,525	0,469	0,296	40	3465
1x300/25	0,0601	0,078	2,8	0,546	0,461	0,286	43	4125
1x400/25	0,0470	0,061	3,0	0,590	0,451	0,275	46	5034
1x500/25	0,0366	0,048	3,2	0,619	0,440	0,261	50	6190
1x630/25	0,0283	0,038		0,685	0,427	0,245	54	7685
1x800/25	0,0221	0,031		0,757	0,418	0,234	58	9485

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,387	0,494	3,4	0,239	0,594	0,437	31	1305
1x70/16	0,268	0,342		0,267	0,567	0,407	32	1545
1x95/16	0,193	0,246		0,300	0,547	0,386	34	1865
1x120/16	0,153	0,196		0,325	0,521	0,357	35	2145
1x150/25	0,124	0,159		0,353	0,509	0,343	37	2535
1x185/25	0,0991	0,127		0,385	0,494	0,325	39	2925
1x240/25	0,0754	0,097		0,429	0,479	0,308	41	3540
1x300/25	0,0601	0,078		0,474	0,468	0,294	43	4185
1x400/25	0,0470	0,061		0,527	0,455	0,280	47	5085
1x500/25	0,0366	0,048		0,586	0,442	0,264	50	6185
1x630/25	0,0283	0,038		0,648	0,429	0,247	54	7700
1x800/25	0,0221	0,031		0,716	0,420	0,236	58	9500

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,387	0,494	4,5	0,193	0,611	0,456	33	1425
1x70/16	0,268	0,342		0,215	0,583	0,426	34	1700
1x95/16	0,193	0,246		0,240	0,563	0,403	36	1980
1x120/16	0,153	0,196		0,259	0,536	0,373	38	2265
1x150/25	0,124	0,159		0,281	0,524	0,359	39	2650
1x185/25	0,0991	0,127		0,305	0,508	0,341	41	3065
1x240/25	0,0754	0,097		0,338	0,492	0,323	43	3700
1x300/25	0,0601	0,078		0,373	0,480	0,309	46	4365
1x400/25	0,0470	0,061		0,413	0,467	0,294	49	5285
1x500/25	0,0366	0,048		0,457	0,453	0,277	52	6500
1x630/25	0,0283	0,038		0,504	0,439	0,260	56	7920

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,387	0,494	5,5	0,167	0,625	0,472	35	1510
1x70/16	0,268	0,342		0,186	0,597	0,441	36	1785
1x95/16	0,193	0,246		0,206	0,576	0,418	38	2100
1x120/16	0,153	0,196		0,222	0,549	0,387	39	2375
1x150/25	0,124	0,159		0,239	0,536	0,373	41	2800
1x185/25	0,0991	0,127		0,260	0,519	0,354	43	3200
1x240/25	0,0754	0,097		0,287	0,503	0,336	45	3845
1x300/25	0,0601	0,078		0,315	0,490	0,321	48	4525
1x400/25	0,0470	0,061		0,348	0,477	0,305	51	5530
1x500/25	0,0366	0,048		0,384	0,462	0,288	55	6700
1x630/25	0,0283	0,038		0,423	0,447	0,270	58	8100

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km		Cable outer diameter, mm	Calculated cable weight, kg/km
	d.c. 20 °C	a.c. 90 °C			⊙⊙⊙		PE sheathed cables	PE sheathed cables
1x50/16	0,387	0,494	8,0	0,130	0,657	0,506	40	1875
1x70/16	0,268	0,342		0,143	0,628	0,474	42	2145
1x95/16	0,193	0,246		0,158	0,606	0,451	44	2490
1x120/16	0,153	0,196		0,168	0,577	0,419	45	2800
1x150/25	0,124	0,159		0,181	0,563	0,404	47	3200
1x185/25	0,0991	0,127		0,195	0,545	0,384	49	3690
1x240/25	0,0754	0,097		0,214	0,528	0,365	52	4445
1x300/25	0,0601	0,078		0,234	0,514	0,349	54	5140
1x400/25	0,0470	0,061		0,257	0,500	0,332	57	6100

Nominal cross-section area of core, mm²	Current carrying capacity, A						
	in the ground		in the pipes		in the air		
							
50	196	203	186	188	238	243	286
70	239	246	227	229	296	303	356
95	285	293	271	274	361	369	434
120	323	332	308	311	417	426	500
150	361	366	343	347	473	481	559
185	406	410	387	391	543	550	637
240	469	470	447	453	641	647	745
300	526	524	510	510	735	739	846
400	590	572	571	571	845	837	938
500	651	630	631	617	980	957	1056
630	724	694	702	680	1113	1077	1182
800	795	756	771	741	1255	1203	1312

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	50	70	95	120	150	185	240	300	400	500	630	800
1-second short-circuit conductor capacity*, kA	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9	57,2	71,5	90,1	114,4

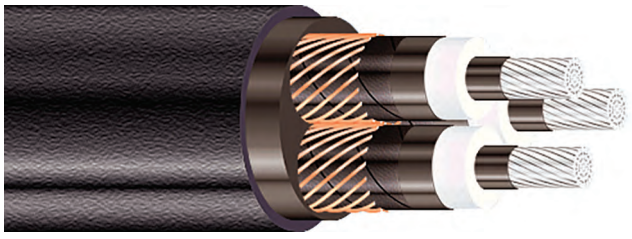
Nominal cross-section area of core/screen (equivalent), mm²	16	25	35	50	70	95	120	150	185	240
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4	30,4	37,6	48,7

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

Aluminum three-core cables with core interstice filling

ALUMINUM THREE-CORE CABLES WITH CORE INTERSTICE FILLING

IEC 60502-2



Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– extruded core filling*
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

*may be applied together with outer sheath

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are impossible
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (for PE or halogen-free flame-retardant sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– single-wire core – conductor sealed of water-blocking yarns – common copper screen – aluminum water-blocking foil – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

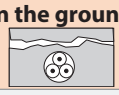
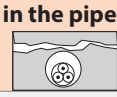
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	2,5	0,270	0,382	48	42	2630	2330
3x50/16	0,641	0,822		0,295	0,357	50	44	2920	2590
3x70/16	0,443	0,568		0,333	0,331	54	47	3360	3010
3x95/16	0,320	0,411		0,375	0,312	58	51	3940	3560
3x120/16	0,253	0,325		0,407	0,287	61	54	4410	4030
3x150/25	0,206	0,264		0,444	0,276	65	58	5170	4790
3x185/25	0,164	0,211		0,486	0,261	69	62	5860	5520
3x240/25	0,125	0,161	2,6	0,525	0,249	74	68	6950	6600
3x300/25	0,100	0,129	2,8	0,546	0,246	81	74	8240	7960

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	3,4	0,219	0,406	51	45	2950	2610
3x50/16	0,641	0,822		0,239	0,380	53	47	3240	2880
3x70/16	0,443	0,568		0,267	0,352	57	50	3710	3350
3x95/16	0,320	0,411		0,300	0,333	61	54	4300	3920
3x120/16	0,253	0,325		0,325	0,307	64	57	4800	4420
3x150/25	0,206	0,264		0,353	0,294	68	61	5580	5210
3x185/25	0,164	0,211		0,385	0,279	72	65	6290	5960
3x240/25	0,125	0,161		0,429	0,264	77	70	7360	7010
3x300/35	0,100	0,129		0,474	0,255	83	76	8610	8300

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	4,5	0,178	0,431	56	49	3420	3040
3x50/16	0,641	0,822		0,193	0,404	58	51	3740	3360
3x70/16	0,443	0,568		0,215	0,376	62	55	4240	3860
3x95/16	0,320	0,411		0,240	0,355	65	59	4850	4470
3x120/16	0,253	0,325		0,259	0,328	68	62	5370	4990
3x150/25	0,206	0,264		0,281	0,315	73	66	6210	5860
3x185/25	0,164	0,211		0,305	0,299	77	70	6960	6620
3x240/35	0,125	0,161		0,338	0,282	82	75	8140	7830
3x300/25	0,100	0,129		0,373	0,274	87	81	9350	9100

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	5,5	0,155	0,452	60	53	3880	3520
3x50/16	0,641	0,822		0,167	0,424	62	55	4210	3830
3x70/16	0,443	0,568		0,186	0,395	66	59	4740	4390
3x95/16	0,320	0,411		0,206	0,374	70	63	5400	5030
3x120/25	0,253	0,325		0,222	0,345	73	67	6170	5810
3x150/25	0,206	0,264		0,239	0,332	77	70	6800	6460
3x185/35	0,164	0,211		0,260	0,315	81	74	7650	7320
3x240/35	0,125	0,161		0,287	0,298	86	79	8800	8510
3x300/25	0,100	0,129		0,315	0,289	92	85	10070	9820

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/25	0,641	0,822	8,0	0,130	0,467	76	69	6160	5810
3x70/25	0,443	0,568		0,143	0,436	79	73	6770	6440
3x95/35	0,320	0,411		0,158	0,414	83	76	7580	7270
3x120/35	0,253	0,325		0,168	0,383	86	79	8200	7910
3x150/35	0,206	0,264		0,181	0,369	90	83	8910	8640
3x185/35	0,164	0,211		0,195	0,350	94	87	9780	9590
3x240/35	0,125	0,161		0,214	0,341	99	92	11060	10870
3x300/50	0,100	0,129		0,234	0,324	104	98	12590	12460

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	119	103	132
50	140	122	158
70	171	150	196
95	203	179	236
120	232	205	273
150	260	231	309
185	294	262	355
240	340	305	415
300	384	346	475

