ELECTRICAL INFORMATION

for Low Voltage Cables

prysmian

The planet's pathways

Connecting people and businesses everywhere

150
Years of Experience

+50
Countries

33k
Employees

+15B
Sales in Euros

Sustainability-driven innovation to lead the energy transition and digital transformation

With a legacy spanning over 150 years, Prysmian is a global leader in energy and telecom cable solutions, driving innovation and sustainability. In 2023, we achieved over €15 billion in sales, supported by our 33,000 employees, 82 manufacturing plants, and operations in more than 50 countries worldwide.

We offer the broadest range of cutting-edge products, services, and technologies tailored to meet the evolving needs of our customers. From enabling the energy transition with our pioneering E-Path sustainable cable solution, to supporting critical telecom infrastructure, Prysmian plays a pivotal role in building resilient and efficient systems across the globe.

Our commitment to work closely with our customers ensures that we deliver solutions to help them expand energy and telecom networks, achieving sustainable, profitable growth while addressing the challenges of a rapidly changing world. Together, we're shaping the future of connectivity and electrification.

Our world-leading cable solutions

Transmission

- Submarine power and telecom systems
- Marine installation through inhouse fleet
- Underground interconnectors up to 525kV DC
- Complete solutions provider:
  - Turn-key execution approach
  - Continuous monitoring
  - Post-installation maintenance

Power Grid

- HV/EHV AC systems supply and installation
- MV and HV/EHV Network Components (NWC) up to 500kV
- Power Distribution cables' solutions from LV to MV (and up to 69kV)
- Data-driven permanent monitoring systems for power networks

Electrification

- Renewables
- Specialties & OEM
  - (Railway, Marine, Crane, Mining, Nuclear, Rolling Stock, Defence, Electro medical, other infrastructure)
- Data Centres
- Energy Storage Systems
- OGP Onshore/Offshore & SURF
- Elevators
- Other Industrial
- Residential, Hospitals & Commercial constructions

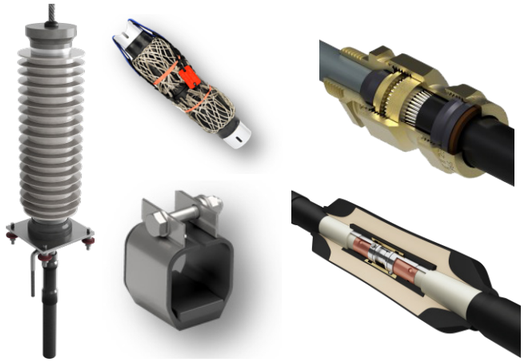
Digital Solutions

- Commercial Buildings
  - Passive Optical Cabling
  - Structured Cabling System
  - Building Management
- Data Centre
- Mission Critical and Harsh Environment
- Broadcast and Studio
- Marine & Shipboard

Network components

Empowering Reliable Grids with Comprehensive Network Components

We go beyond cables to deliver complete solutions for your transmission and distribution needs. Our extensive portfolio of network components and accessories—including joints, terminations, connectors, and glands—ensures seamless integration with power systems, whether for new installations or upgrades to existing grids. Engineered to the highest standards, our components provide reliability, safety, and performance, supporting utilities in building efficient and robust power networks.



We offer tailored solutions across all voltage classes, including innovative designs for optical fiber integration and asset monitoring systems, reflecting our commitment to sustainability and innovation. Our advanced technologies, such as pre-expanded and cold-shrink options, enable faster, easier installations, reducing downtime and ensuring operational excellence.

Backed by Prysmian's global reach and local expertise, we provide dedicated engineering support and customized designs to meet specific project needs. Together, let's build the future of power systems with network components that are as reliable and innovative as our cables.

Asset monitoring & systems

PRY-CAM

Advanced Sensing Solutions for Proactive Asset Management

Prysmian's Electronic and Optical Sensing Solutions (EOSS) are at the forefront of system integrity monitoring, offering cutting-edge tools to safeguard your critical assets. Our comprehensive platform integrates partial discharge (PD) detection, distributed temperature sensing (DTS), and distributed acoustic sensing (DAS) to provide real-time insights into your system's health. With Pry-Cam solutions for both portable, spot analysis and permanent installation for continuous monitoring, you hold the power to act proactively, ensuring safety, reliability, and costefficiency.

Our systems deliver precise data on temperature variations, partial discharge activity, and acoustic anomalies, enabling informed decision-making to prevent costly repairs or unplanned downtime. Scalable and flexible, the modular design adapts to your evolving needs, while user-friendly interfaces streamline monitoring and analysis.

With EOSS, Prysmian elevates monitoring from reactive to preventive, helping utilities and industries achieve enhanced operational reliability. Discover how EOSS and Pry-Cam can transform your approach to asset management, ensuring the safety and longevity

Prysmian in the region

Prysmian operates extensively across the Asia Pacific region, supported by a robust infrastructure that includes 13 manufacturing plants across China, Malaysia, Indonesia, the Philippines, and Thailand. Our regional distribution center in Singapore serves as a strategic hub, ensuring seamless delivery of cutting-edge cable solutions for the energy, infrastructure, and telecom markets.

