SIGMA CABLE™

Leading Power Cable Manufacturer

PRODUCT CATALOG

Sigma Cable has the privilege to be the first Power Cable factory that has crossed **50 years** since their establishment in Singapore.

With the constant upgrading of machineries as well as staffs' commitment to serve the industry, Sigma aspires to remain as the preferred choice for cable suppliers in both domestic and regional markets.

Being a responsible partner to the industry, Sigma Cable looks forward to continuously provide the best services and offer the most competitive prices for high quality cables.

CONTENT

Sigma Is The Leading Power Cable Manufacturer Since 1964



Customer & Products Satisfaction Reliability

Sigma Cable Company (Pte) Ltd is the leading power cable manufacturer in Singapore under pioneer status since June 1964.

Identity
Our company manufactures low tension power cables, up to 3.3kV, complying with IEC, BS, Australia Standard (AS), and Singapore Standard (SS). Sigma Cable is widely accepted in ASEAN, Hong Kong, Australia/New Zealand, Sri Lanka, Maldives, Middle East, etc.

Sigma Cable also distributes medium and high voltage power cables, communication cables, fibre optical cables, winding wire, magnet wire and electronic wire.

High Quality Cable
Sigma Cable takes pride in the quality of its cables, committed to our mission to supply high quality cable which meets customer's need on time and competitive price. We are awarded the Quality Management System conforming to ISO9001. In addition, Sigma's cables are manufactured under stringent control, which are guaranteed free from manufacturing defects.

Product Quality
Our product ranges are endorsed with the Singapore Quality Mark, certified by TUV SUD PSB certification body.
With our total commitment to customer satisfaction and product reliability, we have built a reputation for excellent quality from our customers.

Customers
Through the years, Sigma has continued to excel in their product and service quality. Their continuous improvement has gained good reference with SP Power Assets Limited, Singapore Telecommunications Ltd, HDB as well as various Government and private projects. Sigma will continue to drive in this path to serve the industry and the market to the fullest.

"At Sigma Cable, We Take Pride in The Quality of Our Cables."

Projects

Some of our notable clients include SP Power Assets Limited, Singapore Telecommunications Ltd, government and private sectors.

Sigma Cable has a project engineering team to undertake Supply, Deliver and Install turnkey projects to SP Power Assets Limited (A member of Singapore Power in the field of transmission and distribution of electrical energy). Since its establishment in 1997, we have successfully completed a number of 66kV projects exceeding more than S$190million.

Applications

Sigma Cable manufactures a wide range of Low Tension (LT) power cables, Fire Resistant and Retardant cables to many sectors, such as :

- Public Housing and Private Residential Buildings
- Mass Rapid Transit (MRT) and Light Rapid Transit (LRT)
- Airports, Hotels and High Rise Commercial Buildings
- Hospitals and Schools
- Water and Waste Treatment Plants
- High Tech Factories (Wafer, Pharmaceutical, Petrochemical plants)
- Traffic Lighting and Road Control Systems

CERTIFICATE

The Certification Body
of TÜV SÜD PSB Pte Ltd
certifies that

SIGMA CABLE CO (PTE) LTD
19 Benoi Road
Singapore 629909

has established and applies
a Quality Management System for

Manufacture of Electric Wires and Cables
(See Appendix to Certificate for Details)

Proof has been furnished that the requirements
according to

ISO 9001 : 2008

CERTIFICATE OF CONFORMITY

Product Listing Scheme* : Class 1A

This Certificate is issued to

Sigma Cable Company (Private) Limited
19 Benoi Road
Jurong Town
Singapore 629909

FOR

Product:	XLPE insulated PVC sheathed cables
Brand:	SIGMA
Model:	(1) XP-600S (2) XAP-600S
Country of Origin:	Singapore
Product Details:	Refer to Appendix Issue 6 (1 P

which has complied with the requirements of the

Standard(s)

IEC 60502-1:2009

Vice-President (Certification Department)
TÜV SÜD PSB

CERTIFICATE OF CONFORMITY

Product Listing Scheme* : Class 1A

This Certificate is issued to

Sigma Cable Company (Private) Limited
19 Benoi Road
Jurong Town
Singapore 629909

FOR

Product:	XLPE insulated Steel wire armoured PVC sheathed cable
Brand:	SIGMA
Model:	XSP-600M
Country of Origin:	Singapore
Product Details:	Voltage: 600/1000V, Insulation: XLPE, Ar Sheath: PVC/ST2 Sizes: 2C x 1.5mm² to 4C x 300mm²

which has complied with the requirements of the scheme

Standard(s)

IEC 60502-1:2009

Vice-President (Certification Department)
TÜV SÜD PSB

LICENCE

PRODUCT LISTING SCHEME
CLASS 1A

Sigma Cable Company (Pte) Ltd
No. 19, Benoi Road
Jurong Town
Singapore 629909

is hereby granted the right and licence to use the TÜV SÜD PSB PLS Mark.

Product(s) for which the use of the mark is granted	Standard(s) to which the product(s) is to be produced
1) Fire Resistant Cable	
2) XLPE Insulated Steel Wire Armoured and PVC Sheathed Cable	

TÜV SÜD PSB

CERT NO.: 94-2-0385
ISO 9001 : 2008

bizSAFE 3

PVC INSULATED POWER CABLES

PVC INSULATED CABLES (WITH OR WITHOUT SHEATH)

Voltage Rating (Uo/U) : 300/500V, 450/750V or 600/1000V

Standards Complied

MAIN CABLE SPECIFICATION	MATERIALS TEST METHODS	FLAME RETARDANT TEST
SS 358 PART 3		
BS 6004		BS EN 50265
BS 6360	BS 7655	IEC 60332-1
IEC 60227-3	IEC 60811	IEC 60332-3 (Upon customer request)
IEC 60228		
IEC 60502-1		
AS/NZS 5000-1		

Colours of Identification

INSULATION:

1-core: Brown, Blue, Green/Yellow, Red, Black or other colours as per customer's request.

2-core: (Brown, Blue) or (Red, Black)

3-core: (Brown, Black, Grey) or (Red, Yellow, Blue)

4-core: (Brown, Black, Grey, Blue) or (Red, Yellow, Blue, Black)

OVER SHEATH: Black, Grey or White

1	Conductors	: Plain annealed stranded copper conductor.
2	Insulation	: Flame retardant PVC compound.
3	Filler (where applicable)	: PVC or Polypropylene yarn.
4	Binder Tape (where applicable)	: Polyester (mylar) tape/ non-woven polyester tape.
5	Oversheath	: Flame retardant PVC compound.

Table P1

450/750V 1-CORE PVC INSULATED NON-SHEATHED CABLE TO SS 358 (IEC 60227-3)

MODEL: P-450S

CONSTRUCTION : Plain annealed copper, PVC insulation, type C
COLOUR : Brown, Blue, Red, Black, Yellow/Green or as per customer's request.

CONDUCTOR		Nom. Thick. of Insulation	Approx. OD of Cable	Approx. Weight of Cable	Minimum Insulation Resistance at 70°C
Size	No./Dia. of Wire				
mm^2	mm	mm	mm	kg/km	Mohm/km
1.5	1/1.38	0.7	2.9	20	0.011
1.5	7/0.53	0.7	3.1	22	0.01
2.5	1/1.78	0.8	3.5	32	0.01
2.5	7/0.67	0.8	3.7	34	0.009
4	7/0.85	0.8	4.3	50	0.0077
6	7/1.04	0.8	4.8	70	0.0065
10	7/1.35	1.0	6.2	120	0.0065
16	7/1.70	1.0	7.2	180	0.005
25	7/2.14	1.2	9.0	280	0.005
35	19/1.53	1.2	10.0	375	0.0043
50	19/1.78	1.4	11.9	505	0.0043
70	19/2.14	1.4	13.7	715	0.0035
95	19/2.52	1.6	16.0	985	0.0035
120	37/2.03	1.6	17.6	1220	0.0032
150	37/2.25	1.8	19.6	1505	0.0032
185	37/2.52	2.0	21.9	1885	0.0032
240	61/2.25	2.2	25.0	2460	0.0032
300	61/2.52	2.4	28.0	3075	0.003
400	61/2.85	2.6	31.5	3915	0.0028

Table P2

450/750V 1-CORE PVC INSULATED NON-SHEATHED CABLE TO BS 6004

MODEL: P-450S

CONSTRUCTION : Plain annealed copper, PVC insulation, type TI1
COLOUR : Brown, Blue, Red, Black, Yellow/Green or as per customer's request.

CONDUCTOR		Nom. Thick. of Insulation	Approx. OD of Cable	Approx. Weight of Cable	Minimum Insulation Resistance at 70°C
Size	No./Dia. Of Wire				
mm^2	mm	mm	mm	kg/km	Mohm/km
1.5	1/1.38	0.7	2.9	20	0.011
1.5	7/0.53	0.7	3.1	22	0.01
2.5	1/1.78	0.8	3.5	32	0.01
2.5	7/0.67	0.8	3.7	34	0.0099
4	7/0.85	0.8	4.3	50	0.0082
6	7/1.04	0.8	4.8	70	0.007
10	7/1.35	1.0	6.2	120	0.0067
16	7/1.70	1.0	7.2	180	0.0056
25	7/2.14	1.2	9.0	280	0.0053
35	19/1.53	1.2	10.0	375	0.0046
50	19/1.78	1.4	11.9	505	0.0046
70	19/2.14	1.4	13.7	715	0.0040
95	19/2.52	1.6	16.0	985	0.0039
120	37/2.03	1.6	17.6	1220	0.0035
150	37/2.25	1.8	19.6	1505	0.0035
185	37/2.52	2.0	21.9	1885	0.0035
240	61/2.25	2.2	25.0	2460	0.0034
300	61/2.52	2.4	28.0	3075	0.0033
400	61/2.85	2.6	31.5	3915	0.0031
500	61/3.20	2.8	34.7	4915	0.0030
630	127/2.52	2.8	38.7	6260	0.0027

NOTE: Current Rating & Volt Drop refer to Table T5 on page 36.

Table P3

600/1000V 1-CORE PVC INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: PP-600S

Conductor : Plain annealed copper
Insulation : PVC Type A Colour : Brown, Blue, Red or Black
Sheath : PVC Type ST1 Colour : Grey or Black

CONDUCTOR		Nom. Thick. of Insulation	Nom. Thick. of Sheath	Approx. OD of Cable	Approx. Weight of Cable
Size mm²	No./Dia. of Wire mm	mm	mm	mm	kg/km
1.5	1/1.38	0.8	1.4	6.0	52
1.5	7/0.53	0.8	1.4	6.2	55
2.5	1/1.78	0.8	1.4	6.4	65
2.5	7/0.67	0.8	1.4	6.7	68
4	7/0.85	1.0	1.4	7.6	95
6	7/1.04	1.0	1.4	8.2	120
10	7/1.35	1.0	1.4	9.1	169
16	7/1.70	1.0	1.4	10.2	236
25	7/2.14	1.2	1.4	11.9	350
35	19/1.53	1.2	1.4	13.1	455
50	19/1.78	1.4	1.4	14.8	595
70	19/2.14	1.4	1.4	16.6	813
95	19/2.52	1.6	1.5	19.2	1110
120	37/2.03	1.6	1.5	21.0	1358
150	37/2.25	1.8	1.6	23.0	1664
185	37/2.52	2.0	1.7	25.5	2075
240	61/2.25	2.2	1.8	29.0	2686
300	61/2.52	2.4	1.9	32.0	3328
400	61/2.85	2.6	2.0	36.0	4230
500	61/3.20	2.8	2.1	40.0	5285
630	127/2.52	2.8	2.2	44.0	6686
800	127/2.85	2.8	2.3	48.0	8410
1000	127/3.20	3.0	2.5	54.0	10545

Table P4

600/1000V MULTI-CORE PVC INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: PP-600M

Insulation : PVC insulation, Type A Core identification :
2C : (Brown, Blue) or (Red, Black)
3C : (Brown, Black, Grey) or (Red, Yellow, Blue)
4C : (Brown, Black, Grey, Blue) or (Red, Yellow, Blue, Black)

Sheath : PVC Type ST1 Colour : Black

CONDUCTOR		Nom. Thick. of Insulation	Nom. Thick. of Sheath			Approx. OD & Weight of Cable					
						2C		3C		4C	
Size mm²	No./Dia. of Wire mm	mm	2C mm	3C mm	4C mm	OD mm	WT kg/km	OD mm	WT kg/km	OD mm	WT kg/km
1.5	7/0.53	0.8	1.8	1.8	1.8	11.0	145	11.5	165	12.0	200
2.5	7/0.67	0.8	1.8	1.8	1.8	11.5	180	12.0	210	13.0	255
4	7/0.85	1.0	1.8	1.8	1.8	13.5	255	14.0	305	15.5	375
6	7/1.04	1.0	1.8	1.8	1.8	15.0	285	15.5	370	17.0	455
10	7/1.35	1.0	1.8	1.8	1.8	17.0	395	17.5	515	19.0	665
16	7/1.70	1.0	1.8	1.8	1.8	19.0	590	20.0	740	22.0	930
25	7/2.14	1.2	1.8	1.8	1.8	19.0	710	21.0	1015	23.5	1325
35	19/1.53	1.2	1.8	1.8	1.8	20.0	930	23.0	1330	26.0	1740
50	19/1.78	1.4	1.8	1.8	1.9	23.0	1225	26.0	1765	29.0	2320
70	19/2.14	1.4	1.9	1.9	2.0	25.5	1680	29.0	2435	33.0	3215
95	19/2.52	1.6	2.0	2.1	2.2	29.0	2280	35.0	3360	39.0	4400
120	37/2.03	1.6	2.1	2.2	2.3	32.0	2805	38.0	4140	42.5	5440
150	37/2.25	1.8	2.2	2.3	2.5	35.0	3430	42.0	5070	47.0	6675
185	37/2.52	2.0	2.4	2.5	2.6	39.0	4285	46.0	6330	53.0	8360
240	61/2.25	2.2	2.5	2.6	2.8	48.0	5565	56.0	8265	61.0	10870
300	61/2.52	2.4	2.7	2.8	3.1	53.0	6965	63.0	10355	68.0	13650
400	61/2.85	2.6	2.9	3.1	3.3	58.0	9020	70.0	13090	78.0	17360

NOTE: Current Rating & Volt Drop refer to Table T5 & T6 on page 36 & 37.