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

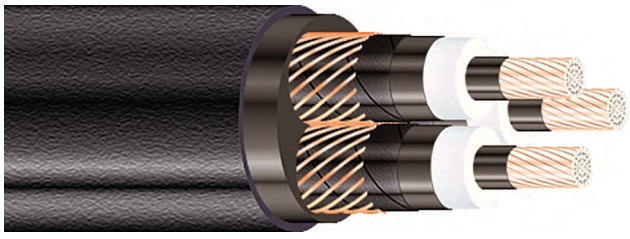
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Copper three-core cables with core interstice filling

COPPER THREE-CORE CABLES WITH CORE INTERSTICE FILLING

IEC 60502-2



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– extruded core filling*
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

*may be applied together with outer sheath

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are impossible
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (for PE or halogen-free flame-retardant sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– conductor sealed of water-blocking yarns – common copper screen – aluminum water-blocking foil – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

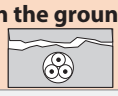
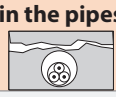
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	2,5	0,270	0,382	48	42	3310	3010
3x50/16	0,387	0,494		0,295	0,357	50	44	3840	3510
3x70/16	0,268	0,342		0,333	0,331	54	47	4660	4300
3x95/16	0,193	0,246		0,375	0,312	58	51	5740	5360
3x120/16	0,153	0,196		0,407	0,287	61	54	6680	6300
3x150/25	0,124	0,159		0,444	0,276	65	58	7960	7580
3x185/25	0,0991	0,127		0,486	0,261	69	62	9370	9030
3x240/25	0,0754	0,097	2,6	0,525	0,249	74	68	11560	11200
3x300/25	0,0601	0,078	2,8	0,546	0,246	81	74	14090	13800

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	3,4	0,219	0,406	51	45	3640	3290
3x50/16	0,387	0,494		0,239	0,380	53	47	4160	3800
3x70/16	0,268	0,342		0,267	0,352	57	50	5010	4640
3x95/16	0,193	0,246		0,300	0,333	61	54	6100	5720
3x120/16	0,153	0,196		0,325	0,307	64	57	7070	6690
3x150/25	0,124	0,159		0,353	0,294	68	61	8370	8000
3x185/25	0,0991	0,127		0,385	0,279	72	65	9800	9470
3x240/25	0,0754	0,097		0,429	0,264	77	70	11960	11620
3x300/25	0,0601	0,078		0,474	0,255	83	76	14460	14150

15 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	4,5	0,178	0,431	56	49	4100	3720
3x50/16	0,387	0,494		0,193	0,404	58	51	4660	4280
3x70/16	0,268	0,342		0,215	0,376	62	55	5540	5150
3x95/16	0,193	0,246		0,240	0,355	65	59	6650	6270
3x120/16	0,153	0,196		0,259	0,328	68	62	7640	7260
3x150/25	0,124	0,159		0,281	0,315	73	66	9000	8650
3x185/25	0,0991	0,127		0,305	0,299	77	70	10470	10120
3x240/25	0,0754	0,097		0,338	0,282	82	75	12740	12430
3x300/25	0,0601	0,078		0,373	0,274	87	81	15190	14950

20 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	5,5	0,155	0,452	60	53	4560	4200
3x50/16	0,387	0,494		0,167	0,424	62	55	5140	4750
3x70/16	0,268	0,342		0,186	0,395	66	59	6040	5690
3x95/16	0,193	0,246		0,206	0,374	70	63	7200	6830
3x120/16	0,153	0,196		0,222	0,345	73	67	8440	8080
3x150/25	0,124	0,159		0,239	0,332	77	70	9590	9250
3x185/25	0,0991	0,127		0,260	0,315	81	74	11150	10820
3x240/25	0,0754	0,097		0,287	0,298	86	79	13400	13110
3x300/25	0,0601	0,078		0,315	0,289	92	85	15920	15670

30 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/16	0,387	0,494	8,0	0,130	0,467	76	69	7080	6730
3x70/16	0,268	0,342		0,143	0,436	79	73	8070	7740
3x95/16	0,193	0,246		0,158	0,414	83	76	9380	9070
3x120/16	0,153	0,196		0,168	0,383	86	79	10470	10180
3x150/25	0,124	0,159		0,181	0,369	90	83	11710	11430
3x185/25	0,0991	0,127		0,195	0,350	94	87	13290	13090
3x240/25	0,0754	0,097		0,214	0,341	99	92	15660	15470
3x300/25	0,0601	0,078		0,234	0,324	104	98	18430	18300

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	153	133	170
50	181	158	204
70	221	193	253
95	262	231	304
120	298	264	351
150	334	297	398
185	377	336	455
240	434	390	531
300	489	441	606

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Aluminum three-core cables with cordel filling

ALUMINUM THREE-CORE CABLES WITH CORDEL FILLING

IEC 60502-2

Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– polypropylene bundles core filling
– semiconducting tape
– outer sheath: of PE, PVC or flame-retardant PVC

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC sheathed cables) – if mechanical stresses are impossible
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (for PE sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– single-wire core – conductor sealed of water-blocking yarns – common copper screen – aluminum water-blocking foil – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

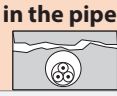
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	2,5	0,270	0,382	43	42	1360	1520
3x50/16	0,641	0,822		0,295	0,357	45	44	1530	1680
3x70/16	0,443	0,568		0,333	0,331	49	47	1840	1980
3x95/16	0,320	0,411		0,375	0,312	53	51	2310	2480
3x120/16	0,253	0,325		0,407	0,287	56	54	2620	2810
3x150/25	0,206	0,264		0,444	0,276	60	58	3050	3270
3x185/25	0,164	0,211		0,486	0,261	64	62	3540	3800
3x240/25	0,125	0,161	2,6	0,525	0,249	70	68	4340	4650
3x300/25	0,100	0,129	2,8	0,546	0,246	76	75	5160	5520

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	3,4	0,219	0,406	46	45	1510	1660
3x50/16	0,641	0,822		0,239	0,380	48	47	1720	1870
3x70/16	0,443	0,568		0,267	0,352	52	51	2000	2170
3x95/16	0,320	0,411		0,300	0,333	56	54	2490	2680
3x120/16	0,253	0,325		0,325	0,307	59	57	2800	3020
3x150/25	0,206	0,264		0,353	0,294	63	62	3290	3530
3x185/25	0,164	0,211		0,385	0,279	67	66	3760	4040
3x240/25	0,125	0,161		0,429	0,264	72	71	4520	4850
3x300/35	0,100	0,129		0,474	0,255	78	76	5360	5740

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	4,5	0,178	0,431	51	49	1760	1920
3x50/16	0,641	0,822		0,193	0,404	53	52	2090	2260
3x70/16	0,443	0,568		0,215	0,376	56	55	2390	2580
3x95/16	0,320	0,411		0,240	0,355	60	59	2780	3010
3x120/16	0,253	0,325		0,259	0,328	63	62	3140	3400
3x150/25	0,206	0,264		0,281	0,315	68	66	3600	3890
3x185/25	0,164	0,211		0,305	0,299	71	70	4180	4500
3x240/35	0,125	0,161		0,338	0,282	77	76	4960	5330
3x300/35	0,100	0,129		0,373	0,274	82	81	5860	6290

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	5,5	0,155	0,452	55	54	2140	2330
3x50/16	0,641	0,822		0,167	0,424	57	56	2320	2550
3x70/16	0,443	0,568		0,186	0,395	61	59	2650	2880
3x95/16	0,320	0,411		0,206	0,374	65	63	3070	3330
3x120/25	0,253	0,325		0,222	0,345	68	67	3510	3800
3x150/25	0,206	0,264		0,239	0,332	72	70	4000	4320
3x185/35	0,164	0,211		0,260	0,315	76	74	4580	4950
3x240/35	0,125	0,161		0,287	0,298	81	80	5290	5700
3x300/35	0,100	0,129		0,315	0,289	86	85	6210	6680

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/25	0,641	0,822	8,0	0,130	0,467	71	70	3420	3740
3x70/25	0,443	0,568		0,143	0,436	74	73	3780	4130
3x95/35	0,320	0,411		0,158	0,414	78	77	4290	4670
3x120/35	0,253	0,325		0,168	0,383	81	80	4670	5090
3x150/35	0,206	0,264		0,181	0,369	85	83	5210	5700
3x185/35	0,164	0,211		0,195	0,350	89	87	5770	6280
3x240/35	0,125	0,161		0,214	0,341	94	93	6550	7150
3x300/50	0,100	0,129		0,234	0,324	99	98	7560	8190

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	119	103	132
50	140	122	158
70	171	150	196
95	203	179	236
120	232	205	273
150	260	231	309
185	294	262	355
240	340	305	415
300	384	346	475

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Copper three-core cables with cordel filling

COPPER THREE-CORE CABLES WITH CORDEL FILLING

IEC 60502

Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– polypropylene bundles core filling
– semiconducting tape
– outer sheath: of PE, PVC or flame-retardant PVC

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC sheathed cables) – if mechanical stresses are impossible
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (for PE sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– conductor sealed of water-blocking yarns – common copper screen – aluminum water-blocking foil – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

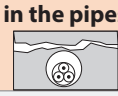
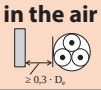
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	2,5	0,270	0,382	43	42	2200	2200
3x50/16	0,387	0,494		0,295	0,357	45	44	2710	2600
3x70/16	0,268	0,342		0,333	0,331	49	47	3540	3280
3x95/16	0,193	0,246		0,375	0,312	53	51	4720	4280
3x120/16	0,153	0,196		0,407	0,287	56	54	5680	5080
3x150/25	0,124	0,159		0,444	0,276	60	58	6840	6060
3x185/25	0,0991	0,127		0,486	0,261	64	62	8330	7300
3x240/25	0,0754	0,097	2,6	0,525	0,249	70	68	10680	9250
3x300/25	0,0601	0,078	2,8	0,546	0,246	76	75	13250	11370