In Asia Pacific, Prysmian is proud to be a part of landmark projects that showcase our expertise and commitment to innovation. These include addressing the complex cable requirements of iconic developments like Marina Bay Sands in Singapore and supporting the ambitious South Vietnam submarine cable projects, which strengthen regional connectivity. Additionally, Prysmian's advanced solutions have contributed to offshore wind farm developments, highlighting our pivotal role in accelerating the region's transition to renewable energy.

With a clear focus on sustainability and a strong local presence, Prysmian is well-positioned to meet the demands of Asia Pacific's rapidly growing markets. We remain dedicated to delivering innovative technologies that empower our partners and drive the region's progress towards a more connected and

Our corporate brand

Prysmian has a multi-brand architecture made of three levels: a strong Corporate Brand, Prysmian, which stands for the whole organization. It is the umbrella brand under which all the initiatives regarding the Company worldwide are carried out.

The second level is represented by the three well-known Commercial Brands: Prysmian, Draka and General Cable.

The third level encompasses the wide range of product brands that serve all the markets and applications in which the Company operates.

Content

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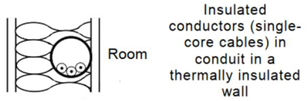
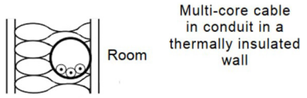
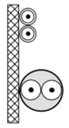
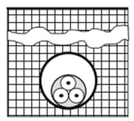
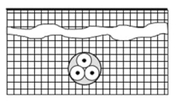
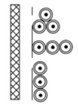
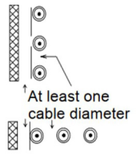
1 Reference method of installation

Installation Method		
A1	 Insulated conductors (single-core cables) in conduit in a thermally insulated wall	The wall consists of an outer weatherproof skin, thermal insulation and an inner skin of wood or wood-like material having a thermal conductance of at least 10 W/m².K. The conduit is fixed to be close to, but not necessary touching the inner skin. Heat from the cables is assumed to escape through the inner skin only. The conduit can be metal or plastic.
A2	 Multi-core cable in conduit in a thermally insulated wall	
B1	 Insulated conductors (single-core cables) in conduit on a wooden wall	Conduit mounted on a wooden wall so that the gap between the conduit and the surface is less than 0.3 times the conduit diameter. The conduit can be metal or plastic. Where the conduit is fixed to a masonry wall the current carrying capacity of the cable or insulated conductors may be higher. (This subject is under consideration)
B2	 Multi-core cable in conduit on a wooden wall	
C	 Single-core or multi-core cable on a wooden wall	Cable mounted on a wooden wall so that the gap between the cable and the surface is less than 0.3 times the cable diameter. Where the cable is fixed to or embedded in a masonry wall the current carrying capacity of the cable or insulated conductors may be higher. (This subject is under consideration)
D1	 Multi-core cable in ducts in the ground	Cables drawn into 100mm diameter plastic, earthenware or metallic ducts laid in direct contact with soil having a thermal resistivity of 2.5 K.m/W and a depth of 0.8m.
D2	 Sheathed single-core or multi-core cables direct in the ground.	Cables laid in direct contact with soil having a thermal resistivity of 2.5 K.m/W and a depth of 0.8m

Installation Method		
E	 Multi-core cable in free air	A cable so supported that the total heat dissipation is not impeded. Heating due to solar radiation and other sources shall be considered. Care shall be taken that natural air convection is not impeded. In practice, a clearance between a cable and any adjacent surface of at least 0.3 times the cable external diameter for multicore cables and 1 time the cable diameter for single core cables is sufficient to permit the use of current carrying capacities appropriate to free air conditions.
F	 Single-core cables, touching in free air	
G	 Single-core cables, spaced in free air	

1.1 Method of installation by cable type

Cable Type	Method of installation							
	Thermal insulated wall	Conduit system on wall	Clipped direct on wall	Ducts in the ground	Direct buried in the ground	Free air	Free air (Touching, Trefoil)	Free air (Spaced; Horizontal, Vertical)
Single core non-armoured	A1	B1	C	-	D2	G	F	G
Multicore	A2	B2	C	D1	D2	E	-	-
non-armoured	-	-	-	-	D2	-	-	-
Single core armoured	-	-	-	-	D2	-	-	-
Multicore armoured								

2 Correction and Reduction Factors for Current Carrying Capacity (Current Rating)

Correction and reduction factors reference as defined in the tables IEC 60364-5-52. This allows the user to tailor a circuit rating for their given prescribed installation. These correction factors cover the following parameters: ambient temperature (air, and ground where appropriate), soil resistivity, depth, proximity of multiple circuits for ladder, tray, direct in ground and in ducts in the ground.

Description	Correction Table Reference in IEC 60364-5-52	Applicable Installation Method & Ratings Table(s)
Rating factors for ambient air temperatures other than 30°C Ambient.	Table B.52.14	Installation method A1, A2, B1, B2, C, F, G Tables: All
Rating factors for ambient ground temperatures other than 20°C Ambient.	Table B.52.15	Installation method D, Tables B.52.2 to B.52.5
Rating factors for cable buried direct in the ground or in buried ducts for soil resistivities.	Table B.52.16	Installation method D, Table B.52.2 to B.52.5
Rating factors for one circuit or one multicore cable or for a group of circuits of multicore cables, to be used with current-carrying capacities of Tables B.52.2 to B.52.13.	Table B.52.17	Installation method A, B, C, E or F (appropriately) Tables B.52.2 to B.52.13
Rating factors for more than one circuit, cables buried directly in the ground.	Table B.52.18	Installation Method D2, Tables B.52.2 to B.52.5
Rating factors for more than one circuit, cables in ducts buried directly in the ground.	Table B.52.19	Installation method D1, Tables B.52.2 to B.52.5
Rating Factors for groups of more than one multicore cable, to be applied to reference current-carrying capacities for multicore cables in free air.	Table B.52.20	Installation method E, Tables B.52.8 to B.52.13
Rating Factors for groups of more than one single- core cable, to be applied to reference current- carrying capacities of single-core cables in free air.	Table B.52.21	Installation Method F, Tables B.52.8 to B.52.13