PVC INSULATED AND PVC SHEATHED ARMOURED CABLES

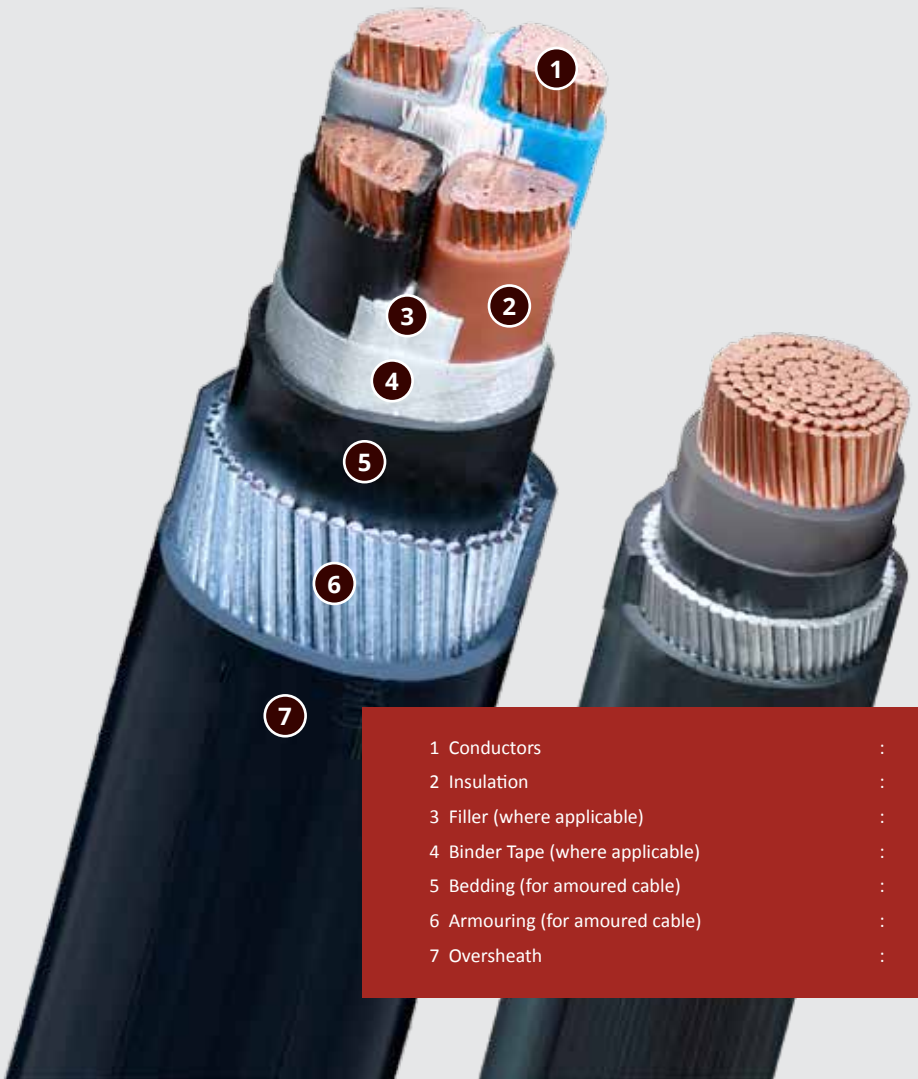
Voltage Rating (Uo/U) : 600/1000V or 1900/3300V

Standards Complied

MAIN CABLE SPECIFICATION	MATERIALS TEST METHODS	FLAME RETARDANT TEST
BS 6346	BS EN 10257	BS EN 50265
BS 6360	BS 2627	IEC 60332-1
BS 5099	BS 6469	IEC 60332-3 (Upon customer request)
AS/NZS 5000-1	BS 7655	
IEC 60502		

Colours of Identification

INSULATION:	1-core:	Brown or Blue
	2-core:	(Brown, Blue) or (Red, Black)
	3-core:	(Brown, Black, Grey) or (Red, Yellow, Blue)
	4-core:	(Brown, Black, Grey, Blue) or (Red, Yellow, Blue, Black)
	5-core and above:	White core with Black number
OVER SHEATH:	Black	



1	Conductors	:	Plain annealed stranded copper conductor.
2	Insulation	:	Flame retardant PVC compound.
3	Filler (where applicable)	:	PVC or Polypropylene yarn.
4	Binder Tape (where applicable)	:	Polyester (mylar) tape/ non-woven polyester tape.
5	Bedding (for amoured cable)	:	Flame retardant PVC compound.
6	Armouring (for amoured cable)	:	Aluminium wires or Galvanized steel wires.
7	Oversheath	:	Flame retardant PVC compound.

Table A1

600/1000V 1-CORE PVC INSULATED ARMOURED CABLE TO IEC 60502

MODEL: PAP-600S
ALUMINIUM WIRE ARMOURED (AWA) CABLE

Size of Conductor mm²	Nom. Thick. of Insulation mm	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
50	1.4	1.0	1.25	1.8	20.1	857
70	1.4	1.0	1.25	1.8	21.9	1103
95	1.6	1.0	1.25	1.8	24.2	1427
120	1.6	1.0	1.60	1.8	26.5	1760
150	1.8	1.0	1.60	1.8	28.5	2094
185	2.0	1.0	1.60	1.8	30.8	2533
240	2.2	1.0	1.60	1.9	34.1	3197
300	2.4	1.0	2.00	2.0	38.0	4016
400	2.6	1.2	2.00	2.1	42.0	5014
500	2.8	1.2	2.00	2.2	45.8	6146
630	2.8	1.2	2.00	2.4	50.1	7662
800	2.8	1.4	2.50	2.5	56.0	9743
1000	3.0	1.4	2.50	2.7	61.4	12011

Table A2

600/1000V 2-CORE PVC INSULATED ARMOURED CABLE TO IEC 60502

MODEL: PSP-600M
GALVANIZED STEEL WIRE ARMOURED (SWA) CABLE

Size of Conductor mm²	Nom. Thick. of Insulation mm	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.8	1.0	0.90	1.8	14.0	365
2.5	0.8	1.0	0.90	1.8	15.0	418
4	1.0	1.0	0.90	1.8	16.7	534
6	1.0	1.0	1.25	1.8	18.6	707
10	1.0	1.0	1.25	1.8	20.9	880
16	1.0	1.0	1.25	1.8	22.7	1105
25	1.2	1.0	1.60	1.8	26.8	1670
35	1.2	1.0	1.60	1.8	24.9	1628
50	1.4	1.0	1.60	1.9	27.8	2033
70	1.4	1.2	2.00	2.0	31.4	2835
95	1.6	1.2	2.00	2.2	35.5	3611
120	1.6	1.2	2.00	2.3	37.8	4247
150	1.8	1.4	2.50	2.4	42.5	5449
185	2.0	1.4	2.50	2.6	47.1	6522
240	2.2	1.4	2.50	2.8	52.0	8070
300	2.4	1.6	2.50	2.9	57.0	9736
400	2.6	1.6	2.50	3.2	62.5	11853

NOTES: Current Rating & Volt Drop refer to Table T7 & T8 on page 38 & 39.
Conductor for 2-core 240mm² to 400mm² shall be circular compacted.

Table A3

600/1000V 3-CORE PVC INSULATED ARMOURED CABLE TO IEC 60502

MODEL: PSP-600M
GALVANIZED STEEL WIRE ARMOURED (SWA) CABLE

Size of Conductor mm²	Nom. Thick. of Insulation mm	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.8	1.0	0.90	1.8	14.5	410
2.5	0.8	1.0	0.90	1.8	15.4	476
4.0	1.0	1.0	1.25	1.8	18.2	717
6.0	1.0	1.0	1.25	1.8	19.5	815
10	1.0	1.0	1.25	1.8	21.5	1029
16	1.0	1.0	1.25	1.8	23.8	1305
25	1.2	1.0	1.60	1.8	25.4	1777
35	1.2	1.0	1.60	1.8	27.6	2160
50	1.4	1.0	1.60	2.0	31.1	2762
70	1.4	1.2	2.00	2.1	35.7	3865
95	1.6	1.2	2.00	2.2	40.8	4958
120	1.6	1.2	2.00	2.3	44.4	5913
150	1.8	1.4	2.50	2.5	49.8	7544
185	2.0	1.4	2.50	2.7	54.5	9051
240	2.2	1.6	2.50	2.9	64.8	11584
300	2.4	1.6	2.50	3.1	71.2	14037
400	2.6	1.8	3.15	3.4	79.8	18173

Table A4

600/1000V 4-CORE PVC INSULATED ARMOURED CABLE TO IEC 60502

MODEL: PSP-600M
GALVANIZED STEEL WIRE ARMOURED (SWA) CABLE

Size of Conductor mm²	Nom. Thick. of Insulation mm	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.8	1.0	0.90	1.8	15.3	462
2.5	0.8	1.0	0.90	1.8	16.4	542
4	1.0	1.0	1.25	1.8	19.4	825
6	1.0	1.0	1.25	1.8	20.8	946
10	1.0	1.0	1.25	1.8	23.1	1210
16	1.0	1.0	1.60	1.8	26.3	1717
25	1.2	1.0	1.60	1.8	28.1	2167
35	1.2	1.0	1.60	1.9	30.5	2674
50	1.4	1.2	2.00	2.1	35.6	3723
70	1.4	1.2	2.00	2.2	39.5	4785
95	1.6	1.4	2.50	2.4	46.5	6666
120	1.6	1.4	2.50	2.5	50.9	7961
150	1.8	1.4	2.50	2.7	55.2	9412
185	2.0	1.6	2.50	2.9	61.4	11492
240	2.2	1.6	2.50	3.1	69.2	14362
300	2.4	1.6	3.15	3.3	70.1	17052
400	2.6	1.8	3.15	3.6	88.1	22951

NOTES: Current Rating & Volt Drop refer to Table T8 on page 39
Conductor for 240mm² to 400mm² shall be circular compacted.

Table A5

600/1000V MULTI-CORE PVC INSULATED ARMOURED CABLE TO IEC 60502

MODEL: PSP-600M
GALVANIZED STEEL WIRE ARMOURED (SWA) CABLE

CONDUCTOR		Nom. Thick. of Insulation mm	No. of Core	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
Size mm^2	No./Dia. of Wire mm							
1.5	7/0.53	0.8	5	1.0	0.90	1.8	16.6	520
			6	1.0	0.90	1.8	17.6	580
			7	1.0	0.90	1.8	17.6	595
			8	1.0	0.90	1.8	18.5	650
			9	1.0	1.25	1.8	20.3	840
			10	1.0	1.25	1.8	21.6	920
			12	1.0	1.25	1.8	22.0	961
			19	1.0	1.60	1.8	25.7	1395
2.5	7/0.67	0.8	5	1.0	0.90	1.8	17.5	600
			6	1.0	1.25	1.8	19.3	785
			7	1.0	1.25	1.8	19.3	809
			8	1.0	1.25	1.8	20.3	880
			9	1.0	1.25	1.8	21.5	977
			10	1.0	1.25	1.8	23.0	1066
			12	1.0	1.25	1.8	23.4	1131
			19	1.0	1.60	1.8	27.3	1654
4	7/0.85	1.0	5	1.0	1.25	1.8	20.7	898
			6	1.0	1.25	1.8	22.1	1009
			7	1.0	1.25	1.8	22.1	1055
			8	1.0	1.60	1.8	24.1	1300
			9	1.0	1.60	1.8	25.6	1441
			10	1.0	1.60	1.8	27.5	1572
			12	1.0	1.60	1.8	28.0	1688
			19	1.0	1.60	1.9	32.2	2265

NOTE: Current Rating & Volt Drop refer to Table T8 on page 39.

XLPE INSULATED PVC OR LSHF SHEATHED

POWER CABLES

COMPARISON OF MAIN PROPERTIES BETWEEN PVC AND XLPE INSULATION

Insulation is made of plastics material; they are divided into two groups depending on how they react to heat. Thermoplastics can be repeatedly softened by heating and hardened by cooling. When you heat thermoplastics like PVC, the molecules do not chemically bond with each other. Instead, thermoplastic chains are held together by weak attractions between molecules.
When heated, these chains slip off from each other and the material melts.

On the other hand, in case of thermosetting plastics, the cross-links or chemical bonds between molecular chains prevent displacement at elevated temperature. Thus thermosetting plastics do not become soft or change their shape on heating. Thermosetting plastics harden permanently once it is moulded and cured. XLPE is polyethylene with their molecular chain cross-linked.

The network structure of the molecular chains cannot deform and the excellent properties that polyethylene has at room temperature are retained at elevated temperature. The cross-linking of the molecules also has the effect of enhancing room temperature properties.

Characteristics	Unit	PVC	XLPE
Permittivity (50Hz , 20°C)	-	4 - 6	2.3
Dielectric loss factor (50Hz, 20°C)	-	0.05 – 0.07	0.0004
Volume resistivity (27°C), (min.)	Ohms cm	1×10^{13}	1×10^{14}
Max. conductor temp.	°C	70	90
Max. short circuit temp.	°C	160	250
Tensile strength, (min.)	N / mm^2	12.5	12.5
Resistance to abrasion	-	Medium	Good
Flexibility at -10°C	-	Poor	Good
Workability	-	Good	Poor
Current carrying capacity	-	low	High
Moisture resistant	-	Medium	Good
Flame retardant	-	Self-extinguishing	Support combustion
Oxidation resistant	-	Medium	Good
Chemical resistant	-	Medium	Good
Halogen content	-	Yes	No

XLPE INSULATED AND PVC OR LOW SMOKE HALOGEN FREE (LSHF) SHEATHED CABLES

Voltage Rating (Uo/U) : 600/1000V, 1800/3000V or 1900/3300V

Standards Complied

MAIN CABLE SPECIFICATION	MATERIALS TEST METHODS	FLAME RETARDANT TEST	TEST ON ACID GAS EVOLVED*	SMOKE DENSITY TEST*
BS 5467 BS 6724 BS 7211 IEC 60228 IEC 60502-1 AS/NZS 5000-1	BS EN 10257 BS 2627 BS 7655 IEC 60811	BS EN 50265 BS EN 50266 IEC 60332-1 IEC 60332-3 (Upon customer request)	BS EN 50267 IEC 60754	BS EN 50268 IEC 61034

Colours of Identification

INSULATION:	1-core: Natural
	2-core: (Red, Black) or (Brown, Blue)
	3-core: (Red, Yellow, Blue) or (Brown, Black, Grey)
	4-core: (Red, Yellow, Blue, Black) or (Brown, Black, Grey, Blue)
OVER SHEATH:	Black

1 Conductors	:	Plain annealed stranded copper conductor.
2 Insulation	:	Cross-linked PE compound.
3 Filler (where applicable)	:	PVC or Polypropylene yarn.
4 Binder Tape (where applicable)	:	Polyester (mylar) tape/ non-woven polyester tape.
5 Bedding (for amoured cable)	:	Flame retardant PVC compound, type ST2, LSHF or ST8 compound.
6 Armouring (for amoured cable)	:	Aluminium wires or Galvanized steel wires.
7 Oversheath	:	Flame retardant PVC compound, type ST2, LSHF or ST8 compound.

Table XL1

600/1000V SINGLE-CORE XLPE INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: XP-600S, XAP-600S

Size of Conductor mm²	Nom. Thick. of Insulation mm	UNARMOURED CABLE XP-600S			ALUMINIUM WIRE ARMOURED (AWA) CABLE XAP-600S				
		Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.7	1.4	6.0	50					
2.5	0.7	1.4	6.5	60					
4	0.7	1.4	7.0	80					
6	0.7	1.4	7.5	105					
10	0.7	1.4	8.5	150					
16	0.7	1.4	9.5	210					
25	0.9	1.4	11.5	320					
35	0.9	1.4	12.5	420					
50	1.0	1.4	14.0	545	1.0	1.25	1.8	19.5	780
70	1.1	1.4	16.0	765	1.0	1.25	1.8	21.5	1025
95	1.1	1.5	18.0	1035	1.0	1.60	1.8	24.0	1375
120	1.2	1.5	20.0	1285	1.0	1.60	1.8	25.5	1650
150	1.4	1.6	22.0	1575	1.0	1.60	1.8	27.5	1960
185	1.6	1.6	24.5	1955	1.0	1.60	1.8	30.0	2375
240	1.7	1.7	27.5	2530	1.0	1.60	1.9	33.0	3005
300	1.8	1.8	30.5	3155	1.0	1.60	1.9	35.5	3650
400	2.0	1.9	34.0	4010	1.2	2.00	2.1	40.5	4725
500	2.2	2.0	38.0	5025	1.2	2.00	2.2	44.5	5815
630	2.4	2.2	42.5	6450	1.2	2.00	2.3	49.0	7315
800	2.6	2.3	47.5	8185	1.4	2.50	2.5	55.5	9400
1000	2.8	2.4	52.5	10255	1.4	2.50	2.7	61.0	11625

Table XL2

600/1000V 2-CORE XLPE INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: XP-600M, XSP-600M

Size of Conductor mm²	Nom. Thick. of Insulation mm	UNARMOURED CABLE XP-600M			STEEL WIRE ARMOURED (SWA) CABLE XSP-600M				
		Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.7	1.8	10.0	125	1.0	0.90	1.8	13.5	340
2.5	0.7	1.8	10.5	160	1.0	0.90	1.8	14.5	390
4	0.7	1.8	12.0	205	1.0	0.90	1.8	15.5	460
6	0.7	1.8	13.0	260	1.0	0.90	1.8	17.0	535
10	0.7	1.8	15.0	375	1.0	1.25	1.8	19.0	800
16	0.7	1.8	17.0	530	1.0	1.25	1.8	21.5	1020
25	0.9	1.8	17.0	655	1.0	1.60	1.8	22.0	1265
35	0.9	1.8	18.5	865	1.0	1.60	1.8	23.5	1535
50	1.0	1.8	21.0	1135	1.0	1.60	1.8	25.5	1865
70	1.1	1.8	23.5	1570	1.0	1.60	2.0	29.0	2445
95	1.1	1.9	26.5	2120	1.2	2.00	2.1	33.0	3345
120	1.2	2.0	29.5	2640	1.2	2.00	2.2	36.0	3990
150	1.4	2.2	33.0	3250	1.2	2.00	2.3	39.0	4730
185	1.6	2.3	36.5	4050	1.4	2.50	2.5	44.5	6160
240	1.7	2.5	46.0	5300	1.4	2.50	2.7	53.5	7820
300	1.8	2.6	50.0	6590	1.6	2.50	2.8	58.0	9390
400	2.0	2.9	54.0	8365	1.6	2.50	3.1	62.0	11475

NOTE: Current Rating & Volt Drop refer to Table T1, T2, T3 & T4 on page 32 to 35.