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	3,4	0,219	0,406	46	45	2340	2340
3x50/16	0,387	0,494		0,239	0,380	48	47	2890	2790
3x70/16	0,268	0,342		0,267	0,352	52	51	3700	3470
3x95/16	0,193	0,246		0,300	0,333	56	54	4890	4480
3x120/16	0,153	0,196		0,325	0,307	59	57	5860	5290
3x150/25	0,124	0,159		0,353	0,294	63	62	7070	6320
3x185/25	0,0991	0,127		0,385	0,279	67	66	8540	7540
3x240/25	0,0754	0,097		0,429	0,264	72	71	10850	9450
3x300/35	0,0601	0,078		0,474	0,255	78	76	13450	11580

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	4,5	0,178	0,431	51	49	2590	2600
3x50/16	0,387	0,494		0,193	0,404	53	52	3260	3180
3x70/16	0,268	0,342		0,215	0,376	56	55	4080	3880
3x95/16	0,193	0,246		0,240	0,355	60	59	5160	4810
3x120/16	0,153	0,196		0,259	0,328	63	62	6190	5670
3x150/25	0,124	0,159		0,281	0,315	68	66	7380	6680
3x185/25	0,0991	0,127		0,305	0,299	71	70	8960	8000
3x240/35	0,0754	0,097		0,338	0,282	77	76	11280	9930
3x300/35	0,0601	0,078		0,373	0,274	82	81	13940	12140

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	5,5	0,155	0,452	55	54	2960	3010
3x50/16	0,387	0,494		0,167	0,424	57	56	3480	3470
3x70/16	0,268	0,342		0,186	0,395	61	59	4330	4180
3x95/16	0,193	0,246		0,206	0,374	65	63	5450	5130
3x120/25	0,153	0,196		0,222	0,345	68	67	6550	6070
3x150/25	0,124	0,159		0,239	0,332	72	70	7770	7110
3x185/35	0,0991	0,127		0,260	0,315	76	74	9350	8450
3x240/35	0,0754	0,097		0,287	0,298	81	80	11600	10300
3x300/35	0,0601	0,078		0,315	0,289	86	85	14280	12530

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/25	0,387	0,494	8,0	0,130	0,467	71	70	4550	4660
3x70/25	0,268	0,342		0,143	0,436	74	73	5430	5430
3x95/35	0,193	0,246		0,158	0,414	78	77	6650	6470
3x120/35	0,153	0,196		0,168	0,383	81	80	7690	7360
3x150/35	0,124	0,159		0,181	0,369	85	83	8950	8490
3x185/35	0,0991	0,127		0,195	0,350	89	87	10520	9780
3x240/35	0,0754	0,097		0,214	0,341	94	93	12840	11750
3x300/50	0,0601	0,078		0,234	0,324	99	98	15610	14040

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	153	133	170
50	181	158	204
70	221	193	253
95	262	231	304
120	298	264	351
150	334	297	398
185	377	336	455
240	434	390	531
300	489	441	606

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

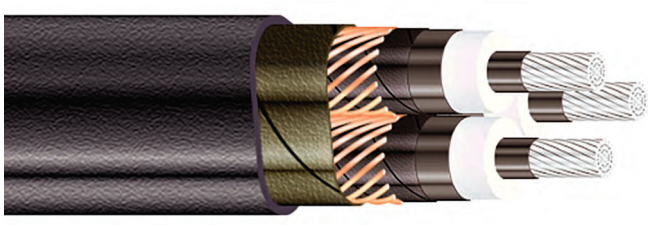
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Aluminum three-core cables without filling

ALUMINUM THREE-CORE CABLES WITHOUT FILLING

IEC 60502



Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– semiconducting tape
– outer sheath: of PE, PVC or flame-retardant PVC

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC sheathed cables) – if mechanical stresses are impossible
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (for PE sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– single-wire core – conductor sealed of water-blocking yarns – common copper screen – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

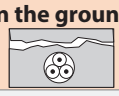
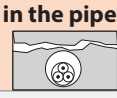
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	2,5	0,270	0,382	43	42	1260	1410
3x50/16	0,641	0,822		0,295	0,357	45	44	1430	1570
3x70/16	0,443	0,568		0,333	0,331	49	47	1690	1840
3x95/16	0,320	0,411		0,375	0,312	53	51	2030	2200
3x120/16	0,253	0,325		0,407	0,287	56	54	2330	2520
3x150/25	0,206	0,264		0,444	0,276	60	58	2770	2990
3x185/25	0,164	0,211		0,486	0,261	64	62	3220	3480
3x240/25	0,125	0,161	2,6	0,525	0,249	70	68	3920	4230
3x300/25	0,100	0,129	2,8	0,546	0,246	76	75	4730	5100

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	3,4	0,219	0,406	46	45	1400	1550
3x50/16	0,641	0,822		0,239	0,380	48	47	1580	1720
3x70/16	0,443	0,568		0,267	0,352	52	51	1860	2030
3x95/16	0,320	0,411		0,300	0,333	56	54	2210	2400
3x120/16	0,253	0,325		0,325	0,307	59	57	2520	2740
3x150/25	0,206	0,264		0,353	0,294	63	62	2970	3210
3x185/25	0,164	0,211		0,385	0,279	67	66	3440	3720
3x240/25	0,125	0,161		0,429	0,264	72	71	4100	4420
3x300/35	0,100	0,129		0,474	0,255	78	76	4940	5310

15 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	4,5	0,178	0,431	51	49	1620	1780
3x50/16	0,641	0,822		0,193	0,404	53	52	1810	1980
3x70/16	0,443	0,568		0,215	0,376	56	55	2110	2300
3x95/16	0,320	0,411		0,240	0,355	60	59	2500	2730
3x120/16	0,253	0,325		0,259	0,328	63	62	2820	3080
3x150/25	0,206	0,264		0,281	0,315	68	66	3290	3570
3x185/25	0,164	0,211		0,305	0,299	71	70	3760	4070
3x240/35	0,125	0,161		0,338	0,282	77	76	4540	4910
3x300/35	0,100	0,129		0,373	0,274	82	81	5330	5760

20 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	5,5	0,155	0,452	55	54	1860	2040
3x50/16	0,641	0,822		0,167	0,424	57	56	2040	2260
3x70/16	0,443	0,568		0,186	0,395	61	59	2370	2600
3x95/16	0,320	0,411		0,206	0,374	65	63	2760	3020
3x120/25	0,253	0,325		0,222	0,345	68	67	3190	3480
3x150/25	0,206	0,264		0,239	0,332	72	70	3580	3900
3x185/35	0,164	0,211		0,260	0,315	76	74	4160	4520
3x240/35	0,125	0,161		0,287	0,298	81	80	4870	5280
3x300/35	0,100	0,129		0,315	0,289	86	85	5680	6150

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/25	0,641	0,822	8,0	0,130	0,467	71	70	3000	3310
3x70/25	0,443	0,568		0,143	0,436	74	73	3360	3700
3x95/35	0,320	0,411		0,158	0,414	78	77	3870	4250
3x120/35	0,253	0,325		0,168	0,383	81	80	4250	4660
3x150/35	0,206	0,264		0,181	0,369	85	83	4680	5170
3x185/35	0,164	0,211		0,195	0,350	89	87	5240	5750
3x240/35	0,125	0,161		0,214	0,341	94	93	6020	6620
3x300/50	0,100	0,129		0,234	0,324	99	98	7040	7660

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	119	103	132
50	140	122	158
70	171	150	196
95	203	179	236
120	232	205	273
150	260	231	309
185	294	262	355
240	340	305	415
300	384	346	475

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2

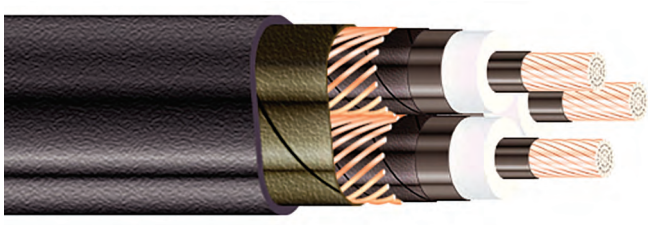
Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

Copper three-core cables without filling

COPPER THREE-CORE CABLES WITHOUT FILLING

IEC 60502



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– semiconducting tape
– outer sheath: of PE, PVC or flame-retardant PVC

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC sheathed cables) – if mechanical stresses are impossible
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (for PE sheathed cables)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– conductor sealed of water-blocking yarns – common copper screen – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

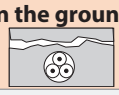
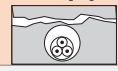
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	2,5	0,270	0,382	43	42	1940	2090
3x50/16	0,387	0,494		0,295	0,357	45	44	2350	2500
3x70/16	0,268	0,342		0,333	0,331	49	47	2990	3140
3x95/16	0,193	0,246		0,375	0,312	53	51	3830	4000
3x120/16	0,153	0,196		0,407	0,287	56	54	4610	4800
3x150/25	0,124	0,159		0,444	0,276	60	58	5560	5780
3x185/25	0,0991	0,127		0,486	0,261	64	62	6730	6990
3x240/25	0,0754	0,097	2,6	0,525	0,249	70	68	8520	8830
3x300/25	0,0601	0,078	2,8	0,546	0,246	76	75	10580	10950