2.1 Correction factors for ambient air temperatures

Correction factors for ambient air temperatures other than 30°C to be applied to the current-carrying capacities for cables in air

Types of insulation	Ground temperature (°C)	Correction factor
PVC	10	1.22
	15	1.17
	20	1.12
	25	1.06
	30	1.00
	35	0.94
	40	0.87
	45	0.79
	50	0.71
	55	0.61
	60	0.50
XLPE, EPR	10	1.15
	15	1.12
	20	1.08
	25	1.04
	30	1.00
	35	0.96
	40	0.91
	45	0.87
	50	0.82
	55	0.76
	60	0.71
	65	0.65
	70	0.58
	75	0.50
	80	0.41

2.2 Correction factors for ambient ground temperatures

Correction factors for ambient ground temperatures other than 20°C to be applied to the current- carrying capacities for cables in ducts in the ground.

Types of insulation	Ground temperature (°C)	Correction factor
PVC	10	1.10
	15	1.05
	20	1.00
	25	0.95
	30	0.89
	35	0.84
	40	0.77
	45	0.71
	50	0.63
	55	0.55
	60	0.45
XLPE, EPR	10	1.07
	15	1.04
	20	1.00
	25	0.96
	30	0.93
	35	0.89
	40	0.85
	45	0.80
	50	0.76
	55	0.71
	60	0.65
	65	0.60
	70	0.53
	75	0.46
	80	0.38

2.3 Correction factors for soil thermal resistivity

Correction factors for soil thermal resistivity other than 2.5 K.m/W to be applied to the current-carrying capacities for cables in ducts in the ground. For installation Method D1 & D2.

Installation Method	Soil Thermal Resistivity, K.m/W						
	0.5	0.7	1.0	1.5	2.0	2.5	3.0
D1: Multi-core cable in ducts in the ground	1.28	1.20	1.18	1.10	1.05	1.00	0.96
D2: Sheathed single-core or multi- core cables direct in the ground	1.88	1.62	1.50	1.28	1.12	1.00	0.90

Note:

Thermal Resistivity K.m/W	Soil Conditions	Weather Conditions
0.5	Very moist	Continuously moist
1.0	Moist	Regular rainfall
2.0	Dry	Seldom rains
3.0	Very dry	Little or no rain

2.4 Correction factors for depth of installation in the ground

Correction factors for depth of installation other than 0.8m to be applied to the current-carrying capacities for cables in ducts in the ground. For installation Method D1 & D2.

Installation Method	Depth of installation (m)							
	0.8	1.0	1.25	1.50	1.75	2.0	2.5	3.0
D1: Multi-core cable in ducts in the ground	1.00	0.99	0.97	0.96	0.95	0.94	0.93	0.92
D2: Sheathed single-core or multi- core cables direct in the ground	1.00	0.98	0.96	0.95	0.94	0.93	0.91	0.90

Note:
The presence of mechanical barriers (such as bricks or slabs) not generating air spaces, thus is does not change the value of current carrying capacities.

2.5 Reduction factors for installation Method A to F (except D)

Reduction factors for one circuit or one multicore cable, or for a group of more than one circuit or more than one multicore cables, to be used with current-carrying capacities for installation method A to F (except for installation method D)

Grouping factors description	No. of cables											
	1	2	3	4	5	6	7	8	9	12	16	>=20
For methods A to F (except D), cables multipolar or more than one circuit in contact, bunched in air, on a surface, embedded or enclosed	1.00	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50	0.45	0.41	0.38
For method C, cables multipolar or more than one circuit single layer on wall, floor or unperforated cable tray systems	1.00	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70	0.70	0.70	0.70
For method C, cables multipolar or more than one circuit single layer fixed directly under a wooden ceiling	0.95	0.81	0.72	0.68	0.66	0.64	0.63	0.62	0.61	0.61	0.61	0.61
For methods E and F, cables multipolar or more than one circuit single layer on a perforated horizontal or vertical cable tray systems	1.00	0.88	0.82	0.77	0.75	0.73	0.73	0.72	0.72	0.72	0.72	0.72
For methods E and F, cables multipolar or more than one circuit single layer on cable ladder systems or cleats etc.	1.00	0.87	0.82	0.8	0.8	0.79	0.79	0.78	0.78	0.78	0.78	0.78

Note 1:
These factors are applicable to uniform groups of cables, equally loaded

Note 2:
Where horizontal clearances between adjacent cables exceeds twice their overall diameter, no reduction applied.

Note 3:
The same factors are applied to groups of two or three single core cables and multicore cables.

2.6 Reduction factors for installation Method D2

Reduction factors for more than one circuit, cables laid directly in the ground – For installation method D2, applicable for single-core or multicore cables.

