



Cables & Pipes (Pvt) Ltd.

Product Catalogue



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INTRODUCTION

of

GM Cables & Pipes (Pvt.) Limited.

- Starting from a modest organization 37 years ago, GM has come a long way in establishing itself as a leading player in cable and polymer pipe & ducts industry of Pakistan. Since its inception, GM has been setting standards of excellence and safety with all its quality products. GM Cables & Pipes (Pvt.) Limited's plant located at 22 km Ferozpur Road, Lahore, is equipped with the most sophisticated manufacturing and testing equipment. Quality is the hallmark of GM products, which has been maintained throughout the period.
- Established by late Mr. M. Janhangir Chauhdary in the year 1975 as a small- scale house wiring industry, GM Cables & Pipes (Pvt.) Limited today proudly stands and as one of the most reliable and recognized manufacturers of Cables, Pipes and Ducts in Pakistan. The visionary leadership of the organization soon realized that the growing population and power needs in Pakistan would demand more power consumption and generation. Accordingly, GM has been continuously enhancing its product range while maintaining its traditional superior quality.
- In 1990, GM started manufacturing power cables for power and industrial infrastructure. In 2000, a new product PVC Granular was started to become self-sufficient in indigenous demand and to serve the other cable industries.
- In 2009, GM added U-PVC Pipes & Accessories for electric cables offering total solution to house electrification. In 2011, the Company started sewerage and pressure pipes to complete its pipes range. A further addition of PPRC pipes is recently launched to offer safe and reliable portable water distribution system to household of Pakistan. The continuous growth of our company is not only an endeavor of manufacturing development in the country but also a testimony to the trust and confidence of customers in GM products.
- GM Cables was setup on the philosophy of delivering products to the customers Just in Time (JIT) off the shelf, and accordingly established a vast network of dealers, the largest in its category, scattered throughout Pakistan, which still is successfully operational. Details of GM dealers are available on its website, www.gmcables.com However, to cater for industrial and infrastructural projects more closely, it has also developed an efficient and congenial sales team which remains available to serve its valued customers.
- GM Cables & Pipes (Pvt.) Limited is committed and geared-up to match rather exceed, customer satisfaction by manufacturing and supplying cables & pipes/ducts conforming to national and international standards. Continuous improvements through R&D cell and technological excellence with vigorous trainings of employees are the features to meet its stringent quality policy.

For further details on our group and products, please visit www.gmcables.com.



GM PRODUCT RANGE (Cables)

1. General Wiring Electric Cable

0.5mm sq - 16 mm sq
(Single-Core / Multi-Core)
Voltage Grade 250/440V ,
300/500V , 450/750V

2. Power Cable Low Voltage (Un-Armoured / Armoured) *

In Thermoplastic (PVC)
Insulation and Sheath

16mm sq - 1000 mm sq (Single-Core)
16mm sq - 400 mm sq (Multi-Core)
Voltage Grade 600/1000V , 1900/3300 V

3. Power Cable Low Voltage (Un-Armoured / Armoured) *

In Thermosetting (XLPE)
Insulation and Thermoplastic
(PVC) Sheath

16mm sq - 1000 mm sq (Single-Core)
16mm sq - 400 mm sq (Multi-Core)
Voltage Grade 600/1000V , 1900/3300 V

4. Flexible Cable

0.25 mm sq. - 1000 mmsq (Single-Core)
0.25mm sq - 400 mm sq (Multi-Core)

5. Grounding Conductor

- 1 - Soft Drawn Bare Copper Conductor
- 2 - Hard Drawn Bare Copper Conductor

6. Indoor Telecom Pair Cable

Upto 50 Pairs (Conductor Size 0.61mm)

7. Coaxial Cables RG Type

RG 7, RG 11

* Manufactured Both in Copper and Aluminum Conductor

Manufacturing Process





Manufacturing of Cables

Cables with Copper and Aluminum conductor with polymer (PVC, XLPE, and PE) insulation are manufactured at GM Cables & Pipes (Pvt.) Ltd. Essentially cables comprise of conductors and insulation, whereas bedding (inner sheath), armour and outersheath are applied according to design requirements. The brief description of the process is mentioned as under:

CONDUCTOR DRAWING

GM Cables are available with both Aluminum and Copper conductors. Conductors are manufactured in Solid/ Stranded Circular/ Shaped/Flexible Conductor/Reduced Neutral formations.

Solid conductor consists of only single wire of different diameter according to size of cable.

Stranded Circular conductor consists of different number of wires, with one wire in the center contains 6, 12, 18, 24, 30 ... wire layers on it in with opposite directions.

Shaped Conductors are in compacted form in 60 or 90 degree, in all multi-core cables from 16 mm Sq. size, Onwards. All conductors for GM cables are manufactured strictly in accordance with National and International standards.

INSULATION

After conductor formulation insulation is applied on conductors. GM cables are available with both thermoplastic & thermo setting insulations. - PVC Cables Thermoplastic - XLPE Cables Thermosetting. Insulation for GM Cables are strictly manufactured and applied over conductor in accordance with applicable National and International specifications. Insulated conductors serve as individual "cores" for manufacturing multi-core cables.

LAYING UP

Cores are tested on line during production both for physical and electrical characteristics. For multicore cables cores are laid up on our latest laying up machine. Filler cords are also provided to maintain the circularity of laid up cables. In case of XLPE insulated cores the same are cured for cross-linking to achieve the requisite characteristics both electrical and mechanical and then are laid up.

INNERSHEATH (Bedding)

Laid up Cores are provided with inner sheath with high quality of PVC which acts as bedding for Steel wires / Aluminum wires. Inner sheath is applied either with extrusion or by wrapping. The inner sheath dimensions are maintained strictly in accordance with laid down specification.

ARMOURING

Mechanical protection to the cable is provided with armouring. GM single core cables are armoured with Aluminum wires, thus avoiding magnetic hysteresis losses on A. C. System. Multicore cables are provided with galvanised Steel wire.

OUTER SHEATH

All GM Cables are provided with PVC outer sheath In order to be identified, GM Cables have their name embossed /printed/ indented on outer sheath at regular intervals throughout its length, along with voltage grade, number of cores, cable size and year of manufacturing.

Sequential cable meter marking is also available on request.

FINAL TESTING

Each GM Cable is tested for all applicable Routine Tests according to standards. From a lot of cables one cable of each type is tested for Type Tests, as per relevant specifications. Only tested and passed cable is dispatched to customers.



General Wiring



Applicable Standards

Some of the important applicable standards are:

- BS EN 60228 / IEC 60228; Conductors of Insulated Cables
- BS EN 50525; Low Voltage Energy Cables
- BS 6004; Electric Cables – PVC Insulated and Sheathed Cables
- BS 6500; Electric Cables - Flexible Cords rated upto 300 / 500 V
- BS 7889; Electric Cables - Thermosetting Insulated, Non-armoured Cables
- BS 5467; Electric Cable - Thermosetting Insulated, Armoured Cables
- IEC 60502-1; Powers Cables with extruded Insulation (Both PVC, XLPE, Cables)
- BS 7671:2018; Requirements for Electrical Installations
- BS EN 60811 (Multiple Parts); Common Test Methods for Insulating and sheathing materials of Electrical Cables
- ASTM B49–17; Standard Specification For Copper Rod for Electrical Purposes
- PS: IEC 60227 (Multiple Parts); PVC Insulated Cables
- BS 6346; PVC – Insulated cables for electricity supply (Upon Request)



Conductor Manufacturing Details

Class 1 solid conductor for single-core and multi-core cables

Applicable Standard: BS EN 60228 / IEC 60228

Nominal cross-sectional area mm ²	Maximum resistance of conductor at 20°C	
	Circular, annealed copper conductors (Plain) Ω/km	Circular, aluminium conductors Ω/km
0.5	36.0	-
0.75	24.5	-
1	18.1	-
1.5	12.1	-
2.5	7.41	-
4	4.61	-
6	3.08	-
10	1.83	3.08
16	1.15	1.91



Conductor Manufacturing Details

Class 2 stranded conductor for single-core and multi-core cables

Applicable Standard: BS EN 60228 / IEC 60228

Nominal cross-sectional area mm ²	Minimum number of wires In the conductor				Maximum resistance of conductor at 20°C	
	Circular		Circular Compacted		Annealed copper conductor Plain wires Ω/km	Aluminum conductor Ω/km
	Cu	Al	Cu	Al		
0.5	7	-	-	-	36.0	-
0.75	7	-	-	-	34.5	-
1.0	7	-	-	-	18.1	-
1.5	7	-	5	-	12.1	-
2.5	7	-	6	-	7.41	-
4	7	-	6	-	4.61	-
6	7	-	6	-	3.08	-
10	7	7	6	6	1.83	308
16	7	7	6	6	1.15	1.91
25	7	7	6	6	0.727	1.20
35	7	7	6	6	0.524	0.868
50	19	19	6	6	0.387	0.641
70	19	19	12	12	0.268	0.443
95	19	19	15	15	0.193	0.320



Conductor Manufacturing Details

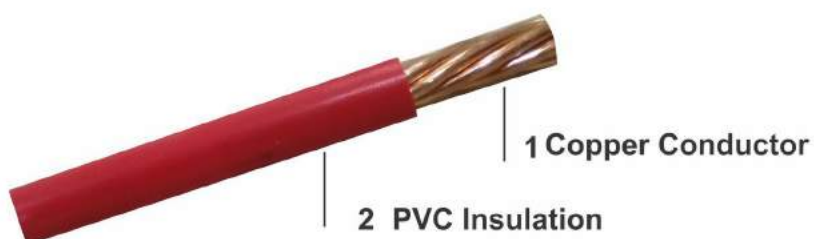
Class 5 flexible copper conductor for single-core and multi-core cables

Applicable Standard: BS EN 60228 / IEC 60228

Nominal cross-sectional area	Maximum diameter of wires in conductor	Maximum resistance of conductor at 20°C
		Plain wires
mm ²	mm	Ω/km
0.5	0.21	39.0
0.75	0.21	26.0
1.0	0.21	19.5
1.5	0.26	13.3
2.5	0.26	7.98
4	0.31	4.95

Dimensions and Weights

Single Core PVC Insulated 450/750 Volt Cables with Copper Conductor



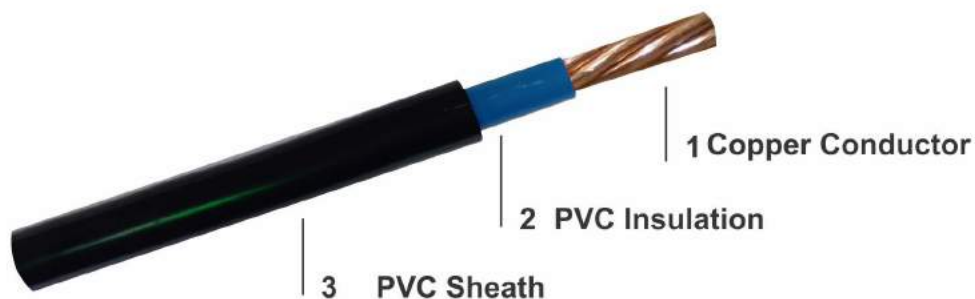
Applicable Standard: BS 6004

Nominal cross-sectional area of conductors	Class of conductor (BS EN 60228)	Thickness of insulation: specified value	Mean overall diameter		Approximate Total weight of cable
			Low limit	Upper limit	
mm ²		mm	mm	mm	kg/90m *
1.5	1	0.7	2.6	3.2	1.93
1.5	2	0.7	2.7	3.3	2.03
2.5	1	0.8	3.2	3.9	2.99
2.5	2	0.8	3.3	4.0	3.10
4	1	0.8	3.6	4.4	4.38
4	2	0.8	3.8	4.6	4.55
6	1	0.8	4.1	5.0	6.12
6	2	0.8	4.3	5.2	6.36
10	1	1.0	5.3	6.4	10.24
10	2	1.0	5.6	6.7	10.62
16	2	1.0	6.4	7.8	15.95
25	2	1.2	8.1	9.7	25.00
35	2	1.2	9.0	10.9	33.53
50	2	1.4	10.6	12.8	45.47
70	2	1.4	12.1	14.6	63.49
95	2	1.6	14.1	17.1	87.65

* Cables are supplied generally in 90m coils

Dimensions and Weights

Single Core PVC Insulated PVC Sheathed 300/500 Volt Cables with Copper Conductor

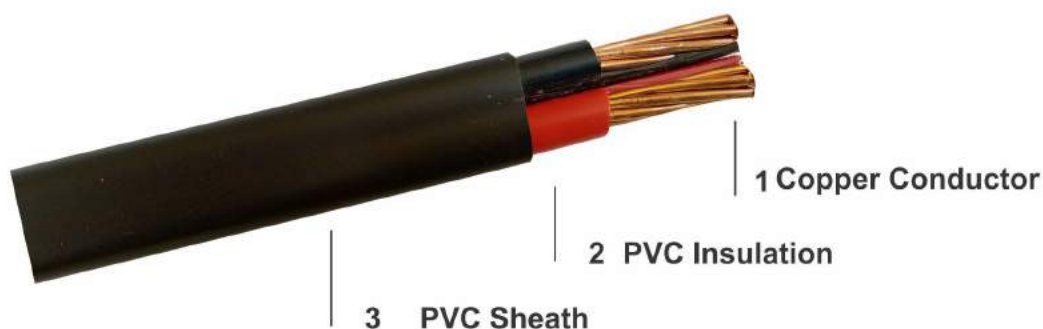


Applicable Standard: BS 6004

Nominal cross-sectional area of conductors mm ²	Class of conductors	Radial thickness of insulation mm	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
				Lower Limits mm	Upper Limits mm	
1.0	1	0.6	0.8	3.7	4.5	28.47
1.5	1	0.7	0.8	4.2	5.0	37.56
2.5	1	0.8	0.8	4.8	5.7	52.3
4	2	0.8	0.9	5.5	6.7	75.76
6	2	0.8	0.9	6.0	7.3	98.57
10	2	1.0	0.9	7.3	8.8	152.78
16	2	1.0	1.0	8.4	10.1	221.4
25	2	1.2	1.1	10.0	12.1	336.03
35	2	1.2	1.1	11.1	13.5	438.15

Dimensions and Weights

Two Core PVC Insulated PVC Sheathed 300/500 Volt Flat Cables

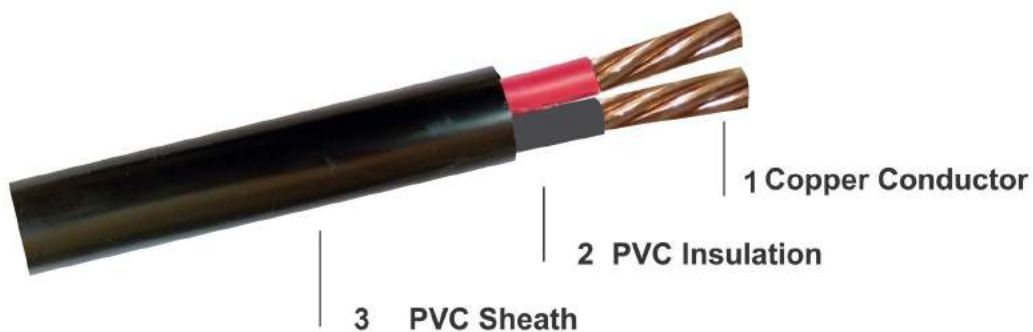


Applicable Standard: BS 6004

Nominal cross-sectional area of conductors mm ²	Class of conductors	Radial thickness of insulation mm	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
				Lower Limits mm	Upper Limits mm	
6192Y						
1.0	1	0.6	0.9	3.9 x 6.1	4.8 x 7.4	59.69
1.5	1	0.7	0.9	4.4 x 7.0	5.3 x 8.5	78.93
2.5	1	0.8	1.0	5.1 x 8.4	6.2 x 10.1	113.90
4	2	0.8	1.0	5.7 x 9.5	6.9 x 11.5	154.43
6	2	0.8	1.1	6.4 x 10.8	7.8 x 13.0	207.82
10	2	1.0	1.2	7.9 x 13.4	9.5 x 16.2	325.11
16	2	1.0	1.3	8.9 x 15.4	10.8 x 18.6	466.42

Dimensions and Weights

Two Core PVC Insulated PVC Sheathed 300/500 Volt Circular Cables

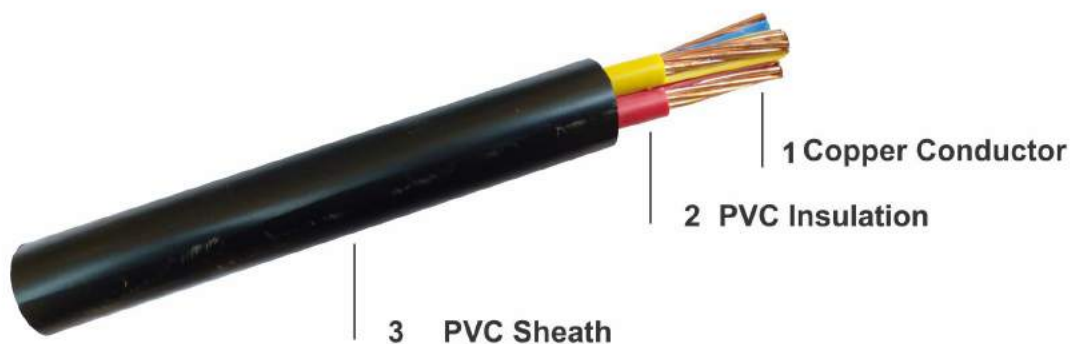


Applicable Standard: BS 6004

Nominal cross-sectional area of conductors mm ²	Class of conductors	Radial thickness of insulation mm	Thickness of Inner Covering	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
					Lower Limits mm	Upper Limits mm	
1.5	1	0.7	0.4	1.2	8.4	10.0	109.35
1.5	2	0.7	0.4	1.2	8.4	10.5	112.60
2.5	1	0.8	0.4	1.2	9.6	11.5	172.78
2.5	2	0.8	0.4	1.2	9.6	12.0	176.31
4	1	0.8	0.4	1.2	10.5	12.5	217.35
4	2	0.8	0.4	1.2	10.5	13.0	224.15

Dimensions and Weights

Three Core PVC Insulated PVC Sheathed 300/500 Volt Circular Cables

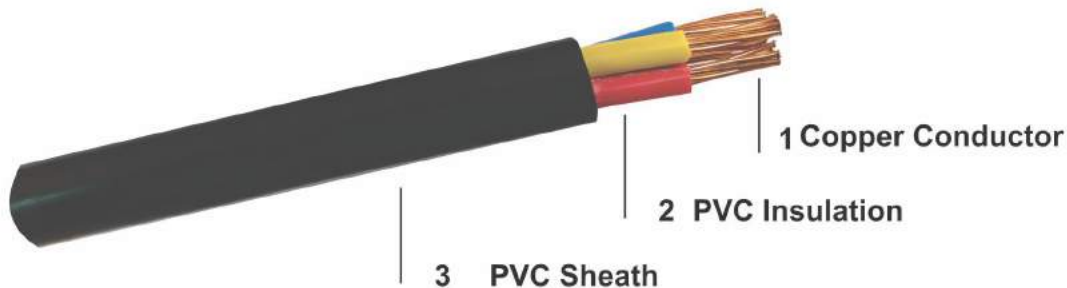


Applicable Standard: BS 6004

Nominal cross-sectional area of conductors mm ²	Class of conductors	Radial thickness of insulation mm	Thickness of inner covering	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
					Lower Limits	Upper Limits	
					mm	mm	
1.5	1	0.7	0.4	1.2	8.8	10.5	137.20
1.5	2	0.7	0.4	1.2	8.8	11.0	142.64
2.5	1	0.8	0.4	1.2	10.0	12.0	184.80
2.5	2	0.8	0.4	1.2	10.0	12.5	190.62
4	1	0.8	0.4	1.2	11.0	13.0	240.48
4	2	0.8	0.4	1.2	11.0	13.5	248.30
6	2	0.8	0.4	1.4	15.5	19.0	341.03
10	2	1.0	0.6	1.4	15.5	19.0	517.95
16	2	1.0	0.8	1.4	18.0	21.5	709.40

Dimensions and Weights

Four Core PVC Insulated PVC Sheathed 300/500 Volt Circular Cables

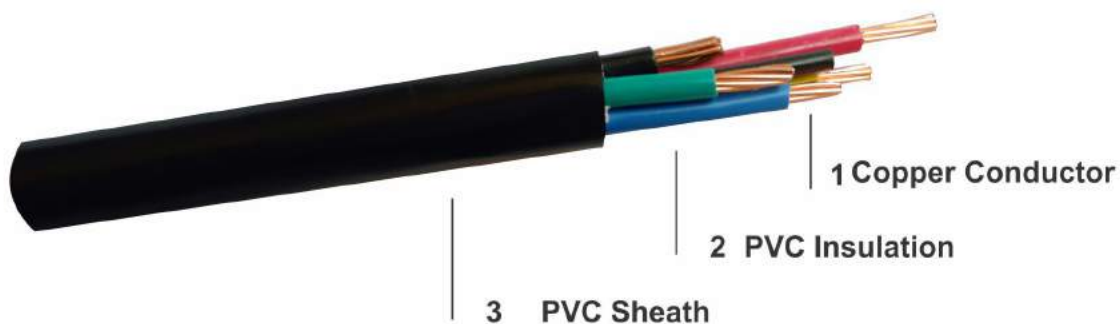


Applicable Standard: BS 6004

Nominal cross-sectional area of conductors mm ²	Class of conductors	Radial thickness of insulation mm	Thickness of inner covering	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
					Lower Limits mm	Upper Limits mm	
1.5	1	0.7	0.4	1.2	9.6	11.5	161.4
1.5	2	0.7	0.4	1.2	9.6	12.0	167.82
2.5	1	0.8	0.4	1.2	11.0	13.0	221.2
2.5	2	0.8	0.4	1.2	11.0	13.5	228.05
4	1	0.8	0.4	1.4	12.0	14.5	307.94
4	2	0.8	0.4	1.4	12.5	15.0	320.12
6	2	0.8	0.6	1.4	14.0	17.0	418.71
10	2	1.0	0.6	1.4	17.0	20.5	641.81