Table XL3

600/1000V 3-CORE XLPE INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: XP-600M, XSP-600M

Size of Conductor mm²	Nom. Thick. of Insulation mm	UNARMOURED CABLE XP-600M			STEEL WIRE ARMOURED (SWA) CABLE XSP-600M				
		Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.7	1.8	10.5	145	1.0	0.90	1.8	14.0	370
2.5	0.7	1.8	11.0	185	1.0	0.90	1.8	15.0	435
4	0.7	1.8	12.5	250	1.0	0.90	1.8	16.0	520
6	0.7	1.8	14.0	310	1.0	0.90	1.8	17.5	610
10	0.7	1.8	16.0	460	1.0	1.25	1.8	20.0	910
16	0.7	1.8	18.0	670	1.0	1.25	1.8	22.5	1180
25	0.9	1.8	19.0	935	1.0	1.60	1.8	24.5	1610
35	0.9	1.8	21.5	1245	1.0	1.60	1.8	26.5	2000
50	1.0	1.8	25.5	1655	1.0	1.60	1.9	30.5	2560
70	1.1	1.9	28.0	2320	1.2	2.00	2.0	34.0	3585
95	1.1	2.0	32.0	3125	1.2	2.00	2.2	38.5	4590
120	1.2	2.1	35.5	3905	1.2	2.00	2.3	42.0	5530
150	1.4	2.3	39.5	4800	1.4	2.50	2.5	47.5	7050
185	1.6	2.4	44.0	6010	1.4	2.50	2.6	52.0	8515
240	1.7	2.6	53.5	8010	1.6	2.50	2.8	62.0	11180
300	1.8	2.7	60.0	9995	1.6	2.50	3.0	68.5	13530
400	2.0	3.0	65.5	12680	1.6	2.50	3.2	74.0	16520

Table XL4

600/1000V 4-CORE XLPE INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: XP-600M, XSP-600M

Size of Conductor mm²	Nom. Thick. of Insulation mm	UNARMOURED CABLE XP-600M			STEEL WIRE ARMOURED (SWA) CABLE XSP-600M				
		Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.7	1.8	11.0	170	1.0	0.90	1.8	15.0	415
2.5	0.7	1.8	12.0	225	1.0	0.90	1.8	16.0	490
4	0.7	1.8	13.5	305	1.0	0.90	1.8	17.0	600
6	0.7	1.8	15.0	385	1.0	1.25	1.8	19.5	815
10	0.7	1.8	17.5	580	1.0	1.25	1.8	22.0	1070
16	0.7	1.8	20.0	835	1.0	1.60	1.8	25.0	1540
25	0.9	1.8	21.5	1210	1.0	1.60	1.8	26.5	1985
35	0.9	1.8	24.0	1610	1.0	1.60	1.9	29.0	2475
50	1.0	1.8	27.0	2120	1.0	1.60	2.0	32.5	3100
70	1.1	2.0	31.5	3015	1.2	2.00	2.2	38.0	4480
95	1.1	2.1	36.0	4085	1.2	2.00	2.3	42.5	5750
120	1.2	2.3	40.0	5155	1.4	2.50	2.5	48.0	7460
150	1.4	2.4	44.5	6310	1.4	2.50	2.6	52.5	8810
185	1.6	2.6	50.5	7940	1.4	2.50	2.8	58.5	10780
240	1.7	2.8	58.0	10520	1.6	2.50	3.0	67.0	13930
300	1.8	3.0	64.0	13135	1.6	2.50	3.2	72.0	16850
400	2.0	3.3	73.0	16700	1.8	3.15	3.5	83.0	22230

NOTE: Current Rating & Volt Drop refer to Table T2 & T4 on page 33 & 35.

Table XL5

600/1000V 4-CORE WITH REDUCED NEUTRAL XLPE INSULATED PVC SHEATHED CABLE TO IEC 60502

MODEL: XP-600M, XSP-600M

Size of Conductor		Nom. Thick. of Insulation		UNARMOURED CABLE XP-600M			STEEL WIRE ARMOURED (SWA) CABLE XSP-600M				
Phase	Neutral	Phase	Neutral	Nom. Thick. of Sheath	Approx. OD of Cable	Approx. Weight of Cable	Nom. Thick. of Bedding	Nom. Dia. of Armour Wire	Nom. Thick. of Sheath	Approx. OD of Cable	Approx. Weight of Cable
mm^2	mm^2	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
16	10	0.7	0.7	1.8	19.0	775	1.0	1.60	1.8	24.0	1475
25	16	0.9	0.7	1.8	21.5	1130	1.0	1.60	1.8	26.5	1915
35	16	0.9	0.7	1.8	24.0	1445	1.0	1.60	1.8	29.0	2305
50	25	1.0	0.9	1.8	27.0	1930	1.0	1.60	2.0	32.0	2905
70	35	1.1	0.9	1.9	31.0	2715	1.2	2.00	2.1	38.0	4175
95	50	1.1	1.0	2.1	36.0	3680	1.2	2.00	2.3	42.5	5330
120	70	1.2	1.1	2.2	40.0	4690	1.2	2.00	2.4	46.5	6500
150	70	1.4	1.1	2.3	44.0	5610	1.4	2.50	2.5	52.0	8110
185	95	1.6	1.1	2.5	50.0	7130	1.4	2.50	2.7	58.0	9980
240	120	1.7	1.2	2.6	57.5	9215	1.6	2.50	3.0	66.5	12930
300	150	1.8	1.4	2.8	63.5	11490	1.6	2.50	3.0	72.0	15400
400	185	2.0	1.6	3.1	72.5	14660	1.6	3.15	3.3	82.0	19750

NOTE: Current Rating & Volt Drop refer to Table T2 & T4 on page 33 & 35.

Table XL6

450/750V & 600/1000V LSHF INSULATED NON-SHEATHED CABLES REFER TO BS EN 50525-3-31, IEC 60332-3, IEC 60754 & IEC 61034

MODEL: L-FRT-450S, L-FRT-600S

CONDUCTOR		450/750V L-FRT-450S			600/1000V L-FRT-600S		
Size	No./Dia. of wire	Nom. Thick. of Insulation	Approx. OD of Cable	Approx. Weight of Cable	Nom. Thick. of Insulation	Approx. OD of Cable	Approx. Weight of Cable
mm^2	No./mm	mm	mm	kg/km	mm	mm	kg/km
1.5	7/0.53	0.7	3.1	23	0.8	3.3	25
2.5	7/0.67	0.8	3.7	35	0.8	3.7	35
4	7/0.85	0.8	4.3	52	1.0	4.7	55
6	7/1.04	0.8	4.8	73	1.0	5.3	75
10	7/1.35	1.0	6.2	120	1.0	6.2	120
16	7/1.70	1.0	7.2	180	1.0	7.2	180
25	7/2.14	1.2	9.0	285	1.2	9.0	285
35	19/1.53	1.2	10.2	375	1.2	10.2	375
50	19/1.78	1.4	12.0	510	1.4	12.0	510
70	19/2.14	1.4	14.0	720	1.4	14.0	720
95	19/2.52	1.6	16.0	995	1.6	16.0	995
120	37/2.03	1.6	18.0	1230	1.6	18.0	1230
150	37/2.25	1.8	20.0	1515	1.8	20.0	1515
185	37/2.52	2.0	22.0	1900	2.0	22.0	1900
240	61/2.25	2.2	25.0	2475	2.2	25.0	2475
300	61/2.52	2.4	28.0	3100	2.4	28.0	3100
400	61/2.85	2.6	31.5	3945	2.6	31.5	3945
500	61/3.20	2.8	35.0	4950	2.8	35.0	4950
630	127/2.52	2.8	39.0	6300	2.8	39.0	6300

NOTE: Current Rating & Volt Drop refer to Table T5 on page 36.

Table XL7

600/1000V SINGLE-CORE XLPE INSULATED LSHF SHEATHED CABLE

MODEL: XL-FRT-600S, XAL-FRT-600S

Size of Conductor mm²	UNARMOURED CABLE (REF IEC 60502) XL-FRT-600S				ALUMINIUM WIRE ARMOURED (AWA) CABLE (BS6724) XAL-FRT-600S				
	Nom. Thick. of Insulation mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
1.5	0.7	1.4	6.0	50					
2.5	0.7	1.4	6.5	65					
4	0.7	1.4	7.0	85					
6	0.7	1.4	7.5	110					
10	0.7	1.4	8.5	155					
16	0.7	1.4	9.5	225					
25	0.9	1.4	11.5	335					
35	0.9	1.4	12.5	435					
50	1.0	1.4	14.0	570	0.8	1.25	1.5	18.5	750
70	1.1	1.4	16.0	795	0.8	1.25	1.5	20.5	1000
95	1.1	1.5	18.0	1075	0.8	1.60	1.6	23.0	1340
120	1.2	1.5	20.0	1330	0.8	1.60	1.6	24.7	1625
150	1.4	1.6	22.0	1630	1.0	1.60	1.7	27.2	1975
185	1.6	1.6	24.5	2030	1.0	1.60	1.8	29.8	2410
240	1.7	1.7	27.5	2625	1.0	1.60	1.8	32.7	3025
300	1.8	1.8	30.5	3260	1.0	1.60	1.9	35.5	3695
400	2.0	1.9	34.0	4140	1.2	2.00	2.0	40.3	4760
500	2.2	2.0	38.0	5185	1.2	2.00	2.1	44.0	5855
630	2.4	2.2	42.5	6640	1.2	2.00	2.2	48.6	7350
800	2.6	2.3	47.5	8420	1.4	2.50	2.4	55.1	9445
1000	2.8	2.4	52.5	10540	1.4	2.50	2.5	60.3	11650

Table XL8

600/1000V MULTI-CORE XLPE INSULATED LSHF SHEATHED CABLE

MODEL: XL-FRT-600M, XSL-FRT-600M

No. of Core	Size of Conductor mm²	UNARMOURED CABLE (REF IEC 60502) XL-FRT-600M				STEEL WIRE ARMOURED (SWA) CABLE (BS6724) XSL-FRT-600M				
		Nom. Thick. of Insulation mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
5	1.5	0.7	1.8	12.2	203	0.8	0.90	1.4	14.0	390
7		0.7	1.8	13.0	245	0.8	0.90	1.4	16.0	480
10		0.7	1.8	16.5	369	0.8	1.25	1.5	19.5	745
12		0.7	1.8	16.5	375	0.8	1.25	1.5	20.0	800
15		0.7	1.8	18.6	485	0.8	1.25	1.6	21.9	960
19		0.7	1.8	19.5	540	0.8	1.25	1.6	23.0	1035
5	2.5	0.7	1.8	13.3	264	0.8	0.90	1.4	15.8	500
7		0.7	1.8	14.5	320	0.8	0.90	1.4	17.0	580
10		0.7	1.8	17.9	473	0.8	1.25	1.6	21.5	912
12		0.7	1.8	18.5	505	0.8	1.25	1.6	22.0	990
15		0.7	1.8	20.3	637	1.0	1.60	1.7	25.1	1360
19		0.7	1.8	21.5	740	1.0	1.60	1.7	26.0	1465
7	4.0	0.7	1.8	16.0	460	0.8	1.25	1.5	19.5	865
12		0.7	1.8	20.5	735	1.0	1.60	1.6	25.5	1455
19		0.7	1.8	24.0	1090	1.0	1.60	1.7	29.0	1940

NOTE: Current Rating & Volt Drop refer to Table T1, T2, T3 & T4 on page 32 to 35.

Table XL9

600/1000V MULTI-CORE XLPE INSULATED LSHF SHEATHED CABLE

MODEL: XL-FRT-600M, XSL-FRT-600M

No. of Core	Size of Conductor mm²	UNARMOURED CABLE (REF IEC 60502) XL-FRT-600M				STEEL WIRE ARMOURED (SWA) CABLE (BS6724) XSL-FRT-600M				
		Nom. Thick. of Insulation mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
2	1.5	0.7	1.8	10.0	130	0.8	0.90	1.3	12.5	300
	2.5	0.7	1.8	10.5	165	0.8	0.90	1.4	13.5	350
	4	0.7	1.8	12.0	215	0.8	0.90	1.4	14.5	430
	6	0.7	1.8	13.0	265	0.8	0.90	1.4	15.5	500
	10	0.7	1.8	15.0	385	0.8	0.90	1.5	17.5	665
	16	0.7	1.9	17.0	545	0.8	1.25	1.5	20.5	985
	25	0.9	1.8	17.0	665	0.8	1.25	1.6	20.5	1105
	35	0.9	1.8	18.5	875	1.0	1.60	1.7	23.5	1540
	50	1.0	1.8	21.0	1145	1.0	1.60	1.8	25.5	1890
	70	1.1	1.8	23.5	1585	1.0	1.60	1.9	29.0	2460
	95	1.1	1.9	26.5	2140	1.2	2.00	2.0	33.0	3360
	120	1.2	2.0	29.5	2665	1.2	2.00	2.1	36.0	4015
	150	1.4	2.2	33.0	3280	1.2	2.00	2.2	39.0	4755
	185	1.6	2.3	36.5	4080	1.4	2.50	2.4	44.5	6195
	240	1.7	2.5	46.0	5330	1.4	2.50	2.5	49.0	7610
	300	1.8	2.6	50.0	6090	1.6	2.50	2.6	53.5	9190
	400	2.0	2.9	54.0	8350	1.6	2.50	2.8	58.5	11220
3	1.5	0.7	1.8	10.5	150	0.8	0.90	1.3	13.0	330
	2.5	0.7	1.8	11.0	195	0.8	0.90	1.4	14.0	400
	4	0.7	1.8	12.5	260	0.8	0.90	1.4	15.0	485
	6	0.7	1.8	14.0	320	0.8	0.90	1.4	16.5	570
	10	0.7	1.8	16.0	470	0.8	1.25	1.5	19.0	875
	16	0.7	1.8	18.0	680	0.8	1.25	1.6	21.5	1150
	25	0.9	1.8	19.0	950	1.0	1.60	1.7	24.0	1615
	35	0.9	1.8	21.5	1260	1.0	1.60	1.8	26.5	2020
	50	1.0	1.8	25.5	1670	1.0	1.60	1.8	30.5	2575
	70	1.1	1.9	28.0	2335	1.0	1.60	1.9	33.0	3320
	95	1.1	2.0	32.0	3150	1.2	2.00	2.1	38.5	4615
	120	1.2	2.1	35.5	3930	1.2	2.00	2.2	41.5	5555
	150	1.4	2.3	39.5	4830	1.4	2.50	2.3	47.0	7065
	185	1.6	2.4	44.0	6045	1.4	2.50	2.4	51.5	8530
	240	1.7	2.6	53.5	8080	1.4	2.50	2.6	61.0	10875
	300	1.8	2.7	60.0	10070	1.6	2.50	2.7	68.0	13225
	400	2.0	3.0	65.5	12770	1.6	2.50	2.9	73.0	16200
4	1.5	0.7	1.8	11.0	180	0.8	0.90	1.3	13.5	375
	2.5	0.7	1.8	12.0	230	0.8	0.90	1.4	14.5	460
	4	0.7	1.8	13.5	315	0.8	0.90	1.4	16.0	565
	6	0.7	1.8	15.0	395	0.8	1.25	1.5	18.5	780
	10	0.7	1.8	17.5	590	0.8	1.25	1.5	20.5	1030
	16	0.7	1.8	20.0	860	0.8	1.25	1.6	23.5	1370
	25	0.9	1.8	21.5	1225	1.0	1.60	1.7	26.5	1995
	35	0.9	1.8	24.0	1625	1.0	1.60	1.8	29.0	2485
	50	1.0	1.8	27.0	2140	1.0	1.60	1.9	32.0	3115
	70	1.1	2.0	31.5	3040	1.2	2.00	2.1	38.0	4500
	95	1.1	2.1	36.0	4110	1.2	2.00	2.2	42.5	5775
	120	1.2	2.3	40.0	5190	1.4	2.50	2.3	47.5	7475
	150	1.4	2.4	44.5	6350	1.4	2.50	2.4	52.0	8830
	185	1.6	2.6	50.5	7985	1.4	2.50	2.6	58.0	10805
	240	1.7	2.8	58.0	10595	1.6	2.50	2.7	66.0	13630
	300	1.8	3.0	64.0	13220	1.6	2.50	2.9	71.5	16530
	400	2.0	3.3	73.0	16805	1.8	3.15	3.2	82.5	21840

NOTE: Current Rating & Volt Drop refer to Table T2 & T4 on page 33 & 35.