(Installation Method D2) Grouping factors description	No. of cables										
	2	3	4	5	6	7	8	9	12	16	>=20
For more than one circuit, cable laid directly in the ground, with cables touching	0.75	0.65	0.6	0.55	0.5	0.45	0.43	0.41	0.36	0.32	0.29
For more than one circuit, cable laid directly in the ground, with cable-to- cable clearance = one cable diameter	0.80	0.70	0.60	0.55	0.55	0.51	0.48	0.46	0.42	0.38	0.35
For more than one circuit, cable laid directly in the ground, with cable-to- cable clearance = 0.125m	0.85	0.75	0.7	0.65	0.6	0.59	0.57	0.55	0.51	0.47	0.44
For more than one circuit, cable laid directly in the ground, with cable-to- cable clearance = 0.25m	0.90	0.80	0.75	0.70	0.70	0.67	0.65	0.63	0.59	0.56	0.53
For more than one circuit, cable laid directly in the ground, with cable-to- cable clearance = 0.5m	0.90	0.85	0.80	0.80	0.80	0.76	0.75	0.74	0.71	0.68	0.66

2.7 Reduction factors for installation Method D1

Reduction factors for more than one circuit, cables laid in ducts in the ground – For installation method D1, applicable for single-core or multicore cables.

(Installation Method D1) Grouping factors description	No. of cables																		
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	>=20
For more than one circuit, cable laid directly ducts in the ground, multi- core cables in single-way ducts, with ducts touching	0.85	0.75	0.70	0.65	0.60	0.57	0.54	0.52	0.49	0.47	0.45	0.44	0.42	0.41	0.39	0.38	0.37	0.35	0.34
For more than one circuit, cable laid directly ducts in the ground, multi- core cables in single-way ducts, with duct-to-duct clearance = 0.25m	0.90	0.85	0.80	0.80	0.80	0.76	0.74	0.73	0.72	0.70	0.69	0.68	0.68	0.67	0.66	0.65	0.65	0.64	0.63
For more than one circuit, cable laid directly ducts in the ground, multi- core cables in single-way ducts, with duct-to-duct clearance = 0.5m	0.95	0.90	0.85	0.85	0.80	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.72	0.71	0.70	0.70	0.69	0.68
For more than one circuit, cable laid directly ducts in the ground, multi- core cables in single-way ducts, with duct-to-duct clearance = 1.0m	0.95	0.95	0.90	0.90	0.90	0.88	0.88	0.87	0.86	0.86	0.85	0.85	0.84	0.84	0.83	0.83	0.83	0.82	0.82
For more than one circuit, cable laid directly ducts in the ground, single- core cables in non-magnetic single- way ducts, with ducts touching	0.80	0.70	0.65	0.60	0.60	0.53	0.50	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.34	0.33	0.31	0.30	0.29
For more than one circuit, cable laid directly ducts in the ground, single- core cables in non-magnetic single- way ducts, with duct-to-duct clearance = 0.25m	0.90	0.80	0.75	0.70	0.70	0.66	0.63	0.61	0.59	0.57	0.56	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47
For more than one circuit, cable laid directly ducts in the ground, single- core cables in non-magnetic single- way ducts, with duct-to-duct clearance = 0.5m	0.90	0.85	0.80	0.80	0.80	0.76	0.74	0.73	0.72	0.70	0.69	0.68	0.68	0.67	0.66	0.65	0.65	0.64	0.63
For more than one circuit, cable laid directly ducts in the ground, single- core cables in non-magnetic single- way ducts, with duct-to-duct clearance = 1.0m	0.95	0.90	0.90	0.90	0.90	0.87	0.87	0.86	0.85	0.85	0.84	0.84	0.83	0.83	0.83	0.82	0.82	0.82	0.81

2.8 Reduction factors for installation method E

Reduction factors for group of more than one multicore cable to be applied to reference current- carrying capacities for multicore cables in free air – For installation Method E.

(Installation Method E) Grouping factors description	No. of trays or ladders	No. of cables per tray or ladder					
		1	2	3	4	6	9
For group of more than one multi- core cable in free air, perforated cable tray system, touching	1	1.00	0.88	0.82	0.79	0.76	0.73
	2	1.00	0.87	0.80	0.77	0.73	0.68
	3	1.00	0.86	0.79	0.76	0.71	0.66
	6	1.00	0.84	0.77	0.73	0.68	0.64
For group of more than one multi- core cable in free air, perforated cable tray system, spaced	1	1.00	1.00	0.98	0.95	0.91	-
	2	1.00	0.99	0.96	0.92	0.87	-
	3	1.00	0.98	0.95	0.91	0.85	-
For group of more than one multi- core cable in free air, vertical perforated cable tray systems, touching	1	1.00	0.88	0.82	0.78	0.73	0.72
	2	1.00	0.88	0.81	0.76	0.71	0.70
For group of more than one multi- core cable in free air, vertical perforated cable tray systems, spaced	1	1.00	0.91	0.89	0.88	0.87	-
	2	1.00	0.91	0.88	0.87	0.85	-
For group of more than one multi- core cable in free air, unperforated cable tray system, touching	1	0.97	0.84	0.78	0.75	0.71	0.68
	2	0.97	0.83	0.76	0.72	0.68	0.63
	3	0.97	0.82	0.75	0.71	0.66	0.61
	6	0.97	0.81	0.73	0.69	0.63	0.58
For group of more than one multi- core cable in free air, cable ladder systems, cleats & etc., touching	1	1.00	0.87	0.82	0.80	0.79	0.78
	2	1.00	0.86	0.80	0.78	0.76	0.73
	3	1.00	0.85	0.79	0.76	0.73	0.70
	6	1.00	0.84	0.77	0.73	0.68	0.64
For group of more than one multi- core cable in free air, cable ladder systems, cleats & etc., spaced	1	1.00	1.00	1.00	1.00	1.00	-
	2	1.00	0.99	0.98	0.97	0.96	-
	3	1.00	0.98	0.97	0.96	0.93	-