Dimensions and Weights

Five Core PVC Insulated PVC Sheathed 300/500 Volt Circular Cables



Applicable Standard: BS 6004

Nominal cross-sectional area of conductors mm ²	Class of conductors	Radial thickness of insulation mm	Thickness of inner Covering	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
					Lower Limits mm	Upper Limits mm	
1.5	1	0.7	0.4	1.2	10.0	12.0	288.80
1.5	2	0.7	0.4	1.2	10.0	12.5	294.71
2.5	1	0.8	0.4	1.2	11.5	14.0	360.86
2.5	2	0.8	0.4	1.2	12.0	14.5	368.22
4	1	0.8	0.6	1.4	13.5	16.0	485.76
4	2	0.8	0.6	1.4	14.0	17.0	495.67
6	2	0.8	0.6	1.4	15.5	18.5	638.08

Dimensions and Weights

Two Core PVC Insulated PVC Sheathed 300/500 Volts Circular (Flexible) Cables

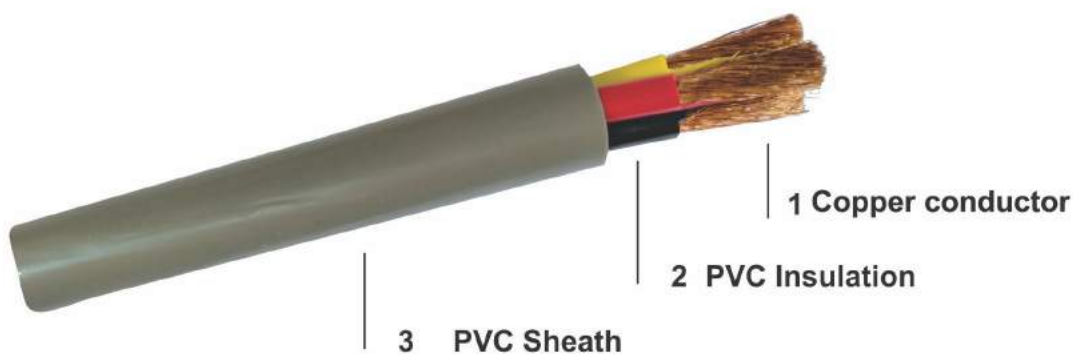


Applicable Standard: BS 6500

Nominal cross-sectional area of conductors mm ²	Radial thickness of insulation mm	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
			Lower Limits mm	Upper Limits mm	
0.75	0.6	0.8	5.7	7.2	60.00
1	0.6	0.8	5.9	7.5	67.13
1.5	0.7	0.8	6.8	8.6	90.50
2.5	0.8	1.0	8.4	10.6	137.07
4	0.8	1.1	9.7	12.1	192.96

Dimensions and Weights

Three Core PVC Insulated PVC Sheathed 300/500 Volt Circular (Flexible) Cables



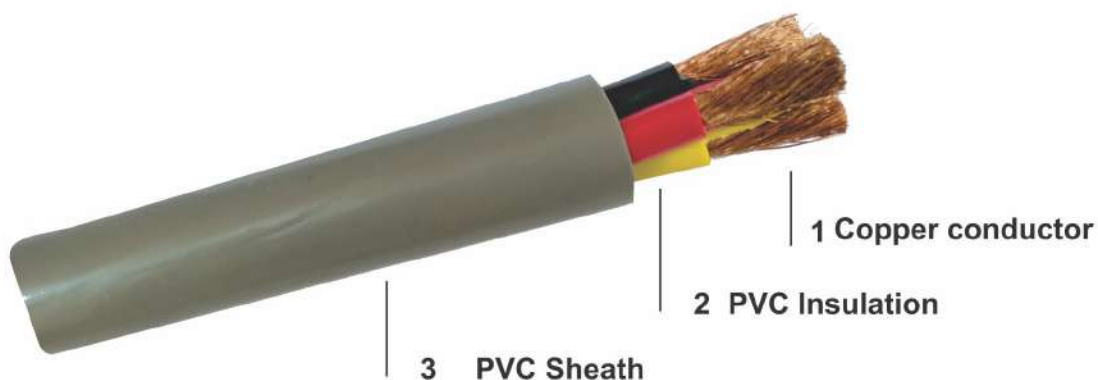
Applicable Standard: BS 6500

Nominal cross-sectional area of conductors mm ²	Radial thickness of insulation mm	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
			Lower Limits mm	Upper Limits mm	
0.75	0.6	0.8	6.0	7.6	81.98
1	0.6	0.8	6.3	8.0	93.87
1.5	0.7	0.9	7.4	9.4	123.48
2.5	0.8	1.1	9.2	11.4	170.37
4	0.8	1.2	10.5	13.1	241.73



Dimensions and Weights

Four Core PVC Insulated PVC Sheathed 300/500 Volts Circular (Flexible) Cables



Applicable Standard: BS 6500

Nominal cross-sectional area of conductors mm ²	Radial thickness of insulation mm	Radial thickness of sheath mm	Mean overall dimensions		Approximate weight of Cable Kg / Km
			Lower Limits mm	Upper Limits mm	
0.75	0.6	0.8	6.6	8.3	108.36
1	0.6	0.9	7.1	9.0	121.89
1.5	0.7	1.0	8.4	10.5	160.01
2.5	0.8	1.1	10.1	12.5	219.83
4	0.8	1.2	11.5	14.3	310.00



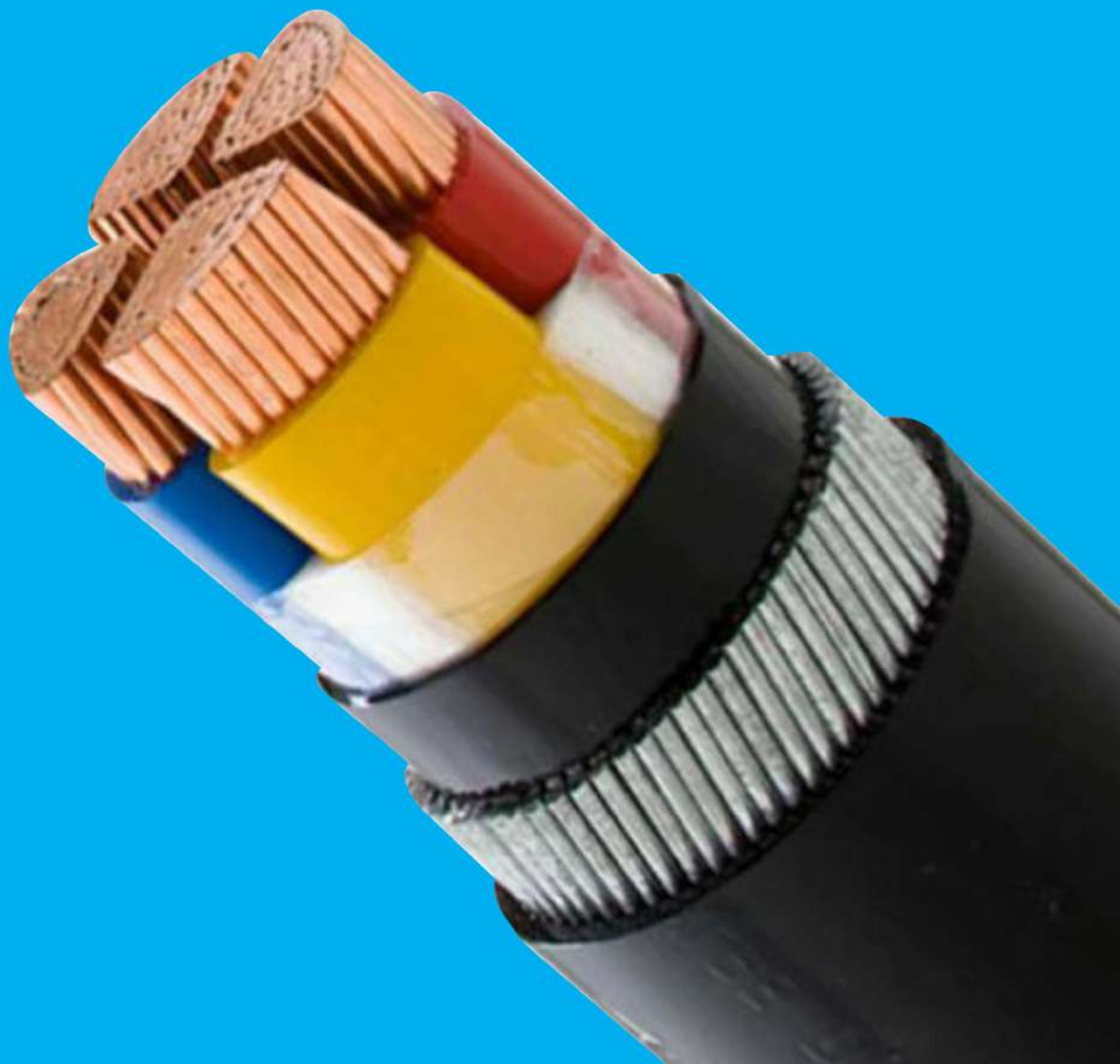
Conductor Manufacturing Detail

Class 1 solid conductor for single-core and multi-core cables

Applicable Standard: BS EN 60228 / IEC 60228

Nominal cross-sectional area mm ²	Maximum resistance of conductor at 20°C	
	Circular, annealed copper conductors (Plain) Ω/km	Circular, aluminium conductors Ω/km
0.5	36.0	-
0.75	24.5	-
1	18.1	-
1.5	12.1	-
2.5	7.41	-
4	4.61	-
6	3.08	-
10	1.83	3.08
16	1.15	1.91
25	0.727	1.20
35	0.524	0.868
50	0.387	0.641

Low Voltage Power Cables





Conductor Manufacturing Detail

Class 1 solid conductor for single-core and multi-core cables

Applicable Standard: BS EN 60228 / IEC 60228

Nominal cross-sectional area mm ²	Maximum resistance of conductor at 20°C	
	Circular, annealed copper conductors (Plain) Ω/km	Circular, aluminium conductors Ω/km
0.5	36.0	-
0.75	24.5	-
1	18.1	-
1.5	12.1	-
2.5	7.41	-
4	4.61	-
6	3.08	-
10	1.83	3.08
16	1.15	1.91
25	0.727	1.20
35	0.524	0.868
50	0.387	0.641



Conductor Manufacturing Detail

Class 2 stranded conductor for single-core and multi-core cables

Applicable Standard: BS EN 60228 / IEC 60228

Nominal cross sectional area mm^2	Minimum number of wires in the conductor						Maximum resistance of conductor at 20°C		
	Circular		Circular compacted		Shaped		Annealed copper conductor		Aluminium or aluminium alloy conductor
	Cu	Al	Cu	Al	Cu	Al	Plain wires Ω/km	Metal coated wires Ω/km	
0.5	7	-	-	-	-	-	30.0	36.7	-
0.75	7	-	-	-	-	-	24.5	24.8	-
1.0	7	-	-	-	-	-	18.1	18.2	-
1.5	7	-	6	-	-	-	12.1	12.2	-
2.5	7	-	6	-	-	-	7.41	7.56	-
4	7	-	6	-	-	-	4.61	4.70	-
6	7	-	6	-	-	-	3.08	3.11	-
10	7	7	6	6	-	-	1.83	1.84	3.08
16	7	7	6	6	-	-	1.15	1.16	1.91
25	7	7	6	6	6	6	0.727	0.734	1.20
35	7	7	6	6	6	6	0.524	0.529	0.868
50	19	9	6	6	6	6	0.387	0.391	0.641
70	19	19	12	12	12	12	0.268	0.270	0.443
95	19	19	15	15	15	15	0.193	0.195	0.320
120	37	37	18	15	18	18	0.153	0.154	0.253
150	37	37	30	30	18	18	0.124	0.125	0.206
185	37	37	34	30	30	30	0.0991	0.100	0.164
240	37	37	34	30	34	34	0.0754	0.0762	0.125
300	61	61	53	53	34	34	0.0601	0.0607	0.100
400	61	61	53	53	53	53	0.0470	0.0475	0.0778
500	61	61	53	53	53	53	0.0366	0.0369	0.0605
630	91	91	53	53	53	53	0.0283	0.0286	0.0469
800	91	91	53	53	-	-	0.0221	0.0224	0.0367
1000	91	91	53	53	-	-	0.0176	0.0177	0.0291



DIMENSIONS AND WEIGHTS

PVC Insulated and PVC Sheathed Power Cables

Single Core PVC Insulated and PVC Sheathed 600/1000 Volt Un-Armoured and Armoured Cables

Applicable Standard: BS 6346

Nominal cross-sectional area of conductors	Thickness of Insulation	Un-armoured Cables			Armoured Cables		
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter	Thickness of oversheath	Approximate overall diameter
mm ²	mm	mm	mm	mm	mm	mm	mm
50	1.4	1.4	15.1	0.8	1.25	1.5	19.1
70	1.4	1.4	16.9	0.8	1.25	1.6	21.1
95	1.6	1.5	19.4	0.8	1.25	1.6	23.4
120	1.6	1.5	21.0	1.0	1.6	1.7	26.3
150	1.8	1.6	23.2	1.0	1.6	1.7	28.3
185	2.0	1.7	25.8	1.0	1.6	1.8	30.8
240	2.2	1.8	29.0	1.0	1.6	1.9	34.1
300	2.4	1.9	32.1	1.0	1.6	1.9	37.0
400	2.6	2.0	35.8	1.2	2.0	2.1	42.0
500	2.8	2.1	39.6	1.2	2.0	2.1	45.6
630	2.8	2.2	43.8	1.2	2.0	2.2	49.7
800	2.8	2.3	48.3	1.4	2.5	2.4	55.8
1000	3.0	2.5	53.7	1.4	2.5	2.5	61.0

* Circular or Circular compacted standard conductors



DIMENSIONS AND WEIGHTS

PVC Insulated and PVC Sheathed Power Cable

Two Core PVC Insulated and PVC Sheathed 600/1000 Volt Armoured and UN-Armoured Cables

Applicable Standard: BS 6346

Nominal cross-sectional area of conductors	Thickness of Insulation	Un-armoured Cables		Armoured Cables		
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter	Thickness of oversheath
mm ²	mm	mm	mm	mm	mm	mm
1.5*	0.6	-	-	0.8	0.9	1.3
1.5**	0.6	-	-	0.8	0.9	1.4
2.5*	0.7	-	-	0.8	0.9	1.4
2.5**	0.7	-	-	0.8	0.9	1.4
4**	0.8	-	-	0.8	0.9	1.4
6**	0.8	-	-	0.8	0.9	1.5
10**	1.0	1.8	16.1	0.8	1.25	1.6
16**	1.0	1.8	18.6	0.8	1.25	1.6
25 [^]	1.2	1.8	18.4	1.0	1.6	1.7
25**	1.2	1.8	22.1	1.0	1.6	1.7
35 [^]	1.2	1.8	20.1	1.0	1.6	1.8
35**	1.2	1.8	24.5	1.0	1.6	1.8
50 [^]	1.4	1.8	22.8	1.0	1.6	1.9
70 [^]	1.4	1.9	25.5	1.0	1.6	1.9
95 [^]	1.6	2.0	29.3	1.2	2.0	2.1
120 [^]	1.6	2.1	31.8	1.2	2.0	2.2
150 [^]	1.8	2.2	35.1	1.2	2.0	2.3
185 [^]	2.0	2.4	39.1	1.4	2.5	2.4
240 [^]	2.2	2.5	43.9	1.4	2.5	2.5
300 [^]	2.4	2.7	48.7	1.6	2.5	2.7
400 [^]	2.6	2.9	54.2	1.6	2.5	2.9

* Circular Solid Conductor (Class 1)

** Circular or Circular Compacted stranded conductors (class 2)

[^] Shaped stranded conductors (Class 2)



Three Core PVC Insulated and PVC Sheathed 600/1000 Volt Un-Armoured and Armoured Cables

Applicable Standard: BS 6346

- * Circular Solid Conductor (Class 1)
- ** Circular or Circular Compacted stranded conductors (class 2)
- ^ Shaped stranded conductors (Class 2)



Four Core PVC Insulated and PVC Sheathed 600/1000 Volt Un-Armoured and Armoured Cables

Applicable Standard: BS 6346

- * Circular Solid Conductor (Class 1)
- ** Circular or Circular Compacted stranded conductors (class 2)
- ^ Shaped stranded conductors (Class 2)



DIMENSIONS AND WEIGHTS

PVC Insulated and PVC Sheathed Power Cables

Four Core PVC Insulated and PVC Sheathed 600/1000 Volt Un-Armoured and Armoured Cables with Reduced Neutral Conductor

Applicable Standard: BS 6346

Nominal cross-sectional area of conductors mm ²	Nominal area of neutral conductor mm ²	Thickness of insulation Phase conductor mm	Thickness of insulation neutral conductor mm	Un-armoured Cables		Armoured Cables			
				Thickness of sheath mm	Approximate overall diameter mm	Thickness of extruded bedding mm	Nominal armour wire diameter mm	Thickness of oversheath mm	Approximate overall diameter mm
25	16	1.2	1.0	1.8	22.9	1.0	1.6	1.8	27.8
25*	16	1.2	1.0	1.8	24.9	1.0	1.6	1.8	29.7
35	16	1.2	1.0	1.8	24.7	1.0	1.6	1.8	29.5
35*	16	1.2	1.0	1.8	27.3	1.0	1.6	1.8	32.1
50	25	1.4	1.2	1.9	28.3	1.0	1.6	1.9	33.1
70	35	1.4	1.2	2.0	32.0	1.2	2.0	2.0	38.0
95	50	1.6	1.4	2.1	37.5	1.2	2.0	2.2	43.7
120	70	1.6	1.4	2.2	41.4	1.4	2.5	2.3	49.0
150	95	1.8	1.4	2.4	44.7	1.4	2.5	2.4	52.0
185	120	2.0	1.6	2.5	49.9	1.4	2.5	2.5	57.2
240	150	2.2	1.6	2.7	56.0	1.6	2.5	2.7	63.7
300	185	2.4	1.8	2.9	62.2	1.6	2.5	2.9	69.8
300	185	2.4	2.0	2.9	64.2	1.6	2.5	2.9	71.8
400	185	2.6	2.0	3.2	69.9	1.8	3.2	3.1	78.6

* Circular or Circular Compacted Stranded Conductors



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Single Core XLPE Insulated and PVC Sheathed 600/1000 Volts Un-Armoured Cables

Applicable Standard: IEC 60502-1/ BS 7889

Nominal cross-sectional area of conductor ^{A)} mm ²	Radial thickness of insulation mm	Approximate thickness of inner covering mm	Radial thickness of sheath mm
1.5	0.7	0.4	1.4
2.5	0.7	0.4	1.4
4	0.7	0.4	1.4
6	0.7	0.4	1.4
10	0.7	0.4	1.4
16	0.7	0.4	1.4
25	0.9	0.4	1.4
35	0.9	0.4	1.4
50	1.0	0.6	1.4
70	1.1	0.6	1.4
95	1.1	0.6	1.5
120	1.2	0.8	1.5
150	1.4	0.8	1.6
185	1.6	0.8	1.6
240	1.7	1.0	1.7
300	1.8	1.0	1.8
400	2.0	1.2	1.9
500	2.2	1.2	2.0
630	2.4	1.4	2.2
800	2.6	1.6	2.3
1 000	2.8	1.6	2.4

^{A)} Circular or compacted circular stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Two Core XLPE Insulated and PVC Sheathed 600/1000 Volts Un-Armoured Cables

Applicable Standard: IEC 60502-1/ BS 7889

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Approximate thickness of inner covering mm	Radial thickness of sheath mm
1.5 ^{A)}	0.7	0.4	1.8
2.5 ^{A)}	0.7	0.4	1.8
4 ^{A)}	0.7	0.4	1.8
6 ^{A)}	0.7	0.4	1.8
10 ^{A)}	0.7	0.6	1.8
16 ^{A)}	0.7	0.6	1.8
25 ^{A)}	0.9	0.8	1.8
35 ^{A)}	0.9	0.8	1.8
50 ^{A)}	1.0	1.0	1.8
70 ^{A)}	1.1	1.0	1.8
95 ^{A)}	1.1	1.2	1.9
120 ^{A)}	1.2	1.2	2.0
25 ^{B)}	0.9	0.6	1.8
35 ^{B)}	0.9	0.6	1.8
50 ^{B)}	1.0	0.8	1.8
70 ^{B)}	1.1	0.8	1.8
95 ^{B)}	1.1	1.0	1.9
120 ^{B)}	1.2	1.0	2.0

^{A)} Circular or compacted circular stranded conductor (Class 2).

^{B)} Shaped stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Three Core XLPE Insulated and PVC Sheathed 600/1000 Volts Un-Armoured Cables

Applicable Standard: IEC 60502-1/ BS 7889

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Approximate thickness of inner covering mm	Radial thickness of sheath mm
1.5 ^{A)}	0.7	0.4	1.8
2.5 ^{A)}	0.7	0.4	1.8
4 ^{A)}	0.7	0.4	1.8
6 ^{A)}	0.7	0.4	1.8
10 ^{A)}	0.7	0.6	1.8
16 ^{A)}	0.7	0.6	1.8
25 ^{A)}	0.9	0.8	1.8
35 ^{A)}	0.9	0.8	1.8
50 ^{A)}	1.0	1.0	1.8
70 ^{A)}	1.1	1.2	1.9
95 ^{A)}	1.1	1.2	2.0
120 ^{A)}	1.2	1.2	2.1
25 ^{B)}	0.9	0.6	1.8
35 ^{B)}	0.9	0.8	1.8
50 ^{B)}	1.0	0.8	1.8
70 ^{B)}	1.1	1.0	1.9
95 ^{B)}	1.1	1.2	2.0
120 ^{B)}	1.2	1.2	2.1

^{A)} Circular or compacted circular stranded conductor (Class 2).