LSHF
FIRE RESISTANT
CABLES

LOW SMOKE HALOGEN FREE (LSHF) FIRE RESISTANT CABLES

Voltage Rating (Uo/U) : 300/500V, 450/750V or 600/1000V

Standards Complied

MAIN CABLE SPECIFICATION	FIRE TESTS	FLAME RETARDANT TEST	TEST ON ACID GAS EVOLVED	SMOKE DENSITY TEST
BS 6724				
BS 7211	SS 229 CAT CWZ	BS EN 50265		
BS 7629	BS 6387 CAT CWZ	BS EN 50266	BS EN 50267	BS EN 50268
BS 7846	IEC 60331	IEC 60332-1	IEC 60754	IEC 61034
IEC 60502-1	AS/NZS 3013	IEC 60332-3		
AS/NZS 5000-1				

Colours of Identification

INSULATION:

1-core: Natural. (Orange for Non-sheathed)

2-core: (Red & Black) or (Brown & Blue)

3-core: (Red, Yellow, Blue) or (Brown, Black, Grey)

4-core: (Red, Yellow, Blue, Black) or (Brown, Black, Grey, Blue)

OVER SHEATH: Orange

1 Conductors	:	Plain annealed stranded copper conductor.
2 Fire Barrier	:	Mica tape.
3 Insulation	:	Cross-linked PE or LSHF compound.
4 Filler (where applicable)	:	LSHF or Polypropylene yarn.
5 Binder Tape (where applicable)	:	Polyester (mylar) tape/ non-woven polyester tape.
6 Bedding (for amoured cable)	:	LSHF compound, type LTS 1 or ST8.
7 Armouring (for amoured cable)	:	Aluminium wires or Galvanized steel wires.
8 Oversheath	:	LSHF compound, type LTS 1, LTS 4 or ST8.

Table FR1

600/1000V SINGLE-CORE LSHF FIRE RESISTANT CABLE

MODEL: XL-FR-600S, EL-FR-600S

SPEC. : REFER IEC 60502, 60331, 60332-3, 60754, 61034, BS6387 & SS 299

CONDUCTOR			Nom. Thick. of Insulation	Nom. Thick. of Sheath	Approx. OD of Cable	Approx. Weight of Cable	
Size	No./Dia. of Wire	Approx. Dia.				XL-FR-600S	EL-FR-600S
mm^2	mm	mm	mm	kg/km	mm	kg/km	kg/km
1.5	7/0.53CR	1.59	0.7	1.4	7.1	60	65
2.5	7/0.67CR	2.01	0.7	1.4	7.5	70	75
4	7/0.85CR	2.55	0.7	1.4	8.1	90	100
6	7/1.04CR	3.12	0.7	1.4	8.6	115	120
10	7/1.35CR	4.05	0.7	1.4	9.6	165	170
16	7/1.70CR	5.10	0.7	1.4	10.6	230	235
25	7/2.14CP	6.10	0.9	1.4	12.3	325	340
35	7/2.52CP	7.10	0.9	1.4	13.6	425	440
50	19/1.78CP	8.40	1.0	1.4	15.0	555	575
70	19/2.14CP	9.90	1.1	1.4	17.0	765	795
95	19/2.52CP	11.80	1.1	1.5	19.2	1035	1065
120	37/2.03CP	13.20	1.2	1.5	21.5	1280	1320
150	37/2.25CP	14.80	1.4	1.6	23.7	1575	1625
185	37/2.52CP	16.40	1.6	1.6	26.0	1945	2005
240	37/2.88CP	19.00	1.7	1.7	29.0	2525	2600
300	61/2.52CP	21.20	1.8	1.8	31.8	3135	3225
400	61/2.85CP	23.70	2.0	1.9	35.4	3970	4085
500	61/3.20CP	27.00	2.2	2.0	39.2	5055	5200
630	91/2.97CP*	31.20	2.4	2.2	44.0	6515	6690
800	127/2.85CR	37.10	2.6	2.3	48.9	8270	8480
1000	127/3.20CR	41.60	2.8	2.4	54.1	10340	10600

Table FR2

450/750V & 600/1000V SINGLE-CORE NON-SHEATHED LSHF FIRE RESISTANT CABLE

MODEL: E-FR-450S, E-FR-600S

SPEC. : REFER BS 7211, 6387, SS 299, IEC 60331, 60332-3, 60754 & 61034

CONDUCTOR			450/750V E-FR-450S			600/1000V E-FR-600S		
Size	No./Dia. of Wire	Approx. Dia.	Nom. Thick. of Insulation	Approx. OD of Cable	Approx. Weight of Cable	Nom. Thick. of Insulation	Approx. OD of Cable	Approx. Weight of Cable
mm^2	No./mm^2	mm	mm	mm	kg/km	mm	mm	kg/km
1.5	7/0.53CR	1.59	0.7	4.2	28	0.8	4.4	30
2.5	7/0.67CR	2.01	0.8	4.8	40	0.8	4.8	40
4	7/0.85CR	2.55	0.8	5.3	58	1.0	5.7	65
6	7/1.04CR	3.12	0.8	5.9	80	1.0	6.3	85
10	7/1.35CR	4.05	1.0	7.2	130	1.0	7.2	130
16	7/1.70CR	5.10	1.0	8.3	190	1.0	8.3	190
25	7/2.14CP	6.10	1.2	10.0	285	1.2	10.0	285
35	7/2.52CP	7.10	1.2	11.3	380	1.2	11.3	380
50	19/1.78CP	8.40	1.4	12.9	510	1.4	12.9	510
70	19/2.14CP	9.90	1.4	14.7	715	1.4	14.7	715
95	19/2.52CP	11.80	1.6	17.0	980	1.6	17.0	980
120	37/2.03CP	13.20	1.6	19.2	1,220	1.6	19.2	1220
150	37/2.25CP	14.80	1.8	21.1	1,500	1.8	21.1	1500
185	37/2.52CP	16.40	2.0	23.4	1,870	2.0	23.4	1870
240	37/2.88CP	19.00	2.2	26.5	2,445	2.2	26.5	2445
300	61/2.52CP	21.20	2.4	29.3	3,050	2.4	29.3	3050
400	61/2.85CP	23.70	2.6	32.7	3,880	2.6	32.7	3880
500	61/3.20CP	27.00	2.8	36.3	4,950	2.8	36.3	4950
630	91/2.97CP*	31.20	2.8	40.2	6,325	2.8	40.2	6325

NOTES : CR=circular stranded conductor

CP=circular compacted stranded conductor (*630mm^2 shall be 89/3.0mm or 91/2.97mm)

Current Rating & Volt Drop refer to Table T1 on page 32

Model E-FR-600S is suitable for 90°C or up to 125°C operating temperature.

Table FR3

600/1000V MULTI-CORE LSHF FIRE RESISTANT CABLE

MODEL: XL-FR-600M, EL-FR-600M

SPEC. : REFER IEC 60502, 60331, 60332-3, 60754, 61034, SS299 & BS 6387

No. of Core	CONDUCTOR			Nom. Thick. of Insulation	Nom. Thick. of Sheath	Approx. OD of Cable	Approx. Weight of Cable	
	Size	No./Dia. of Wire	Approx. Dia.				XL-FR-600M	EL-FR-600M
	mm^2	No./mm	mm	mm	mm	mm	kg/km	kg/km
2	1.5	7/0.53CR	1.59	0.7	1.8	12.0	190	200
	2.5	7/0.67CR	2.01	0.7	1.8	12.5	225	235
	4	7/0.85CR	2.55	0.7	1.8	14.0	295	305
	6	7/1.04CR	3.12	0.7	1.8	15.0	360	375
	10	7/1.35CR	4.05	0.7	1.8	17.0	490	510
	16	7/1.70CR	5.10	0.7	1.8	19.0	665	685
	25	7/2.14CP	6.10	0.9	1.8	22.0	935	965
	35	7/2.52CP	7.10	0.9	1.8	24.0	1185	1220
	50	19/1.78CP	8.40	1.0	1.8	27.0	1545	1590
	70	19/2.14CP	9.90	1.1	1.8	30.5	2090	2145
	95	19/2.52CP	11.80	1.1	1.9	34.5	2780	2845
	120	37/2.03CP	13.20	1.2	2.0	38.0	3445	3520
	150	37/2.25CP	14.80	1.4	2.2	42.5	4255	4360
	185	37/2.52CP	16.40	1.6	2.3	46.5	5245	5375
	240	37/2.88CP	19.00	1.7	2.5	52.5	6780	6940
	300	61/2.52CP	21.20	1.8	2.6	57.5	8340	8520
	400	61/2.85CP	23.70	2.0	2.9	64.0	10525	10750
3	1.5	7/0.53CR	1.59	0.7	1.8	12.5	215	230
	2.5	7/0.67CR	2.01	0.7	1.8	13.5	265	280
	4	7/0.85CR	2.55	0.7	1.8	15.0	350	365
	6	7/1.04CR	3.12	0.7	1.8	16.0	435	455
	10	7/1.35CR	4.05	0.7	1.8	18.0	600	630
	16	7/1.70CR	5.10	0.7	1.8	20.5	835	865
	25	7/2.14CP	6.10	0.9	1.8	23.5	1185	1230
	35	7/2.52CP	7.10	0.9	1.8	25.5	1520	1575
	50	19/1.78CP	8.40	1.0	1.8	29.0	1995	2065
	70	19/2.14CP	9.90	1.1	1.9	33.0	2745	2830
	95	19/2.52CP	11.80	1.1	2.0	37.0	3660	3760
	120	37/2.03CP	13.20	1.2	2.1	41.0	4560	4675
	150	37/2.25CP	14.80	1.4	2.3	45.5	5630	5780
	185	37/2.52CP	16.40	1.6	2.4	50.0	6945	7135
	240	37/2.88CP	19.00	1.7	2.6	56.5	8995	9230
	300	61/2.52CP	21.20	1.8	2.7	62.0	11100	11375
	400	61/2.85CP	23.70	2.0	3.0	69.0	14045	14380
4	1.5	7/0.53CR	1.59	0.7	1.8	13.5	260	280
	2.5	7/0.67CR	2.01	0.7	1.8	14.5	320	340
	4	7/0.85CR	2.55	0.7	1.8	16.5	425	450
	6	7/1.04CR	3.12	0.7	1.8	17.5	535	560
	10	7/1.35CR	4.05	0.7	1.8	20.0	750	785
	16	7/1.70CR	5.10	0.7	1.8	22.5	1040	1080
	25	7/2.14CP	6.10	0.9	1.8	26.0	1495	1555
	35	7/2.52CP	7.10	0.9	1.8	28.5	1930	2000
	50	19/1.78CP	8.40	1.0	1.8	32.0	2535	2625
	70	19/2.14CP	9.90	1.1	2.0	36.5	3510	3625
	95	19/2.52CP	11.80	1.1	2.1	41.5	4710	4840
	120	37/2.03CP	13.20	1.2	2.3	45.5	5885	6040
	150	37/2.25CP	14.80	1.4	2.4	50.5	7230	7435
	185	37/2.52CP	16.40	1.6	2.6	56.0	8955	9215
	240	37/2.88CP	19.00	1.7	2.8	63.0	11615	11930
	300	61/2.52CP	21.20	1.8	3.0	69.0	14360	14720
	400	61/2.85CP	23.70	2.0	3.3	77.0	18175	18625

NOTES : CR=circular stranded conductor
CP=circular compacted stranded conductor
Current Rating & Volt Drop refer to Table T2 on page 33
Model EL-FR-600M is suitable for 90°C or up to 125°C operating temperature

Table FR4

300/500V MULTI-CORE LSHF FIRE RESISTANT CABLE

MODEL: XL-FR-300M
SPEC. : REFER BS 7211, 6387, SS 299, IEC 60331, 60332-3, 60754 & 61034

No. of Core	CONDUCTOR			Nom. Thick. of Insulation mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable kg/km
	Size mm²	No./Dia. of Wire No./mm	Approx. Dia. mm				
2	1.5	7/0.53CR	1.59	0.7	0.9	9.0	115
	2.5	7/0.67CR	2.01	0.8	1.0	10.5	160
	4.0	7/0.85CR	2.55	0.8	1.1	12.0	220
3	1.5	7/0.53CR	1.59	0.7	1.0	10.0	140
	2.5	7/0.67CR	2.01	0.8	1.1	11.5	195
	4.0	7/0.85CR	2.55	0.8	1.1	12.5	265
4	1.5	7/0.53CR	1.59	0.7	1.0	11.0	170
	2.5	7/0.67CR	2.01	0.8	1.1	12.5	240
	4.0	7/0.85CR	2.55	0.8	1.2	14.0	335

NOTES : CR=circular stranded conductor
Current Rating & Volt Drop refer to Table T2 on page 33.

Table FR5

600/1000V SINGLE-CORE ARMOURED LSHF FIRE RESISTANT CABLE

MODEL: XAL-FR-600S, EAL-FR-600S
SPEC. : REFER BS 6724, 6387, SS 299, IEC 60332-3, 60754 & 61034

CONDUCTOR			Nom. Thick. of Insulation mm	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable	
Size mm²	No./Dia. of Wire No./mm	Approx. Dia. mm						XAL-FR-600S kg/km	EAL-FR-600S kg/km
50	19/1.78CP	8.40	1.0	0.8	1.25	1.5	19.3	760	780
70	19/2.14CP	9.90	1.1	0.8	1.25	1.5	21.4	990	1015
95	19/2.52CP	11.80	1.1	0.8	1.25	1.6	23.5	1285	1315
120	37/2.03CP	13.20	1.2	0.8	1.25	1.6	25.8	1550	1590
150	37/2.25CP	14.80	1.4	1.0	1.60	1.7	29.1	1960	2010
185	37/2.52CP	16.40	1.6	1.0	1.60	1.8	31.6	2380	2440
240	37/2.88CP	19.00	1.7	1.0	1.60	1.8	34.4	2990	3070
300	61/2.52CP	21.20	1.8	1.0	1.60	1.9	37.3	3640	3730
400	61/2.85CP	23.70	2.0	1.2	2.00	2.0	42.1	4680	4785
500	61/3.20CP	27.00	2.2	1.2	2.00	2.1	45.8	5840	5975
630	91/2.97CP*	31.20	2.4	1.2	2.00	2.2	50.4	7370	7540
800	127/2.85CR	37.05	2.6	1.4	2.50	2.4	57.0	9505	9720
1000	127/3.20CR	41.60	2.8	1.4	2.50	2.5	62.1	11695	11950

NOTES : CP=circular compacted stranded conductor (*630mm² shall be 89/3.0mm or 91/2.97mm)
CR=circular stranded conductor
Current Rating & Volt Drop refer to Table T3 on page 34
Model EAL-FR-600S is suitable for 90°C or up to 125°C operating temperature.