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	3,4	0,219	0,406	46	45	2080	2240
3x50/16	0,387	0,494		0,239	0,380	48	47	2500	2650
3x70/16	0,268	0,342		0,267	0,352	52	51	3160	3320
3x95/16	0,193	0,246		0,300	0,333	56	54	4010	4200
3x120/16	0,153	0,196		0,325	0,307	59	57	4790	5010
3x150/25	0,124	0,159		0,353	0,294	63	62	5760	6000
3x185/25	0,0991	0,127		0,385	0,279	67	66	6940	7230
3x240/25	0,0754	0,097		0,429	0,264	72	71	8700	9020
3x300/35	0,0601	0,078		0,474	0,255	78	76	10780	11160

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	4,5	0,178	0,431	51	49	2300	2460
3x50/16	0,387	0,494		0,193	0,404	53	52	2730	2900
3x70/16	0,268	0,342		0,215	0,376	56	55	3410	3600
3x95/16	0,193	0,246		0,240	0,355	60	59	4300	4530
3x120/16	0,153	0,196		0,259	0,328	63	62	5090	5350
3x150/25	0,124	0,159		0,281	0,315	68	66	6080	6370
3x185/25	0,0991	0,127		0,305	0,299	71	70	7260	7580
3x240/35	0,0754	0,097		0,338	0,282	77	76	9140	9510
3x300/35	0,0601	0,078		0,373	0,274	82	81	11180	11610

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	5,5	0,155	0,452	55	54	2540	2730
3x50/16	0,387	0,494		0,167	0,424	57	56	2960	3180
3x70/16	0,268	0,342		0,186	0,395	61	59	3670	3900
3x95/16	0,193	0,246		0,206	0,374	65	63	4560	4820
3x120/25	0,153	0,196		0,222	0,345	68	67	5470	5760
3x150/25	0,124	0,159		0,239	0,332	72	70	6370	6690
3x185/35	0,0991	0,127		0,260	0,315	76	74	7660	8030
3x240/35	0,0754	0,097		0,287	0,298	81	80	9470	9880
3x300/35	0,0601	0,078		0,315	0,289	86	85	11530	12000

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/25	0,387	0,494	8,0	0,130	0,467	71	70	3920	4240
3x70/25	0,268	0,342		0,143	0,436	74	73	4660	5000
3x95/35	0,193	0,246		0,158	0,414	78	77	5670	6050
3x120/35	0,153	0,196		0,168	0,383	81	80	6520	6930
3x150/35	0,124	0,159		0,181	0,369	85	83	7470	7960
3x185/35	0,0991	0,127		0,195	0,350	89	87	8750	9250
3x240/35	0,0754	0,097		0,214	0,341	94	93	10630	11220
3x300/50	0,0601	0,078		0,234	0,324	99	98	12880	13510

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	153	133	170
50	181	158	204
70	221	193	253
95	262	231	304
120	298	264	351
150	334	297	398
185	377	336	455
240	434	390	531
300	489	441	606

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

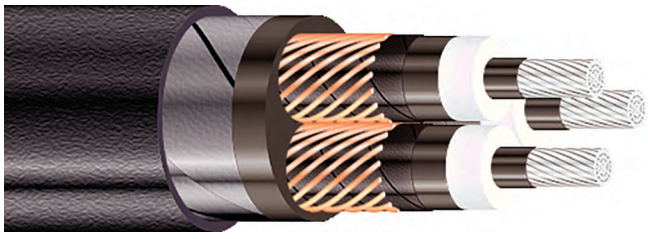
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Aluminum three-core cables with steel tape armor

ALUMINUM THREE-CORE CABLES WITH STEEL TAPE ARMOR

IEC 60502-2



Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– extruded core filling
– armour of two steel galvanized tapes
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– single-wire core – conductor sealed of water-blocking yarns – common copper screen – reinforced PE outer sheath – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

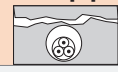
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	2,5	0,270	0,382	47	47	2480	2830
3x50/16	0,641	0,822		0,295	0,357	49	49	2740	3120
3x70/16	0,443	0,568		0,333	0,331	53	53	3170	3590
3x95/16	0,320	0,411		0,375	0,312	57	57	3720	4660
3x120/16	0,253	0,325		0,407	0,287	61	61	4700	5240
3x150/25	0,206	0,264		0,444	0,276	64	64	5230	5830
3x185/25	0,164	0,211		0,486	0,261	68	68	5940	6600
3x240/25	0,125	0,161	2,6	0,525	0,249	74	74	7030	7800
3x300/25	0,100	0,129	2,8	0,546	0,246	80	80	8320	9220

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	3,4	0,219	0,406	51	51	2810	3200
3x50/16	0,641	0,822		0,239	0,380	53	53	3100	3540
3x70/16	0,443	0,568		0,267	0,352	56	56	3570	4040
3x95/16	0,320	0,411		0,300	0,333	60	60	4130	5160
3x120/16	0,253	0,325		0,325	0,307	65	65	5160	5760
3x150/25	0,206	0,264		0,353	0,294	68	68	5720	6380
3x185/25	0,164	0,211		0,385	0,279	72	72	6470	7210
3x240/25	0,125	0,161		0,429	0,264	77	77	7510	8350
3x300/25	0,100	0,129		0,474	0,255	82	82	8690	9650

15 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	4,5	0,178	0,431	55	55	3220	3680
3x50/16	0,641	0,822		0,193	0,404	57	57	3540	4020
3x70/16	0,443	0,568		0,215	0,376	61	61	4020	4570
3x95/16	0,320	0,411		0,240	0,355	64	64	4610	5750
3x120/16	0,253	0,325		0,259	0,328	69	69	5720	6410
3x150/25	0,206	0,264		0,281	0,315	72	72	6310	7050
3x185/25	0,164	0,211		0,305	0,299	76	76	7070	7890
3x240/25	0,125	0,161		0,338	0,282	81	81	8170	9110
3x300/25	0,100	0,129		0,373	0,274	87	87	9400	10460

20 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	5,5	0,155	0,452	59	59	3670	4190
3x50/16	0,641	0,822		0,167	0,424	61	61	4000	4550
3x70/16	0,443	0,568		0,186	0,395	65	65	4510	5120
3x95/16	0,320	0,411		0,206	0,374	69	69	5150	6400
3x120/16	0,253	0,325		0,222	0,345	73	73	6300	7060
3x150/25	0,206	0,264		0,239	0,332	76	76	6910	7730
3x185/25	0,164	0,211		0,260	0,315	80	80	7690	8600
3x240/25	0,125	0,161		0,287	0,298	85	85	8830	9850
3x300/25	0,100	0,129		0,315	0,289	91	91	10100	11250

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/16	0,641	0,822	8,0	0,130	0,467	74	74	5640	6430
3x70/16	0,443	0,568		0,143	0,436	78	78	6250	7130
3x95/16	0,320	0,411		0,158	0,414	81	81	6960	8590
3x120/16	0,253	0,325		0,168	0,383	86	86	8300	9330
3x150/25	0,206	0,264		0,181	0,369	89	89	8980	10080
3x185/25	0,164	0,211		0,195	0,350	93	93	9880	11090
3x240/25	0,125	0,161		0,214	0,341	98	98	11110	12440

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	119	104	133
50	140	123	159
70	171	150	196
95	204	180	238
120	232	206	274
150	259	231	309
185	293	262	354
240	338	304	415
300	380	343	472

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

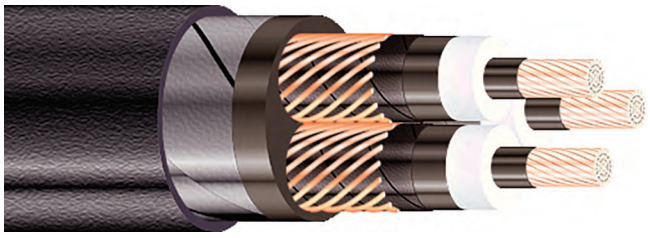
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Copper three-core cables with steel tape armor

COPPER THREE-CORE CABLES WITH STEEL TAPE ARMOR

IEC 60502



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– extruded core filling
– armour of two steel galvanized tapes
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, excluded significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– conductor sealed of water-blocking yarns – common copper screen – reinforced PE outer sheath – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

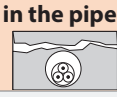
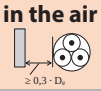
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	2,5	0,270	0,382	47	47	3130	3480
3x50/16	0,387	0,494		0,295	0,357	49	49	3620	4000
3x70/16	0,268	0,342		0,333	0,331	53	53	4400	4810
3x95/16	0,193	0,246		0,375	0,312	57	57	5430	6380
3x120/16	0,153	0,196		0,407	0,287	61	61	6860	7400
3x150/25	0,124	0,159		0,444	0,276	64	64	7900	8490
3x185/25	0,0991	0,127		0,486	0,261	68	68	9300	9960
3x240/25	0,0754	0,097	2,6	0,525	0,249	74	74	11410	12190
3x300/25	0,0601	0,078	2,8	0,546	0,246	80	80	13890	14800

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	3,4	0,219	0,406	51	51	3460	3850
3x50/16	0,387	0,494		0,239	0,380	53	53	3990	4410
3x70/16	0,268	0,342		0,267	0,352	56	56	4800	5280
3x95/16	0,193	0,246		0,300	0,333	60	60	5840	6870
3x120/16	0,153	0,196		0,325	0,307	65	65	7320	7930
3x150/25	0,124	0,159		0,353	0,294	68	68	8380	9030
3x185/25	0,0991	0,127		0,385	0,279	72	72	9820	10580
3x240/25	0,0754	0,097		0,429	0,264	77	77	11890	12730
3x300/25	0,0601	0,078		0,474	0,255	82	82	14260	15220