^{B)} Shaped stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Four Core XLPE Insulated and PVC Sheathed 600/1000 Volts Un-Armoured Cables

Applicable Standard: IEC 60502-1/ BS 7889

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Approximate thickness of inner covering mm	Radial thickness of sheath mm
1.5 ^{A)}	0.7	0.4	1.8
2.5 ^{A)}	0.7	0.4	1.8
4 ^{A)}	0.7	0.4	1.8
6 ^{A)}	0.7	0.6	1.8
10 ^{A)}	0.7	0.6	1.8
16 ^{A)}	0.7	0.6	1.8
25 ^{A)}	0.9	0.8	1.8
35 ^{A)}	0.9	1.0	1.8
50 ^{A)}	1.0	1.0	1.8
70 ^{A)}	1.1	1.2	2.0
95 ^{A)}	1.1	1.2	2.1
120 ^{A)}	1.2	1.2	2.3
25 ^{B)}	0.9	0.8	1.8
35 ^{B)}	0.9	0.8	1.8
50 ^{B)}	1.0	1.0	1.8
70 ^{B)}	1.1	1.2	2.0
95 ^{B)}	1.1	1.2	2.1
120 ^{B)}	1.2	1.2	2.3

^{A)} Circular or compacted circular stranded conductor (Class 2).

^{B)} Shaped stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Five Core XLPE Insulated and PVC Sheathed 600/1000 Volts Un-Armoured Cables

Applicable Standard: IEC 60502-1/ BS 7889

Nominal cross-sectional area of conductor ^{A)}	Radial thickness of insulation	Approximate thickness of inner covering	Radial thickness of sheath
mm ²	mm	mm	mm
1.5	0.7	0.4	1.8
2.5	0.7	0.4	1.8
4	0.7	0.6	1.8
6	0.7	0.6	1.8
10	0.7	0.6	1.8
16	0.7	0.8	1.8
25	0.9	1.0	1.8
35	0.9	1.0	1.8
50	1.0	1.2	1.9
70	1.1	1.2	2.1
95	1.1	1.4	2.2
120	1.2	1.4	2.4

^{A)} Circular or compacted circular stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Single Core XLPE Insulated and PVC Sheathed 600/1000 Volts Armoured Cables

Applicable Standard: BS 5467

Nominal cross-sectional area of conductor ^{A)} mm ²	Radial thickness of insulation mm	Nominal thickness of extruded bedding mm	Nominal aluminium armour wire diameter mm	Nominal thickness of oversheath mm	Approximate overall diameter mm
50	1.0	0.8	0.9	1.5	17.5
70	1.1	0.8	1.25	1.5	20.2
95	1.1	0.8	1.25	1.6	22.3
120	1.2	0.8	1.25	1.6	24.2
150	1.4	1.0	1.6	1.7	27.4
185	1.6	1.0	1.6	1.8	30.0
240	1.7	1.0	1.6	1.8	32.8
300	1.8	1.0	1.6	1.9	35.6
400	2.0	1.2	2.0	2.0	40.5
500	2.2	1.2	2.0	2.1	44.2
630	2.4	1.2	2.0	2.2	48.8
800	2.6	1.4	2.5	2.4	55.4
1 000	2.8	1.4	2.5	2.5	60.6

^{A)} Circular or compacted circular stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Two Core XLPE Insulated and PVC Sheathed 600/1000 Volts Armoured Cables

Applicable Standard: BS 5467

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Nominal thickness of extruded bedding mm	Nominal steel armour wire diameter mm	Nominal thickness of oversheath mm	Approximate overall diameter mm
1.5 ^{A)}	0.6	0.8	0.9	1.3	12.1
2.5 ^{A)}	0.7	0.8	0.9	1.4	13.6
4 ^{A)}	0.7	0.8	0.9	1.4	14.7
6 ^{A)}	0.7	0.8	0.9	1.4	15.9
10 ^{A)}	0.7	0.8	0.9	1.5	18.0
16 ^{A)}	0.7	0.8	1.25	1.5	20.4
25 ^{A)}	0.9	0.8	1.25	1.6	24.1
25 ^{B)}	0.9	0.8	1.25	1.6	20.4
35 ^{A)}	0.9	1.0	1.6	1.7	27.7
35 ^{B)}	0.9	1.0	1.6	1.7	23.3
50 ^{A)}	1.0	1.0	1.6	1.9	30.8
50 ^{B)}	1.0	1.0	1.6	1.8	25.8
70 ^{A)}	1.1	1.2	2.0	2.0	36.2
70 ^{B)}	1.1	1.0	1.6	1.9	29.0
95 ^{A)}	1.1	1.2	2.0	2.1	40.2
95 ^{B)}	1.1	1.2	2.0	2.0	33.1
120 ^{A)}	1.2	1.2	2.0	2.1	44.1
120 ^{B)}	1.2	1.2	2.0	2.1	36.1
150 ^{B)}	1.4	1.2	2.0	2.2	39.3
185 ^{B)}	1.6	1.4	2.5	2.4	44.7
240 ^{B)}	1.7	1.4	2.5	2.5	49.0
300 ^{B)}	1.8	1.6	2.5	2.6	53.5
400 ^{B)}	2.0	1.6	2.5	2.8	59.0

^{A)} Circular or compacted circular stranded conductor (Class 2).

^{B)} Shaped stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Three Core XLPE Insulated and PVC Sheathed 600/1000 Volts Armoured Cables

Applicable Standard: BS 5467

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Nominal thickness of extruded bedding mm	Nominal steel armour wire diameter mm	Nominal thickness of oversheath mm	Approximate overall diameter mm
1.5 ^{A)}	0.6	0.8	0.9	1.3	12.6
2.5 ^{A)}	0.7	0.8	0.9	1.4	14.1
4 ^{A)}	0.7	0.8	0.9	1.4	15.3
6 ^{A)}	0.7	0.8	0.9	1.4	16.6
10 ^{A)}	0.7	0.8	1.25	1.5	19.5
16 ^{A)}	0.7	0.8	1.25	1.6	21.6
25 ^{A)}	0.9	1.0	1.6	1.7	26.7
25 ^{B)}	0.9	1.0	1.6	1.7	23.6
35 ^{A)}	0.9	1.0	1.6	1.8	29.4
35 ^{B)}	0.9	1.0	1.6	1.8	25.7
50 ^{A)}	1.0	1.0	1.6	1.9	32.5
50 ^{B)}	1.0	1.0	1.6	1.8	28.5
70 ^{A)}	1.1	1.2	2.0	2.0	38.3
70 ^{B)}	1.1	1.0	1.6	1.9	32.2
95 ^{A)}	1.1	1.4	2.0	2.2	42.6
95 ^{B)}	1.1	1.2	2.0	2.1	37.0
120 ^{A)}	1.2	1.4	2.5	2.3	48.1
120 ^{B)}	1.2	1.2	2.0	2.2	40.4
150 ^{B)}	1.4	1.4	2.5	2.3	45.5
185 ^{B)}	1.6	1.4	2.5	2.4	49.8
240 ^{B)}	1.7	1.4	2.5	2.6	55.1
300 ^{B)}	1.8	1.6	2.5	2.7	60.2
400 ^{B)}	2.0	1.6	2.5	2.9	66.6

^{A)} Circular or compacted circular stranded conductor (Class 2).

^{B)} Shaped stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Four Core XLPE Insulated and PVC Sheathed 600/1000 Volts Armoured Cables

Applicable Standard: BS 5467

Nominal cross-sectional area of conductor mm ²	Radial thickness of insulation mm	Nominal thickness of extruded bedding mm	Nominal steel armour wire diameter mm	Nominal thickness of oversheath mm	Approximate overall diameter mm
1.5 ^{A)}	0.6	0.8	0.9	1.3	13.3
2.5 ^{A)}	0.7	0.8	0.9	1.4	15.0
4 ^{A)}	0.7	0.8	0.9	1.4	16.4
6 ^{A)}	0.7	0.8	1.25	1.5	18.7
10 ^{A)}	0.7	0.8	1.25	1.5	21.1
16 ^{A)}	0.7	0.8	1.25	1.6	23.4
25 ^{A)}	0.9	1.0	1.6	1.7	28.9
25 ^{B)}	0.9	1.0	1.6	1.7	26.1
35 ^{A)}	0.9	1.0	1.6	1.8	31.9
35 ^{B)}	0.9	1.0	1.6	1.8	28.6
50 ^{A)}	1.0	1.2	2.0	2.0	36.6
50 ^{B)}	1.0	1.0	1.6	1.9	32.0
70 ^{A)}	1.1	1.2	2.0	2.2	41.9
70 ^{B)}	1.1	1.2	2.0	2.1	37.7
95 ^{A)}	1.1	1.4	2.5	2.3	48.1
95 ^{B)}	1.1	1.2	2.0	2.2	41.7
120 ^{A)}	1.2	1.4	2.5	2.4	52.6
120 ^{B)}	1.2	1.4	2.5	2.3	47.1
150 ^{B)}	1.4	1.4	2.5	2.4	51.4
185 ^{B)}	1.6	1.4	2.5	2.6	56.6
240 ^{B)}	1.7	1.6	2.5	2.7	63.0
300 ^{B)}	1.8	1.6	2.5	2.9	68.8
400 ^{B)}	2.0	1.8	3.15	3.2	78.1

^{A)} Circular or compacted circular stranded conductor (Class 2).

^{B)} Shaped stranded conductor (Class 2).



DIMENSIONS AND WEIGHTS

XLPE Insulated and PVC Sheathed Power Cables

Five Core XLPE Insulated and PVC Sheathed 600/1000 Volts Armoured Cables

Applicable Standard: BS 5467

Nominal cross-sectional area of conductor ^{A)} mm ²	Radial thickness of insulation mm	Nominal thickness of extruded bedding mm	Nominal steel armour wire diameter mm	Nominal thickness of oversheath mm	Approximate overall diameter mm
1.5	0.6	0.8	0.9	1.4	14.3
2.5	0.7	0.8	0.9	1.4	16.1
4	0.7	0.8	0.9	1.5	17.8
6	0.7	0.8	1.25	1.5	20.0
10	0.7	0.8	1.25	1.6	22.9
16	0.7	1.0	1.6	1.7	26.6
25	0.9	1.0	1.6	1.8	31.5
35	0.9	1.0	1.6	1.9	34.8
50	1.0	1.2	2.0	2.0	40.4
70	1.1	1.2	2.0	2.2	46.3

^{A)} Circular or compacted circular stranded conductor (Class 2).



Core Identification

GM Cables follow both Old and New colour sequence depend on customer's requirement.

Cable Type	Old Core Colours	New Core Colours *
Single - Core	Red or Black	Brown or Blue
Two - Core	Red, Black	Brown, Blue
Three - Core	Red, Yellow, Blue	Brown, Black, Gray
Four - Core	Red, Yellow, Blue, Black	Blue, Brown, Black, Gray
Five - Core	Red, Yellow, Blue, Black, Green-and-Yellow	Green-and-Yellow, Blue, Brown, Black, Gray

Sheath Colour is Gray or Black (according to customer demand)

* Reference; BS 7671-18th Edition

Cable Installation Bending Radius:

Construction (cables with)	Minimum internal radius of bend
Circular copper conductors (overall cable diameter Less than or equal to 25mm)	4xD
Circular copper conductors (overall cable diameter greater than or equal to 25mm)	6xD
Shaped copper conductor	8xD
Armoured cables	8xD

Where, D is the measured overall diameter of the cable.

Note; Wherever possible, larger installation radius should be used



Quality Control

At GM Cables we follow the philosophy of famous quote “Quality is never an accident, it is always the result of intelligent efforts”.

In the manufacture of cables, intelligent efforts are incorporated to achieve quality. All raw materials are selected carefully and only materials of high quality are used in production. Having done this, stage wise inspection is done to ensure conformity with the requirements of relevant Standards where these apply. Detail of stage wise inspection is below.

Stage - Wise Inspection

Section	Check
Wire-Drawing:	Wire diameter, Surface, Shape, Quality of joints in the wire
Stranding:	Compaction of conductor, Shape of Conductor, Dimension, Resistance of Conductor
Insulation:	Diameter over Insulation, Thickness of Insulation,
Curing:	Hot set test, Tensile strength & elongation test.
(For XLPE only)	
Laying Up:	Sequence of Cores, Direction of lay, Diameter over laid up cores, Circularity of laid up cables
Inner Sheath:	Thickness of Sheath, Diameter over Sheath, Surface Uniformity, Circularity
Armoring:	Diameter of Wires/ Dimensions of Strips, Direction of lay, Quality of Joints of Wires
Outer Sheath:	Thickness of Sheath, Diameter over Sheath, Tightness of Sheath, Embossing

The tests on cables have been classified broadly in four categories as follows:

Routine Tests: Tests carried out on each cable to check the requirements which are likely to vary during production.

Type Tests: Tests carried out to prove conformity with the specification.

Factory Acceptance Tests: Tests carried out on samples taken from a lot for the purpose of acceptance of the lot by customer.

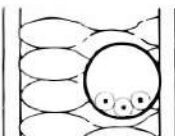
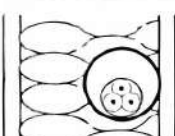
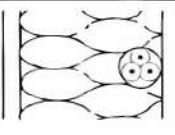
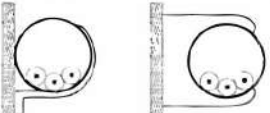
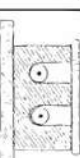
Optional Tests: Special tests to be carried out when required by agreement between the purchaser and the manufacturer. Together with the most advanced equipment available, we are able to offer to our valued customer's assurances of highest quality and strict adherence to the required specification.

As a third party guarantee, our cables have passed rigorous tests at various Government recognized test laboratories such as UET Lahore, UET Taxila, PCSIR Peshawar, PCSIR Lahore.

Installation Methods

Ref: BS 7671

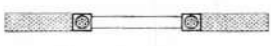
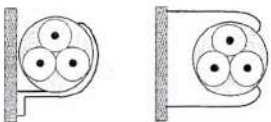
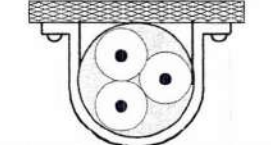
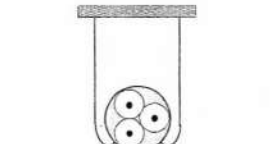
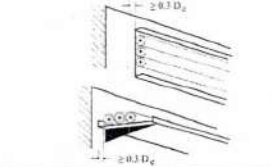
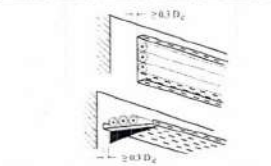
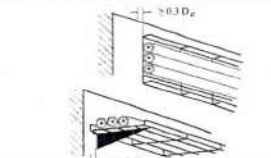
**Table 4A2- Schedule of Installation Methods of cables (including Reference method)
for determining current-carrying capacity**

Number	Examples	Installation Method Description	Reference Method to be used to determine current- carrying capacity
1	 Room	Non-sheathed cables in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m2K	A
2	 Room	Multicore cable in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 Wlin2K	A
3	 Room	Multicore cable direct in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 Wlm2K	A
4		Non-sheathed cables in conduit on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it	B
5		Multicore cable in conduit on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it	B
6 7	 6  7	Non-sheathed cables in cable trunking on a wooden or masonry wall 6 - run horizontally b 7 - run vertically b,c	B
8 9	 8  9	Multicore cable in cable trunking on a wooden or masonry wall 8 - run horizontally b 9 - run vertically b,c	B*
10		Non-sheathed cables in suspended cable trunking b	B
11		Multicore cable in suspended cable trunking	B
12		Non-sheathed cables run in mouldings c,c	A

- b Values given for Reference Method B in Appendix 4 are for a single circuit. Where there is more than one circuit in the trunking the group rating factor given in Table 4C1 is applicable, irrespective of the presence of an internal barrier or partition.
- c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.
- e The thermal resistivity of the enclosure is assumed to be poor because of the material of construction and possible air spaces. Where the construction is thermally equivalent to Installation Methods 6 or 7. Reference Method B may be used.

* Still under consideration in IEC.

Table 4A2 (continued)

Number	Examples	Installation Method Description	Reference Method to be used to determine current- carrying capacity
15		Non-sheathed cables in conduit or single-core or multicore cable in architrave "	A
16		Non-sheathed cables in conduit or single-core or multicore cable in window frames "	A
24		Single-core or multicore cables: - fixed on (clipped direct), or spaced less than 0.3 x cable diameter from a wooden or masonry wall	C
21		Single-core or multicore cables: - fixed directly under a wooden or masonry ceiling	C
22		Single-core or multicore cables: - spaced from a ceiling	E F or G
23		Not used	
30		Single-core or multi core cables: - on unperforated tray run horizontally or vertically	C with item 2 of table 4C1
31		Single-core or multicore cables: - on perforated tray run horizontally or vertically	E or F
32		Single-core or multicore cables: - on brackets or on a wire mesh tray run horizontally or vertically "	E or F

c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.

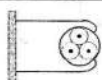
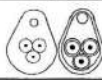
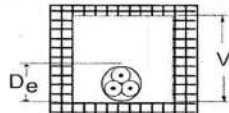
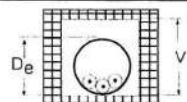
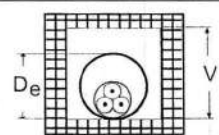
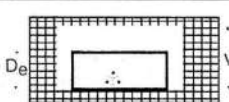
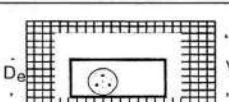
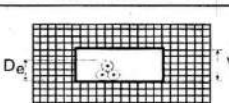
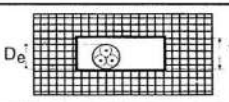
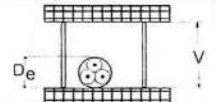
f The thermal resistivity of the enclosure is assumed to be poor because of the material of construction and possible air spaces. Where the construction is thermally equivalent to Installation Methods 6, 7, 8 or 9, Reference Method B may be used.

h D_e = the external diameter of a multicore cable:

- 2.2 x the cable diameter when three single-core cables are bound in trefoil, or
- 3 x the cable diameter when three single-core cables are laid in flat formation.

* Still under consideration in IEC.

Table 4A2 (continued)

Number	Examples	Installation Method	Reference Method to be used to determine current-carrying capacity
		Description	
33		Single-core or multicore cables: - spaced more than 0.3 times the cable diameter from a wall	E, F or Gg
34		Single-core or multicore cables: - on a ladder	E or F
35		Single-core or multicore cable suspended from or incorporating a support wire or harness	E or F
36		Bare or non-sheathed cables on insulators	G
40		Single-core or multicore cable in a building void	Where $1.5 D < V < 20 D$ use B
41		Non-sheathed cables in conduit in a building void in masonry having a thermal resistivity not greater than 2 K.m/W	Where $1.5 D < V$ use B
42		Single-core or multicore cable in conduit in a building void in masonry having a thermal resistivity not greater than 2 K.m/W	Where $1.5 D < V$ use B
43		Non-sheathed cables in cable ducting in a building void in masonry having a thermal resistivity not greater than 2 K.m/W	Where $1.5 D < V$ use B
44		Single-core or multicore cable in cable ducting in a building void in masonry having a thermal resistivity not greater than 2 K.m/W	Where $1.5 D < V$ use B
45		Non-sheathed cables in cable ducting in masonry having a thermal resistivity not greater than 2 K.m/W	Where $1.5 D < V < 50 D$ use B
46		Single-core or multicore cable in cable ducting in masonry having a thermal resistivity not greater than 2 K.m/W	Where $1.5 D < V < 50 D$ use B
47		Single-core or multicore cable: - in a ceiling void - in a suspended floor	Where $1.5 D < V < 50 D$ use B

c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.

g The factors in Table 4C1 may also be used.

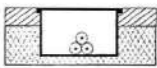
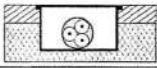
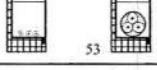
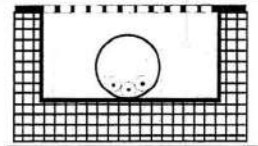
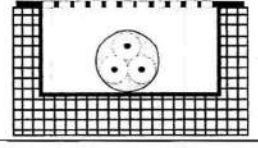
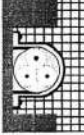
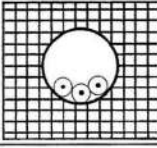
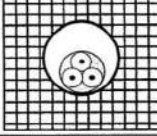
h D_c = the external diameter of a multicore cable:

- 2.2 x, the cable diameter when three single-core cables are bound in trefoil, or
- 3 x the cable diameter when three single-core cables are laid in flat formation.

i V = the smaller dimension or diameter of a masonry duct or void, or the vertical depth of a rectangular duct, floor or ceiling void or channel.

j D_c = external diameter of conduit or vertical depth of cable ducting.