2.9 Reduction factors for installation method F

Reduction factors for groups of one or more circuits of single-core cables to be applied to reference current-carrying capacity for one circuit of single-core cables in free air – For installation Method F.

(Installation Method E) Grouping factors description	No. of trays or ladders	No. of cables per tray or ladder		
		1	2	3
For groups of one or more circuits of single-core cables in free air, perforated cable tray system, touching, three cables in horizontal formation	1	0.98	0.91	0.87
	2	0.96	0.87	0.81
	3	0.95	0.85	0.78
For groups of one or more circuits of single-core cables in free air, vertical perforated cable tray system, touching, three cables in horizontal formation	1	0.96	0.86	-
	2	0.95	0.84	-
For groups of one or more circuits of single-core cables in free air, cable ladder systems, cleats & etc., touching, three cables in horizontal formation	1	1.00	0.97	0.96
	2	0.98	0.93	0.89
	3	0.97	0.90	0.86
For groups of one or more circuits of single-core cables in free air, perforated cable tray systems, three cables in trefoil formation	1	1.00	0.98	0.96
	2	0.97	0.93	0.89
	3	0.96	0.92	0.86
For groups of one or more circuits of single-core cables in free air, vertical perforated cable tray systems, three cables in trefoil formation	1	1.00	0.91	0.89
	2	1.00	0.90	0.86
For groups of one or more circuits of single-core cables in free air, cable ladder systems, cleats & etc., three cables in trefoil formation	1	1.00	1.00	1.00
	2	0.97	0.95	0.93
	3	0.96	0.94	0.90

Note 1:
Factors are given for single layers of cables (or trefoil groups) as shown in 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 2:
Values are given for vertical spacing between cables trays of 300mm and at least 20mm between cable trays and wall. For closer spacing the factors should be reduced.

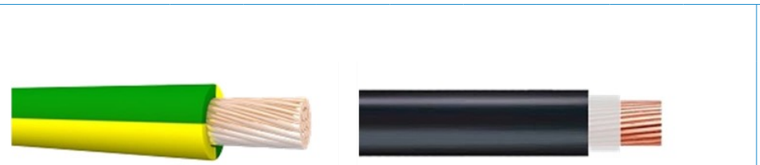
Note 3:
Values are given for horizontal spacing between cables trays of 225mm with cable trays mounted back- to-back. For closer spacing the factors should be reduced.

Note 4:
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.

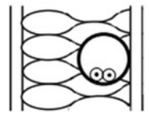
3 Current Carrying Capacities (Current Ratings)

3.1 Current Ratings for installation Method A1 (Non-armoured cables)

Current ratings for single-core non-armoured cables in conduit in a thermally insulated wall.



Method A1



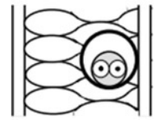
Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	13.5	-	14.5	-	14.5	-	17	-	19	-	19	-
2.5	18	-	19.5	-	19.5	-	23	-	26	-	26	-
4	24	-	26	-	26	-	31	-	35	-	35	-
6	31	-	34	-	34	-	40	-	45	-	45	-
10	42	-	46	-	46	-	54	-	61	-	61	-
16	56	-	61	-	61	-	73	-	81	-	81	-
25	73	57	80	63	80	63	95	76	106	84	106	84
35	89	70	99	77	99	77	117	94	131	103	131	103
50	108	84	119	93	119	93	141	113	158	125	158	125
70	136	107	151	118	151	118	179	142	200	158	200	158
95	164	129	182	142	182	142	216	171	241	191	241	191
120	188	149	210	164	210	164	249	197	278	220	278	220
150	216	170	240	189	240	189	285	226	318	253	318	253
185	245	194	273	215	273	215	324	256	362	288	362	288
240	286	227	321	252	321	252	380	300	424	338	424	338
300	328	261	367	289	367	289	435	344	486	387	486	387

Ambient temperature: 30°C in air

3.2 Current Ratings for installation Method A2 (Non-armoured cables)

Current ratings for multi-core non-armoured cables in conduit in a thermally insulated wall.

Method A2



Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	13	-	14	-	14	-	16.5	-	18.5	-	18.5	-
2.5	17.5	-	18.5	-	18.5	-	22	-	25	-	25	-
4	23	-	25	-	25	-	30	-	33	-	33	-
6	29	-	32	-	32	-	38	-	42	-	42	-
10	39	-	43	-	43	-	51	-	57	-	57	-
16	52	-	57	-	57	-	68	-	76	-	76	-
25	68	53	75	58	75	58	89	71	99	78	99	78
35	83	65	92	71	92	71	109	87	121	96	121	96
50	99	78	110	86	110	86	130	104	145	115	145	115
70	125	98	139	108	139	108	164	131	183	145	183	145
95	150	118	167	130	167	130	197	157	220	175	220	175
120	172	135	192	150	192	150	227	180	253	201	253	201
150	196	155	219	172	219	172	259	206	290	230	290	230
185	223	176	248	195	248	195	295	233	329	262	329	262
240	261	207	291	229	291	229	346	273	386	307	386	307
300	298	237	334	263	334	263	396	313	442	352	442	352

Ambient temperature: 30°C in air

3.3 Current Ratings for installation Method B1 (Non-armoured cables)

Current ratings for single-core non-armoured cables in conduit on a wooden wall.