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	4,5	0,178	0,431	55	55	3870	4330
3x50/16	0,387	0,494		0,193	0,404	57	57	4410	4900
3x70/16	0,268	0,342		0,215	0,376	61	61	5260	5800
3x95/16	0,193	0,246		0,240	0,355	64	64	6330	7460
3x120/16	0,153	0,196		0,259	0,328	69	69	7890	8580
3x150/25	0,124	0,159		0,281	0,315	72	72	8970	9720
3x185/25	0,0991	0,127		0,305	0,299	76	76	10420	11240
3x240/25	0,0754	0,097		0,338	0,282	81	81	12550	13490
3x300/25	0,0601	0,078		0,373	0,274	87	87	14970	16030

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	5,5	0,155	0,452	59	59	4320	4830
3x50/16	0,387	0,494		0,167	0,424	61	61	4870	5420
3x70/16	0,268	0,342		0,186	0,395	65	65	5750	6360
3x95/16	0,193	0,246		0,206	0,374	69	69	6860	8120
3x120/16	0,153	0,196		0,222	0,345	73	73	8460	9220
3x150/25	0,124	0,159		0,239	0,332	76	76	9570	10390
3x185/25	0,0991	0,127		0,260	0,315	80	80	11050	11950
3x240/25	0,0754	0,097		0,287	0,298	85	85	13210	14230
3x300/25	0,0601	0,078		0,315	0,289	91	91	15660	16820

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/16	0,387	0,494	8,0	0,130	0,467	74	74	6520	7310
3x70/16	0,268	0,342		0,143	0,436	78	78	7490	8370
3x95/16	0,193	0,246		0,158	0,414	81	81	8670	10300
3x120/16	0,153	0,196		0,168	0,383	86	86	10460	11490
3x150/25	0,124	0,159		0,181	0,369	89	89	11630	12740
3x185/25	0,0991	0,127		0,195	0,350	93	93	13230	14450
3x240/25	0,0754	0,097		0,214	0,341	98	98	15490	16820

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	154	134	172
50	181	158	205
70	220	194	253
95	263	232	307
120	298	264	352
150	332	296	397
185	374	335	453
240	431	387	529
300	482	435	599

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

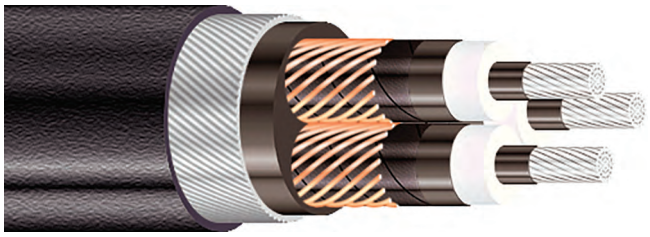
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

6–30 kV | THREE-CORE CABLES

Aluminum three-core cables with steel wire armor

ALUMINUM THREE-CORE CABLES WITH STEEL WIRE ARMOR

IEC 60502-2



Design
– aluminium compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– extruded core filling
– armour of round steel galvanized wires
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, included significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	30 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– single-wire core – conductor sealed of water-blocking yarns – common copper screen – reinforced PE outer sheath – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

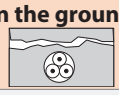
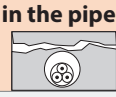
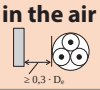
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	2,5	0,270	0,382	51	51	3880	4260
3x50/16	0,641	0,822		0,295	0,357	53	53	4230	4650
3x70/16	0,443	0,568		0,333	0,331	57	57	4770	5230
3x95/16	0,320	0,411		0,375	0,312	61	61	5460	5990
3x120/16	0,253	0,325		0,407	0,287	64	64	6030	6610
3x150/25	0,206	0,264		0,444	0,276	67	67	6640	7280
3x185/25	0,164	0,211		0,486	0,261	71	72	7430	8140
3x240/25	0,125	0,161	2,6	0,525	0,249	79	79	9820	10680
3x300/25	0,100	0,129	2,8	0,546	0,246	85	84	11350	12200

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	3,4	0,219	0,406	55	55	4350	4790
3x50/16	0,641	0,822		0,239	0,380	57	57	4720	5200
3x70/16	0,443	0,568		0,267	0,352	60	60	5270	5800
3x95/16	0,320	0,411		0,300	0,333	64	64	5990	6580
3x120/16	0,253	0,325		0,325	0,307	68	68	6590	7230
3x150/25	0,206	0,264		0,353	0,294	71	71	7210	7920
3x185/25	0,164	0,211		0,385	0,279	75	75	8050	8850
3x240/25	0,125	0,161		0,429	0,264	82	82	10410	11340
3x300/25	0,100	0,129		0,474	0,255	87	86	11800	12660

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	4,5	0,178	0,431	59	59	4880	5380
3x50/16	0,641	0,822		0,193	0,404	61	61	5270	5800
3x70/16	0,443	0,568		0,215	0,376	65	65	5880	6470
3x95/16	0,320	0,411		0,240	0,355	69	69	6610	7290
3x120/16	0,253	0,325		0,259	0,328	72	72	7230	7970
3x150/25	0,206	0,264		0,281	0,315	75	75	7920	8720
3x185/25	0,164	0,211		0,305	0,299	81	81	9940	10840
3x240/25	0,125	0,161		0,338	0,282	86	86	11210	12220
3x300/25	0,100	0,129		0,373	0,274	91	90	12630	13620

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,868	1,113	5,5	0,155	0,452	63	63	5500	6070
3x50/16	0,641	0,822		0,167	0,424	65	65	5900	6520
3x70/16	0,443	0,568		0,186	0,395	69	69	6510	7190
3x95/16	0,320	0,411		0,206	0,374	73	73	7280	8020
3x120/16	0,253	0,325		0,222	0,345	78	78	9050	9890
3x150/25	0,206	0,264		0,239	0,332	81	81	9780	10680
3x185/25	0,164	0,211		0,260	0,315	85	85	10730	11720
3x240/25	0,125	0,161		0,287	0,298	90	90	12060	13180
3x300/25	0,100	0,129		0,315	0,289	95	95	13490	14580

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/16	0,641	0,822	8,0	0,130	0,467	80	80	9080	9970
3x70/16	0,443	0,568		0,143	0,436	83	83	9810	10770
3x95/16	0,320	0,411		0,158	0,414	87	87	10750	11800
3x120/16	0,253	0,325		0,168	0,383	90	90	11520	12640
3x150/25	0,206	0,264		0,181	0,369	94	94	12380	13580
3x185/25	0,164	0,211		0,195	0,350	98	98	13360	14650
3x240/25	0,125	0,161		0,214	0,341	103	102	14870	16160

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	119	104	133
50	140	123	159
70	171	150	196
95	204	180	238
120	232	206	274
150	259	231	309
185	293	262	354
240	338	304	415
300	380	343	472

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	3,3	4,7	6,6	8,9	11,3	14,2	17,5	22,7	28,2

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

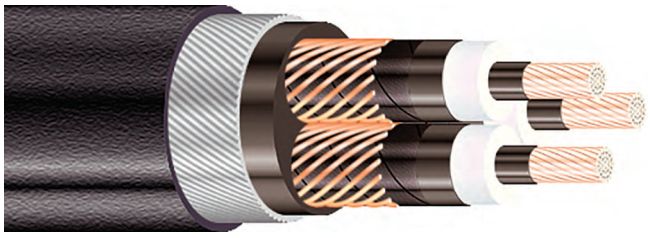
* if the short-circuit time is different from 1 s, this value must be multiplied by the factor ($1/\sqrt{t}$)

6–30 kV | THREE-CORE CABLES

Copper three-core cables with steel wire armor

COPPER THREE-CORE CABLES WITH STEEL WIRE ARMOR

IEC 60502-2



Design
– copper compacted conductor RMC, cl.2
– inner semiconductor layer
– XLPE insulation
– outer semiconductor layer
– semiconducting water-blocking tape
– copper wire screen
– extruded core filling
– armour of round steel galvanized wires
– outer sheath: of PE, PVC, flame-retardant PVC or halogen-free flame-retardant polymer compound

Application	– for laying in the ground (trenches) (PE sheathed cables) – in premises, tunnels, canals, mines, dry ground and outdoors (PVC sheathed cables) – for group laying in cable structures, premises (including those in fire hazardous areas) (flame-retardant PVC sheathed cables) – for laying at facilities where requirements are imposed for reduced smoke emission during combustion and smoldering (flame-retardant PVC or halogen-free sheathed cables) and for low corrosion activity of combustion products (halogen-free flame-retardant sheathed cables) – if mechanical stresses are possible, included significant tensile forces
Ambient temperature	from –50 °C up to +50 °C (for PVC or flame-retardant PVC sheathed cables) from –60 °C up to +50 °C (the rest types)
Permissible conductor temperature – normal mode – alarm mode – short-circuit mode	 90 °C 130 °C 250 °C
Permissible screen short-circuit temperature	350 °C
Minimum bending radius	15·D
Test voltage (50 Hz)	$3{,}5U_0$, 5 min
Partial discharge level at $1{,}5 \cdot U_0$ A.C.	5 pC
Maximum permissible pulling force at installing	50 N/mm^2
Minimum permissible temperature at installing	–20 °C (for PE sheathed cables) –15 °C (the rest types)
Design options	– conductor sealed of water-blocking yarns – common copper screen – reinforced PE outer sheath – semiconductor layer on the outer sheath
Flame resistance	not determined (PE sheathed cables) / EN 60332-1-2 (the rest types)
CPR - reaction to fire class according to EN 50575	Fca (PE sheathed cables) / Eca (the rest types)