Table 4A2 (continued)

Number	Examples	Installation Method	Reference Method to be used to determine current-carrying capacity
		Description	
50		Non-sheathed cables in flush cable trunking in the floor	B
51		Multicore cable in flush cable trunking in the floor	B
52		Non-sheathed cables in flush trunking	B
53		Multicore cable in flush trunking	B
54		Non-sheathed cables or single-core cables in conduit in an unventilated cable channel run horizontally or vertically	Where $1.5 D < V$ Use B
55		Non-sheathed cables in conduit in an open or ventilated cable channel in the floor	B
56		Sheathed single-core or multicore cable in an open or ventilated cable channel run horizontally or vertically	B
57		Single-core or multicore cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - without added mechanical protection	C
58		Single-core or multicore cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - with added mechanical protection (e.g. capping)	C
59		Non-sheathed cables or single-core cables in conduit in masonry having a thermal resistivity not greater than 2 K.m/W	B
60		Multicore cables in conduit in masonry having a thermal resistivity not greater than 2 K.m/W	B

c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.

k D_e = external diameter of conduit.

i V = the smaller dimension or diameter of a masonry duct or void, or the vertical depth of a rectangular duct, floor or ceiling void or channel. The depth of the channel is more important than the width.

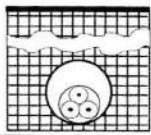
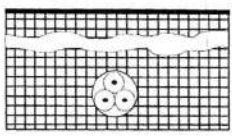
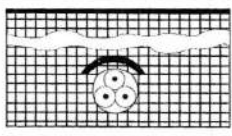
l For multicore cable installed as Method 55, use current-carrying capacity for Reference Method B.

m It is recommended that these Installation Methods are used only in areas where access is restricted to authorized persons so that the reduction in current-carrying capacity and the fire hazard due to the accumulation of debris can be prevented.

n For cables having conductors not greater than 16 mm², the current-carrying capacity may be higher.

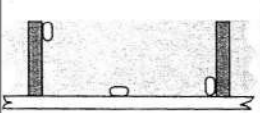
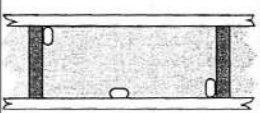
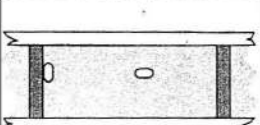
o Thermal resistivity of masonry is not greater than 2 K.m/W. The term masonry is taken to include brickwork, concrete, plaster and the like (excludes thermally insulating materials).

Table 4A2 (continued)

Installation Method		Reference Method to be used to determine current-carrying capacity
Number	Examples	
70		D For multicore armoured cable only
71		Not used
72		D
73		D

NOTE: The inclusion of directly buried cables is satisfactory where the soil thermal resistivity is of the order of 2.5 K.m/W. For lower soil resistivities the current carrying capacity for directly buried cables is appreciably higher than for cables in ducts.

Table 4A2 (continued)
Installation methods for flat twin earth cables in thermal insulation)

Installation Method		Reference Method to be used to determine current-carrying capacity
Number	Examples	
100		Table 4D5
101		Table 4D5
102		Table 4D5
103		Table 4D5

Wherever practicable, a cable is to be fixed in a position such that it will not be covered with thermal insulation.

Regulation 523.9. BS 5803-5: Appendix C: Avoidance of overheating of electric cables. Building Regulations Approved Document B and Thermal insulation: avoiding risks, BR 262. BRE, 2001 refer.

Table 4A2 (continued)
Installation methods for cables enclosed in infloor concrete troughs)

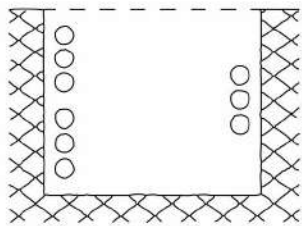
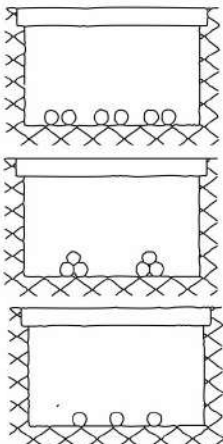
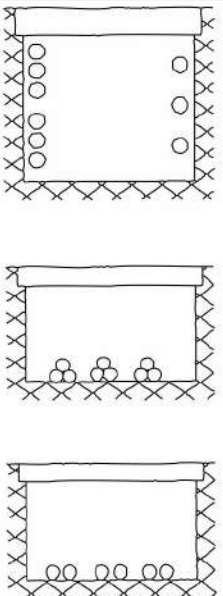
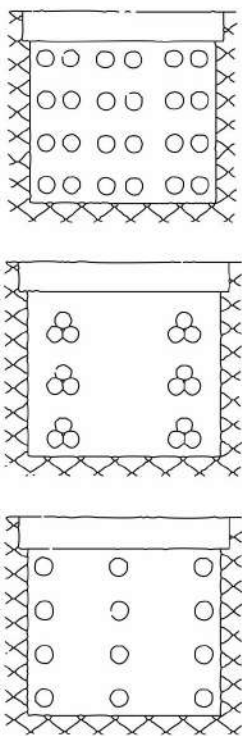
Number	Examples	Installation Method	Reference Method to be used to determine current- carrying capacity
		Description	
117		Cables supported on the wall of an open or ventilated infloor concrete trough with spacing as follows: - Sheathed single-core cables in free air (any supporting metalwork under the cables occupying less than 10 % of plan area). - Two or three cables vertically one above the other, minimum, distance between cable surfaces equal to the overall cable diameters, distance from the wall not less than 'A the cable diameter. - Two or three cables horizontally with spacing as above.	E or F
118		Cables in enclosed trench 450 mm wide by 300 mm deep (minimum dimensions) including 100 mm cover - Two to six single—core cables with surfaces separated by a minimum of one cable diameter - One or two groups of three single-core cables in trefoil formation - One to four 2-core cables or one to three cables of 3 or 4 cores with all cables separated by a minimum of 50 mm	E or F using rating factors in Table 4C6
119		Cables enclosed in an infloor concrete trough 450 mm wide by 600 mm deep (minimum dimensions) including 100 mm cover. Six to twelve single-core cables arranged in flat . groups of two or three on the vertical trench wall with cables separated by one cable diameter and a minimum of 50 mm between groups. Or two to four groups of three single-core cables in trefoil formation with a minimum of 50 mm between trefoil formations. or four to eight 2-core cables or three to six cables of 3 or 4 cores with cables separated by a minimum of 75 mm. All cables spaced at least 25 mm from trench wall.	E or F using rating factors in Table 4C6

Table 4A2 (continued)
Installation methods for cables enclosed in infloor concrete troughs)

Number	Examples	Installation Method	Reference Method to be used to determine current-carrying capacity
		Description	
120		Cables enclosed in an infloor concrete trough 600 mm wide by 760 mm deep (minimum dimensions) including 100 mm cover. Twelve to twenty-four single-core cables arranged in either flat formation of two or three cables in a group with cables separated by one cable diameter and each cable group separated by a minimum of 50 mm either horizontally or vertically or single-core cables in trefoil formation with each group or trefoil formation separated by a minimum of 50 mm either horizontally or vertically or eight to sixteen 2-core cables or six to twelve cables of 3 or 4 cores with cables separated by a minimum of 75 mm either horizontally or vertically. All cables spaced at least 25 mm from trench wall.	E or F using rating factors in Table 4C6

Current Carrying Capacity & Voltage Drop

Current Carrying Capacity and Voltage Drop of cable mentioned in this catalogue are taken from BS 7671, 18th Edition. (IET wiring regulation)

GM Cables & Pipes (Pvt) Limited is the official member of BSI (British Standard Institution)

TABLE 4C4 – Rating factors for groups of more than one multicore cable, to be applied to reference current-carrying capacities for multicore cables in free air – Reference Method E in Tables 4D2A to 4J4A

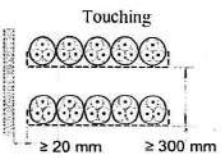
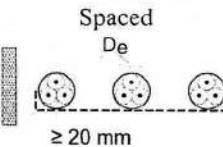
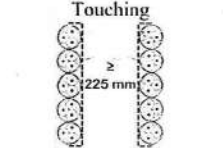
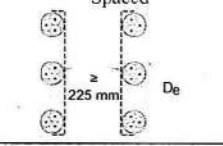
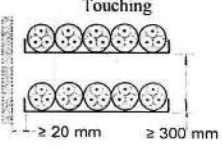
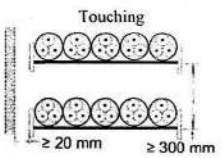
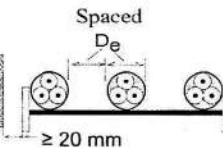
Installation Method in Table 4A2			Number of trays or ladders	Number of cables per tray or ladder							
				1	2	3	4	6	9		
Perforated cable tray systems (Note 3)	31		1	See item 3 of Table 4C1							
			2	1.00	0.87	0.80	0.77	0.73	0.68		
			3	1.00	0.86	0.79	0.76	0.71	0.66		
			6	1.00	0.84	0.77	0.73	0.68	0.64		
			1	1.00	1.00	0.98	0.95	0.91	—		
			2	1.00	0.99	0.96	0.92	0.87	—		
	Vertical perforated cable tray systems (Note 4)	31		1	See item 3 of Table 4C1						
				2	1.00	0.88	0.81	0.76	0.71	0.70	
					1	1.00	0.91	0.89	0.88	0.87	—
					2	1.00	0.91	0.88	0.87	0.85	—
Unperforated cable tray systems			30		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	
		Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34		1	See item 4 of Table 4C1					
					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		
	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	—	

TABLE 4C5 – Rating 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 – Reference Method F in Tables 4D1A to 4J3A

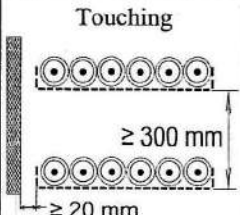
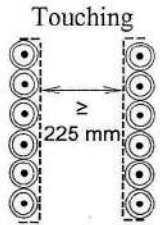
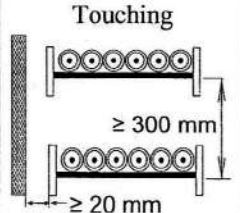
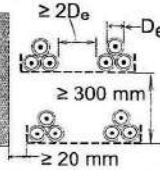
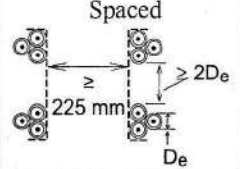
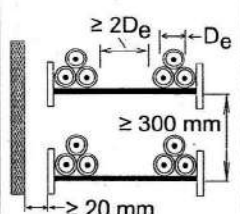
Installation Method in Table 4A2			Number of trays or ladders	Number of three-phase circuits per tray or ladder			Use as a multiplier to rating for
				1	2	3	
Perforated cable tray systems (Note 3)	31		1	0.98	0.91	0.87	Three cables in horizontal formation
			2	0.96	0.87	0.81	
			3	0.95	0.85	0.78	
Vertical perforated cable tray systems (Note 4)	31		1	0.96	0.86	–	Three cables in vertical formation
			2	0.95	0.84	–	
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34		1	1.00	0.97	0.96	Three cables in horizontal formation
			2	0.98	0.93	0.89	
			3	0.97	0.90	0.86	
Perforated systems (Note 3)	31		1	1.00	0.98	0.96	Three cables in trefoil formation
			2	0.97	0.93	0.89	
			3	0.96	0.92	0.86	
Vertical perforated cable tray systems (Note 4)	31		1	1.00	0.91	0.89	
			2	1.00	0.90	0.86	
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34		1	1.00	1.00	1.00	
			2	0.97	0.95	0.93	
			3	0.96	0.94	0.90	



Table 4D1A

**Single-Core 70 °C thermoplastic insulated cables, non – armoured, with or without sheath
(Copper Conductors)**

CURRENT-CARRYING CAPACITY (amperes):											
Ambient temperature: 30 °C Conductor operating temperature: 70 °C											
Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray horizontal or vertical)				
	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC flat and touching	3 or 4 cables, three-phase AC flat and touching or trefoil	Touching			Spaced by one diameter	
							2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	3 cables, three-phase AC trefoil	2 cables, single-phase AC or DC or 3 cables three-phase AC flat	
										Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1	11	10.5	13.5	12	15.5	14	-	-	-	-	-
1.5	14.5	13.5	17.5	15.5	20	18	-	-	-	-	-
2.5	20	18	24	21	27	25	-	-	-	-	-
4	26	24	32	28	37	33	-	-	-	-	-
6	34	31	41	36	47	43	-	-	-	-	-
10	46	42	57	50	65	59	-	-	-	-	-
16	61	56	76	68	87	79	-	-	-	-	-
25	80	73	101	89	114	104	131	114	110	146	130
35	99	89	125	110	141	129	162	143	137	181	162
50	119	108	151	134	182	167	196	174	167	219	197
70	151	136	192	171	234	214	251	225	216	281	254
95	182	164	232	207	284	261	304	275	264	341	311
120	210	188	269	239	330	303	352	321	308	396	362
150	240	216	300	262	381	349	406	372	356	456	419
185	273	245	341	296	436	400	463	427	409	521	480
240	321	286	400	346	515	472	546	507	485	615	569
300	367	328	458	394	594	545	629	587	561	709	659
400	-	-	546	467	694	634	754	689	656	852	795
500	-	-	626	533	792	723	868	789	749	982	920
630	-	-	720	611	904	826	1005	905	855	1138	1070
800	-	-	-	-	1030	943	1086	1020	971	1265	1188
1000	-	-	-	-	1154	1058	1216	1149	1079	1420	1337



Conductor operating temperature: 70 °C

Conductor cross-sectional area	2 cables, DC	2 cables, single-phase AC				3 or 4 cables, three-phase AC			
		Reference Methods A & B (enclosed in conduit or trunking)		Reference Methods C & F (clipped direct, on tray or in free air)		Reference Methods A & B (enclosed in conduit or trunking)		Reference Methods C & F (clipped direct, on tray or in free air)	
		Cables touching		Cables spaced*		Cables touching, Trefoil		Cables touching, Flat	
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)	4 (mV/A/m)	5 (mV/A/m)	6 (mV/A/m)	7 (mV/A/m)	8 (mV/A/m)	9 (mV/A/m)	
1	44	44	44	44	38	38	38	38	
1.5	29	29	29	29	25	25	25	25	
2.5	18	18	18	18	15	15	15	15	
4	11	11	11	11	9.5	9.5	9.5	9.5	
6	7.3	7.3	7.3	7.3	6.4	6.4	6.4	6.4	
10	4.4	4.4	4.4	4.4	3.8	3.8	3.8	3.8	
16	2.8	2.8	2.8	2.8	2.4	2.4	2.4	2.4	
25	1.75	1.80	1.75	1.75	1.50	1.50	1.50	1.50	
35	1.25	1.30	1.25	1.25	1.10	1.10	1.10	1.10	
50	0.93	0.95	0.93	0.93	0.85	0.80	0.80	0.80	
70	0.63	0.65	0.63	0.63	0.61	0.55	0.55	0.55	
95	0.46	0.49	0.47	0.47	0.42	0.41	0.41	0.40	
120	0.36	0.39	0.37	0.37	0.33	0.32	0.32	0.32	
150	0.29	0.31	0.30	0.30	0.27	0.26	0.26	0.26	
185	0.23	0.25	0.24	0.24	0.23	0.21	0.22	0.21	
240	0.180	0.195	0.185	0.185	0.23	0.160	0.160	0.160	
300	0.145	0.160	0.150	0.150	0.23	0.130	0.130	0.130	
400	0.105	0.130	0.120	0.115	0.22	0.105	0.105	0.100	
500	0.086	0.110	0.098	0.093	0.22	0.086	0.086	0.081	
630	0.068	0.094	0.081	0.076	0.24	0.072	0.072	0.066	
800	0.053	-	0.068	0.061	-	0.060	0.060	0.053	
1000	0.042	-	0.059	0.050	-	0.052	0.052	0.044	



Table 4D2A

**Multicore 70 °C thermoplastic insulated and thermoplastic sheathed cables, non-armoured
(Copper Conductors)**

CURRENT-CARRYING CAPACITY (amperes): Ambient temperature: 30 °C
Conductor operating temperature: 70 °C

Conductor cross- sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)	
	1 two-core cable*, single-phase AC or DC	1 three-core cable* or 1 four-core cable, three- phase AC	1 two-core cable*, single-phase AC or DC	1 three-core cable* or 1 four-core cable, three- phase AC	1 two-core cable*, single-phase AC or DC	1 three-core cable* or 1 four-core cable, three- phase AC	1 two-core cable*, single-phase AC or DC	1 three-core cable* or 1 four-core cable, three- phase AC
1	2	3	4	5	6	7	8	9
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1	11	10	13	11.5	15	13.5	17	14.5
1.5	14	13	16.5	15	19.5	17.5	22	18.5
2.5	18.5	17.5	23	20	27	24	30	25
4	25	23	30	27	36	32	40	34
6	32	29	38	34	46	41	51	43
10	43	39	52	46	63	57	70	60
16	57	52	69	62	85	76	94	80
25	75	68	90	80	112	96	119	101
35	92	83	111	99	138	119	148	126
50	110	99	133	118	168	144	180	153
70	139	125	168	149	213	184	232	196
95	167	150	201	179	258	223	282	238
120	192	172	232	206	299	259	328	276
150	219	196	258	225	344	299	379	319
185	248	223	294	255	392	341	434	364
240	291	261	344	297	461	403	514	430
300	334	298	394	339	530	464	593	497
400	-	-	470	402	634	557	715	597



TABLE 4D2B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
1	44	44			38		
1.5	29	29			25		
2.5	18	18			15		
4	11	11			9.5		
6	7.3	7.3			6.4		
10	4.4	4.4			3.8		
16	2.8	2.8			2.4		
		r	x	z	r	x	z
25	1.75	1.75	0.170	1.75	1.50	0.145	1.50
35	1.25	1.25	0.165	1.25	1.10	0.145	1.10
50	0.93	0.93	0.165	0.94	0.80	0.140	0.81
70	0.63	0.63	0.160	0.65	0.55	0.140	0.57
95	0.46	0.47	0.155	0.50	0.41	0.135	0.43
120	0.36	0.38	0.155	0.41	0.33	0.135	0.35
150	0.29	0.30	0.155	0.34	0.26	0.130	0.29
185	0.23	0.25	0.150	0.29	0.21	0.130	0.25
240	0.180	0.190	0.150	0.24	0.165	0.130	0.21
300	0.145	0.155	0.145	0.21	0.135	0.130	0.185
400	0.105	0.115	0.145	0.185	0.100	0.125	0.160



**TABLE 4D3A – Single-core armoured 70 °C thermoplastic insulated cables
(non-magnetic armour)
(COPPER CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes):

Ambient temperature: 30 °C
Conductor operating temperature: 70 °C

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray, horizontal or vertical)									
	Touching		Touching			Spaced by one cable diameter						
	2 cables, single-phase AC or DC flat	3 or 4 cables, three-phase AC flat	2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	3 cables, three-phase AC trefoil	2 cables, DC		2 cables, single-phase AC		3 or 4 cables, three-phase AC		
1	2	3	4	5	6	7	8	9	10	11	12	
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	
50	193	179	205	189	181	229	216	229	217	230	212	
70	245	225	259	238	231	294	279	287	272	286	263	
95	296	269	313	285	280	357	340	349	332	338	313	
120	342	309	360	327	324	415	396	401	383	385	357	
150	393	352	413	373	373	479	458	449	429	436	405	
185	447	399	469	422	425	548	525	511	489	490	456	
240	525	465	550	492	501	648	622	593	568	566	528	
300	594	515	624	547	567	748	719	668	640	616	578	
400	687	575	723	618	657	885	851	737	707	674	632	
500	763	622	805	673	731	1035	997	810	777	721	676	
630	843	669	891	728	809	1218	1174	893	856	771	723	
800	919	710	976	777	886	1441	1390	943	905	824	772	
1000	975	737	1041	808	945	1685	1627	1008	967	872	816	



TABLE 4D3B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	2 cables, DC	Reference Methods C & F (clipped direct, on tray or free air)					
		2 cables, single-phase AC			3 or 4 cables, three-phase AC		
		touching	spaced*	trefoil and touching	flat and touching	flat and spaced*	
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)	4 (mV/A/m)	5 (mV/A/m)	6 (mV/A/m)	7 (mV/A/m)	
50	0.93	F 0.93 X 0.22 Z 0.95	F 0.92 X 0.30 Z 0.97	F 0.80 X 0.190 Z 0.82	F 0.79 X 0.26 Z 0.84	F 0.79 X 0.34 Z 0.86	
70	0.63	0.64 0.21 0.68	0.66 0.29 0.72	0.56 0.180 0.58	0.57 0.25 0.62	0.59 0.32 0.68	
95	0.46	0.48 0.20 0.52	0.51 0.28 0.58	0.42 0.175 0.45	0.44 0.25 0.50	0.47 0.31 0.57	55
120	0.36	0.39 0.195 0.43	0.42 0.28 0.50	0.33 0.170 0.37	0.36 0.24 0.43	0.40 0.30 0.50	
150	0.29	0.31 0.190 0.37	0.34 0.27 0.44	0.27 0.165 0.32	0.30 0.24 0.38	0.34 0.30 0.45	
185	0.23	0.26 0.190 0.32	0.29 0.27 0.39	0.22 0.160 0.27	0.25 0.23 0.34	0.29 0.29 0.41	
240	0.180	0.20 0.180 0.27	0.23 0.26 0.35	0.175 0.160 0.23	0.20 0.23 0.30	0.24 0.28 0.37	
300	0.145	0.160 0.180 0.24	0.190 0.26 0.32	0.140 0.155 0.21	0.165 0.22 0.28	0.20 0.28 0.34	
400	0.105	0.140 0.175 0.22	0.180 0.24 0.30	0.120 0.130 0.195	0.160 0.21 0.26	0.21 0.25 0.32	
500	0.086	0.120 0.170 0.21	0.165 0.23 0.29	0.105 0.145 0.180	0.145 0.20 0.25	0.190 0.24 0.30	
630	0.068	0.105 0.165 0.195	0.150 0.22 0.27	0.091 0.145 0.170	0.135 0.195 0.23	0.175 0.22 0.28	
800	0.053	0.095 0.160 0.185	0.145 0.21 0.25	0.082 0.140 0.160	0.125 0.180 0.22	0.170 0.195 0.26	
1000	0.042	0.091 0.155 0.180	0.140 0.190 0.24	0.079 0.135 0.155	0.125 0.165 0.21	0.165 0.170 0.24	

NOTE: * Spacings larger than one cable diameter will result in a larger voltage drop.