Method B1

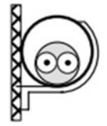
Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	15.5	-	17.5	-	17.5	-	20	-	23	-	23	-
2.5	21	-	24	-	24	-	28	-	31	-	31	-
4	28	-	32	-	32	-	37	-	42	-	42	-
6	36	-	41	-	41	-	48	-	54	-	54	-
10	50	-	57	-	57	-	66	-	75	-	75	-
16	68	-	76	-	76	-	88	-	100	-	100	-
25	89	70	101	79	101	79	117	93	133	105	133	105
35	110	86	125	97	125	97	144	116	164	130	164	130
50	134	104	151	118	151	118	175	140	198	157	198	157
70	171	133	192	150	192	150	222	179	253	200	253	200
95	207	161	232	181	232	181	269	217	306	242	306	242
120	239	186	269	210	269	210	312	251	354	281	354	281
150	262	204	300	234	300	234	342	267	393	307	393	307
185	296	230	341	266	341	266	384	300	449	351	449	351
240	346	269	400	312	400	312	450	351	528	412	528	412
300	394	306	458	358	458	358	514	402	603	471	603	471

Ambient temperature: 30°C in air

3.4 Current Ratings for installation Method B2 (Non-armoured cables)

Current ratings for multi-core non-armoured cables in conduit on a wooden wall.

Method B2



Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	15	-	16.5	-	16.5	-	19.5	-	22	-	22	-
2.5	20	-	23	-	23	-	26	-	30	-	30	-
4	27	-	30	-	30	-	35	-	40	-	40	-
6	34	-	38	-	38	-	44	-	51	-	51	-
10	46	-	52	-	52	-	60	-	69	-	69	-
16	62	-	69	-	69	-	80	-	91	-	91	-
25	80	62	90	71	90	71	105	84	119	94	119	94
35	99	77	111	86	111	86	128	103	146	115	146	115
50	118	92	133	104	133	104	154	124	175	138	175	138
70	149	116	168	131	168	131	194	156	221	175	221	175
95	179	139	201	157	201	157	233	188	265	210	265	210
120	206	160	232	181	232	181	268	216	305	242	305	242
150	225	176	258	201	258	201	300	240	334	261	334	261
185	255	199	294	230	294	230	340	272	384	300	384	300
240	297	232	344	269	344	269	398	318	459	358	459	358
300	339	265	394	308	394	308	455	364	532	415	532	415

Ambient temperature: 30°C in air

3.5 Current Ratings for installation Method C (Non-armoured cables)

Current ratings for single-core or multi-core non-armoured cables on a wooden wall.

Method C

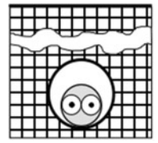
Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	17.5	-	19.5	-	19.5	-	22	-	24	-	24	-
2.5	24	-	27	-	27	-	30	-	33	-	33	-
4	32	-	36	-	36	-	40	-	45	-	45	-
6	41	-	46	-	46	-	52	-	58	-	58	-
10	57	-	63	-	63	-	71	-	80	-	80	-
16	76	-	85	-	85	-	96	-	107	-	107	-
25	96	73	112	83	112	83	119	90	138	101	138	101
35	119	90	138	103	138	103	147	112	171	126	171	126
50	144	110	168	125	168	125	179	136	209	154	209	154
70	184	140	213	160	213	160	229	174	269	198	269	198
95	223	170	258	195	258	195	278	211	328	241	328	241
120	259	197	299	226	299	226	322	245	382	280	382	280
150	299	227	344	261	344	261	371	283	441	324	441	324
185	341	259	392	298	392	298	424	323	506	371	506	371
240	403	305	461	352	461	352	500	382	599	439	599	439
300	464	351	530	406	530	406	576	440	693	508	693	508

Ambient temperature: 30°C in air

3.6 Current Ratings for installation Method D1 (Non-armoured cables)

Current ratings for multi-core non-armoured cables in ducts in the ground.

Method D1

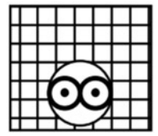


Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	18	-	22	-	22	-	21	-	25	-	25	-
2.5	24	-	29	-	29	-	28	-	33	-	33	-
4	30	-	37	-	37	-	36	-	43	-	43	-
6	38	-	46	-	46	-	44	-	53	-	53	-
10	50	-	60	-	60	-	58	-	71	-	71	-
16	64	-	78	-	78	-	75	-	91	-	91	-
25	82	64	99	77	99	77	96	75	116	90	116	90
35	98	77	119	93	119	93	115	90	139	108	139	108
50	116	91	140	109	140	109	135	106	164	128	164	128
70	143	112	173	135	173	135	167	130	203	158	203	158
95	169	132	204	159	204	159	197	154	239	186	239	186
120	192	150	231	180	231	180	223	174	271	211	271	211
150	217	169	261	204	261	204	251	197	306	238	306	238
185	243	190	292	228	292	228	281	220	343	267	343	267
240	280	218	336	262	336	262	324	253	395	307	395	307
300	316	247	379	296	379	296	365	286	446	346	446	346

Ambient temperature: 20°C in ground

3.7 Current Ratings for installation Method D2 (Non-armoured cables)

Current ratings for sheathed single-core or multi-core non-armoured cables direct in the ground.