Table FR6

600/1000V MULTI-CORE ARMOURED LSHF FIRE RESISTANT CABLE

MODEL: XSL-FR-600M, ESL-FR-600M

SPEC. : REFER BS 7846, 6387, SS 299, IEC 60331, 60332-3, 60754 & 61034

No. of Core	CONDUCTOR			Nom. Thick. of Insulation mm	Nom. Thick. of Bedding mm	Nom. Dia. of Armour Wire mm	Nom. Thick. of Sheath mm	Approx. OD of Cable mm	Approx. Weight of Cable	
	Size mm^2	No./Dia. of Wire No./mm	Approx. Dia. mm						XSL-FR-600M kg/km	ESL-FR-600M kg/km
2	1.5	7/0.53CR	1.59	0.7	0.8	0.90	1.4	14.5	400	415
	2.5	7/0.67CR	2.01	0.7	0.8	0.90	1.4	15.5	460	470
	4	7/0.85CR	2.55	0.7	0.8	0.90	1.4	16.5	550	560
	6	7/1.04CR	3.12	0.7	0.8	0.90	1.4	18.0	630	645
	10	7/1.35CR	4.05	0.7	0.8	0.90	1.5	20.0	805	825
	16	7/1.70CR	5.10	0.7	0.8	1.25	1.5	22.5	1155	1180
	25	7/2.14CP	6.10	0.9	0.8	1.25	1.6	26.0	1510	1540
	35	7/2.52CP	7.10	0.9	1.0	1.60	1.7	29.0	2045	2080
	50	19/1.78CP	8.40	1.0	1.0	1.60	1.8	32.0	2515	2560
	70	19/2.14CP	9.90	1.1	1.0	1.60	1.9	36.0	3215	3270
	95	19/2.52CP	11.80	1.1	1.2	2.00	2.0	41.0	4390	4455
	120	37/2.03CP	13.20	1.2	1.2	2.00	2.1	44.5	5175	5255
	150	37/2.25CP	14.80	1.4	1.2	2.00	2.2	49.0	6155	6260
	185	37/2.52CP	16.40	1.6	1.4	2.50	2.4	54.5	7920	8050
	240	37/2.88CP	19.00	1.7	1.4	2.50	2.5	60.5	9730	9885
	300	61/2.52CP	21.20	1.8	1.6	2.50	2.6	66.0	11630	11815
	400	61/2.85CP	23.70	2.0	1.6	2.50	2.8	73.0	14235	14465
3	1.5	7/0.53CR	1.59	0.7	0.8	0.90	1.4	15.0	440	455
	2.5	7/0.67CR	2.01	0.7	0.8	0.90	1.4	16.0	505	520
	4	7/0.85CR	2.55	0.7	0.8	0.90	1.4	17.5	615	635
	6	7/1.04CR	3.12	0.7	0.8	0.90	1.4	19.0	720	740
	10	7/1.35CR	4.05	0.7	0.8	1.25	1.5	21.5	1110	1135
	16	7/1.70CR	5.10	0.7	0.8	1.25	1.6	24.0	1365	1395
	25	7/2.14CP	6.10	0.9	1.0	1.60	1.7	28.5	2020	2070
	35	7/2.52CP	7.10	0.9	1.0	1.60	1.8	31.0	2430	2485
	50	19/1.78CP	8.40	1.0	1.0	1.60	1.8	34.0	3020	3090
	70	19/2.14CP	9.90	1.1	1.0	1.60	1.9	38.0	3925	4010
	95	19/2.52CP	11.80	1.1	1.2	2.00	2.1	43.5	5360	5460
	120	37/2.03CP	13.20	1.2	1.2	2.00	2.2	47.5	6400	6520
	150	37/2.25CP	14.80	1.4	1.4	2.50	2.3	53.0	8160	8310
	185	37/2.52CP	16.40	1.6	1.4	2.50	2.4	58.0	9725	9920
	240	37/2.88CP	19.00	1.7	1.4	2.50	2.6	64.5	12115	12350
	300	61/2.52CP	21.20	1.8	1.6	2.50	2.7	70.0	14570	14845
	400	61/2.85CP	23.70	2.0	1.6	2.50	2.9	79.0	18915	19260
4	1.5	7/0.53CR	1.59	0.7	0.8	0.90	1.4	16.0	500	520
	2.5	7/0.67CR	2.01	0.7	0.8	0.90	1.4	17.0	580	605
	4	7/0.85CR	2.55	0.7	0.8	0.90	1.4	19.0	710	735
	6	7/1.04CR	3.12	0.7	0.8	1.25	1.5	21.0	975	1000
	10	7/1.35CR	4.05	0.7	0.8	1.25	1.5	23.5	1315	1350
	16	7/1.70CR	5.10	0.7	0.8	1.25	1.6	26.0	1620	1660
	25	7/2.14CP	6.10	0.9	1.0	1.60	1.7	31.0	2400	2465
	35	7/2.52CP	7.10	0.9	1.0	1.60	1.8	33.5	2930	3000
	50	19/1.78CP	8.40	1.0	1.0	1.60	1.9	37.5	3705	3790
	70	19/2.14CP	9.90	1.1	1.2	2.00	2.1	43.0	5175	5290
	95	19/2.52CP	11.80	1.1	1.2	2.00	2.2	48.0	6590	6720
	120	37/2.03CP	13.20	1.2	1.4	2.50	2.3	53.5	8415	8570
	150	37/2.25CP	14.80	1.4	1.4	2.50	2.4	58.5	10045	10250
	185	37/2.52CP	16.40	1.6	1.4	2.50	2.6	63.5	12015	12275
	240	37/2.88CP	19.00	1.7	1.6	2.50	2.7	71.0	15115	15430
	300	61/2.52CP	21.20	1.8	1.6	2.50	2.9	78.5	19130	19500
	400	61/2.85CP	23.70	2.0	1.8	3.15	3.2	87.0	23710	24170

NOTES : CR=circular stranded conductor
CP=circular compacted stranded conductor
Current Rating & Volt Drop refer to Table T2 on page 33
Model ESL-FR-600M is suitable for 90°C or up to 125°C operating temperature

TECHNICAL DATA

1. Circuit Integrity

Circuit integrity refers to the cable property that maintains function in the event of fire.

Test Standards: SS299-1 CWZ; BS 6387 CWZ; IEC 60331

During the test, the conductor is energized with load current, It shall maintain circuit integrity, no fuse shall be ruptured or no short circuit shall occur.

Test Standard	Duration	Subject to			Temperature	Category
		Fire	Water	Shock		
SS299-1, BS 6387	3 hr	✓			650°C	A
SS299-1, BS 6387 IEC 60331-21	3 hr	✓			750°C	B
SS299-1, BS 6387	3 hr	✓			950°C	C
SS299-1, BS 6387	20 min	✓			950°C	S
SS299-1, BS 6387	15min	✓	✓		650°C	W
SS299-1, BS 6387	15min	✓		✓	650°C	X
SS299-1, BS 6387	15min	✓		✓	750°C	Y
SS299-1, BS 6387 IEC 60331-31	15min	✓		✓	950°C	Z

Fire Resistant Test with Fire Alone

Fire Resistant Test with Water Spray

Fire Resistant Test with Mechanical Shock

2. Flame Retardance

Flame retardant refers to cable's properties that restrict the propagation of flame in the event of fire.

Vertical-mounted Single Wire Test

Test Standards: IEC 60332-1-2; BS EN 60332-1-2; EN 60332-1-2

The test piece is mounted vertically in the test chamber, fire source is applied according to the test method, the fire shall be self extinguished and the char shall not be greater than 425mm from the point of application of fire.

Vertically-mounted Bundled Wires & Cable Test

Test Standards: IEC 60332-3; BS EN 60332-3; EN 60332-3

The cables shall self-extinguish after removing the fire source. The fire shall not have propagated any further than 2.5 meter from the point of application of fire.

Test Standard	Nominal total volume of non-metallic of test sample (litre/meter)	Temperature	Category
IEC 60332-3-25; BS EN 60332-3-25; EN 60332-3-25	0.5	20 mins	D
IEC 60332-3-24; BS EN 60332-3-24; EN 60332-3-24	1.5	20 mins	C
IEC 60332-3-23; BS EN 60332-3-23; EN 60332-3-23	3.5	40 mins	B
IEC 60332-3-22; BS EN 60332-3-22; EN 60332-3-22	7.0	40 mins	A
IEC 60332-3-21; BS EN 60332-3-21; EN 60332-3-21	7.0	40 mins	A F/R

3. Halogen Free & Emission of Corrosive Gas

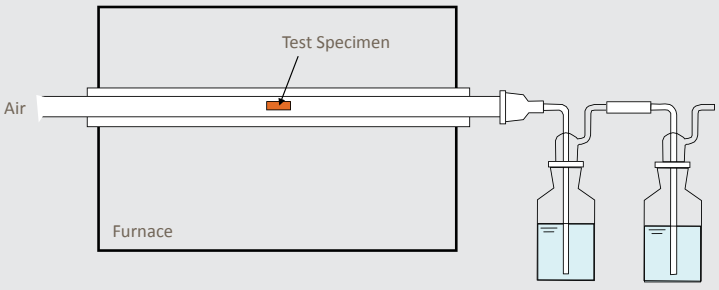
Halogen containing plastic material release substance like hydrogen chloride, a poisonous gas that form hydrochloride acid when it comes in contact with moisture. It causes fatality and hinder the operation of fire fighting. Furthermore, it damages expensive equipment. Halogen free material emits no halogen when exposed to fire.

Test Standards: IEC 60754-1; EN 50267-2-1

1g of insulation or sheath sample taken from cable construction is subject to the test, If the hydrochloric acid yield is less than 5 mg/g, the cable specimen is categorized as LSZH (Low Smoke Zero Halogen) or LSHF (Low Smoke Halogen Free).

Test Standards: IEC 60754-2; EN 50267-2-2

1g of insulation or sheath sample taken from cable construction is subject to the test, The resulting gases are guided by air blow-trough to scrubbers with distilled water. Take measurement of acidity (pH) and conductivity of the solution. The pH acidity of the solutions shall be less than 4.3 and the conductivity shall be not greater than 10 µS/mm.



Gas Washing Bottles

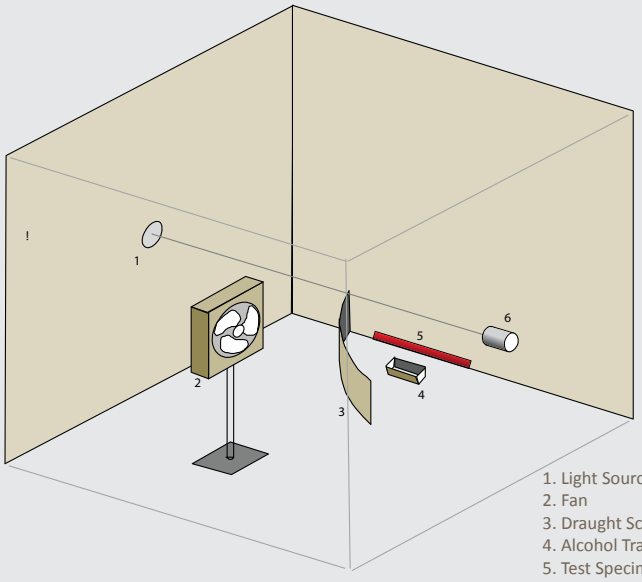
4. Smoke Emission

Some plastic materials emit dense smoke during combustion which affects visibility and causes difficulty in the evacuation.

Low smoke material emits very little smoke in the event of fire and ensures at least 60% of light transmission when tested in a 3 meter cube chamber.

Test Standards: IEC 61034-1&2; EN 61034 -1&2

The cable sections are burned in test chamber with light source on one side of the wall and the photometric measuring system in the opposite. Photometric measuring system takes the reading of the light transmission in the chamber. The result of measurement shall be not less than 60%.



1. Light Source
2. Fan
3. Draught Screen
4. Alcohol Tray
5. Test Specimen
6. Photocell

TABLE T1: 1-CORE CABLES HAVING XLPE or LSHF INSULATION, NON-ARMOURED, WITH or WITHOUT SHEATH (COPPER CONDUCTOR) 450/750V or 600/1000V

CURRENT-CARRYING CAPACITY (amp)

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.) Touching			Reference Method G (in free air) Spaced by one cable diameter	
	2 cables, single-phase a.c. or d.c.	3 or 4 cables, three-phase a.c.	2 cables, single-phase a.c. or d.c.	3 or 4 cables, three-phase a.c.	2 cables, single-phase a.c. or d.c. flat & touching	3 or 4 cables, single-phase a.c. flat & touching or trefoil	2 cables, single-phase a.c. or d.c. flat	3 or 4 cables, single-phase a.c. flat	3 or 4 cables, three-phase a.c. trefoil	2 cables, single-phase a.c. or d.c. or 3 cables, three-phase a.c. flat	
1 mm²	2 A	3 A	4 A	5 A	6 A	7 A	8 A	9 A	10 A	11 A	12 A
										Horizontal	Vertical
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 T1a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	2 Cables d.c.	2 Cables, single-phase a.c.									3 or 4 Cables, three-phase a.c.												
		Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C, F & G (clipped direct on trays or in free air)						Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C, F & G (clipped direct on trays or in free air)								
					Cable touching			Cable spaced*						Cable touching, Trefoil			Cable touching, flat			Cable spaced*, flat		
1 mm²	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		
1.5	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	
		r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z
25	1.850	1.850	0.310	1.900	1.850	0.190	1.850	1.850	0.280	1.850	1.600	0.270	1.650	1.600	0.165	1.600	1.600	0.190	1.600	1.600	0.270	1.650
35	1.350	1.350	0.290	1.350	1.350	0.180	1.350	1.350	0.270	1.350	1.150	0.250	1.150	1.150	0.155	1.150	1.150	0.180	1.150	1.150	0.260	1.200
50	0.990	1.000	0.290	1.050	0.990	0.180	1.000	0.990	0.270	1.000	0.870	0.250	0.900	0.860	0.155	0.870	0.860	0.180	0.870	0.860	0.260	0.890
70	0.680	0.700	0.280	0.750	0.680	0.175	0.710	0.680	0.260	0.730	0.600	0.240	0.650	0.590	0.150	0.610	0.590	0.175	0.620	0.590	0.250	0.650
95	0.490	0.510	0.270	0.580	0.490	0.170	0.520	0.490	0.260	0.560	0.440	0.230	0.500	0.430	0.145	0.450	0.430	0.170	0.460	0.430	0.250	0.490
120	0.390	0.410	0.260	0.480	0.390	0.165	0.430	0.390	0.250	0.470	0.350	0.230	0.420	0.340	0.140	0.370	0.340	0.165	0.380	0.340	0.240	0.420
150	0.320	0.330	0.260	0.430	0.320	0.165	0.360	0.320	0.250	0.410	0.290	0.230	0.370	0.280	0.140	0.310	0.280	0.165	0.320	0.280	0.240	0.370
185	0.250	0.270	0.260	0.370	0.260	0.165	0.300	0.250	0.250	0.360	0.230	0.230	0.320	0.220	0.140	0.260	0.220	0.165	0.280	0.220	0.240	0.330
240	0.190	0.210	0.260	0.330	0.200	0.160	0.250	0.195	0.250	0.310	0.185	0.220	0.290	0.170	0.140	0.220	0.170	0.165	0.240	0.170	0.240	0.290
300	0.155	0.175	0.250	0.310	0.160	0.160	0.220	0.155	0.250	0.290	0.150	0.220	0.270	0.140	0.140	0.195	0.135	0.160	0.210	0.135	0.240	0.270
400	0.120	0.140	0.250	0.290	0.130	0.155	0.200	0.125	0.240	0.270	0.125	0.220	0.250	0.110	0.135	0.175	0.110	0.160	0.195	0.110	0.240	0.260
500	0.093	0.120	0.250	0.280	0.105	0.155	0.185	0.098	0.240	0.260	0.100	0.220	0.240	0.090	0.135	0.160	0.088	0.160	0.180	0.085	0.240	0.250
630	0.072	0.100	0.250	0.270	0.086	0.155	0.175	0.078	0.240	0.250	0.088	0.210	0.230	0.074	0.135	0.150	0.071	0.160	0.170	0.068	0.230	0.240
800	0.056				0.072	0.150	0.170	0.064	0.240	0.250				0.062	0.130	0.145	0.059	0.155	0.165	0.055	0.230	0.240
1000	0.045				0.063	0.150	0.165	0.054	0.240	0.240				0.055	0.130	0.140	0.050	0.155	0.165	0.047	0.230	0.240

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance
* Spacings larger than one cable diameter will result in a larger voltage drop.