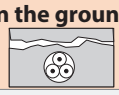
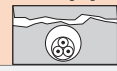
6 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	2,5	0,270	0,382	51	51	4530	4910
3x50/16	0,387	0,494		0,295	0,357	53	53	5110	5530
3x70/16	0,268	0,342		0,333	0,331	57	57	6000	6470
3x95/16	0,193	0,246		0,375	0,312	61	61	7180	7700
3x120/16	0,153	0,196		0,407	0,287	64	64	8200	8790
3x150/25	0,124	0,159		0,444	0,276	67	67	9300	9940
3x185/25	0,0991	0,127		0,486	0,261	71	72	10790	11500
3x240/25	0,0754	0,097	2,6	0,525	0,249	79	79	14200	15060
3x300/25	0,0601	0,078	2,8	0,546	0,246	85	84	16920	17770

10 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	3,4	0,219	0,406	55	55	5000	5430
3x50/16	0,387	0,494		0,239	0,380	57	57	5600	6070
3x70/16	0,268	0,342		0,267	0,352	60	60	6510	7030
3x95/16	0,193	0,246		0,300	0,333	64	64	7700	8290
3x120/16	0,153	0,196		0,325	0,307	68	68	8750	9400
3x150/25	0,124	0,159		0,353	0,294	71	71	9870	10580
3x185/25	0,0991	0,127		0,385	0,279	75	75	11410	12200
3x240/25	0,0754	0,097		0,429	0,264	82	82	14800	15720
3x300/25	0,0601	0,078		0,474	0,255	87	86	17370	18220

15 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	4,5	0,178	0,431	59	59	5540	6020
3x50/16	0,387	0,494		0,193	0,404	61	61	6150	6680
3x70/16	0,268	0,342		0,215	0,376	65	65	7120	7710
3x95/16	0,193	0,246		0,240	0,355	69	69	8330	9000
3x120/16	0,153	0,196		0,259	0,328	72	72	9400	10140
3x150/25	0,124	0,159		0,281	0,315	75	75	10580	11380
3x185/25	0,0991	0,127		0,305	0,299	81	81	13300	14200
3x240/25	0,0754	0,097		0,338	0,282	86	86	15600	16600
3x300/25	0,0601	0,078		0,373	0,274	91	90	18200	19200

20 kV								
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, µF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x35/16	0,524	0,668	5,5	0,155	0,452	63	63	6150	6720
3x50/16	0,387	0,494		0,167	0,424	65	65	6780	7400
3x70/16	0,268	0,342		0,186	0,395	69	69	7740	8410
3x95/16	0,193	0,246		0,206	0,374	73	73	9000	9740
3x120/16	0,153	0,196		0,222	0,345	78	78	11210	12050
3x150/25	0,124	0,159		0,239	0,332	81	81	12430	13340
3x185/25	0,0991	0,127		0,260	0,315	85	85	14080	15070
3x240/25	0,0754	0,097		0,287	0,298	90	90	16440	17570
3x300/25	0,0601	0,078		0,315	0,289	95	95	19060	20150

30 kV									
Number of cores × nom. cross-section area of core/ screen, mm²	Conductor electrical resistance, Ohm/km, no more than		Nominal insulation thickness, mm	Calculated capacitance, μF/km	Calculated inductance, mH/km	Cable outer diameter, mm		Calculated cable weight, kg/km	
	d.c. 20 °C	a.c. 90 °C				PE sheathed cables	flame-retardant PVC sheathed cables	PE sheathed cables	flame-retardant PVC sheathed cables
3x50/16	0,387	0,494	8,0	0,130	0,467	80	80	9970	10840
3x70/16	0,268	0,342		0,143	0,436	83	83	11050	12000
3x95/16	0,193	0,246		0,158	0,414	87	87	12460	13520
3x120/16	0,153	0,196		0,168	0,383	90	90	13680	14800
3x150/25	0,124	0,159		0,181	0,369	94	94	15030	16240
3x185/25	0,0991	0,127		0,195	0,350	98	98	16710	18000
3x240/25	0,0754	0,097		0,214	0,341	103	102	19250	20540

Nominal cross-section area of cores, mm²	Current carrying capacity, A		
	in the ground 	in the pipes 	in the air 
35	154	134	172
50	181	158	205
70	220	194	253
95	263	232	307
120	298	264	352
150	332	296	397
185	374	335	453
240	431	387	529
300	482	435	599

Permissible current loads are calculated for following conditions: conductor temperature 90 °C; air temperature 30 °C; ground temperature 20 °C; laying depth in ground 0,8 m; soil thermal resistance 1,2 K·m/W; both-ends grounding.

Nominal cross-section area of core, mm²	35	50	70	95	120	150	185	240	300
1-second short-circuit conductor capacity*, kA	5,0	7,2	10,0	13,6	17,2	21,5	26,5	34,3	42,9

Nominal cross-section area of screen, mm²	16	25	35	50	70	95	120
1-second short-circuit screen capacity*, kA	3,3	5,1	7,1	10,2	14,2	19,3	24,4

* if the short-circuit time is different from 1 s, this value must be multiplied by the factor $(1/\sqrt{t})$

Note: the cable parameters shown on pages 11–114 are calculated, the technical characteristics of the cables manufactured may differ from those stated.

Correction factors for permissible current calculation

Permissible current loads are calculated for following conditions:

– conductor temperature 90 °C
– both-ends grounding

In air:

– air temperature 30 °C
– single-core cables in flat formation are touching throughout their length or spacing with a clearance of one cable diameter

In ground:

– ground temperature 20 °C
– laying depth 0.8 m
– soil thermal resistance 1.2 K·m/W
– pipes are not filled by any substances such as bentonite
– single-core cables in flat formation are spacing with a clearance of one cable diameter

If the cables are laid in pipes filled with bentonite, they are treated as directly buried cables.

CORRECTION FACTORS FOR DEPTHS OF LAYING FOR DIRECT BURIED CABLES

Laying depth, m	Core cross-section of one-core cables, mm²		Three-core cables, mm²
	up to 185	more than 185	
0,50	1,04	1,06	1,04
0,60	1,02	1,04	1,03
0,80	1,00	1,00	1,00
1,00	0,98	0,97	0,98
1,25	0,96	0,95	0,96
1,50	0,95	0,93	0,95
1,75	0,94	0,91	0,94
2,00	0,93	0,90	0,93
2,50	0,91	0,88	0,91
3,00	0,90	0,86	0,90
4,00	0,88	0,83	0,88
5,00	0,86	0,80	0,86
10,00	0,80	0,71	0,80
15,00	0,76	0,65	0,76
20,00	0,73	0,60	0,73

CORRECTION FACTORS FOR DEPTHS OF LAYING IN THE PIPES BURIED IN THE GROUND

Laying depth, m	Core cross-section of one-core cables, mm²		Three-core cables, mm²
	up to 185	more than 185	
0,50	1,04	1,05	1,03
0,60	1,02	1,03	1,02
1,00	0,98	0,97	0,99
1,25	0,96	0,95	0,97
1,50	0,95	0,93	0,96
1,75	0,94	0,92	0,95
2,00	0,93	0,91	0,94
2,50	0,91	0,89	0,93
3,00	0,90	0,88	0,92
4,00	0,88	0,85	0,90
5,00	0,86	0,83	0,89
10,00	0,80	0,75	0,84
15,00	0,76	0,71	0,81
20,00	0,73	0,67	0,79

CORRECTION FACTORS FOR AMBIENT AIR TEMPERATURES OTHER THAN 30 °C

Maximum permissible long-term core temperature, °C	Ambient air temperature, °C							
	20	25	35	40	45	50	55	60
90	1,08	1,04	0,96	0,91	0,87	0,82	0,76	0,71

CORRECTION FACTORS FOR AMBIENT GROUND TEMPERATURES OTHER THAN 20 °C

Maximum permissible long-term core temperature, °C	Ambient ground temperature, °C							
	10	15	25	30	35	40	45	50
90	1,07	1,04	0,96	0,93	0,89	0,85	0,80	0,76

CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITIES OTHER THAN 1,5 K·M/W FOR DIRECT BURIED ONE-CORE CABLES

Nominal cross-section area of core, mm²	Soil thermal resistivity, K·m/W						
	0,7	0,8	0,9	1	2	2,5	3
35	1,30	1,25	1,21	1,16	0,89	0,81	0,75
50	1,32	1,26	1,21	1,16	0,89	0,81	0,74
70	1,33	1,27	1,22	1,17	0,89	0,81	0,74
95	1,34	1,28	1,22	1,18	0,89	0,80	0,74
120	1,34	1,28	1,22	1,18	0,88	0,80	0,74
150	1,35	1,28	1,23	1,18	0,88	0,80	0,74
185	1,35	1,29	1,23	1,18	0,88	0,80	0,74
240	1,36	1,29	1,23	1,18	0,88	0,80	0,73
300	1,36	1,30	1,24	1,19	0,88	0,80	0,73
400	1,37	1,30	1,24	1,19	0,88	0,79	0,73
500	1,38	1,31	1,24	1,19	0,87	0,79	0,73
630	1,38	1,31	1,25	1,20	0,87	0,79	0,73
800	1,39	1,32	1,25	1,20	0,87	0,79	0,73
1000	1,39	1,32	1,25	1,20	0,87	0,79	0,73

CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITIES OTHER THAN 1,5 K·M/W FOR THE ONE-CORE CABLES IN THE PIPES BURIED IN THE GROUND