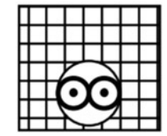


Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	19	-	22	-	22	-	23	-	27	-	27	-
2.5	24	-	28	-	28	-	30	-	35	-	35	-
4	33	-	38	-	38	-	39	-	46	-	46	-
6	41	-	48	-	48	-	49	-	58	-	58	-
10	54	-	64	-	64	-	65	-	77	-	77	-
16	70	-	83	-	83	-	84	-	100	-	100	-
25	92	69	110	82	110	82	107	82	129	98	129	98
35	110	83	132	98	132	98	129	98	155	117	155	117
50	130	99	156	117	156	117	153	117	183	139	183	139
70	162	122	192	145	192	145	188	144	225	170	225	170
95	193	148	230	173	230	173	226	172	270	204	270	204
120	220	169	261	200	261	200	257	197	306	233	306	233
150	246	189	293	224	293	224	287	220	343	261	343	261
185	278	214	331	255	331	255	324	250	387	296	387	296
240	320	250	382	298	382	298	375	290	448	343	448	343
300	359	282	427	336	427	336	419	326	502	386	502	386

Ambient temperature: 20°C in ground

3.8 Current Ratings for installation Method D2 (Armoured cables)

Current ratings for sheathed single-core or multi-core armoured cables direct in the ground.



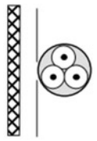
Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	18	-	22	-	22	-	21	-	25	-	25	-
2.5	24	-	29	-	29	-	28	-	33	-	33	-
4	30	-	37	-	37	-	36	-	43	-	43	-
6	38	-	46	-	46	-	44	-	53	-	53	-
10	50	-	60	-	60	-	58	-	71	-	71	-
16	64	-	78	-	78	-	75	59	91	-	91	-
25	82	64	99	77	99	77	96	75	116	90	116	90
35	98	77	119	93	119	93	115	90	139	108	139	108
50	116	91	140	109	140	109	135	106	164	128	164	128
70	143	112	173	135	173	135	167	130	203	158	203	158
95	169	132	204	159	204	159	197	154	239	186	239	186
120	192	150	231	-	231	-	223	174	271	-	271	-
150	217	169	261	-	261	-	251	197	306	-	306	-
185	243	190	292	-	292	-	281	220	343	-	343	-
240	280	218	336	-	336	-	324	253	395	-	395	-
300	316	247	379	-	379	-	365	286	446	-	446	-

Ambient temperature: 20°C in ground

3.9 Current Ratings for installation Method E (Non-armoured cables)

Current ratings for multi-core non-armoured cables in free air.

Method E



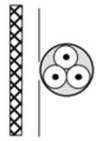
Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
1.5	18.5	-	22	-	22	-	23	-	26	-	26	-
2.5	25	-	30	-	30	-	32	-	36	-	36	-
4	34	-	40	-	40	-	42	-	49	-	49	-
6	43	-	51	-	51	-	54	-	63	-	63	-
10	60	-	70	-	70	-	75	-	86	-	86	-
16	80	-	94	-	94	-	100	-	115	-	115	-
25	101	78	119	89	119	89	127	97	149	108	149	108
35	126	96	148	111	148	111	158	120	185	135	185	135
50	153	117	180	135	180	135	192	146	225	164	225	164
70	196	150	232	173	232	173	246	187	289	211	289	211
95	238	183	282	210	282	210	298	227	352	257	352	257
120	276	212	328	244	328	244	346	263	410	300	410	300
150	319	245	379	282	379	282	399	304	473	346	473	346
185	364	280	434	322	434	322	456	347	542	397	542	397
240	430	330	514	380	514	380	538	409	641	470	641	470
300	497	381	593	439	593	439	621	471	741	543	741	543

Ambient temperature: 30°C in air

3.10 Current Ratings for installation Method F (Non-armoured cables)

Current ratings for single-core non-armoured cables, touching in free air.

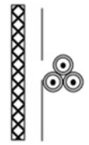
Method F (Touching)



Max work temp	70°C (PVC)						90°C (XLPE, EPR)					
Cond size (mm²)	3ph		1ph		DC		3ph		1ph		DC	
	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al	Cu	Al
25	114	87	131	98	131	98	141	107	161	121	161	121
35	143	109	162	122	162	122	176	135	200	150	200	150
50	174	133	196	149	196	149	216	165	242	184	242	184
70	225	173	251	192	251	192	279	215	310	237	310	237
95	275	212	304	235	304	235	342	264	377	289	377	289
120	321	247	352	273	352	273	400	308	437	337	437	337
150	372	287	406	316	406	316	464	358	504	389	504	389
185	427	330	463	363	463	363	533	413	575	447	575	447
240	507	392	546	430	546	430	634	492	679	530	679	530
300	587	455	629	497	629	497	736	571	783	613	783	613
400	689	552	754	600	754	600	868	694	940	740	940	740
500	789	640	868	694	868	694	998	806	1083	856	1083	856
630	905	746	1005	808	1005	808	1151	942	1254	996	1254	996

Ambient temperature: 30°C in air

Current ratings for single-core non-armoured cables, trefoil in free air.