TABLE T2: MULTI-CORE CABLES HAVING XLPE or LSHF INSULATION, NON-ARMOURED, (COPPER CONDUCTOR) 300/500V or 600/1000V

CURRENT-CARRYING CAPACITY (amp)

Ambient Temperature: 30°C
Conductor Operating Temperature: 90°C

Conductor cross-sectional area	Reference Method A (enclosed in conduit and in insulated wall etc.)		Reference Method B (enclosed in conduit on a wall or ceiling, or in trunking)		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 a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable*, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable*, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable*, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.
1	2	3	4	5	6	7	8	9
mm²	A	A	A	A	A	A	A	A
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

*with or without a protective conductor

Table T2a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	Two-core Cable, d.c.	Two-core Cable, single-phase, a.c.			Three or Four-core Cable, three-phase a.c.		
1	2	3			4		
mm²	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	1.850	1.850	0.160	1.900	1.600	0.140	1.650
35	1.350	1.350	0.155	1.350	1.150	0.135	1.150
50	0.980	0.990	0.155	1.000	0.860	0.135	0.870
70	0.670	0.670	0.150	0.690	0.590	0.130	0.600
95	0.490	0.500	0.150	0.520	0.430	0.130	0.450
120	0.390	0.400	0.145	0.420	0.340	0.130	0.370
150	0.310	0.320	0.145	0.350	0.280	0.125	0.300
185	0.250	0.260	0.145	0.290	0.220	0.125	0.260
240	0.195	0.200	0.140	0.240	0.175	0.125	0.210
300	0.155	0.160	0.140	0.210	0.140	0.120	0.185
400	0.120	0.130	0.140	0.190	0.115	0.120	0.165

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance

TABLE T3: 1-CORE CABLES HAVING XLPE or LSHF INSULATION, ARMOURED, (COPPER CONDUCTOR) 600/1000V

CURRENT-CARRYING CAPACITY (amp)

Ambient Temperature: 30°C
Ground Temperature 15 °C
Depth of Laying 0.5m
Ground Thermal Resistivity 1.2 K.m/W
Conductor Operating Temperature: 90°C

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method F (in free air or on perforated cable tray, horizontal or vertical)										Laid Direct in Ground	
	Touching		Touching			Spaced by one cable diameter							Touching	
	2 cables, single-phase a.c. or d.c. flat	3 or 4 cables, three-phase a.c. flat	2 cables, single-phase a.c. or d.c. flat	3 cables three-phase a.c. flat	3 cables three-phase a.c. trefoil	2 cables, d.c.		2 cables, single phase a.c.		3 or 4 cables, three-phase a.c.		2 cables, 1 phase ac or dc	3 cables, 3 phase ac, trefoil
						Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
mm²	A	A	A	A	A	A	A	A	A	A	A	A	A
50	237	220	253	232	222	284	270	282	266	288	266	274	231
70	303	277	322	293	285	356	349	357	337	358	331	337	284
95	367	333	389	352	346	446	426	436	412	425	393	403	340
120	425	383	449	405	402	519	497	504	477	485	449	458	386
150	488	437	516	462	463	600	575	566	539	549	510	510	431
185	557	496	587	524	529	688	660	643	614	618	574	574	485
240	656	579	689	612	625	815	782	749	714	715	666	661	558
300	755	662	792	700	720	943	906	842	805	810	755	739	623
400	853	717	899	767	815	1137	1094	929	889	848	797	820	691
500	962	791	1016	851	918	1314	1266	1032	989	923	871	910	765
630	1082	861	1146	935	1027	1528	1474	1139	1092	992	940	1001	841
800	1170	904	1246	987	1119	1809	1744	1204	1155	1042	978	1055	888
1000	1261	961	1345	1055	1214	2100	2026	1289	1238	1110	1041	1115	942

Table T3a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	2 Cables d.c.	Reference method C & F (clipped direct, on tray or in free air)															Laid Direct in Ground	
		2 Cables, single-phase a.c.						3 or 4 cables, three-phase a.c.									Single-core	
		Touching			Spaced*			Trefoil and touching			Flat and touching			Flat and spaced*			Trefoil, three-phase a.c.	Flat, three-phase a.c.
1	2	3			4			5			6			7			8	9
mm²	mV/A/m	mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m	mV/A/m
		r	x	z	r	x	z	r	x	z	r	x	z	r	x	z		
50	0.980	0.990	0.210	1.000	0.980	0.290	1.000	0.860	0.180	0.870	0.840	0.250	0.880	0.840	0.330	0.900	0.870	0.900
70	0.670	0.680	0.200	0.710	0.690	0.290	0.750	0.590	0.170	0.620	0.600	0.250	0.650	0.620	0.320	0.700	0.620	0.700
95	0.490	0.510	0.195	0.550	0.530	0.280	0.600	0.440	0.170	0.470	0.460	0.240	0.520	0.490	0.310	0.580	0.470	0.580
120	0.390	0.410	0.190	0.450	0.430	0.270	0.510	0.350	0.165	0.390	0.380	0.240	0.440	0.410	0.300	0.510	0.390	0.510
150	0.310	0.330	0.185	0.380	0.360	0.270	0.450	0.290	0.160	0.330	0.310	0.230	0.390	0.340	0.290	0.450	0.330	0.450
185	0.250	0.270	0.185	0.330	0.300	0.260	0.400	0.230	0.160	0.280	0.260	0.230	0.340	0.290	0.290	0.410	0.280	0.410
240	0.195	0.210	0.180	0.280	0.240	0.260	0.350	0.180	0.155	0.240	0.210	0.220	0.300	0.240	0.280	0.370	0.240	0.370
300	0.155	0.170	0.175	0.250	0.195	0.250	0.320	0.145	0.150	0.210	0.170	0.220	0.280	0.200	0.270	0.340	0.210	0.340
400	0.115	0.145	0.170	0.220	0.180	0.240	0.300	0.125	0.150	0.195	0.160	0.210	0.270	0.200	0.270	0.330	0.195	0.330
500	0.093	0.125	0.170	0.210	0.165	0.240	0.290	0.105	0.145	0.180	0.145	0.200	0.250	0.190	0.240	0.310	0.180	0.310
630	0.073	0.105	0.165	0.195	0.150	0.230	0.270	0.092	0.145	0.170	0.135	0.195	0.240	0.175	0.230	0.290	0.170	0.290
800	0.056	0.090	0.160	0.190	0.145	0.230	0.270	0.086	0.140	0.165	0.130	0.180	0.230	0.175	0.195	0.260	0.165	0.260
1000	0.045	0.092	0.155	0.180	0.140	0.210	0.250	0.080	0.135	0.155	0.125	0.170	0.210	0.165	0.180	0.240	0.155	0.240

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance
* Spacings larger than one cable diameter will result in a larger voltage drop.

TABLE T4: MULTI-CORE CABLES HAVING XLPE or LSHF INSULATION, ARMOURED, (COPPER CONDUCTOR) 600/1000V

CURRENT-CARRYING CAPACITY (amp)

Ambient Temperature: 30°C
Ground Temperature 15 °C
Depth of Laying 0.5m
Ground Thermal Resistivity 1.2 K.m/W
Conductor Operating Temperature: 90°C

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method E (on perforated cable tray) or Method 13 (in free air)		Reference Method D (Laid direct in ground)	
	1 two-core cable, single-phase a.c. or d.c.	1 three or 1 four-core cable three-phase a.c.	1 two-core cable, single-phase a.c. or d.c.	1 three or 1 four-core cable three-phase a.c.	1 two-core cable, single-phase a.c. or d.c.	1 three or 1 four-core cable, three-phase a.c.
1	2	3	4	5	6	7
mm²	A	A	A	A	A	A
1.5	27	23	29	25	38	32
2.5	36	31	39	33	49	42
4	49	42	52	44	65	55
6	62	53	66	56	81	69
10	85	73	90	78	109	92
16	110	94	115	99	141	119
25	146	124	152	131	183	152
35	180	154	188	162	219	182
50	219	187	228	197	259	217
70	279	238	291	251	317	266
95	338	289	354	304	381	319
120	392	335	410	353	433	363
150	451	386	472	406	485	406
185	515	441	539	463	547	458
240	607	520	636	546	632	529
300	698	599	732	628	708	592
400	787	673	847	728	799	667

Table T4a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	Two-core Cable, d.c.	Two-core Cable, single-phase, a.c.			Three or Four-core Cable, three-phase a.c.		
1	2	3			4		
mm²	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	1.850	1.850	0.160	1.900	1.600	0.140	1.650
35	1.350	1.350	0.155	1.350	1.150	0.135	1.150
50	0.980	0.990	0.155	1.000	0.860	0.135	0.870
70	0.670	0.670	0.150	0.690	0.590	0.130	0.600
95	0.490	0.500	0.150	0.520	0.430	0.130	0.450
120	0.390	0.400	0.145	0.420	0.340	0.130	0.370
150	0.310	0.320	0.145	0.350	0.280	0.125	0.300
185	0.250	0.260	0.145	0.290	0.220	0.125	0.260
240	0.195	0.200	0.140	0.240	0.175	0.125	0.210
300	0.155	0.160	0.140	0.210	0.140	0.120	0.185
400	0.120	0.130	0.140	0.190	0.115	0.120	0.165

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance

TABLE T5: SINGLE-CORE PVC INSULATED CABLES, NON-ARMOURED, WITH or WITHOUT SHEATH (COPPER CONDUCTOR) 450/750V or 600/1000V

Ambient Temperature: 30°C
Conductor Operating Temperature: 70°C

CURRENT-CARRYING CAPACITY (amp)

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 perforated cable tray, horizontal or vertical)				
							Touching			Spaced by one diameter	
	2 cables, single-phase a.c. or d.c.	3 or 4 cables, three-phase a.c.	2 cables, single-phase a.c. or d.c.	3 or 4 cables, three-phase a.c.	2 cables single-phase a.c. or d.c. flat & touching	3 or 4 cables, three-phase a.c. flat & touching or trefoil	2 cables, single-phase a.c. or d.c. flat	3 cables, three-phase a.c. flat	3 cables, three-phase a.c. trefoil	2 cables, single-phase a.c. or d.c. or 3 cables three-phase a.c. flat	
										Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12
mm²	A	A	A	A	A	A	A	A	A	A	A
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

Table T5a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	2 Cables d.c.	2 Cables, single-phase a.c.						3 or 4 Cables, three-phase a.c.													
		Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C & F (clipped direct on trays or in free air)			Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C & F (clipped direct on trays or in free air)										
					Cable touching			Cable spaced*						Cable touching, Trefoil			Cable touching, flat			Cable spaced*, flat		
1	2	3			4			5			6			7			8			9		
mm²	mV/A/m	mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m		
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		
		r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z
25	1.750	1.800	0.33	1.80	1.750	0.200	1.750	1.750	0.29	1.80	1.50	0.29	1.55	1.500	0.175	1.50	1.500	0.25	1.550	1.500	0.32	1.55
35	1.250	1.300	0.31	1.30	1.250	0.195	1.250	1.250	0.28	1.30	1.10	0.27	1.10	1.100	0.170	1.10	1.100	0.24	1.100	1.100	0.32	1.15
50	0.930	0.950	0.30	1.00	0.930	0.190	0.950	0.930	0.28	0.97	0.81	0.26	0.85	0.800	0.165	0.82	0.800	0.24	0.840	0.800	0.32	0.86
70	0.630	0.650	0.29	0.72	0.630	0.185	0.660	0.630	0.27	0.69	0.56	0.25	0.61	0.550	0.160	0.57	0.550	0.24	0.600	0.550	0.31	0.63
95	0.460	0.490	0.28	0.56	0.470	0.180	0.500	0.470	0.27	0.54	0.42	0.24	0.48	0.410	0.155	0.43	0.410	0.23	0.470	0.400	0.31	0.51
120	0.360	0.390	0.27	0.47	0.370	0.175	0.410	0.370	0.26	0.45	0.33	0.23	0.41	0.320	0.150	0.36	0.320	0.23	0.400	0.320	0.30	0.44
150	0.290	0.310	0.27	0.41	0.300	0.175	0.340	0.290	0.26	0.39	0.27	0.23	0.36	0.260	0.150	0.30	0.260	0.23	0.340	0.260	0.30	0.40
185	0.230	0.250	0.27	0.37	0.240	0.170	0.290	0.240	0.26	0.35	0.22	0.23	0.32	0.210	0.145	0.26	0.210	0.22	0.310	0.210	0.30	0.36
240	0.180	0.195	0.26	0.33	0.185	0.165	0.250	0.185	0.25	0.31	0.17	0.23	0.29	0.160	0.145	0.22	0.160	0.22	0.270	0.160	0.29	0.34
300	0.145	0.160	0.26	0.31	0.150	0.165	0.220	0.150	0.25	0.29	0.14	0.23	0.27	0.130	0.140	0.19	0.130	0.22	0.250	0.130	0.29	0.32
400	0.105	0.130	0.26	0.29	0.120	0.160	0.200	0.115	0.25	0.27	0.12	0.22	0.25	0.105	0.140	0.18	0.105	0.21	0.240	0.100	0.29	0.31
500	0.086	0.110	0.26	0.28	0.098	0.155	0.185	0.093	0.24	0.26	0.10	0.22	0.25	0.086	0.135	0.16	0.086	0.21	0.230	0.081	0.29	0.30
630	0.068	0.094	0.25	0.27	0.081	0.155	0.175	0.076	0.24	0.25	0.08	0.22	0.24	0.072	0.135	0.15	0.072	0.21	0.220	0.066	0.28	0.29
800	0.053				0.068	0.150	0.165	0.061	0.24	0.25				0.060	0.130	0.15	0.060	0.21	0.220	0.053	0.28	0.29
1000	0.042				0.059	0.150	0.160	0.050	0.24	0.24				0.052	0.130	0.14	0.052	0.20	0.210	0.044	0.28	0.28

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance
* Spacings larger than one cable diameter will result in a larger voltage drop.