**TABLE 4D4A – Multicore armoured 70 °C thermoplastic insulated cables
(COPPER CONDUCTORS)**

Ambient temperature: 30 °C
Ground ambient temperature: 20 °C

Conductor operating temperature: 70 °C

CURRENT-CARRYING CAPACITY (amperes):

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)		Reference Method D (direct in ground or in ducting in ground, in or around buildings)	
	1 two-core cable, single-phase AC or DC	1 three- or four- core cable, three- phase AC	1 two-core cable, single-phase AC or DC	1 three- or four- core cable, three- phase AC	1 two-core cable, single-phase AC or DC	1 three- or four- core cable, three- phase AC
1	2	3	4	5	6	7
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)
1.5	21	18	22	19	22	18
2.5	28	25	31	26	29	24
4	38	33	41	35	37	30
6	49	42	53	45	46	38
10	67	58	72	62	60	50
16	89	77	97	83	78	64
25	118	102	128	110	99	82
35	145	125	157	135	119	98
50	175	151	190	163	140	116
70	222	192	241	207	173	143
95	269	231	291	251	204	169
120	310	267	336	290	231	192
150	356	306	386	332	261	217
185	405	348	439	378	292	243
240	476	409	516	445	336	280
300	547	469	592	510	379	316
400	621	540	683	590	-	-



TABLE 4D4B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
1.5	29	29			25		
2.5	18	18			15		
4	11	11			9.5		
6	7.3	7.3			6.4		
10	4.4	4.4			3.8		
16	2.8	2.8			2.4		
		r	x	z	r	x	z
25	1.75	1.75	0.170	1.75	1.50	0.145	1.50
35	1.25	1.25	0.165	1.25	1.10	0.145	1.10
50	0.93	0.93	0.165	0.94	0.80	0.140	0.81
70	0.63	0.63	0.160	0.65	0.55	0.140	0.57
95	0.46	0.47	0.155	0.50	0.41	0.135	0.43
120	0.36	0.38	0.155	0.41	0.33	0.135	0.35
150	0.29	0.30	0.155	0.34	0.26	0.130	0.29
185	0.23	0.25	0.150	0.29	0.21	0.130	0.25
240	0.180	0.190	0.150	0.24	0.165	0.130	0.21
300	0.145	0.155	0.145	0.21	0.135	0.130	0.185
400	0.105	0.115	0.145	0.185	0.100	0.125	0.160



Table 4E1A
Single – Core 90 °C thermosetting insulated cables, non-armoured,
With or without sheath
(COPPER CONDUCTORS)

CURRENT-CARRYING CAPACITY (amperes):

Ambient temperature: 30 °C
 Conductor operating temperature: 90 °C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray etc horizontal or vertical etc)			Reference Method G (in free air) Spaced by one cable diameter	
	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC flat and touching	3 or 4 cables, three-phase AC flat and touching or trefoil	2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	3 cables, three-phase AC trefoil	Horizontal	Vertical
1 (mm ²)	2	3	4	5	6	7	8	9	10	11	12
1	14	13	17	15	19	17.5	-	-	-	-	-
1.5	19	17	23	20	25	23	-	-	-	-	-
2.5	26	23	31	28	34	31	-	-	-	-	-
4	35	31	42	37	46	41	-	-	-	-	-
6	45	40	54	48	59	54	-	-	-	-	-
10	61	54	75	66	81	74	-	-	-	-	-
16	81	73	100	88	109	99	-	-	-	-	-
25	106	95	133	117	143	130	161	141	135	182	161
35	131	117	164	144	176	161	200	176	169	226	201
50	158	141	198	175	228	209	242	216	207	275	246
70	200	179	253	222	293	268	310	279	268	353	318
95	241	216	306	269	355	326	377	342	328	430	389
120	278	249	354	312	413	379	437	400	383	500	454
150	318	285	393	342	476	436	504	464	444	577	527
185	362	324	449	384	545	500	575	533	510	661	605
240	424	380	528	450	644	590	679	634	607	781	719
300	486	435	603	514	743	681	783	736	703	902	833
400	-	-	683	584	868	793	940	868	823	1085	1008
500	-	-	783	666	990	904	1083	998	946	1253	1169
630	-	-	900	764	1130	1033	1254	1151	1088	1454	1362
800	-	-	-	-	1288	1179	1358	1275	1214	1581	1485
1000	-	-	-	-	1443	1323	1520	1436	1349	1775	1671



Table 4E1B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90°C

Conductor cross-sectional area	2 cables, DC	2 cables, single-phase AC			3 or 4 cables, three-phase AC								
		Reference Methods A & B (enclosed in conduit or trunking)	References Methods C, F & G (clipped direct, on tray or in free air)		Reference Methods A & B (enclosed in conduit or trunking)	Reference Methods C, F & G (clipped direct, on tray or in free air)							
			Cables touching	Cables spaced*		Cables touching, Trefoil	Cables touching, Flat	Cables spaced*, Flat					
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)	4 (mV/A/m)	5 (mV/A/m)	6 (mV/A/m)	7 (mV/A/m)	8 (mV/A/m)	9 (mV/A/m)					
1	46	46	46	46	40	40	40	40					
1.5	31	31	31	31	27	27	27	27					
2.5	19	19	19	19	16	16	16	16					
4	12	12	12	12	10	10	10	10					
6	7.9	7.9	7.9	7.9	6.8	6.8	6.8	6.8					
10	4.7	4.7	4.7	4.7	4.0	4.0	4.0	4.0					
16	2.9	2.9	2.9	2.9	2.5	2.5	2.5	2.5					
25	1.85	1.85	1.85	1.85	1.60	1.60	1.60	1.60					
35	1.35	1.35	1.35	1.35	1.15	1.15	1.15	1.15					
50	0.99	0.99	0.99	0.99	0.86	0.86	0.86	0.86					
70	0.68	0.70	0.75	0.71	0.60	0.61	0.62	0.62					
95	0.49	0.51	0.58	0.52	0.44	0.45	0.46	0.46					
120	0.39	0.41	0.48	0.43	0.35	0.37	0.38	0.38					
150	0.32	0.33	0.43	0.36	0.29	0.31	0.32	0.32					
185	0.25	0.27	0.37	0.30	0.23	0.26	0.28	0.28					
240	0.190	0.21	0.33	0.25	0.185	0.22	0.24	0.24					
300	0.155	0.175	0.31	0.22	0.150	0.195	0.21	0.21					
400	0.120	0.140	0.29	0.20	0.125	0.24	0.27	0.27					
500	0.093	0.120	0.28	0.185	0.098	0.24	0.26	0.26					
630	0.072	0.100	0.27	0.175	0.078	0.24	0.25	0.25					
800	0.056	-		0.170	0.064	0.24	0.25	0.25					
1000	0.045	-		0.165	0.054	0.24	0.24	0.24					



**TABLE 4E2A – Multicore 90 °C thermosetting insulated and thermoplastic sheathed cables,
non-armoured
(COPPER CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes): Ambient temperature: 30 °C
Conductor operating temperature: 90 °C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method E (free air or on a perforated cable tray etc, horizontal or vertical)	
	1 two-core cable*, single-phase AC or DC	1 three- or four-core cable*, three-phase AC	1 two-core cable*, single-phase AC or DC	1 three- or four-core cable*, three-phase AC	1 two-core cable*, single-phase AC or DC	1 three- or four-core cable*, three-phase AC	1 two-core cable*, single-phase AC or DC	1 three- or four-core cable*, three-phase AC
1 (mm ²)	2 (A)	3 (A)	4 (A)	5 (A)	6 (A)	7 (A)	8 (A)	9 (A)
1	14.5	13	17	15	19	17	21	18
1.5	18.5	16.5	22	19.5	24	22	26	23
2.5	25	22	30	26	33	30	36	32
4	33	30	40	35	45	40	49	42
6	42	38	51	44	58	52	63	54
10	57	51	69	60	80	71	86	75
16	76	68	91	80	107	96	115	100
25	99	89	119	105	138	119	149	127
35	121	109	146	128	171	147	185	158
50	145	130	175	154	209	179	225	192
70	183	164	221	194	269	229	289	246
95	220	197	265	233	328	278	352	298
120	253	227	305	268	382	322	410	346
150	290	259	334	300	441	371	473	399
185	329	295	384	340	506	424	542	456
240	386	346	459	398	599	500	641	538
300	442	396	532	455	693	576	741	621
400	-	-	625	536	803	667	865	741



Table 4E2B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
1	46	46			40		
1.5	31	31			27		
2.5	19	19			16		
4	12	12			10		
6	7.9	7.9			6.8		
10	4.7	4.7			4.0		
16	2.9	2.9			2.5		
		r	x	z	r	x	z
25	1.85	1.85	0.160	1.90	1.60	0.140	1.65
35	1.35	1.35	0.155	1.35	1.15	0.135	1.15
50	0.98	0.99	0.155	1.00	0.86	0.135	0.87
70	0.67	0.67	0.150	0.69	0.59	0.130	0.60
95	0.49	0.50	0.150	0.52	0.43	0.130	0.45
120	0.39	0.40	0.145	0.42	0.34	0.130	0.37
150	0.31	0.32	0.145	0.35	0.28	0.125	0.30
185	0.25	0.26	0.145	0.29	0.22	0.125	0.26
240	0.195	0.200	0.140	0.24	0.175	0.125	0.21
300	0.155	0.160	0.140	0.21	0.140	0.120	0.185
400	0.120	0.130	0.140	0.190	0.115	0.120	0.165



**TABLE 4E3A – Single-core armoured 90 °C thermosetting insulated cables
(non-magnetic armour)
(COPPER CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes):

Ambient temperature: 30 °C
Conductor operating temperature: 90 °C

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray, horizontal or vertical)									
	Touching		Touching			Spaced by one cable diameter						
	2 cables, single-phase AC or DC flat	3 or 4 cables, three-phase AC flat	2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	3 cables, three-phase AC trefoil	2 cables, DC		2 cables, single-phase AC		3 or 4 cables, three-phase AC		
1	2	3	4	5	6	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	
50	237	220	253	232	222	284	270	282	266	288	266	
70	303	277	322	293	285	356	349	357	337	358	331	
95	367	333	389	352	346	446	426	436	412	425	393	
120	425	383	449	405	402	519	497	504	477	485	449	
150	488	437	516	462	463	600	575	566	539	549	510	
185	557	496	587	524	529	688	660	643	614	618	574	
240	656	579	689	612	625	815	782	749	714	715	666	
300	755	662	792	700	720	943	906	842	805	810	755	
400	853	717	899	767	815	1137	1094	929	889	848	797	
500	962	791	1016	851	918	1314	1266	1032	989	923	871	
630	1082	861	1146	935	1027	1528	1474	1139	1092	992	940	
800	1170	904	1246	987	1119	1809	1744	1204	1155	1042	978	
1000	1261	961	1345	1055	1214	2100	2026	1289	1238	1110	1041	



Table 4E3B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	2 cables, DC	Reference Methods C & F (clipped direct, on tray or in free air)					
		2 cables, single-phase AC			3 or 4 cables, three-phase AC		
		touching	spaced*	trefoil and touching	flat and touching	flat and spaced*	
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)	4 (mV/A/m)	5 (mV/A/m)	6 (mV/A/m)	7 (mV/A/m)	
50	0.98	r x z 0.99 0.21 1.00	r x z 0.98 0.29 1.00	r x z 0.86 0.180 0.87	r x z 0.84 0.25 0.88	r x z 0.84 0.33 0.90	
70	0.67	0.68 0.200 0.71	0.69 0.29 0.75	0.59 0.170 0.62	0.60 0.25 0.65	0.62 0.32 0.70	
95	0.49	0.51 0.195 0.55	0.53 0.28 0.60	0.44 0.170 0.47	0.46 0.24 0.52	0.49 0.31 0.58	
120	0.39	0.41 0.190 0.45	0.43 0.27 0.51	0.35 0.165 0.39	0.38 0.24 0.44	0.41 0.30 0.51	
150	0.31	0.33 0.185 0.38	0.36 0.27 0.45	0.29 0.160 0.33	0.31 0.23 0.39	0.34 0.29 0.45	
185	0.25	0.27 0.185 0.33	0.30 0.26 0.40	0.23 0.160 0.28	0.26 0.23 0.34	0.29 0.29 0.41	
240	0.195	0.21 0.180 0.28	0.24 0.26 0.35	0.180 0.155 0.24	0.21 0.22 0.30	0.24 0.28 0.37	
300	0.155	0.170 0.175 0.25	0.195 0.25 0.32	0.145 0.150 0.21	0.170 0.22 0.28	0.20 0.27 0.34	
400	0.115	0.145 0.170 0.22	0.180 0.24 0.30	0.125 0.150 0.195	0.160 0.21 0.27	0.20 0.27 0.33	
500	0.093	0.125 0.170 0.21	0.165 0.24 0.29	0.105 0.145 0.180	0.145 0.20 0.25	0.190 0.24 0.31	
630	0.073	0.105 0.165 0.195	0.150 0.23 0.27	0.092 0.145 0.170	0.135 0.195 0.24	0.175 0.23 0.29	
800	0.056	0.090 0.160 0.190	0.145 0.23 0.27	0.086 0.140 0.165	0.130 0.180 0.23	0.175 0.195 0.26	
1000	0.045	0.092 0.155 0.180	0.140 0.21 0.25	0.080 0.135 0.155	0.125 0.170 0.21	0.165 0.180 0.24	

NOTE: * Spacings larger than one cable diameter will result in a larger voltage drop.



**TABLE 4E4A – Multicore armoured 90 °C thermosetting insulated cables
(COPPER CONDUCTORS)**

Air ambient temperature: 30 °C
Ground ambient temperature: 20 °C
Conductor operating temperature: 90 °C

CURRENT-CARRYING CAPACITY (amperes):

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)		Reference Method D (direct in ground or in ducting in ground, in or around buildings)	
	1 two-core cable, single-phase AC or DC	1 three- or 1 four- core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or 1 four- core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or 1 four- core cable, three-phase AC
1	2	3	4	5	6	7
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)
1.5	27	23	29	25	25	21
2.5	36	31	39	33	33	28
4	49	42	52	44	43	36
6	62	53	66	56	53	44
10	85	73	90	78	71	58
16	110	94	115	99	91	75
25	146	124	152	131	116	96
35	180	154	188	162	139	115
50	219	187	228	197	164	135
70	279	238	291	251	203	167
95	338	289	354	304	239	197
120	392	335	410	353	271	223
150	451	386	472	406	306	251
185	515	441	539	463	343	281
240	607	520	636	546	395	324
300	698	599	732	628	446	365
400	787	673	847	728	-	-



TABLE 4E4B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
1.5	31	31			27		
2.5	19	19			16		
4	12	12			10		
6	7.9	7.9			6.8		
10	4.7	4.7			4.0		
16	2.9	2.9			2.5		
		r	x	z	r	x	z
25	1.85	1.85	0.160	1.90	1.60	0.140	1.65
35	1.35	1.35	0.155	1.35	1.15	0.135	1.15
50	0.98	0.99	0.155	1.00	0.86	0.135	0.87
70	0.67	0.67	0.150	0.69	0.59	0.130	0.60
95	0.49	0.50	0.150	0.52	0.43	0.130	0.45
120	0.39	0.40	0.145	0.42	0.34	0.130	0.37
150	0.31	0.32	0.145	0.35	0.28	0.125	0.30
185	0.25	0.26	0.145	0.29	0.22	0.125	0.26
240	0.195	0.20	0.140	0.24	0.175	0.125	0.21
300	0.155	0.16	0.140	0.21	0.140	0.120	0.185
400	0.120	0.13	0.140	0.190	0.115	0.120	0.165



**TABLE 4H1A – Single-core 70 °C thermoplastic insulated cables,
non-armoured, with or without sheath
(ALUMINIUM CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes):

Ambient temperature: 30 °C
Conductor operating temperature: 70 °C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method F (in free air on a perforated cable tray, horizontal or vertical)					
	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC flat and touching	3 or 4 cables, three-phase AC flat and touching or trefoil	Touching			Spaced by one diameter		
							2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	3 cables, three-phase AC trefoil	2 cables, single-phase AC or DC or 3 cables three-phase AC flat	Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12	
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	
50	93	84	118	104	125	110	149	133	128	169	152	
70	118	107	150	133	160	140	192	173	166	217	196	
95	142	129	181	161	195	170	235	212	203	265	241	
120	164	149	210	186	226	197	273	247	237	308	282	
150	189	170	234	204	261	227	316	287	274	356	327	
185	215	194	266	230	298	259	363	330	316	407	376	
240	252	227	312	269	352	305	430	392	375	482	447	
300	289	261	358	306	406	351	497	455	434	557	519	
380	-	-	413	352	511	472	543	502	507	625	584	
480	-	-	477	405	591	546	629	582	590	726	680	
600	-	-	545	462	679	626	722	669	680	837	787	
740	-	-	-	-	771	709	820	761	776	956	902	
960	-	-	-	-	900	823	953	886	907	1125	1066	
1200	-	-	-	-	1022	926	1073	999	1026	1293	1229	



TABLE 4H1B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	2 cables, DC	2 cables, single-phase AC					3 or 4 cables, three-phase AC				
		Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C & F (clipped direct, on tray or in free air)		Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C & F (clipped direct, on tray or in free air)	
		Cables touching			Cables spaced*		Cables touching, Trefoil			Cables touching, Flat	
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)	4 (mV/A/m)	5 (mV/A/m)	6 (mV/A/m)	7 (mV/A/m)	8 (mV/A/m)	9 (mV/A/m)	10 (mV/A/m)	11 (mV/A/m)	12 (mV/A/m)
50	1.55	1.60	1.55	1.55	1.35	1.35	1.35	1.35	1.35	1.35	1.40
70	1.05	1.10	1.05	1.05	0.94	0.91	0.91	0.91	0.91	0.91	0.96
95	0.77	0.81	0.77	0.77	0.70	0.67	0.67	0.67	0.67	0.67	0.74
120	0.61	0.64	0.61	0.61	0.55	0.53	0.53	0.53	0.53	0.53	0.61
150	0.49	0.51	0.49	0.49	0.45	0.42	0.42	0.42	0.42	0.42	0.52
185	0.39	0.42	0.40	0.39	0.36	0.34	0.34	0.34	0.34	0.34	0.46
240	0.30	0.32	0.30	0.30	0.28	0.26	0.26	0.26	0.26	0.26	0.40
300	0.24	0.26	0.24	0.24	0.23	0.21	0.21	0.21	0.21	0.21	0.36
380	0.190	0.22	0.195	0.195	0.190	0.170	0.170	0.170	0.170	0.170	0.34
480	0.150	0.18	0.155	0.155	0.155	0.140	0.140	0.140	0.140	0.140	0.32
600	0.120	0.150	0.130	0.130	0.125	0.110	0.110	0.110	0.110	0.110	0.31
740	0.099	-	0.105	0.105	-	0.094	0.094	0.094	0.094	0.094	0.30
960	0.075	-	0.086	0.086	-	0.077	0.077	0.077	0.077	0.077	0.29
1200	0.060	-	0.074	0.074	-	0.066	0.066	0.066	0.066	0.066	0.29



**TABLE 4H2A – Multicore 70 °C thermoplastic insulated and thermoplastic sheathed cables,
non-armoured
(ALUMINIUM CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes):									
Ambient temperature: 30 °C Conductor operating temperature: 70 °C									
Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)		
	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	
1 (mm ²)	2	3	4	5	6	7	8	9	
16	(A) 44	(A) 41	(A) 54	(A) 48	(A) 66	(A) 59	(A) 73	(A) 61	
25	58	53	71	62	83	73	89	78	
35	71	65	86	77	103	90	111	96	
50	86	78	104	92	125	110	135	117	
70	108	98	131	116	160	140	173	150	
95	130	118	157	139	195	170	210	183	
120	-	135	-	160	-	197	-	212	
150	-	155	-	176	-	227	-	245	
185	-	176	-	199	-	259	-	280	
240	-	207	-	232	-	305	-	330	
300	-	237	-	265	-	351	-	381	



Table 4H2B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
16	4.5	4.5			3.9		
		r	x	z	r	x	z
25	2.9	2.9	0.175	2.9	2.5	0.150	2.5
35	2.1	2.1	0.170	2.1	1.80	0.150	1.80
50	1.55	1.55	0.170	1.55	1.35	0.145	1.35
70	1.05	1.05	0.165	1.05	0.90	0.140	0.92
95	0.77	0.77	0.160	0.79	0.67	0.140	0.68
120	-	-	-	-	0.53	0.135	0.55
150	-	-	-	-	0.42	0.135	0.44
185	-	-	-	-	0.34	0.135	0.37
240	-	-	-	-	0.26	0.130	0.30
300	-	-	-	-	0.21	0.130	0.25



**TABLE 4H3A – Single-core armoured 70 °C thermoplastic insulated cables
(non-magnetic armour)
(ALUMINIUM CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes):