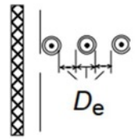


Max work temp	70°C (PVC)		90°C (XLPE, EPR)	
Cond size (mm²)	3ph		3ph	
	Cu	Al	Cu	Al
25	110	84	135	103
35	137	105	169	129
50	167	128	207	159
70	216	166	268	206
95	264	203	328	253
120	308	237	383	296
150	356	274	444	343
185	409	315	510	395
240	485	375	607	471
300	561	434	703	547
400	656	526	823	663
500	749	610	946	770
630	855	711	1088	899

Ambient temperature: 30°C in air

3.11 Current Ratings for installation Method G (Non-armoured cables)

Current ratings for single-core non-armoured cables, spaced in free air (horizontal).

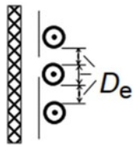


Max work temp	70°C (PVC)		90°C (XLPE, EPR)	
Cond size (mm²)	3ph		3ph	
	Cu	Al	Cu	Al
25	146	112	182	138
35	181	139	226	172
50	219	169	275	210
70	281	217	353	271
95	341	265	430	332
120	396	308	500	387
150	456	356	577	448
185	521	407	661	515
240	615	482	781	611
300	709	557	902	708
400	852	671	1085	856
500	982	775	1253	991
630	1138	900	1454	1154

Ambient temperature: 30°C in air

Current ratings for single-core non-armoured cables, spaced in free air (vertical).

Method F (Trefoil)



Max work temp	70°C (PVC)		90°C (XLPE, EPR)	
Cond size (mm²)	3ph		3ph	
	Cu	Al	Cu	Al
25	130	99	161	122
35	162	124	201	153
50	197	152	246	188
70	254	196	318	244
95	311	241	389	300
120	362	282	454	351
150	419	327	527	408
185	480	376	605	470
240	569	447	719	561
300	659	519	833	652
400	795	629	1008	792
500	920	730	1169	921
630	1070	852	1362	1077

Ambient temperature: 30°C in air

4 Conductor Resistance and Reactance

For copper conductor,

Cross section area (mm2)	DC resistance at 20°C (Ω/km)	AC resistance at 70°C (Ω/km)	AC resistance at 90°C (Ω/km)	Reactance at 50Hz (Ω/km)
1.5	12.1	14.5	15.4	0.113
2.5	7.41	8.87	9.45	0.106
4	4.61	5.52	5.88	0.100
6	3.08	3.69	3.93	0.093
10	1.83	2.19	2.33	0.087
16	1.15	1.38	1.47	0.084
25	0.727	0.870	0.927	0.081
35	0.524	0.627	0.668	0.078
50	0.387	0.464	0.494	0.078
70	0.268	0.321	0.342	0.078
95	0.193	0.232	0.247	0.076
120	0.153	0.185	0.197	0.073
150	0.124	0.149	0.160	0.075
185	0.0991	0.120	0.128	0.075
240	0.0754	0.0926	0.0989	0.073
300	0.0601	0.0750	0.0802	0.072
400	0.0470	0.0600	0.0640	0.073
500	0.0366	0.0484	0.0515	0.072
630	0.0283	0.0398	0.0420	0.071

For aluminium conductor,

Cross section area (mm2)	DC resistance at 20°C (Ω/km)	AC resistance at 70°C (Ω/km)	AC resistance at 90°C (Ω/km)	Reactance at 50Hz (Ω/km)
25	1.20	1.44	1.54	0.081
35	0.868	1.04	1.11	0.078
50	0.641	0.771	0.822	0.078
70	0.443	0.533	0.568	0.078
95	0.320	0.385	0.411	0.076
120	0.253	0.305	0.325	0.073
150	0.206	0.248	0.265	0.075
185	0.164	0.198	0.211	0.075
240	0.125	0.152	0.162	0.073
300	0.100	0.122	0.130	0.072
400	0.0778	0.0935	0.0997	0.073
500	0.0605	0.0727	0.0776	0.072
630	0.0469	0.0564	0.0601	0.071

5 Voltage Drop

Voltage drops may be determined using the following formula:

$$u = b\left(\rho_1 \frac{L}{S}\cos\theta + \lambda L \sin\theta\right) I_B$$

where,

u is the voltage drop in volts;

b is the coefficient equal to 1 for three-phases circuits, and equal to 2 for single-phase circuits;

ρ_1 is the resistivity of conductors in normal service, taken equal to the resistivity at the temperature in normal service, i.e. 1.25 times the resistivity at 20°C, or 0.0225 Ωmm²/m for copper and 0.036 Ωmm²/m for aluminium;

L is the straight length of the wiring systems, in meters;

S is the cross-sectional area of conductors, in mm²

cosθ is the power factor; in the absence of precise details, the power factor is taken as equal to 0.8 (sin**θ** = 0.6);

λ is the reactance per unit length of conductors, which is taken to be 0.08 mΩ/m in the absence of details;

I_B is the design current (in amps);

U_0 is the voltage between line and neutral, in volts.

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