TABLE T6: MULTI-CORE PVC INSULATED CABLES, NON-ARMOURED, (COPPER CONDUCTOR) 600/1000V

Ambient Temperature: 30°C
Conductor Operating Temperature: 70°C

CURRENT-CARRYING CAPACITY (amp)

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 a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable*, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable*, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable*, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.
1	2	3	4	5	6	7	8	9
mm²	A	A	A	A	A	A	A	A
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

*with or without a protective conductor

Table T6a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	Two-core Cable, d.c.	Two-core cable, single-phase a.c.			Three or four-core Cable, three-phase a.c.		
1	2	3			4		
mm2	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	1.750	1.750	0.170	1.75	1.50	0.145	1.50
35	1.250	1.250	0.165	1.25	1.10	0.145	1.10
50	0.930	0.930	0.165	0.94	0.80	0.140	0.81
70	0.630	0.630	0.160	0.65	0.55	0.140	0.57
95	0.460	0.470	0.155	0.50	0.41	0.135	0.43
120	0.360	0.380	0.155	0.41	0.33	0.135	0.35
150	0.290	0.300	0.155	0.34	0.26	0.130	0.29
185	0.230	0.250	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

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance

TABLE T7: 600/1000V 1C PVC/AWA/PVC ARMOURED CABLE (COPPER)

CURRENT-CARRYING CAPACITY (amp)

Ambient Temperature: 30°C
Ground Temperature 15 °C
Depth of Laying 0.5m
Ground Thermal Resistivity 1.2 K.m/W
Conductor Operating Temperature: 70°C

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference Method F (in free air or on perforated cable tray, horizontal or vertical)										Laid Direct in Ground	
	Touching		Touching			Spaced by one cable diameter							Touching	
	2 cables, single-phase a.c. or d.c. flat	3 or 4 cables, three-phase a.c. flat	2 cables, single-phase a.c. or d.c. flat	3 cables three-phase a.c. flat	3 cables three-phase a.c. trefoil	2 cables, d.c.		2 cables, single phase a.c.		3 or 4 cables, three-phase a.c.		2 cables, 1 phase ac or dc	3 cables, 3 phase ac, trefoil
						Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical		
1	2	3	4	5	6	7	8	9	10	11	12	13	14
mm²	A	A	A	A	A	A	A	A	A	A	A	A	A
50	193	179	205	189	181	229	216	229	217	230	212	238	203
70	245	225	259	238	231	294	279	287	272	286	263	292	248
95	296	289	313	285	280	357	340	349	332	338	313	349	297
120	342	309	360	327	324	415	396	401	383	385	357	396	337
150	393	352	413	373	373	479	458	449	429	436	405	443	376
185	447	399	469	422	425	548	525	511	489	490	456	497	423
240	525	465	550	492	501	648	622	593	568	566	528	571	485
300	594	515	624	547	567	748	719	668	640	616	578	640	542
400	687	575	723	618	657	885	851	737	707	674	632	708	600
500	763	622	805	673	731	1035	997	810	777	721	676	780	660
630	843	669	891	728	809	1218	1174	893	856	771	723	856	721
800	919	710	976	777	886	1441	1390	943	905	824	772	895	756
1000	975	737	1041	808	945	1685	1627	1008	967	872	816	939	797

Table T7a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	2 Cables d.c.	Reference method C & F (clipped direct, on tray or in free air)															Laid Direct in Ground	
		2 Cables, single-phase a.c.						3 or 4 cables, three-phase a.c.									Single-core	
		Touching			Spaced*			Trefoil and touching			Flat and touching			Flat and spaced*			Trefoil, three-phase a.c.	Flat, three-phase a.c.
1	2	3			4			5			6			7			8	9
mm²	mV/A/m	mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m	mV/A/m
		r	x	z	r	x	z	r	x	z	r	x	z	r	x	z		
50	0.930	0.930	0.220	0.950	0.920	0.300	0.970	0.800	0.190	0.820	0.790	0.260	0.840	0.790	0.340	0.860	0.820	0.860
70	0.630	0.640	0.210	0.680	0.660	0.290	0.720	0.560	0.180	0.580	0.570	0.250	0.620	0.590	0.320	0.680	0.580	0.680
95	0.460	0.480	0.200	0.520	0.510	0.280	0.580	0.420	0.175	0.450	0.440	0.250	0.500	0.470	0.310	0.570	0.450	0.570
120	0.360	0.390	0.195	0.430	0.420	0.280	0.500	0.330	0.170	0.370	0.360	0.240	0.430	0.400	0.300	0.500	0.370	0.500
150	0.290	0.310	0.190	0.370	0.340	0.270	0.440	0.270	0.165	0.320	0.300	0.240	0.380	0.340	0.300	0.450	0.320	0.450
185	0.230	0.260	0.190	0.320	0.290	0.270	0.390	0.220	0.160	0.270	0.250	0.230	0.340	0.290	0.290	0.410	0.270	0.410
240	0.180	0.200	0.180	0.270	0.230	0.260	0.350	0.175	0.160	0.230	0.200	0.230	0.300	0.240	0.280	0.370	0.230	0.370
300	0.145	0.160	0.180	0.240	0.190	0.260	0.320	0.140	0.155	0.210	0.165	0.220	0.280	0.200	0.280	0.340	0.210	0.340
400	0.105	0.140	0.175	0.220	0.180	0.240	0.300	0.120	0.130	0.195	0.160	0.210	0.280	0.210	0.250	0.320	0.195	0.320
500	0.086	0.120	0.170	0.210	0.165	0.230	0.290	0.105	0.145	0.180	0.145	0.200	0.250	0.190	0.240	0.300	0.180	0.300
630	0.068	0.105	0.165	0.195	0.150	0.220	0.270	0.091	0.145	0.170	0.135	0.195	0.230	0.175	0.220	0.280	0.170	0.280
800	0.053	0.095	0.160	0.185	0.145	0.210	0.250	0.082	0.140	0.160	0.125	0.180	0.220	0.170	0.195	0.260	0.160	-
1000	0.042	0.091	0.155	0.180	0.140	0.190	0.240	0.079	0.135	0.155	0.125	0.165	0.210	0.165	0.170	0.240	0.155	-

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance
* Spacings larger than one cable diameter will result in a larger voltage drop.

TABLE T8: 600/1000V MULTI-CORE PVC/SWA/PVC, ARMOURED CABLE (COPPER)

CURRENT-CARRYING CAPACITY (amp)

Ambient Temperature: 30°C
Ground Temperature 15 °C
Depth of Laying 0.5m
Ground Thermal Resistivity 1.2 K.m/W
Conductor Operating Temperature: 70°C

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 (in single-way duct)		Reference Method D (Laid direct in ground)	
	1 two-core cable, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.	1 two-core cable, single-phase a.c. or d.c.	1 three or four-core cable three-phase a.c.
1	2	3	4	5	6	7	8	9
mm²	A	A	A	A	A	A	A	A
1.5	21	18	22	19	26	22	32	27
2.5	28	25	31	26	34	29	41	35
4	38	33	41	35	45	38	55	47
6	49	42	53	45	57	48	69	59
10	67	58	72	62	76	64	92	78
16	89	77	97	83	98	83	119	101
25	118	102	128	110	129	107	158	132
35	145	125	157	135	154	129	190	159
50	175	151	190	163	183	153	225	188
70	222	192	241	207	225	190	277	233
95	269	231	291	251	271	228	332	279
120	310	267	336	290	309	260	377	317
150	356	306	386	332	346	292	422	355
185	405	348	439	378	393	331	478	401
240	476	409	516	445	455	382	551	462
300	547	469	592	510	510	428	616	517
400	621	540	683	590	574	490	693	580

Table T8a

VOLTAGE DROP (PER amp PER METER)

Conductor cross-sectional area	Two-core Cable, d.c.	Two-core cable, single-phase a.c.			Three or four-core Cable, three-phase a.c.		
1	2	3			4		
mm2	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	1.750	1.750	0.170	1.75	1.500	0.145	1.500
35	1.250	1.250	0.165	1.25	1.100	0.145	1.100
50	0.930	0.930	0.165	0.94	0.800	0.140	0.810
70	0.630	0.630	0.160	0.65	0.550	0.140	0.570
95	0.460	0.470	0.155	0.50	0.410	0.135	0.430
120	0.360	0.380	0.155	0.41	0.330	0.135	0.350
150	0.290	0.300	0.155	0.34	0.260	0.130	0.290
185	0.230	0.250	0.150	0.29	0.210	0.130	0.250
240	0.180	0.190	0.150	0.24	0.165	0.130	0.210
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

NOTES: r = conductor resistance at operating temperature,
z = impedance, x = reactance

TABLE T9A: RATING FACTORS(Ca) FOR AMBIENT AIR TEMPERATURES OTHER THAN 30°C

AMBIENT TEMPERATURE (°C)			15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
IN AIR	PVC	70°C			1.03	1.00	0.94	0.87	0.79	0.71	0.61	0.50					
	XLPE or LSHF	90°C			1.02	1.00	0.96	0.91	0.87	0.82	0.76	0.71	0.65	0.58	0.50	0.41	

TABLE T10A: RATING FACTORS(Ca) FOR PVC IN AMBIENT GROUND TEMPERATURES OTHER THAN 15°C

AMBIENT GROUND TEMPERATURE (°C)		10	15	20	25	30	35	40	45	50
PVC	IN GROUND OR IN DUCTS	1.04	1.00	0.95	0.90	0.85	0.80	0.74	0.67	0.60

TABLE T10B:RATING FACTORS(Ca) FOR XLPE IN AMBIENT GROUND TEMPERATURES OTHER THAN 15°C

AMBIENT GROUND TEMPERATURE (°C)		10	15	20	25	30	35	40
XLPE	IN GROUND OR IN DUCTS	1.03	1.00	0.97	0.93	0.89	0.86	0.82

TABLE T11: RATING FACTORS FOR DEPTHS OF LAYING OTHER THAN 0.5M FOR DIRECT BURRIED CABLES AND CABLES IN SINGLE-WAY DUCTS

Depth of Laying, Metre	Direct In Ground			In Single-Way Ducts	
	Up to 50 mm²	70mm² to 300mm²	Above 300mm²	Single-Core	Multi-Core
0.50	1.00	1.00	1.00	1.00	1.00
0.60	0.99	0.98	0.97	0.98	0.99
0.80	0.97	0.96	0.94	0.95	0.98
1.00	0.95	0.93	0.92	0.93	0.96
1.25	0.94	0.92	0.89	0.91	0.95
1.50	0.93	0.90	0.87	0.89	0.94
2.00	0.91	0.88	0.85	0.87	0.93
2.50	0.90	0.87	0.84	0.86	0.92
3.0 or more	0.89	0.85	0.82	0.85	0.91

TABLE T12: 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

NOTE 1: The current-carrying capacity for a cable in the size range 1.5 to 4 mm^2, having more than 4 loaded cores, is obtained by multiplying the current-carrying capacity of a 2-core, having the same insulation type, by the factor selected from this table. The current-carrying capacity for the 2-core cable is that for the installation condition to be used for the multicore cable.

NOTE 2: If, due to known operating conditions, a core is expected to carry not more than 30% of its current-carrying capacity in the multicore cable it may be ignored for the purpose of determining the number of cores in the cable.

NOTE 3: If, due to known operating conditions, a core is expected to carry not more than 30% of its rating after applying the rating factor for the total number of current-carrying cores, it may be ignored for the purpose of obtaining the rating factor for the number of loaded cores. For example, the current-carrying capacity of a cable having N loaded cores would normally be obtained by multiplying the current-carrying capacity of a 2-core, having the same insulation type, by the factor selected from this table for N cores. That is $I_{zlc} = I_{t2c} \times C_{gN}$ where:

I_{zlc} is the current-carrying capacity of the multicore cable after applying the rating factor for the total number of current-carrying cores.

I_{t2c} is the tabulated current-carrying capacity of a 2-core cable, having the same insulation type as the multi-core cable

C_{gN} is the rating factor from Table T12 for the total number of current-carrying cores

However, if M cores in the cable carry loads which are not greater than $0.3 \times I_{t2c} \times C_{gN}$, the current-carrying capacity can be obtained by using the rating factor corresponding to (N-M) cores.

The "not greater than $0.3 \times I_{t2c} \times C_{gN}$" calculation should be applied before the adjacent muticore cable grouping factor, if applicable, from Table T13. The 30% rule should not be further applied to any adjacent cable grouping factor calculations.

I_{zlc} should be greater than or equal to I_n or I_b as appropriate, divided by the relevant rating factor(s) C, that is $I_{zlc} \geq I_n$ or I_b/C

TABLE T13: 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 T1 TO T8

Item	Arrangement (cables touching)	Number of circuits of multi-core cables												To be used with current-carrying capacities
		1	2	3	4	5	6	7	8	9	12	16	20	Reference Method
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 multi-core 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 multi-core 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	E

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

NOTE 2: Where horizontal clearances between adjacent cables exceed twice their overall diameter, no rating factor need be applied.

NOTE 3: The same factors are applied to:
- group of two or three single-core cables;
- multicore cables

NOTE 4: If a group consists of both two- and three-core cables, the total number of cables is taken as the number of circuits, and the corresponding factor is applied to the tables for two loaded conductors for the two-core cables, and to the Tables for three loaded conductors for the three-core cables.

NOTE 5: If a group consists of *n* single-core cables it may either be considered as *n*/2 circuits of two loaded conductors or *n*/3 circuits of three loaded conductors.

NOTE 6: The rating factors given have been averaged over the range of conductor sizes and types of installation included in Tables T1 to T8 and the overall accuracy of tabulated values is within 5%.

NOTE 7: For some installations and for other methods not provided for in the above tables, it may be appropriate to use factors calculated for specific cases, see for examples Tables T16 and T17

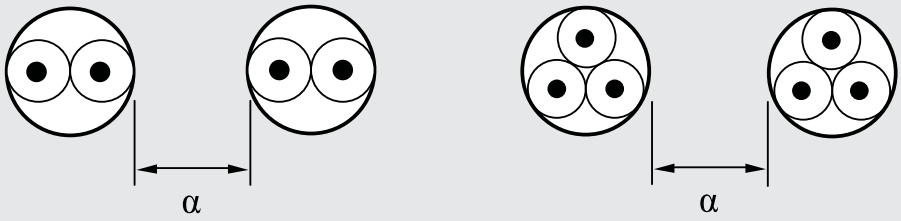
NOTE 8: Where cables having differing conductor operating temperature are grouped together, the current rating is to be based upon the lowest operating temperature of any cable in the group.

NOTE 9: If, due to known operating conditions, a cable is expected to carry not more than 30% of its *grouped* rating, it may be ignored for the purpose of obtaining the rating factor for the rest of the group. For example, a group of N loaded cables would normally require a group rating factor of C_g applied to the tabulated I_t. However, if M cables in the group carry loads which are not greater than 0.3 $C_g I_t$ amperes the other cables can be sized by using the group rating factor corresponding to (N-M) cables.

TABLE T14: RATING FACTORS FOR MORE THAN ONE CIRCUIT, CABLES BURIED DIRECTLY IN THE GROUND - REFERENCES METHOD D IN TABLES T1 TO T8 MULTICORE CABLES

Number of circuits	Cable-to-cable clearance(α)				
	Nil(cables touching)	One cable diameter	0.125m	0.25m	0.50m
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



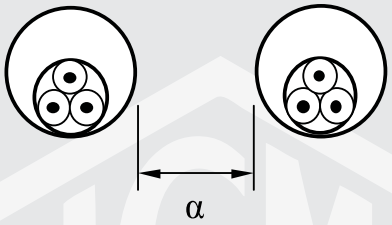
NOTE 1: Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 1.2 K.m/W.
These are average values for the range of cable sizes and types quoted for Table T1 to T8. The process of averaging, together with rounding off, can result in some cases in errors of up to ±10%. (Where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287)

NOTE 2: Where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287)

TABLE T15: RATING FACTORS FOR MORE THAN ONE CIRCUIT, CABLES IN DUCTS BURIED IN THE GROUND - REFERENCES METHOD D IN TABLES T1 TO T8 (MULTICORE CABLES IN SINGLE-WAY DUCTS)

Number of cables	Cable-to-cable clearance(α)			
	Nil(ducts touching)	0.25m	0.50m	1.0m
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

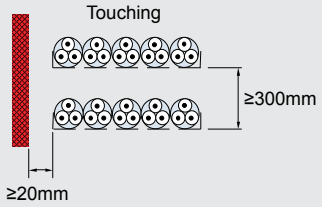
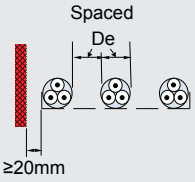
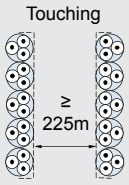
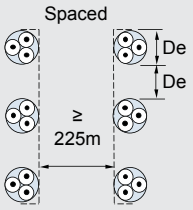
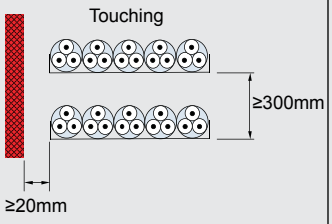
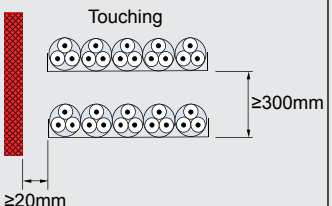
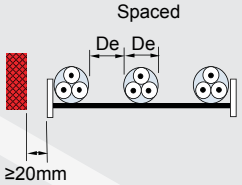
Multicore cables



NOTE 1: Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 1.2 K.m/W.
These are average values for the range of cable sizes and types quoted for Table T1 to T8. The process of averaging, together with rounding off, can result in some cases in errors of up to ±10%. (Where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287).