Nominal cross-section area of core, mm²	Soil thermal resistivity, K·m/W						
	0,7	0,8	0,9	1	2	2,5	3
35	1,21	1,18	1,21	1,12	0,91	0,84	0,79
50	1,21	1,18	1,21	1,12	0,91	0,84	0,78
70	1,22	1,19	1,22	1,12	0,91	0,84	0,78
95	1,23	1,19	1,22	1,13	0,91	0,84	0,78
120	1,23	1,20	1,22	1,13	0,91	0,84	0,78
150	1,24	1,20	1,23	1,13	0,91	0,83	0,78
185	1,24	1,20	1,23	1,13	0,91	0,83	0,78
240	1,25	1,21	1,23	1,14	0,90	0,83	0,77
300	1,25	1,21	1,24	1,14	0,90	0,83	0,77
400	1,25	1,21	1,24	1,14	0,90	0,83	0,77
500	1,26	1,22	1,24	1,14	0,90	0,82	0,77
630	1,26	1,22	1,25	1,14	0,90	0,82	0,77
800	1,27	1,22	1,25	1,15	0,90	0,82	0,77
1000	1,27	1,22	1,25	1,15	0,90	0,82	0,77

CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITIES OTHER THAN 1,5 K·M/W FOR DIRECT BURIED THREE-CORE CABLES

Nominal cross-section area of core, mm²	Soil thermal resistivity, K·m/W						
	0,7	0,8	0,9	1	2	2,5	3
35	1,25	1,21	1,17	1,13	0,91	0,83	0,78
50	1,25	1,21	1,17	1,14	0,91	0,83	0,77
70	1,26	1,21	1,18	1,14	0,90	0,83	0,77
95	1,26	1,22	1,18	1,14	0,90	0,83	0,77
120	1,26	1,22	1,18	1,14	0,90	0,83	0,77
150	1,27	1,22	1,18	1,15	0,90	0,83	0,77
185	1,27	1,23	1,18	1,15	0,90	0,83	0,77
240	1,28	1,23	1,19	1,15	0,90	0,83	0,77
300	1,28	1,23	1,19	1,15	0,90	0,82	0,77

CORRECTION FACTORS FOR SOIL THERMAL RESISTIVITIES OTHER THAN 1,5 K·M/W FOR THE THREE-CORE CABLES LAID IN THE PIPES BURIED IN THE GROUND

Nominal cross-section area of core, mm²	Soil thermal resistivity, K·m/W						
	0,7	0,8	0,9	1	2	2,5	3
35	1,14	1,12	1,10	1,08	0,94	0,88	0,84
50	1,14	1,12	1,10	1,08	0,94	0,88	0,84
70	1,15	1,13	1,11	1,09	0,94	0,88	0,83
95	1,15	1,13	1,11	1,09	0,94	0,88	0,83
120	1,15	1,13	1,11	1,09	0,93	0,88	0,83
150	1,16	1,13	1,11	1,09	0,93	0,88	0,83
185	1,16	1,14	1,11	1,09	0,93	0,87	0,83
240	1,16	1,14	1,12	1,10	0,93	0,87	0,82
300	1,17	1,14	1,12	1,10	0,93	0,87	0,82

CORRECTION FACTORS FOR GROUPS OF THREE-CORE CABLES IN HORIZONTAL FORMATION LAID DIRECT IN THE GROUND

Number of cables in group	Spacing between cables centres, mm				
	touching	200	400	600	800
2	0,80	0,86	0,90	0,92	0,94
3	0,69	0,77	0,82	0,86	0,89
4	0,62	0,72	0,79	0,83	0,87
5	0,57	0,68	0,76	0,81	0,85
6	0,54	0,65	0,74	0,80	0,84
7	0,51	0,63	0,72	0,78	0,83
8	0,49	0,61	0,71	0,78	-
9	0,47	0,60	0,70	0,77	-
10	0,46	0,59	0,69	-	-
11	0,45	0,57	0,69	-	-
12	0,43	0,56	0,68	-	-

CORRECTION FACTORS FOR GROUPS OF THREE-PHASE CIRCUITS OF ONE-CORE CABLES LAID DIRECT IN THE GROUND

Number of cable groups	Spacing between group centres, mm				
	touching	200	400	600	800
2	0,73	0,83	0,88	0,90	0,92
3	0,60	0,73	0,79	0,83	0,86
4	0,54	0,68	0,75	0,80	0,84
5	0,49	0,63	0,72	0,78	0,82
6	0,46	0,61	0,70	0,76	0,81
7	0,43	0,58	0,68	0,75	0,80
8	0,41	0,57	0,67	0,74	-
9	0,39	0,55	0,66	0,73	-
10	0,37	0,54	0,65	-	-
11	0,36	0,53	0,64	-	-
12	0,35	0,52	0,64	-	-

CORRECTION FACTORS FOR GROUPS OF THREE-CORE CABLES LAID IN A SINGLE PIPE BURIED IN THE GROUND IN HORIZONTAL FORMATION (EACH CABLE IN A SEPARATE PIPE)

Number of cables in group	Spacing between cables centres, mm				
	touching	200	400	600	800
2	0,85	0,88	0,92	0,94	0,95
3	0,75	0,80	0,85	0,88	0,91
4	0,69	0,75	0,82	0,86	0,89
5	0,65	0,72	0,79	0,84	0,87
6	0,62	0,69	0,77	0,83	0,87
7	0,59	0,67	0,76	0,82	0,86
8	0,57	0,65	0,75	0,81	-
9	0,55	0,64	0,74	0,80	-
10	0,54	0,63	0,73	-	-
11	0,52	0,62	0,73	-	-
12	0,51	0,61	0,72	-	-

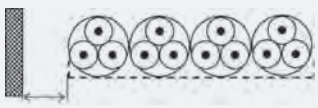
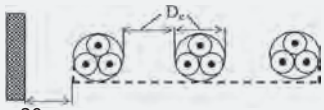
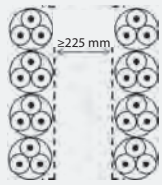
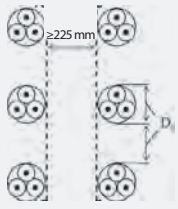
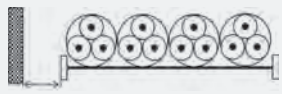
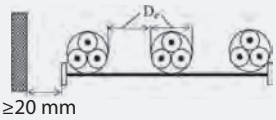
CORRECTION FACTORS FOR GROUPS OF THREE-PHASE CIRCUITS OF ONE-CORE CABLES LAID IN A SINGLE PIPE BURIED IN THE GROUND IN HORIZONTAL FORMATION (EACH CABLE IN A SEPARATE PIPE)

Number of cables in group	Spacing between cables centres, mm				
	touching	200	400	600	800
2	0,78	0,85	0,89	0,91	0,93
3	0,66	0,75	0,81	0,85	0,88
4	0,59	0,70	0,77	0,82	0,86
5	0,55	0,66	0,74	0,80	0,84
6	0,51	0,64	0,72	0,78	0,83
7	0,48	0,61	0,71	0,77	0,82
8	0,46	0,60	0,70	0,76	-
9	0,44	0,58	0,69	0,76	-
10	0,43	0,57	0,68	-	-
11	0,42	0,56	0,67	-	-
12	0,40	0,55	0,67	-	-

CORRECTION FACTORS FOR DIFFERENT SCREEN CROSS-SECTION OF ONE-CORE CABLES (BOTH ENDS GROUNDED)

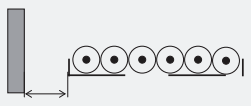
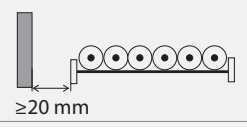
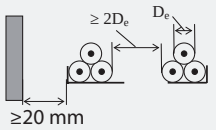
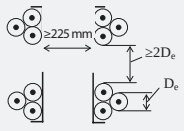
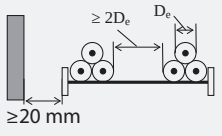
Nominal screen cross-section area, mm²	Aluminum core cross-section, mm²											
	70	95	120	150	185	240	300	400	500	630	800	1000
16	1	1	1									
25	1	1	1	1	1	1	1					
35	1	1	1	1	1	1	0,99	1	1	1	1	1
50	0,99	0,99	1	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99
70	-	0,99	0,99	0,99	0,99	0,98	0,98	0,98	0,98	0,97	0,97	0,96
95	-	-	0,98	0,98	0,98	0,98	0,97	0,97	0,96	0,95	0,95	0,94
120	-	-	-	0,98	0,97	0,97	0,96	0,96	0,95	0,94	0,93	0,92
150	-	-	-	-	0,97	0,96	0,95	0,95	0,94	0,92	0,91	0,90
185	-	-	-	-	-	0,95	0,94	0,94	0,92	0,91	0,89	0,88
240	-	-	-	-	-	-	0,93	0,92	0,91	0,89	0,87	0,85
Nominal screen cross-section area, mm²	**Copper core cross-section, mm²**											
	70	**95**	**120**	**150**	**185**	**240**	**300**	**400**	**500**	**630**	**800**	**1000**
16	1	1	1									
25	1	1	1	1	1	1	1					
35	1	1	0,99	1	1	0,99	0,99	1	1	1	1	1
50	0,99	0,99	0,99	0,99	0,99	0,98	0,98	0,99	0,99	0,98	0,98	0,98
70	-	0,99	0,98	0,98	0,98	0,97	0,97	0,97	0,96	0,96	0,96	0,95
95	-	-	0,97	0,97	0,97	0,96	0,95	0,95	0,94	0,93	0,92	0,92
120	-	-	-	0,96	0,96	0,95	0,94	0,93	0,92	0,91	0,90	0,89
150	-	-	-	-	0,95	0,94	0,92	0,92	0,91	0,89	0,88	0,87
185	-	-	-	-	-	0,92	0,91	0,90	0,89	0,87	0,85	0,84
240	-	-	-	-	-	-	0,90	0,89	0,87	0,85	0,83	0,81