Ambient temperature: 30 °C
Conductor operating temperature: 70 °C

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray, horizontal or vertical)									
	Touching		Touching		Spaced by one cable diameter							
	2 cables, single-phase AC or DC flat	3 or 4 cables, three-phase AC flat	2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	2 cables, DC		2 cables, single-phase AC		3 or 4 cables, three-phase AC			
					Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12	
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
50	143	133	152	141	131	167	157	168	159	169	155	155
70	183	168	194	178	168	214	202	212	200	213	196	196
95	221	202	234	214	205	261	247	259	245	255	236	236
120	255	233	270	246	238	303	288	299	285	293	272	272
150	294	267	310	282	275	349	333	340	323	335	312	312
185	334	303	352	319	315	400	382	389	371	379	354	354
240	393	354	413	374	372	472	452	457	437	443	415	415
300	452	405	474	427	430	545	523	520	498	505	475	475
380	518	452	543	479	497	638	613	583	559	551	518	518
480	586	501	616	534	568	742	715	655	629	604	568	568
600	658	550	692	589	642	859	828	724	696	656	618	618
740	728	596	769	642	715	986	952	802	770	707	666	666
960	819	651	868	706	808	1171	1133	866	832	770	726	726
1200	893	692	952	756	880	1360	1317	938	902	822	774	774



TABLE 4H3B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	2 cables, DC	Reference Methods C & F (clipped direct, on tray or in free air)				
		2 cables, single-phase AC		3 or 4 cables, three-phase AC		
		touching	spaced*	trefoil and touching	flat and touching	flat and spaced*
1	2	3	4	5	6	7
(mm ²)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)
50	1.55	T X Z 1.55 0.23 1.55	T X Z 1.55 0.31 1.55	T X Z 1.35 0.195 1.35	T X Z 1.35 0.27 1.35	T X Z 1.30 0.34 1.35
70	1.05	1.05 0.22 1.10	1.05 0.30 1.10	0.92 0.190 0.93	0.93 0.26 0.96	0.95 0.33 1.00
95	0.77	0.78 0.21 0.81	0.81 0.29 0.86	0.68 0.185 0.70	0.70 0.25 0.75	0.73 0.32 0.80
120	0.61	0.62 0.21 0.66	0.65 0.29 0.71	0.54 0.180 0.57	0.57 0.25 0.62	0.60 0.32 0.68
150	0.49	0.50 0.20 0.54	0.53 0.28 0.60	0.44 0.175 0.47	0.46 0.24 0.52	0.50 0.31 0.58
185	0.39	0.41 0.195 0.45	0.44 0.28 0.52	0.35 0.170 0.39	0.38 0.24 0.45	0.42 0.30 0.51
240	0.30	0.32 0.190 0.37	0.34 0.27 0.44	0.28 0.165 0.32	0.30 0.23 0.38	0.33 0.29 0.44
300	0.24	0.26 0.185 0.32	0.28 0.26 0.39	0.22 0.160 0.27	0.24 0.23 0.34	0.28 0.29 0.40
380	0.190	0.22 0.185 0.28	0.26 0.25 0.36	0.185 0.155 0.24	0.22 0.22 0.32	0.27 0.26 0.38
480	0.150	0.180 0.180 0.25	0.22 0.25 0.33	0.155 0.155 0.22	0.195 0.22 0.29	0.24 0.25 0.35
600	0.120	0.150 0.175 0.23	0.195 0.24 0.31	0.130 0.150 0.200	0.170 0.21 0.27	0.21 0.24 0.32
740	0.097	0.135 0.170 0.22	0.180 0.23 0.29	0.115 0.145 0.185	0.160 0.20 0.26	0.200 0.22 0.30
960	0.075	0.115 0.160 0.200	0.165 0.21 0.27	0.100 0.140 0.175	0.150 0.185 0.24	0.190 0.195 0.27
1200	0.060	0.110 0.155 0.190	0.160 0.180 0.24	0.094 0.140 0.170	0.145 0.160 0.22	0.185 0.165 0.25



**TABLE 4H4A – Multicore armoured 70 °C thermoplastic insulated cables
(ALUMINIUM CONDUCTORS)**

Air Ambient temperature: 30 °C
Ground Ambient temperature: 20 °C
Conductor operating temperature: 70 °C

CURRENT-CARRYING CAPACITY (amperes):

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical).		Reference Method D (direct in ground or in ducting in ground, in or around buildings)	
	1 two-core cable, single-phase AC or DC	1 three- or 1 four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or 1 four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or 1 four-core cable, three-phase AC
1	2	3	4	5	6	7
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)
16	68	58	71	61		
25	89	76	94	80	77	64
35	109	94	115	99	93	77
50	131	113	139	119	109	91
70	165	143	175	151	135	112
95	199	174	211	186	159	132
120	-	202	-	216	-	150
150	-	232	-	250	-	169
185	-	265	-	287	-	190
240	-	312	-	342	-	218
300	-	360	-	399	-	247



Table 4H4B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 70 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
16	4.5	4.5			3.9		
		r	x	z	r	x	z
25	2.9	2.9	0.175	2.9	2.5	0.150	2.5
35	2.1	2.1	0.170	2.1	1.80	0.150	1.80
50	1.55	1.55	0.170	1.55	1.35	0.145	1.35
70	1.05	1.05	0.165	1.05	0.90	0.140	0.92
95	0.77	0.77	0.160	0.79	0.67	0.140	0.68
120	-	-	-	-	0.53	0.135	0.55
150	-	-	-	-	0.42	0.135	0.44
185	-	-	-	-	0.34	0.135	0.37
240	-	-	-	-	0.26	0.130	0.30
300	-	-	-	-	0.21	0.130	0.25



**TABLE 4J1A – Single-core 90 °C thermosetting insulated cables, non-armoured,
with or without sheath
(ALUMINIUM CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes):

Ambient temperature: 30 °C
Conductor operating temperature: 90 °C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray horizontal or vertical etc.)			Reference Method G (in free air)	
	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC	3 or 4 cables, three-phase AC	2 cables, single-phase AC or DC flat and touching	3 or 4 cables, three-phase AC flat and touching or trefoil	2 cables, single-phase AC or DC flat	3 cables, three-phase AC flat	3 cables, three-phase AC trefoil	2 cables, single-phase AC or DC or 3 cables three-phase AC flat	Spaced by one cable diameter
1	2	3	4	5	6	7	8	9	10	11	12
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
50	125	113	157	140	154	136	184	165	159	210	188
70	158	142	200	179	198	174	237	215	206	271	244
95	191	171	242	217	241	211	289	264	253	332	300
120	220	197	281	251	280	245	337	308	296	387	351
150	253	226	307	267	324	283	389	358	343	448	408
185	288	256	351	300	371	323	447	413	395	515	470
240	338	300	412	351	439	382	530	492	471	611	561
300	387	344	471	402	508	440	613	571	544	708	652
380	-	-	-	-	658	594	679	628	638	798	742
480	-	-	-	-	765	692	786	728	743	927	865
600	-	-	-	-	871	791	903	836	849	1058	990
740	-	-	-	-	1001	911	1025	951	979	1218	1143
960	-	-	-	-	1176	1072	1191	1108	1151	1440	1355
1200	-	-	-	-	1333	1217	1341	1249	1307	1643	1550



TABLE 4J1B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	2 cables, DC	2 cables, single-phase AC					3 or 4 cables, three-phase AC				
		Reference Methods A & B (enclosed in conduit or trunking)	Reference Methods C, F & G (clipped direct, on tray or in free air)		Reference Methods A & B (enclosed in conduit or trunking)	Reference Methods C, F & G (clipped direct, on tray or in free air)			Cables touching, Trefoil	Cables touching, Flat	Cables spaced*, Flat
1	2	3	4	5	6	7	8	9			
(mm ²)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)			
50	1.65	r 1.70 x 0.30 z 1.72	r 1.65 x 0.190 z 1.66	r 1.65 x 0.28 z 1.68	r 1.44 x 0.26 z 1.46	r 1.44 x 0.165 z 1.45	r 1.44 x 0.24 z 1.46	r 1.44 x 0.32 z 1.48			
70	1.13	r 1.17 x 0.30 z 1.21	r 1.12 x 0.185 z 1.14	r 1.12 x 0.27 z 1.15	r 1.00 x 0.26 z 1.04	r 0.97 x 0.160 z 0.98	r 0.97 x 0.24 z 1.00	r 0.97 x 0.31 z 1.02			
95	0.82	r 0.86 x 0.29 z 0.91	r 0.82 x 0.185 z 0.84	r 0.82 x 0.27 z 0.94	r 0.75 x 0.25 z 0.79	r 0.71 x 0.160 z 0.73	r 0.71 x 0.23 z 0.75	r 0.71 x 0.31 z 0.78			
120	0.65	r 0.68 x 0.29 z 0.74	r 0.65 x 0.180 z 0.67	r 0.65 x 0.27 z 0.70	r 0.59 x 0.25 z 0.64	r 0.57 x 0.155 z 0.59	r 0.57 x 0.23 z 0.61	r 0.57 x 0.31 z 0.64			
150	0.53	r 0.54 x 0.28 z 0.61	r 0.52 x 0.175 z 0.55	r 0.52 x 0.26 z 0.58	r 0.48 x 0.24 z 0.54	r 0.45 x 0.155 z 0.47	r 0.45 x 0.23 z 0.50	r 0.45 x 0.30 z 0.54			
185	0.42	r 0.45 x 0.28 z 0.53	r 0.43 x 0.175 z 0.46	r 0.42 x 0.26 z 0.49	r 0.38 x 0.24 z 0.45	r 0.36 x 0.150 z 0.39	r 0.36 x 0.23 z 0.43	r 0.36 x 0.30 z 0.47			
240	0.32	r 0.34 x 0.27 z 0.43	r 0.32 x 0.170 z 0.36	r 0.32 x 0.26 z 0.41	r 0.30 x 0.24 z 0.38	r 0.28 x 0.150 z 0.32	r 0.28 x 0.22 z 0.35	r 0.28 x 0.30 z 0.41			
300	0.26	r 0.28 x 0.27 z 0.38	r 0.26 x 0.170 z 0.31	r 0.26 x 0.26 z 0.36	r 0.25 x 0.23 z 0.34	r 0.22 x 0.145 z 0.27	r 0.22 x 0.22 z 0.31	r 0.22 x 0.30 z 0.37			
380	0.20	r - x - z -	r 0.21 x 0.165 z 0.27	r 0.21 x 0.25 z 0.33	r 0.20 x 0.23 z 0.31	r 0.180 x 0.145 z 0.23	r 0.180 x 0.22 z 0.28	r 0.180 x 0.29 z 0.34			
480	0.160	r - x - z -	r 0.170 x 0.165 z 0.23	r 0.165 x 0.25 z 0.30	r 0.165 x 0.23 z 0.28	r 0.150 x 0.140 z 0.20	r 0.150 x 0.22 z 0.27	r 0.145 x 0.29 z 0.32			
600	0.130	r - x - z -	r 0.140 x 0.160 z 0.21	r 0.135 x 0.25 z 0.28	r 0.135 x 0.22 z 0.26	r 0.120 x 0.140 z 0.185	r 0.120 x 0.22 z 0.25	r 0.120 x 0.29 z 0.31			
740	0.105	r - x - z -	r 0.115 x 0.160 z 0.19	r 0.110 x 0.25 z 0.27	r - x - z -	r 0.100 x 0.135 z 0.170	r 0.100 x 0.21 z 0.23	r 0.095 x 0.29 z 0.30			
960	0.080	r - x - z -	r 0.092 x 0.155 z 0.18	r 0.087 x 0.24 z 0.26	r - x - z -	r 0.082 x 0.135 z 0.160	r 0.082 x 0.21 z 0.23	r 0.076 x 0.29 z 0.30			
1200	0.064	r - x - z -	r 0.079 x 0.155 z 0.17	r 0.073 x 0.24 z 0.25	r - x - z -	r 0.070 x 0.135 z 0.150	r 0.070 x 0.21 z 0.22	r 0.063 x 0.28 z 0.29			

NOTE: * Spacings larger than one cable diameter will result in a larger voltage drop.

**TABLE 4J2A – Multicore 90 °C thermosetting insulated and thermoplastic sheathed cables,
non-armoured
(ALUMINIUM CONDUCTORS)**

CURRENT-CARRYING CAPACITY (amperes)

Ambient temperature: 30 °C
Conductor operating temperature: 90 °C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc.)		Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)	
	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or four-core cable, three-phase AC
1 (mm ²)	2	3	4	5	6	7	8	9
16	(A) 60	(A) 55	(A) 72	(A) 64	(A) 84	(A) 76	(A) 91	(A) 77
25	78	71	94	84	101	90	108	97
35	96	87	115	103	126	112	135	120
50	115	104	138	124	154	136	164	146
70	145	131	175	156	198	174	211	187
95	175	157	210	188	241	211	257	227
120	-	180	-	216	-	245	-	263
150	-	206	-	240	-	283	-	304
185	-	233	-	272	-	323	-	347
240	-	273	-	318	-	382	-	409
300	-	313	-	364	-	440	-	471



TABLE 4J2B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
16	4.8	4.8			4.2		
		r	x	z	r	x	z
25	3.1	3.1	0.165	3.1	2.7	0.140	2.7
35	2.2	2.2	0.160	2.2	1.90	0.140	1.95
50	1.60	1.65	0.160	1.65	1.40	0.135	1.45
70	1.10	1.10	0.155	1.15	0.96	0.135	0.97
95	0.82	0.82	0.150	0.84	0.71	0.130	0.72
120	-	-	-	-	0.56	0.130	0.58
150	-	-	-	-	0.45	0.130	0.47
185	-	-	-	-	0.37	0.130	0.39
240	-	-	-	-	0.28	0.125	0.31
300	-	-	-	-	0.23	0.125	0.26



**TABLE 4J3A – Single-core armoured 90 °C thermosetting insulated cables
(non-magnetic armour)
ALUMINIUM CONDUCTOR**

CURRENT-CARRYING CAPACITY (amperes): Ambient temperature: 30 °C
Conductor operating temperature: 90 °C

Conductor cross- sectional area	Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray, horizontal or vertical)								
	Touching		Touching			Spaced by one cable diameter					
	2 cables, single- phase AC or DC flat	3 or 4 cables, three- phase AC flat	2 cables, single- phase AC or DC flat	3 cables, three- phase AC flat	3 cables, three- phase AC trefoil	2 cables, DC		2 cables, single-phase AC		3 or 4 cables, three-phase AC	
						Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
50	179	165	192	176	162	216	197	212	199	215	192
70	228	209	244	222	207	275	253	269	254	270	244
95	276	252	294	267	252	332	307	328	310	324	296
120	320	291	340	308	292	384	357	378	358	372	343
150	368	333	390	352	337	441	411	429	409	424	394
185	419	378	444	400	391	511	480	490	467	477	447
240	494	443	521	468	465	605	572	576	549	554	523
300	568	508	597	536	540	701	666	654	624	626	595
380	655	573	688	608	625	812	780	735	704	693	649
480	747	642	786	685	714	942	906	825	790	765	717
600	836	706	880	757	801	1076	1036	909	872	832	780
740	934	764	988	824	897	1250	1205	989	950	890	835
960	1056	838	1121	911	1014	1488	1435	1094	1052	970	911
1200	1163	903	1236	990	1118	1715	1658	1187	1141	1043	980



TABLE 4J3B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	2 cables, DC	Reference Method C & F (clipped direct, on tray or in free air)											
		2 cables, single-phase AC				3 or 4 cables, three-phase AC							
		touching 3		spaced* 4		trefoil and touching 5		flat and touching 6		flat and spaced* 7			
(mm ²)	(mV/A/m)	(mV/A/m)			4 (mV/A/m)			(mV/A/m)			(mV/A/m)		
1	2	r	x	z	r	x	z	r	x	z	r	x	z
50	1.60	1.60	0.22	1.60	1.60	0.30	1.60	1.40	0.185	1.40	1.40	0.26	1.40
70	1.10	1.10	0.21	1.15	1.10	0.29	1.15	0.96	0.180	0.98	0.97	0.25	1.00
95	0.82	0.83	0.20	0.85	0.85	0.29	0.90	0.71	0.175	0.74	0.74	0.25	0.78
120	0.66	0.66	0.20	0.69	0.69	0.28	0.74	0.57	0.170	0.60	0.60	0.24	0.64
150	0.52	0.53	0.195	0.57	0.56	0.28	0.62	0.46	0.170	0.49	0.49	0.24	0.54
185	0.42	0.43	0.190	0.47	0.46	0.27	0.54	0.38	0.165	0.41	0.40	0.24	0.47
240	0.32	0.34	0.185	0.39	0.37	0.27	0.45	0.29	0.160	0.34	0.32	0.23	0.39
300	0.26	0.27	0.185	0.33	0.30	0.26	0.40	0.24	0.160	0.29	0.26	0.23	0.34
380	0.21	0.23	0.180	0.29	0.26	0.25	0.36	0.195	0.155	0.25	0.23	0.22	0.32
480	0.160	0.185	0.175	0.25	0.23	0.25	0.34	0.160	0.155	0.22	0.20	0.21	0.29
600	0.130	0.160	0.175	0.24	0.20	0.24	0.31	0.135	0.150	0.20	0.175	0.21	0.27
740	0.105	0.140	0.170	0.22	0.190	0.22	0.29	0.120	0.145	0.190	0.165	0.195	0.26
960	0.080	0.120	0.160	0.20	0.170	0.21	0.27	0.105	0.140	0.175	0.150	0.180	0.24
1200	0.064	0.105	0.160	0.190	0.155	0.20	0.25	0.093	0.135	0.165	0.140	0.175	0.22



**TABLE 4J4A – Multicore armoured 90 °C thermosetting insulated cables
(ALUMINIUM CONDUCTORS)**

Air Ambient temperature: 30 °C
Ground Ambient temperature: 20 °C
Conductor operating temperature: 90 °C

CURRENT-CARRYING CAPACITY (amperes):

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)		Reference Method D (direct in ground or in ducting in ground, in or around buildings)	
	1 two-core cable, single-phase AC or DC	1 three- or 1 four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or 1 four-core cable, three-phase AC	1 two-core cable, single-phase AC or DC	1 three- or 1 four-core cable, three-phase AC
1	2	3	4	5	6	7
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)
16	82	71	85	74	71	59
25	108	92	112	98	90	75
35	132	113	138	120	108	90
50	159	137	166	145	128	106
70	201	174	211	185	158	130
95	242	214	254	224	186	154
120	-	249	-	264	-	174
150	-	284	-	305	-	197
185	-	328	-	350	-	220
240	-	386	-	418	-	253
300	-	441	-	488	-	286



TABLE 4J4B

VOLTAGE DROP (per ampere per metre):

Conductor operating temperature: 90 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC			Three- or four-core cable, three-phase AC		
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
16	4.8	4.8			4.2		
		r	x	z	r	x	z
25	3.1	3.1	0.165	3.1	2.7	0.140	2.7
35	2.2	2.2	0.160	2.2	1.90	0.140	1.95
50	1.60	1.65	0.160	1.65	1.40	0.135	1.45
70	1.10	1.10	0.155	1.15	0.96	0.135	0.97
95	0.82	0.82	0.150	0.84	0.71	0.130	0.72
120	-	-	-	-	0.56	0.130	0.58
150	-	-	-	-	0.45	0.130	0.47
185	-	-	-	-	0.37	0.130	0.39
240	-	-	-	-	0.28	0.125	0.31
300	-	-	-	-	0.23	0.125	0.26



Table 4F1A
60°C thermosetting insulated flexible cables with sheath, non-armoured
(COPPER CONDUCTORS)

CURRENT-CARRYING CAPACITY (amperes): Ambient temperature: 30 °C
 Conductor operating temperature: 60 °C

Conductor cross-sectional area	Single-phase AC or DC	Three-phase AC	Single-phase AC or DC
	1 two-core cable, with or without protective conductor	1 three-core, four- core or five-core cable	2 single-core cables, touching
1	2	3	4
(mm ²)	(A)	(A)	(A)
4	30	26	-
6	39	34	-
10	51	47	-
16	73	63	-
25	97	83	-
35	-	102	140
50	-	124	175
70	-	158	216
95	-	192	258
120	-	222	302
150	-	255	347
185	-	291	394
240	-	343	471
300	-	394	541
400	-	-	644
500	-	-	738
630	-	-	861



Conductor operating temperature: 60 °C

Conductor cross-sectional area	Two-core cable, DC	Two-core cable, single-phase AC	1 three-core, four-core or five-core cable, three-phase AC	2 single-core cables, touching	
				DC	Single-phase AC*
1	2	3	4	5	6
(mm ²)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)	(mV/A/m)
4	12	12	10	-	-
6	7.8	7.8	6.7	-	-
10	4.6	4.6	4.0	-	-
16	2.9	2.9	2.5	-	-
25	1.80	1.80	1.55	-	-
35	-	-	1.10	1.31	0.21
50	-	-	0.83	0.91	0.21
70	-	-	0.57	0.64	0.20
95	-	-	0.42	0.49	0.195
120	-	-	0.33	0.38	0.190
150	-	-	0.27	0.31	0.190
185	-	-	0.22	0.25	0.190
240	-	-	0.170	0.190	0.185
300	-	-	0.135	0.150	0.180
400	-	-	-	0.115	0.175
500	-	-	-	0.090	0.170
630	-	-	-	0.068	0.170

NOTE: * A larger voltage drop will result if the cables are spaced.