REDUCTION FACTORS FOR GROUPS OF MORE THAN ONE MULTI-CORE CABLE IN AIR —
TO BE APPLIED TO THE CURRENT-CARRYING CAPACITY FOR ONE MULTI-CORE CABLE IN FREE AIR

Method of installation		Number of trays	Number of cables					
			1	2	3	4	6	9
Cables on perforated trays	touching  ≥20 mm	1 2 3	1,00 1,00 1,00	0,88 0,87 0,86	0,82 0,80 0,79	0,79 0,77 0,76	0,76 0,73 0,71	0,73 0,68 0,66
	spaced  ≥20 mm	1 2 3	1,00 1,00 1,00	1,00 0,99 0,98	0,98 0,96 0,95	0,95 0,92 0,91	0,91 0,87 0,85	- - -
Cables on vertical perforated trays	touching  ≥225 mm	1 2	1,00 1,00	0,88 0,88	0,82 0,81	0,78 0,76	0,73 0,71	0,72 0,72
	spaced  ≥225 mm	1 2	1,00 1,00	0,91 0,91	0,89 0,88	0,88 0,87	0,87 0,85	- -
Cables on ladder supports, cleats, etc.	touching  ≥20 mm	1 2 3	1,00 1,00 1,00	0,87 0,86 0,85	0,82 0,80 0,79	0,80 0,78 0,76	0,79 0,76 0,73	0,78 0,73 0,70
	spaced  ≥20 mm	1 2 3	1,00 1,00 1,00	1,00 0,99 0,98	1,00 0,98 0,97	1,00 0,97 0,96	1,00 0,96 0,93	- - -

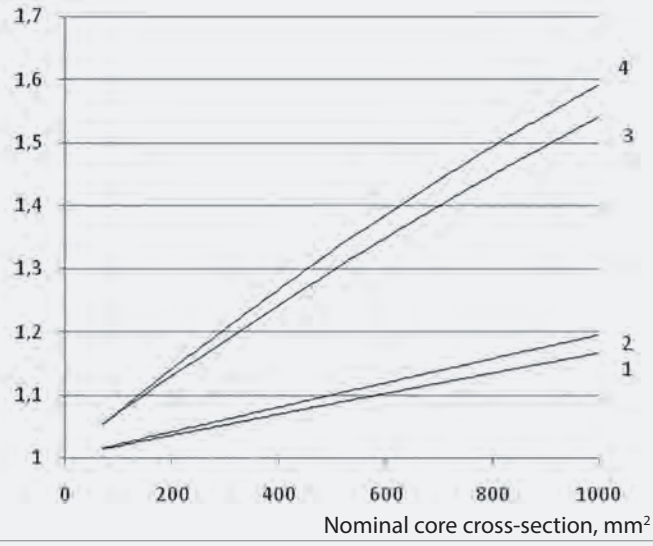
NOTE 1 Values given are averages for the cable types and range of conductor sizes considered. The spread of values is generally less than 5 %.
NOTE 2 Factors apply to single layer groups of cables as shown above and do not apply when cables are installed in more than one layer touching each other. Values for such installations may be significantly lower and must be determined by an appropriate method.
NOTE 3 Values are given for vertical spacings between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing, the factors should be reduced.
NOTE 4 Values are given for horizontal spacing between trays of 225 mm with trays mounted back to back. For closer spacing, the factors should be reduced.

REDUCTION FACTORS FOR GROUPS OF MORE THAN ONE CIRCUIT OF SINGLE-CORE CABLES — TO BE APPLIED TO THE CURRENT-CARRYING CAPACITY FOR ONE CIRCUIT OF SINGLE-CORE CABLES IN FREE AIR

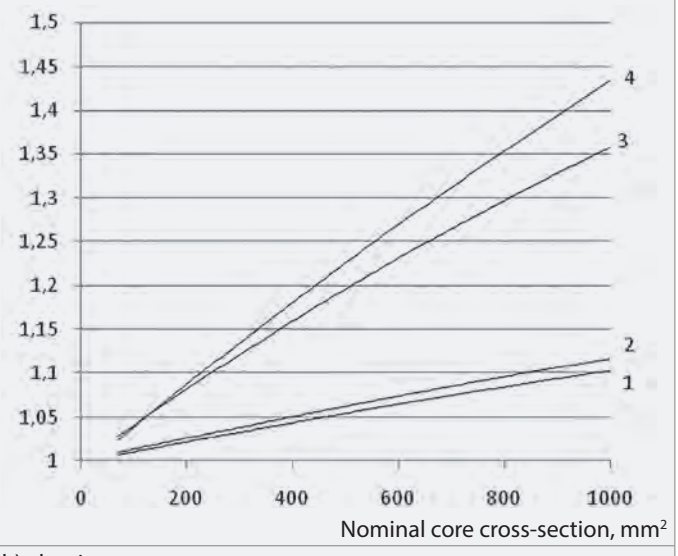
Method of installation		Number of trays	Number of cables			Use as a multiplier to rating for
			1	2	3	
Perforated trays	touching 	1 2 3	0,98 0,96 0,95	0,91 0,87 0,85	0,87 0,81 0,78	Three cables in horizontal formation
Ladder supports, cleats etc.	touching 	1 2 3	1,00 0,98 0,97	0,97 0,93 0,90	0,96 0,89 0,86	
Perforated trays		1 2 3	1,00 0,97 0,96	0,98 0,93 0,92	0,96 0,89 0,86	Three cables in trefoil formation
Vertical perforated trays	spaced 	1 2	1,00 1,00	0,91 0,90	0,89 0,86	
Ladder supports, cleats etc.		1 2 3	1,00 0,97 0,96	1,00 0,95 0,94	1,00 0,93 0,90	

NOTE 1 Values given are averages for the cable types and range of conductor sizes considered. The spread of values is generally less than 5 %.
NOTE 2 Factors are given for single layers of cables (or trefoil groups) as shown in the table and do not apply when cables are installed in more than one layer touching each other. Values for such installations may be significantly lower and should be determined by an appropriate method.
NOTE 3 Values are given for vertical spacings between trays of 300 mm. For closer spacing, the factors should be reduced.
NOTE 4 Values are given for horizontal spacing between trays of 225 mm with trays mounted back to back. For closer spacing, the factors should be reduced.
NOTE 5 For circuits having more than one cable in parallel per phase, each three phase set of conductors should be considered as a circuit for the purpose of this table.

CORRECTION FACTORS FOR ONE END GROUNDED OR CROSS BONDED GROUNDED CABLE LINES



a) copper core



b) aluminum core

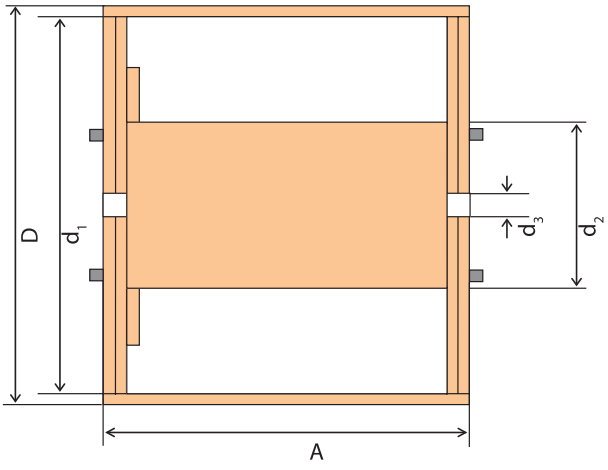
1 — trefoil formation in the air; 2 — trefoil formation in the ground; 3 — flat formation in the ground; 4 — flat formation in the air

Cables packaging and delivery

Cables are supplied on the lined wooden drums with a snail according to GOST 5151-79.

The ends of the cables during transport and storage are sealed with heat shrinkable caps to prevent the penetration of water, and are fixed. During laying, the cap should be removed directly before installition. If the caps were removed prematurely, the cable ends should be protected from moisture.

During the storage, loading and transportation of cables, it is necessary to ensure control and necessary repair of the outer sheath and protective cap to avoid penetration of water under the outer sheath.



D — drum diameter with packaging plank
d_1 — drum flange diameter
d_2 — drum barrel diameter
d_3 — diameter of the axial hole
A — packaging plank length

Drum type	Dimensions, mm					Calculated drum mass, kg	
	D	d_1	d_2	A	d_3	without packaging plank	with packaging plank
20	2060	2000	1220	1180	80	390	530
22	2260	2200	1320	1236	100	670	820
25	2580	2500	1500	1560	120	1210	1500
26	2680	2600	1500	1780		1370	1700
30	3080	3000	1800	2160	150	2290	2750

Note. The weight of drums is calculated with a moisture content of 30–40% and a specific weight of sawn timber 550 kg/m^3

CALCULATED CABLE LENGTH ON THE DRUMS

Drum type	Cable outer diameter, mm																
	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
20	2300	1630	1110	870	660	500	480	340	330	–	–	–	–	–	–	–	–
22	2910	2130	1500	1070	820	640	620	450	430	–	–	–	–	–	–	–	–
25	5230	3630	2420	1980	1560	1290	1040	820	620	590	570	430	410	380	270	270	250
26	7410	4880	3770	2850	2100	1720	1380	1110	1040	850	780	610	580	440	420	420	400
30	10630	7210	5090	3840	3220	2640	2170	1750	1420	1130	1100	830	800	770	590	560	530

For notes

YUZHCABLE

YUZHCABLE WORKS PRIVATE JOINT STOCK COMPANY

Address: Avtogennaya str. 7, Kharkov, 61099, Ukraine
Tel.: +38 057 728 12 41, +38 057 728 12 31, +38 057 754 52 82
E-mail: oves@yuzhcable.com.ua
Web: www.yuzhcable.com.ua