Table 4F2A
90 °C and 180 °C thermosetting insulated flexible cables with sheath, non-armoured
(COPPER CONDUCTORS)

CURRENT-CARRYING CAPACITY (amperes): Ambient temperature: 30 °C
 Conductor operating temperature: 90 °C

Conductor cross-sectional area	Single-phase AC or DC	Three-phase AC	Single-phase AC or DC
	1 two-core cable, with or without protective conductor	1 three-core, four-core or five- core cable	2 single-core cables, touching
1	2	3	4
(mm ²)	(A)	(A)	(A)
4	42	37	-
6	55	49	-
10	76	66	-
16	103	89	-
25	136	119	-
35	-	146	200
50	-	177	250
70	-	225	310
95	-	273	369
120	-	316	432
150	-	363	497
185	-	414	564
240	-	487	673
300	-	560	773
400	-	-	924
500	-	-	1062
630	-	-	1242



VOLTAGE DROP (per ampere per metre):

TABLE 4F2B

Conductor operating temperature: 90 °C

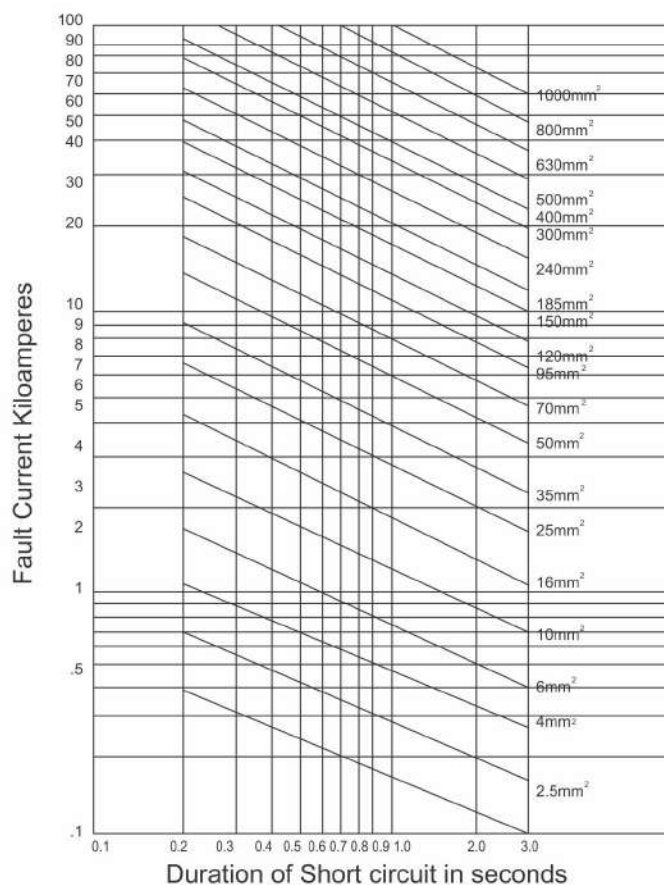
Conductor cross-sectional area	1 two-core or 2 single-core cables, DC	Two-core cable, single-phase AC	1 three-core, four-core or five-core cable, three-phase AC	2 single-core cables touching		
				Single-phase AC*		
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)	4 (mV/A/m)	5 (mV/A/m)		
4	13.2	13.2	11.1	-	-	-
6	8.5	8.5	7.4	-	-	-
10	5.1	5.1	4.4	-	-	-
16	3.2	3.2	2.7	-	-	-
25	2.03	2.03	1.73	-	-	-
35	1.42	-	1.22	1.44	0.21	1.46
50	1.00	-	0.91	1.00	0.21	1.02
70	0.71	-	0.62	0.71	0.20	0.73
95	0.54	-	0.47	0.54	0.195	0.57
120	0.42	-	0.37	0.42	0.190	0.46
150	0.34	-	0.29	0.34	0.190	0.39
185	0.27	-	0.24	0.27	0.190	0.33
240	0.21	-	0.188	0.21	0.185	0.28
300	0.167	-	0.147	0.173	0.180	0.25
400	0.127	-	-	0.132	0.175	0.22
500	0.100	-	-	0.107	0.170	0.20
630	0.074	-	-	0.085	0.170	0.190



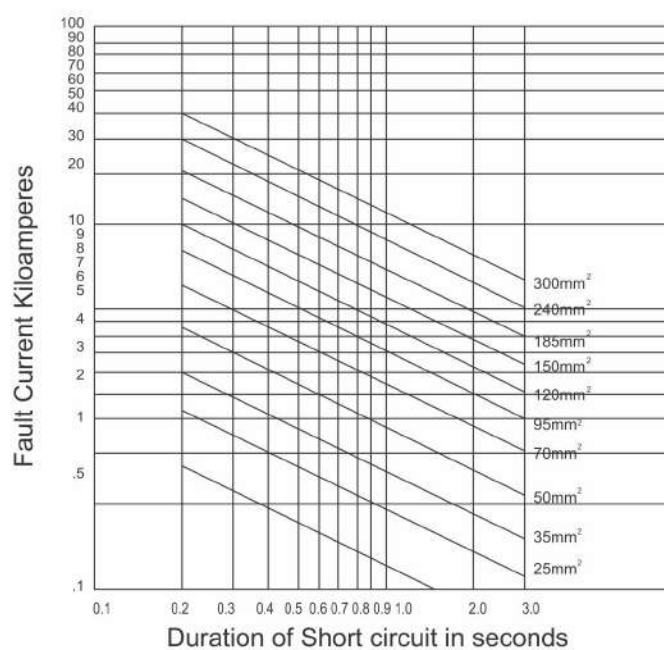
Short Circuit Ratings

PVC Insulated Cables

Copper Conductors



Aluminum Conductors

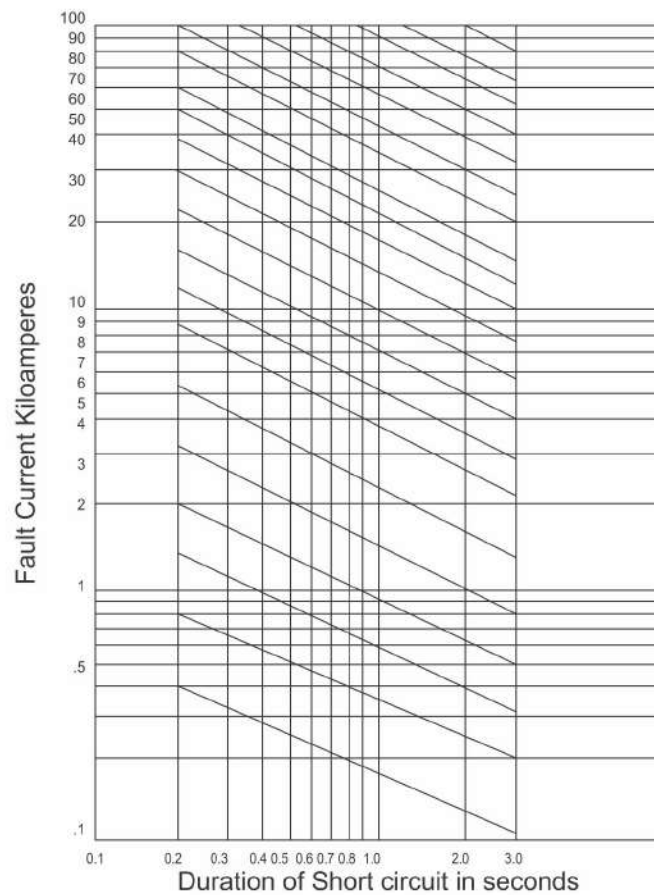




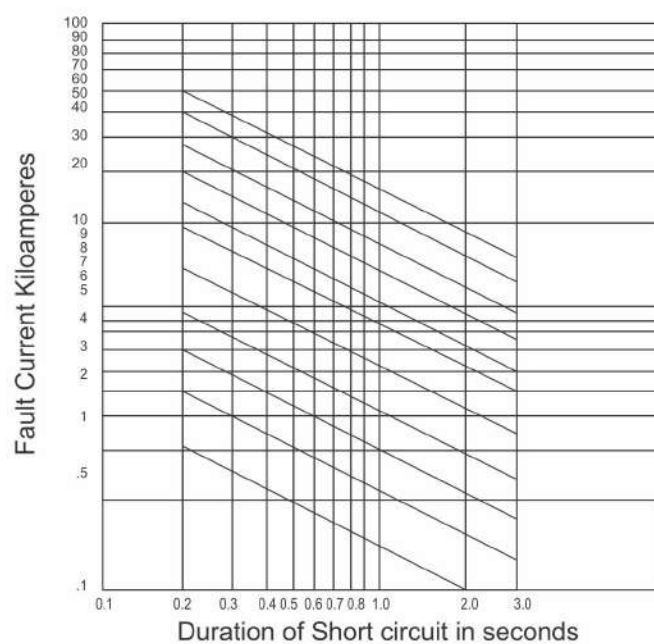
Short Circuit Ratings

XLPE Insulated Cables

Copper Conductors



Aluminum Conductors





Correction Factors

TABLE 4B1 - Rating factors (Ca) for ambient air temperatures other than 30 °C

Ambient temperature ^a °C	Insulation	
	70 °C thermoplastic (PVC)	90 °C thermosetting (XLPE)
25	1.03	1.02
30	1.00	1.00
35	0.94	0.96
40	0.87	0.91
45	0.79	0.87
50	0.71	0.82
55	0.61	0.76
60	0.50	0.71
65	–	0.65
70	–	0.58
75	–	0.50
80	–	0.41
85	–	–
90	–	–
95	–	–

^a For higher ambient manufacturer.

TABLE 4B2 – Rating factors (Ca) for ambient ground temperatures other than 20 °C

Ground temperature °C	Insulation	
	70 °C (PVC) thermoplastic	90 °C (XLPE) thermosetting
10	1.10	1.07
15	1.05	1.04
20	1.00	1.00
25	0.95	0.96
30	0.89	0.93
35	0.84	0.89
40	0.77	0.85
45	0.71	0.80
50	0.63	0.76
55	0.55	0.71
60	0.45	0.65
65	–	0.60
70	–	0.53
75	–	0.46
80	–	0.38

TABLE 4B3 – Rating factors (C_s) for cables buried direct in the ground or in an underground conduit system to BS EN 50086-2-4 for soil thermal resistivities other than 2.5 K.m/W to be applied to the current-carrying capacities for Reference Method D

Thermal resistivity, K.m/W	0.5	0.8	1	1.2	1.5	2	2.5	3
Rating factor for cables in buried ducts	1.28	1.20	1.18	1.13	1.1	1.05	1	0.96
Rating factor for direct buried cables	1.88	1.62	1.5	1.40	1.28	1.12	1	0.90

TABLE 4B5 – Rating factors for cables having more than 4 loaded cores

Number of loaded cores	5	6	7	10	12	14	19
Rating factor	0.72	0.67	0.63	0.56	0.53	0.51	0.45
Number of loaded cores	24	27	30	37	44	46	48
Rating factor	0.42	0.40	0.39	0.36	0.34	0.33	0.33

TABLE 4C1 – Rating factors for one circuit or one multicore cable or for a group of circuits, or a group of multicore cables, to be used with current-carrying capacities of Tables 4D1A to 4J4A

Item	Arrangement (cables touching)	Number of circuits or multicore cables												To be used with current-carrying capacities, Reference Method
		1	2	3	4	5	6	7	8	9	12	16	20	
1.	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	A to F
2.	Single layer on wall or floor	1.00	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70	0.70	0.70	0.70	C
3.	Single layer multicore on a perforated horizontal or vertical cable tray system	1.00	0.88	0.82	0.77	0.75	0.73	0.73	0.72	0.72	0.72	0.72	0.72	E
4.	Single layer multicore on cable ladder system or cleats etc.	1.00	0.87	0.82	0.80	0.80	0.79	0.79	0.78	0.78	0.78	0.78	0.78	

TABLE 4C2 – Rating factors for more than one circuit, cables buried directly in the ground
Reference Method D in Tables 4D4A to 4J4A
multicore cables

Number of circuits	Cable-to-cable clearance (α)				
	Nil (cables touching)	One cable diameter	0.125 m	0.25 m	0.5 m
2	0.75	0.80	0.85	0.90	0.90
3	0.65	0.70	0.75	0.80	0.85
4	0.60	0.60	0.70	0.75	0.80
5	0.55	0.55	0.65	0.70	0.80
6	0.50	0.55	0.60	0.70	0.80

Multicore cables

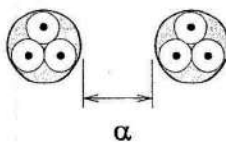
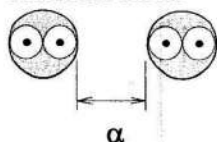
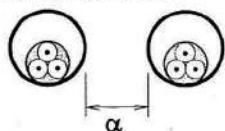


TABLE 4C3 – Rating factors for more than one circuit, single cables in ducts buried in the ground
Reference Method D in Tables 4D4A to 4J4A (Multicore cables in single-way ducts)

Number of ducts	Duct-to-duct clearance (α)			
	Nil (ducts touching)	0.25 m	0.5 m	1.0 m
2	0.85	0.90	0.95	0.95
3	0.75	0.85	0.90	0.95
4	0.70	0.80	0.85	0.90
5	0.65	0.80	0.85	0.90
6	0.60	0.80	0.80	0.90

Multicore cables



Handling & Storage

Handling (Unloading at site):

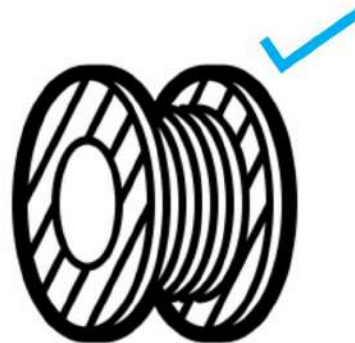
While unloading the cables certain precautions are to be taken to ensure the safety of the cables.

1. Cable drums should not be dropped or thrown from trucks during unloading operations as the shock may cause serious damage to cable layers. A crane or load lifter should be used for unloading cable drums. If the crane is not available, a suitable ramp should be prepared. The cable drum should be rolled over the ramp by means of ropes and winches. Additionally a sand bed at the foot of the ramp may be prepared to brake the rolling the cable drum.
2. Cable should not be dragged along the earth surface.
3. Cable ends should always be sealed by means of suitable end caps to prevent moisturization ingress to cores and armour of cable.
4. Drums should always be rolled in direction of arrow marked on the drum.



Storage:

Cables should be stored in a dry covered place to prevent exposure to climatic conditions and wear and tear of wooden drums. All drums should be stored in such a manner as to leave sufficient space between them for air circulation. In no case should the drums be stored, "On the Flat", i.e., with flange horizontal.





Useful Information

TABLE A

COMPARISON BETWEEN STANDARD IMPERIAL AND THE NEAREST
STANDARD METRIC SIZES OF CONDUCTORS FOR ELECTRIC CABLES.

Standard Imperial Stranding / wire Diameter inch	Calculated Area Inch ²	Inch ² converted To mm ²	Nearest Metric Stranded Size mm ²	No. and Nominal Diameter of wires In circular conductor mm
3/.029"	0.0020	1.29	1.5	1/1.38
3/.036"	0.0030	1.94	1.5	1/1.38
7/.029"	0.0045	2.90	2.5	1/1.77
7/.036"	0.0070	4.52	4	7/0.85
7/.044"	0.010	6.45	6	7/1.04
7/.052"	0.0145	9.35	10	7/1.35
7/.064"	0.0225	14.52	16	7/1.70
19/.052"	0.04	25.81	25	7/2.14
19/.064"	0.06	38.71	35	7/2.52
19/.072"	0.075	48.39	50	19/1.78
19/.083"	0.10	64.52	70	19/2.14
37/.072"	0.45	96.77	95	19/2.52
37/.083"	0.20	129.0	120	37/2.03
37/.093"	0.25	161.3	150	37/2.25
37/.103"	0.30	193.6	185	37/2.52
61/.093"	0.40	258.1	240	61/2.25
61/.103"	0.50	322.6	300	61/2.52
91/.093"	0.60	387.1	400	61/2.85
91/.103"	0.75	483.9	500	61/3.20
127/.103"	1.0	645.2	630	127/2.52
127/.112"	1.25	806.4	800	127/2.85
127/.123"	1.50	967.7	1000	127/3.20



TABLE B

STANDARD COEFFICIENT OF CONVERSION

ITEMS	DESCRIPTION
1. LENGTH	1 mil = 0.0254 mm = 0.001 in. 1 mm = 39.37 mils = 0.03937 in. 1 cm = 0.3937 in. = 0.0328 ft. 1 inch = 25.4 mm = 0.083 ft. = 0.0278 yd. = 2.54 cm. 1 foot = 0.305 m = 0.333 yd. 1 yard = 0.914 m = 91.44 cm. 1 meter = 39.37 in. = 3.28 ft. = 1.094 yd. 1 kilometer = 3,281 ft. = 1.094 yd. = 0.6213 mile 1 mile = 5,280 ft. = 1.760 yd. = 1.609 m = 1.609 km.
2. AREA	1 MCM = 1000 CM (Circulator Mil) = 0.5067 mm ² = 1/1000 in ² 1 CM = 0.0005067 mm ² = 0.000007854 in ² = 0.7854 sq. mil. 1 mm ² = 1973 CM = 0.00155 in ² = 1,550 sq. Mil. 1 in ² = 1273240 CM = 645.1 mm ² = 0.0069 ft. ² 1 yd. ² = 1,296 in ² = 0.83613 m ² 1 m ² = 1,550 in ² = 10.7 ft. ² = 1.195 yd. ² 1 km ² = 0.001562 mile ² 1 mile ² = 27,880,000 ft. ² = 3,098,000 yd. ² = 2,590,000 m ² = 2.59 km ²
3. VOLUME	1 cm ³ = 0.061 in ³ 1 in ³ = 16.39 cm ³ = 0.0036 gal = 0.0005787 ft. ³ 1 l. = 1,000 cm ³ = 61.023 in ³ = 0.2642 gal. = 0.03531 ft. ³ 1 gal. = 3,785 cm ³ = 231 in ³ = 0.1337 ft. ³ = 0.004951 yd. ³ 1 ft. ³ = 28,317 cm ³ = 1,728 in ³ = 28.32 l. = 7.48 gal. 1 yd. ³ = 46,656 in ³ = 0.7646 m ³ 1 m ³ = 61,023 in ³ = 35.31 ft. ³ = 1.308 yd. ³
4. WEIGHT	1 g. = 15.43 gr. = 0.03527 oz. = 0.002205 lb. 1 oz. = 437.5 gr. = 28.35 g. = 0.0625 lb. 1 lb. = 7,000 gr. = 453.6 g. = 16 oz. = 0.4536 kg. 1 kg. = 15,432 gr. = 35.27 oz. = 2.205 lb. 1 ton (short) = 2,000 lb. = 907.2 kg = 0.8928 ton (long) 1 ton (long) = 2,240 lb. = 1.12 ton (short) = 1.016 ton (metric) 1 ton (metric) = 2,204.62 lb.



TABLE C

(Imperial) to metric and metric to (imperial) (approximately)

(each group is listed in a alphabetic order)

COLUMN A x Multiplier = COLUMN B

COLUMN B x Reciprocal = COLUMN A

Example: Yards (Col A) x 0.914 (multiplier) = Metres (Col B)

Metres (Col B) x 1.093 (Reciprocal) = Yards (Col A)

CONVERSION FACTORS :

Column A	Column B	Multiplier	Reciprocal
Length			
cm	in	0.3937	25.4
ft	m	0.3048	3.2808
in	mm	25.4	0.03937
km	cm	2.54	0.3937
km	mile	0.6214	0.6093
m	yd	1093.6	0.000914
m	in	39.37	0.0254
m	ft	3.2808	0.3048
m	yd	1.0936	0.9144
mile	km	1.6093	0.6214
mm	in	0.03937	25.4
yd	km	0.000914	1094.09
yd	m	0.9144	1.0936
Area			
cm ²	in ²	0.1550	6.4516
ft ²	m ²	0.0929	10.7642
in ²	Cm ²	6.4516	0.155
in ²	mm ²	645.16	0.0015
m ²	ft ²	10.7639	0.0929
m ²	yd ²	1.1960	0.8361
m ²	m ²	0.8361	1.1960
yd ²			
Volume			
	in ³	0.0610	16.393
	m ³	0.0283	35.3335
cm ³ (or : millilitre)	gal (British)	6.229	0.1605
ft ³	litre (dm ³)	28.328	0.0353
ft ³	ft ³	0.1605	6.2305
ft ³	m ³	0.00455	219.78
gal (British)	litre (dm ³)	4.546	0.2199
gal (British)	gal (USA)	1.2009	0.8327
gal (British)	cm ³	16.387	0.0610
gal (British)	gal (British)	0.219	4.566
in ³	gal (USA)	0.264	3.7878
dm ³ (or: litre)	ft ³	0.0353	28.328
dm ³ (or: litre)	pint	1.7597	0.5682
dm ³ (or: litre)	ft ³	35.3147	0.0283
dm ³ (or: litre)	yd ³	1.3079	0.7645
dm ³ (or: litre)	gal (British)	220.0	0.00455
m ³	litre dm ³	1000.0	0.001
m ³	m ³	0.7645	1.3079
m ³			
m ³			
yd ³			
Mass			
	kg	50.802	0.0197
	lb	2.2046	0.4536
	cwt	0.0197	50.791
	ton (long)	0.000984	1016.05
cwt	t	0.001	1000.0
kg	gr	28.349	0.0352
kg	kg	0.4536	2.204
kg	t	0.00454	220.26
kg	t	1.016	0.9842
oz	kg	1016.05	0.000984
lb			
ton (long)			
ton (long)	lbf	2.2046	0.4535
	N	9.8065	0.1019
Force	ton (long) f	0.1003	9.97
	N	404482	0.2248
kfg or : kp	kgf	0.4535	2.2046
kfg or : kp	pd	32.1740	0.0311
kN	kgf	0.01409	70.9723
lbf	N	0.1382	7.2359
lbf	dyne	13825.5	0.0000723
pd	t (metric) of Velocity	1.0160	0.9842
pd	kn	9.9640	0.10036
pd			
ton (long) f			
ton (long) f			
Velocity			
	m/s	0.3048	3.2808
	m/s	0.00508	196.850
	m/min	0.3048	3.2808
ft/s	km/h	0.1828	54.7046
ft/min	mile/h	0.6213	1.6095
ft/min	km/h	3.0	0.2777
ft/min	km/h	1.6093	0.6213



TABLE D

ELECTRICAL FORMULAS

Electrical fomulas for determining ampere, Kilowatt, Kilovolt - ampere and horse power

DIRECT CURRENT	ALTERNATING CURRENT	
	SINGLE PHASE	THREE PHASE
$A = \frac{KW \times 1000}{V}$	$A = \frac{KW \times 1000}{V \times P.F.}$	$A = \frac{KW \times 1000}{1.73 \times V \times P.F.}$
$A = \frac{KVA \times 1000}{V}$	$A = \frac{KVA \times 1000}{V}$	$A = \frac{KVA \times 1000}{1.73 \times V}$
$A = \frac{HP \times 746}{V \times (\%Eff.)}$	$A = \frac{HP \times 746}{V \times (\%Eff.) \times P.F.}$	$A = \frac{HP \times 746}{1.73 \times V \times (\%Eff.) \times P.F.}$
$KW = \frac{A \times V}{1000}$	$KW = \frac{A \times V \times P.F.}{1000}$	$KW = \frac{A \times V \times 1.73 \times P.F.}{1000}$
$KVA = \frac{A \times V}{1000}$	$KVA = \frac{A \times V}{1000}$	$KVA = \frac{A \times V \times 1.73}{1000}$
$HP = \frac{A \times V \times (\% Eff.)}{746}$	$HP = \frac{A \times V \times (\% Eff.) \times P.F.}{746}$	$HP = \frac{A \times V \times 1.73 \times (\% Eff.) \times P.F.}{746}$

APPROXIMATE MOTOR AMPERES PER TERMINAL:

220 Vac = 4 amperes per H.P.
 3 phase 220 Vac = 2.5 amperes per H.P.
 3 phase 380 Vac = 1.41 amperes per H.P.
 3 phase 440 Vac = 1.25 amperes per H.P.
 3 phase 550 Vac = 1 amperes per H.P.



TABLE E

WIRE GAUGES IN COMMON USE:

Gauge				Diameter		Cross-Sectional Area			Weight	
B.W.G.	A.W.G.	S.W.G.	mm.G.	Mil	mm	Cir. Mil	In ²	mm ²	lb/1,000 ft	kg/km
5/0	—	7/0	—	500	12.700	250.000	.1964	126.7	756.9	1.126
—	—	—	12	472.4	12.000	223.162	.1753	113.1	675.6	1.005
—	—	6/0	—	464	11.786	215.296	.1691	109.1	651.7	969.9
—	4/0	—	—	460	11.684	211.600	.1662	107.2	640.5	953
4/0	—	—	—	454	11.532	206.100	.1619	104.4	624	928.1
—	—	5/0	—	432	10.973	186.624	.1466	94.56	565	840.6
3/0	—	—	—	425	10.795	180.600	.1419	91.52	546.9	813.6
—	3/0	—	—	409.6	10.404	167.772	.1318	85.03	508	755.9
—	—	4/0	—	400	10.160	160.000	.1257	81.07	484.5	720.7
—	—	—	10	393.7	10.000	155.000	.1217	78.54	468	698.2
2/0	—	—	—	380	9.652	144.400	.1134	73.17	437.1	650.5
—	—	3/0	—	372	9.440	138.384	.1087	70.12	418.9	623.4
—	2/0	—	—	364.8	9.266	133.079	.1045	67.42	402.7	599.4
—	—	—	9	354.3	9.000	125.528	.09859	63.62	380	565.6
—	—	2/0	—	348	8.839	121.104	.09512	61.36	366.6	545.5
0	—	—	—	340	8.636	155.600	.09079	58.58	349.9	520.8
—	0	—	—	324.9	8.250	105.560	.08291	53.49	319.5	475.5
—	—	0	—	324	8.230	104.976	.08245	53.19	317.8	472.8
—	—	—	8	315	8.000	99.225	.07793	50.27	300.3	446.9
1	—	1	—	300	7.629	90.000	.07069	45.60	272.4	405.4
—	1	—	—	389.3	7.348	83.694	.06573	42.41	253.3	377
2	—	2	—	284	7.214	80.660	.06335	40.87	244.2	363.3
—	—	—	—	276	7.010	76.176	.05983	39.60	230.6	343.2
—	—	—	7	275.6	7.000	75.955	.05966	38.48	229.9	342.1
3	—	—	—	259	6.579	67.080	.05269	33.99	203.1	302.2
—	2	—	—	257.6	6.544	66.358	.05212	33.63	200.9	299.0
—	—	—	6.5	255.9	6.500	65.485	.05143	22.18	189.2	295
—	—	3	—	252	6.401	63.504	.04988	28.70	192.2	286.1
4	—	—	—	238	6.045	65.640	.04449	28.27	171.5	255.1
—	—	—	6.0	236.2	6.000	55.790	.04382	168.9	168.9	251.1
—	—	4	—	232	5.893	53.824	.04227	27.27	162.9	242.4
—	—	—	—	229.4	5.827	52.624	.04133	26.66	159.3	237
5	3	—	—	220	5.588	48.400	.03801	24.52	146.5	218
—	—	—	5.5	216.5	5.500	46.872	.03681	23.72	141.9	210.9
—	—	5	—	212	5.385	44.944	.03530	22.77	136	202.4
—	4	—	—	204.3	5.189	41.738	.03278	21.15	126.3	188
6	—	—	—	203	5.156	41.210	.03237	20.88	124.8	185.6
—	—	—	5.0	196.9	5.000	38.770	.03045	19.63	117.4	174.5
—	—	6	—	192	4.877	36.864	.02895	18.68	111.6	166.3
—	5	—	—	181.9	4.621	33.088	.02599	16.77	100.2	149.1
7	—	—	—	180	4.572	32.400	.02545	16.42	98.08	146
—	—	7	4.5	177.2	4.500	31.400	.02466	15.90	95.04	141.4
—	—	—	—	176	4.470	30.976	.02433	15.70	93.77	139.6
—	—	—	—	165	4.191	27.220	.02138	13.80	82.40	122.7
8	6	—	—	162	4.115	26.244	.02061	13.30	79.43	118.2



TABLE E

WIRE GAUGE IN COMMON USE CONTD.

Gauge				Diameter		Cross-Sectional Area			Weight	
B.W.G.	A.W.G.	S.W.G.	mm.G.	Mil	mm	Cir. Mil	In ²	mm ²	lb/1,000 ft	kg/km
—	—	8	—	160	4.064	25.600	.02011	12.97	77.50	115.30
9	—	—	4.0	157.5	4.000	24.806	.01948	12.57	75.08	111.80
—	7	—	—	148	3.759	21.900	.01720	11.10	66.29	98.68
—	—	9	—	144.3	3.665	20.822	.01635	10.55	63.01	93.79
—	—	—	—	144	3.658	20.736	.01629	10.52	62.78	93.52
10	—	—	3.5	137.8	3.500	18.989	.01491	9.621	57.46	85.53
—	8	—	—	134	3.404	17.960	.01410	9.098	54.34	80.88
—	—	10	—	128.5	3.264	16.512	.01297	8.368	49.99	74.39
—	—	—	3.2	128	3.251	16.384	.01287	8.302	49.60	73.81
—	—	—	—	126	3.200	15.876	.01247	8.042	48.06	71.49
11	—	—	—	120	3.048	14.400	.01131	7.297	43.59	64.87
—	9	—	—	116	2.946	13.456	.01057	6.818	40.74	60.61
—	—	—	2.9	114.4	2.906	13.087	.01028	6.632	39.62	58.96
12	—	—	—	114.2	2.900	13.042	.01024	6.605	39.47	58.72
—	—	—	—	109	2.769	11.880	.009331	6.020	35.96	53.52
—	—	12	—	104	2.642	10.816	.008495	5.481	32.74	48.73
—	10	—	2.6	102.4	2.600	10.486	.008246	5.309	31.78	47.29
13	—	—	—	101.9	2.588	10.384	.008156	5.262	31.43	46.78
—	—	13	—	95	2.413	9.025	.007088	4.573	27.32	40.65
—	—	—	—	92	2.337	8.464	.006648	4.289	25.62	38.13
—	11	—	—	90.74	2.305	8.234	.006467	4.172	24.92	37.09
14	—	—	2.3	90.55	2.300	8.199	.006439	4.155	24.82	36.96
—	12	—	—	83	2.108	6.889	.005411	3.491	20.85	31.04
—	—	14	—	80.81	2.053	6.530	.005129	3.309	19.77	29.42
—	—	—	—	80	2.032	6.400	.005027	3.243	19.37	28.83
15	—	—	2.0	78.74	2.000	6.200	.004869	3.142	18.77	27.93
—	13	—	—	72	1.829	5.184	.004072	2.627	18.46	27.36
16	—	—	1.8	71.96	1.828	5.178	.004067	2.624	15.67	23.33
—	—	—	—	70.87	1.800	5.023	.003945	2.545	15.20	22.63
—	—	—	—	65	1.651	4.225	.003318	2.141	12.79	19.03
—	14	—	—	64.08	1.628	4.106	.003225	2.081	12.43	18.50
—	—	16	—	64	1.626	4.096	.003217	2.075	12.40	18.45
17	—	—	1.6	62.99	1.600	3.968	.003116	2.011	12.01	17.88
—	15	—	—	58	1.473	3.364	.002642	1.705	10.18	15.16
—	—	—	—	57.07	1.450	3.257	.002558	1.650	9.859	14.67
—	—	17	—	56	1.422	3.136	.002463	1.589	9.493	14.13
18	—	—	1.4	55.12	1.400	3.038	.002386	1.539	9.196	13.68
—	16	—	—	50.82	1.291	2.583	.002029	1.309	7.820	11.64
—	—	18	—	49	1.245	2.401	.001886	1.217	7.269	10.82
—	—	—	—	48	1.219	2.304	.001810	1.167	6.976	10.38
—	—	—	1.2	47.24	1.200	2.232	.001753	1.131	6.756	10.06
19	17	—	—	45.26	1.150	2.048	.001608	1.037	6.197	9.219
—	—	—	—	24	1.067	1.764	.001385	0.8938	5.388	7.946
—	18	—	—	40.30	1.024	1.624	.001275	0.8226	4.914	7.313
—	—	19	—	40	1.016	1.600	.001157	0.8107	4.845	7.207



TABLE E

WIRE GAUGE IN COMMON USE CONTD.

Gauge				Diameter		Cross-Sectional Area			Weight	
B.W.G.	A.W.G.	S.W.G.	mm.G.	Mil	Mm.	Cir. Mil	In ²	mm ²	lb/1,000 ft	kg/km
—	—	—	1.0	39.37	1.000	1.550	.001217	0.7854	4.690	6.982
—	—	20	—	36	0.9144	1.296	.001018	0.6576	3.923	5.838
—	19	—	—	35.89	0.9116	1.288	.001012	0.6529	3.900	5.804
—	—	—	.90	35.43	0.9000	1.255	.0009857	0.6362	3.799	5.565
20	—	—	—	35	0.8890	1.225	.0009621	0.6207	3.708	5.518
21	—	21	—	32	0.8128	1.024	.0008042	0.5189	3.099	4.613
—	20	—	—	31.96	0.8118	1.021	.0008019	0.5174	3.091	4.600
—	21	—	.80	31.50	0.8000	992.3	.0007794	0.5027	3.004	4.469
—	—	—	—	28.46	0.7229	810	.0006362	0.4105	2.452	3.649
22	—	22	—	28	0.7112	784	.0006158	0.3973	2.373	3.532
—	—	—	.70	27.56	0.7000	759.6	.0005966	0.3848	2.299	3.421
—	22	—	.65	25.59	0.6500	654.8	.0005047	0.3318	1.982	2.950
23	—	—	—	25.35	0.6438	642.6	.0004909	0.3256	1.945	2.895
—	—	23	—	25	0.6350	625	.0004524	0.3167	1.892	2.816
—	—	—	—	24	0.6096	576	—	0.2919	1.744	2.595
—	23	—	.60	23.62	0.6000	557.9	.0004382	0.2827	1.689	2.513
24	—	24	—	22.57	0.5733	509.4	.0003801	0.2581	1.542	2.295
—	—	—	.55	22	0.5583	484	.0003681	0.2452	1.465	2.180
—	24	—	—	21.65	0.5500	468.7	.0003173	0.2376	1.419	2.112
—	—	—	—	20.10	0.5106	404	—	0.2047	1.223	1.820
25	—	25	—	20	0.5080	400	.0003142	0.2027	1.211	1.802
—	—	26	.50	19.69	0.5000	387.7	.0003045	0.1963	1.174	1.745
16	25	—	—	18	0.4572	324	.0002545	0.1642	0.9809	1.460
—	—	—	.45	17.90	0.4547	320.4	.0002516	0.1623	0.9697	1.443
—	—	—	—	17.72	0.4500	314	.0002466	0.1590	0.9504	1.414
—	—	27	—	16.4	0.4166	269	.0002113	0.1363	0.1844	1.212
27	—	—	—	16	0.4064	256	.0002011	0.1297	0.7750	1.153
—	26	—	—	15.94	0.4049	254.1	.0001996	0.1288	0.7693	1.145
—	—	28	.40	15.75	0.4000	248.1	.0001949	0.1257	0.7512	1.118
—	—	—	—	14.8	0.3759	219	.0001720	0.1110	0.6629	0.9868
—	27	—	—	14.20	0.3606	210.6	.0001583	0.1021	0.6101	0.9077
28	—	—	—	14	0.3556	196	.0001539	0.09932	0.5931	0.8330
—	—	—	.35	13.78	0.3500	189.9	.0001491	0.9621	0.5746	0.8553
—	—	29	—	13.6	0.3454	185	.0001453	0.09372	0.5600	0.8332
29	—	—	—	13	0.3302	169	.0001327	0.08563	0.5114	0.7613
—	28	—	—	12.64	0.3211	159.8	.0001255	0.08097	0.4837	0.7198
—	—	30	.30	12.60	0.3200	158.8	.0001246	0.08042	0.7806	0.7149
30	—	—	—	12.4	0.3150	153.8	.0001208	0.07791	0.4656	0.6926
—	—	31	—	12	0.3048	144	.0001131	0.07297	0.4359	0.6487
—	—	—	—	11.6	0.2946	134.6	.0001057	0.06818	0.4074	0.6061
—	29	—	.29	11.42	0.2900	130.4	.0001024	0.06605	0.3947	0.5872
—	—	—	—	11.26	0.2859	126.8	.00009959	0.06425	0.3838	0.5712
—	—	32	—	10.8	0.2743	116.6	.00009158	0.05913	0.3530	0.5257
—	30	—	26	10.24	0.2600	104.9	.00008239	0.05309	0.3175	0.4720
—	—	—	—	10.03	0.2546	100.6	.00007901	0.05097	0.3045	0.4531



TABLE E

WIRE GAUGE IN COMMON USE CONTD.

Gauge				Diameter		Cross-Sectional Area			Weight	
B.W.G.	A.W.G.	S.W.G.	mm.G.	Mil	Mm.	Cir. Mil	In ²	mm ²	lb/1,000 ft	kg/km
31	—	33	—	10	0.2540	100	.00007954	0.05067	0.3027	0.4505
—	—	34	.23	9.2	0.2337	84.64	.00006648	0.04289	0.2562	0.3813
—	—	—	—	9.055	0.2300	81.102	.00006440	0.04155	0.2482	0.3694
32	—	—	—	9	0.2286	79.71	.00006362	0.04104	0.2452	0.3649
—	31	—	—	8.928	0.2238	—	.00006260	0.04039	0.2413	0.3591
—	—	35	—	8.4	0.2134	70.56	.00005542	0.03575	0.2136	0.3178
33	—	—	—	8	0.2032	64	.00005027	0.03243	0.1937	0.2883
—	32	—	—	7.950	0.2019	65.20	.00004964	0.03203	0.1913	0.2847
—	—	—	.20	7.874	0.2000	62	.00004869	0.03142	0.1877	0.2793
—	—	36	—	7.6	0.1930	57.76	.00004536	0.02927	0.1748	0.2602
—	—	—	.18	7.087	0.1800	50.23	.00003945	0.02545	0.1520	0.2263
—	33	—	—	7.080	0.1798	50.13	.00003937	0.02540	0.1517	0.2258
34	—	—	—	7	0.1778	49	.00003848	0.02483	0.1483	0.2207
—	34	37	—	6.8	0.1727	46.24	.00003632	0.02343	0.1400	0.2083
—	—	—	—	6.305	0.1601	39.75	.00003122	0.02014	0.1203	0.1790
—	—	—	.16	6.299	0.1600	39.68	.00003116	0.02011	0.02011	0.1201
—	—	38	—	6	0.1524	36	.00002827	0.01824	0.1090	0.1622
—	35	—	—	5.615	0.1426	31.53	.00002476	0.01597	0.09543	0.1420
—	—	39	.14	5.512	0.1400	30.38	.00002386	0.01539	0.09196	0.1368
—	—	—	—	5.2	0.1321	27.04	.00002124	0.01370	0.08186	0.1218
35	36	40	—	5.000	0.1270	25	.00001963	0.01267	0.07565	0.1126
—	—	—	.12	4.8	0.1219	23.04	.00001810	0.01167	0.06976	0.1037
—	—	—	—	4.724	0.1200	22.32	.00001753	0.01131	0.06756	0.1006
—	37	41	—	4.453	0.1131	19.38	.00001557	0.01005	0.06001	0.08934
—	—	—	—	4.4	0.1118	19.36	.00001521	0.009810	0.05812	0.08721
36	38	42	—	4	0.1016	16.00	.00001257	0.008107	0.04845	0.07207
—	—	—	.10	3.965	0.1007	15.72	.00001235	0.007968	0.04760	0.07084
—	—	43	—	3.937	0.1000	15.50	.00001217	0.007854	0.04690	0.06982
—	39	—	—	3.6	0.09114	12.96	.00001018	0.006567	0.03923	0.05838
—	—	—	—	3.531	0.08969	12.47	.000009794	0.006319	0.03775	0.05618
—	40	44	—	3.2	0.08138	10.24	.000008042	0.005819	0.03099	0.04613
—	—	—	—	3.145	0.07987	9.891	.000007768	0.005012	0.02994	0.04456
—	41	45	—	3.800	0.07113	7.842	.000006159	0.003973	0.02374	0.03532
—	42	—	—	2.494	0.06334	6.219	.000004884	0.003151	0.01882	0.02801
—	46	—	—	2.4	0.06096	5.760	.000004528	0.002929	0.01744	0.02595
—	43	47	—	2.221	0.05641	4.932	.000003873	0.002495	0.01498	0.02222
—	—	—	.05	2	0.05080	4.000	.000003142	0.002027	0.01211	0.01802
—	44	—	—	1.987	0.05023	3.911	.000003072	0.001982	0.01184	0.01762
—	—	—	—	1.969	0.05000	3.877	.000003045	0.001963	0.01174	0.01645
—	45	48	—	1.761	0.04473	3.102	.000002436	0.001572	0.009383	0.01398
—	—	—	—	1.6	0.04064	2.560	.000002011	0.001297	0.007750	0.01153
—	46	—	—	1.568	0.03984	2.460	.000001931	0.001246	0.007446	0.01108
—	—	—	—	1.397	0.03547	1.951	.000001532	0.0009884	0.005904	0.008787
—	47	—	—	1.244	0.03159	1.547	.000001215	0.0007838	0.004683	0.006968
—	48	49	—	1.2	0.03048	1.400	.000001131	0.0007297	0.004359	0.006487



TABLE F

WIRE GAUGE IN COMMON USE CONTD.

Gauge				Diameter		Cross-Sectional Area			Weight	
B.W.G.	A.W.G.	S.W.G.	mm.G.	Mil	Mm.	Cir. Mil	In ²	mm ²	lb/1,000 ft	kg/km
—	49	—	—	0.108	0.02813	1.227	.0000009635	0.0006216	0.003713	0.005526
—	—	50	—	1	0.02540	1.000	.0000007854	0.0005067	0.003027	0.004505
—	50	—	—	0.986	0.02505	0.9728	.0000007641	0.0004929	0.002945	0.004382

Note: B.W.G. _ Birmingham Iron wire Gauge
A.W.G. _ American Wire Gauge
S.W.G. _ British Standard Wire Gauge
mm.G. _ Millimeter Gauge

SYMBOLS OF ELECTRICAL UNITS

ELECTRICAL UNIT		SYMBOL
CURRENT	(AMPERE)	A
VOLTAGE	(VOLT)	V (KV)
RESISTANCE	(OHM)	Ω (K Ω , M Ω)
ELECTRICAL POWER	(WATT)	W (KW, MW.)
ELECTRICAL ENERGY	(WATT HOUR)	WH (KWH).
HORSE POWER		HP
POWER FACTOR	(COS ϕ)	P.F.
FREQUENCY	(HERTZ)	HZ
CAPACITANCE	(FARAD)	F (μ F, PF.)
APPARENT POWER	(VOLT, AMPERE)	VA (KVA)
DIRECT CURRENT	(AMPERE)	I DC
ALTERNATING CURRENT	(AMPERE)	I AC
EFFICIENCY		Eff.
MAXIMUM VALUES		Em, Im
AVERAGE VALUES		Eav, Iav
EFFECTIVE VALUES		E, I
INSTANTANEOUS		e, i



Factory:

22-km, Ferozpur Road Lahore

UAN : 111-222-369

E-mail: info@gmcables.com

URL: www.gmcables.com

Ph: 042-35276143-5