NOTE 2: Where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287)

TABLE T16: 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 T1 TO T8

Installation Method in Table T19			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 T13					
			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	-
			3	1.00	0.98	0.95	0.91	0.85	-
Vertical perforated cable tray systems(Note 4)	31		1	See item 3 of Table T13					
			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
			4	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 TC1					
			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
			4	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	-

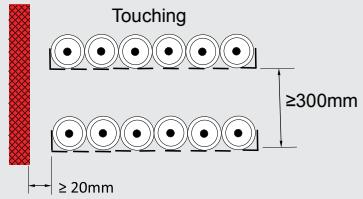
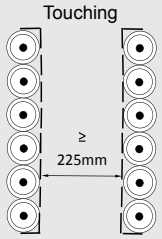
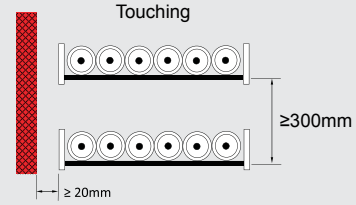
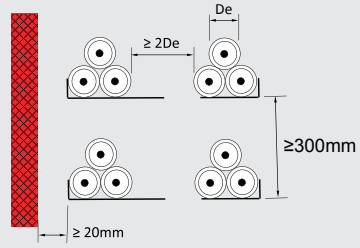
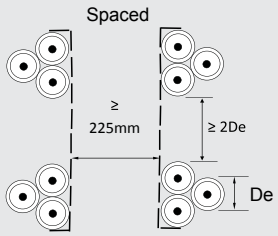
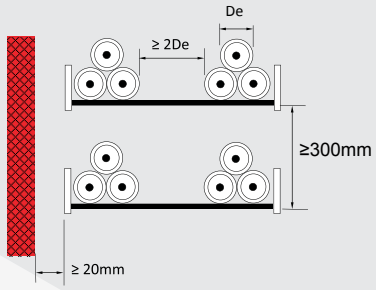
NOTE 1: Values given are averages for the cable types and range of conductor sizes considered in Tables T1 to T8. The spread of values is genarally less than 5%.

NOTE 2: Factors apply to single layer groups of cables as shown above and do not apply when cables are installed in more than one layer touching each other. Values for such installations may be signigicantly lower and must be determined by an appropriate method.

NOTE 3: Values are given for vertical spacing between cable trays of 300mm and at least 20mm between cable trays and wall. For closer spacing the factors should be reduced.

NOTE 4: Values are given for horizontal spacing between cable trays of 225mm with cable trays mounted back to back. For closer spacing the factors should be reduced.

TABLE T17: RATING FACTORS FOR GROUPS OF ONE OR MORE CIRCUITS OF SINGLE-CORE CABLES TO BE APPLIED TO REFERENCE CURRENT-CARRYING CAPACITIES FOR ONE CIRCUIT OF SINGLE-CORE CABLES IN FREE AIR - REFERENCE METHOD F IN TABLES T1 TO T8

Installation Method in Table T19			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 2 3	0.98 0.96 0.95	0.91 0.87 0.85	0.87 0.81 0.78	Three cables in horizontal formation
Vertical perforated cable tray systems (Note 4)	31		1 2	0.96 0.95	0.86 0.84	- -	Three cables in vertical formation
Cable, ladder systems, cleats, wire mesh tray, etc. (Note 3)	32 33 34		1 2 3	1.00 0.98 0.97	0.97 0.93 0.90	0.96 0.89 0.86	Three cables in horizontal formation
Perforated cable tray systems (Note 3)	31		1 2 3	1.00 0.97 0.96	0.98 0.93 0.92	0.96 0.89 0.86	Three cables in trefoil formation
Vertical perforated cable tray systems (Note 4)	31		1 2	1.00 1.00	0.91 0.90	0.89 0.86	
Cable ladder systems, cleats wire mesh tray, etc. (Note 3)	32 33 34		1 2 3	1.00 0.97 0.96	1.00 0.95 0.94	1.00 0.93 0.90	

NOTE 1: Values given are averages for the cable types and range of conductor sizes considered in Tables T1 to T8. The spread of values is genarally less than 5%.

NOTE 2: Factors apply to single layer groups of cables(or trefoil groups) as shown above and do not apply when cables are installed in more than one layer touching each other.Values for such installations may be signigicantly lower and must be determined by an appropriate method.

NOTE 3: Values are given for vertical spacing between cable trays of 300mm and at least 20mm between cable trays and wall. For closer spacing the factors should be reduced.

NOTE 4: Values are given for horizontal spacing between cable trays of 225mm with cable trays mounted back to back. For closer spacing the factors should be reduced.

NOTE 5: For circuits having more than one cable in parallel per phase,each three-phase set of conductors is to be considered as a circuit for the purpose of this table.

TABLE T18: RATING FACTORS FOR CABLES ENCLOSED IN INFLOOR CONCRETE TROUGHS (INSTALLATION METHODS 118 TO 120 OF TABLE T19)

The rating factors tabulated below relate to the disposition of cables illustrated in items 118 to 120 of Table T19 and are applicable to the current-carrying capacities for Reference Methods E and F as given in the relevant tables of this appendix.

Conductor cross-sectional area	Rating Factor									
	Installation method 118				Installation method 119			Installation method 120		
	2 single-core cables, or 1 three-or-four-core cable	3 single-core cables, or 2 two-core cables	4 single-core cables, or 2 three-or-four-core cables	6 single-core cables, 4 two-core cables, or 3 three-or-four-core cables	6 single-core cables, 4 two-core cables, or 3 three-or-four-core cables	8 single-core cables, or 4 three-or-four-core cables	12 single-core cables, 8 two-core cables, or 6 three-or-four-core cacbles	12 single-core cables, 8 two-core cables, or 6 three-or-four-core cables	18 single-core cables, 12 two-core cables, or 9 three-or-four-core cables	24 single-core cables, 16 two-core cables, or 12 three-or-four-core cables
1	2	3	4	5	6	7	8	9	10	11
(mm^2)										
4	0.93	0.90	0.87	0.82	0.86	0.83	0.76	0.81	0.74	0.69
6	0.92	0.89	0.86	0.81	0.86	0.82	0.75	0.80	0.73	0.68
10	0.91	0.88	0.85	0.80	0.85	0.80	0.74	0.78	0.72	0.66
16	0.91	0.87	0.84	0.78	0.83	0.78	0.71	0.76	0.70	0.64
25	0.90	0.86	0.82	0.76	0.81	0.76	0.69	0.74	0.67	0.62
35	0.89	0.85	0.81	0.75	0.80	0.74	0.68	0.72	0.66	0.60
50	0.88	0.84	0.79	0.74	0.78	0.73	0.66	0.71	0.64	0.59
70	0.87	0.82	0.78	0.72	0.77	0.72	0.64	0.70	0.62	0.57
95	0.86	0.81	0.76	0.70	0.75	0.70	0.63	0.68	0.60	0.55
120	0.85	0.80	0.75	0.69	0.73	0.68	0.61	0.66	0.58	0.53
150	0.84	0.78	0.74	0.67	0.72	0.67	0.59	0.64	0.57	0.51
185	0.83	0.77	0.73	0.65	0.70	0.65	0.58	0.63	0.55	0.49
240	0.82	0.76	0.71	0.63	0.69	0.63	0.56	0.61	0.53	0.48
300	0.81	0.74	0.69	0.62	0.68	0.62	0.54	0.59	0.52	0.46
400	0.80	0.73	0.67	0.59	0.66	0.60	0.52	0.57	0.50	0.44
500	0.78	0.72	0.66	0.58	0.64	0.58	0.51	0.56	0.48	0.43
630	0.77	0.71	0.65	0.56	0.63	0.57	0.49	0.54	0.47	0.41

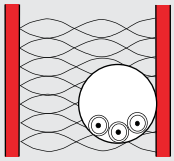
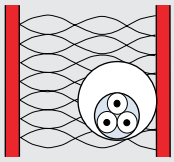
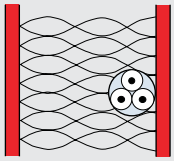
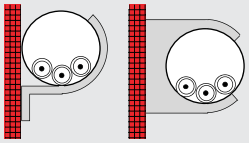
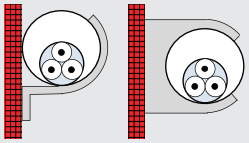
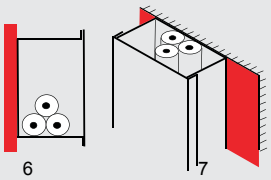
NOTE 1: The factors in Table T18 are applicable to groups of cables all of one size. The value of current derived from application of the appropriate factors is the maximum current to be carried by any of the cables in the group.

NOTE 2: If due to known operating conditions, a cable is expected to carry not more than 30% of its grouped rating, it may be ignored for the purpose of obtaining the rating factor for the rest of the group.

NOTE 3: Where cables having different conductor operating temperatures are grouped together the current rating should be based on the lowest operating temperature of any cable in the group.

NOTE 4: When the number of cables used differs from those stated in the table, the rating factor for the next higher stated number of cables should be used.

TABLE T19: SCHEDULE OF INSTALLATION METHODS OF CABLES (INCLUDING REFERENCES METHODS) FOR DETERMINING CURRENT-CARRYING CAPACITY

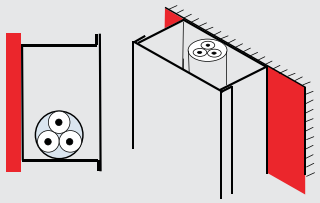
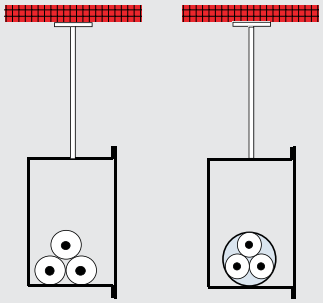
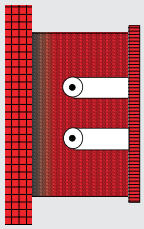
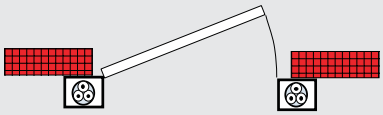
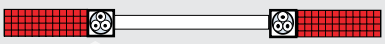
Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
1		Non-sheathed cables in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10W/m^{2}K[c]	A
2		Multicore cable in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10W/m^{2}K[c]	A
3		Multicore cable direct in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10W/m^{2}K[c]	A
4		Non-sheathed cables in conduit on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it[c]	B
5		Multicore cable in conduit on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it[c].	B
6 7		Non-sheathed cables in cable trunking on a wooden or masonry wall 6-run horizontally[b] 7-run vertically [b,c]	B

b Values given for Installation 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 T13 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.

NOTE 1: The illustrations are not intended to depict actual product or installation practices but are indicative of the method described.
NOTE 2: The installation and reference methods stated are in line with IEC. However, not all methods have a corresponding rating for all cable types.

TABLE T19 (continued)

Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
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 11	 10 11	Non-sheathed cables in suspended cable trunking[b]	B
		Multicore cable in suspended cable trunking[b]	B
12		Non-sheathed cables run in moulding[c,e]	A
13 14		Deleted by BS7671:2008 Amendment No.1	
15		Non-sheathed cables in conduit or single-core or multicore cable in architrave[c,f]	A
16		Non-sheathed cables in conduit or single-core or multicore cable in window frames[c,f]	A

b Values given for Installation 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 T13 is applicable, irrespective of the presence of an internal barrier or partition.

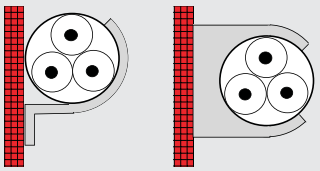
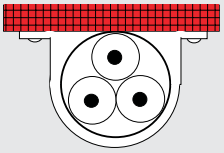
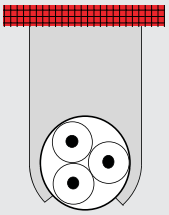
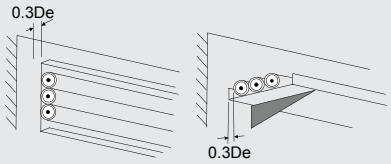
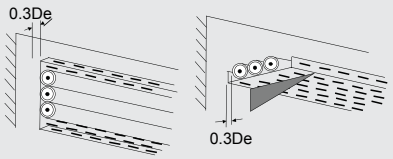
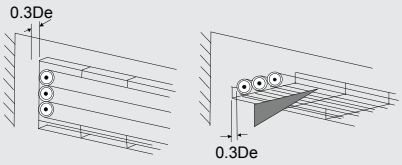
c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.

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 may be used.

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.

* Still under consideration in IEC

TABLE T19 (continued)

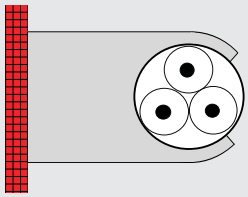
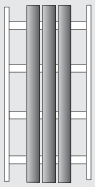
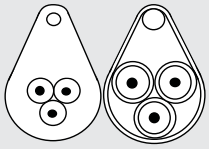
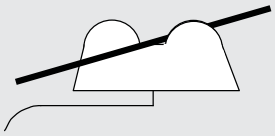
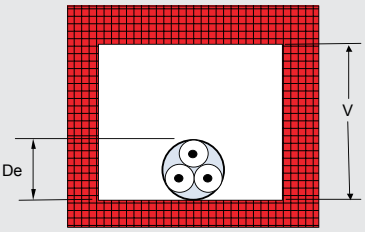
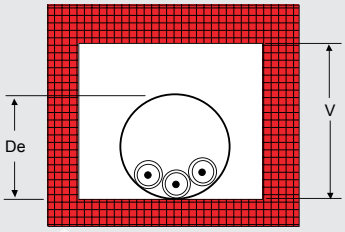
Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
20		Single-core or multicore cables: - fixed on (clipped direct), or spaced less than 0.3 x cable diameter from a wooden or masonry wall[c]	C
21		Single-core or multicore cables: - fixed directly under a wooden or masonry ceiling	C (Higher than standard ambient temperatures may occur with this installation method)
22		Single-core or multicore cables: - spaced from a ceiling	E, F or G* (Higher than standard ambient temperatures may occur with this installation method)
30		Single-core or multicore cables: - on unperforated tray run horizontally or vertically[c,h]	C with item 2 or Table T13
31		Single-core or multicore cables: - on perforated tray run horizontally or vertically[c,h]	E or F
32		Single-core or multicore cables: - on brackets or on a wire mesh tray run horizontally or vertically[c,h]	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.

h De = 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 T19 (continued)

Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
33		Single-core or multicore cables: - spaced more than 0.3 times the cable diameter from a wall	E, F or G[g]
34		Single-core or multicore cables: - on a ladder[c]	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[c,h,i]	Where 1.5 De ≤ V < 20 De 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[c,i,j]	Where 1.5 De ≤ V 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.

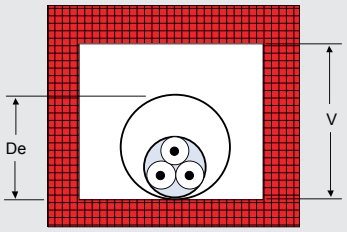
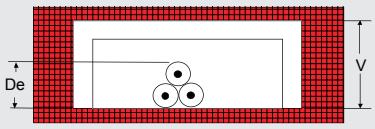
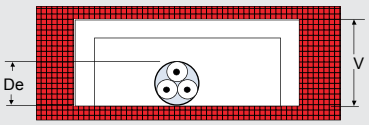
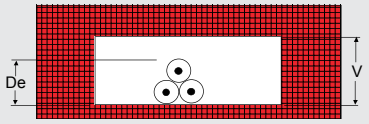
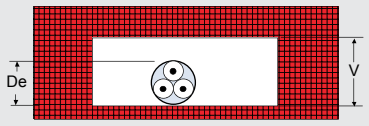
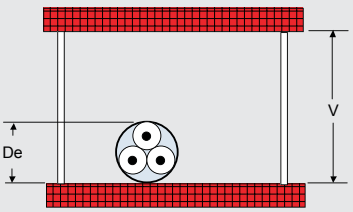
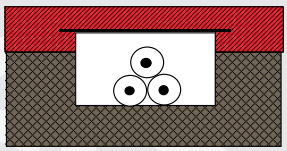
g The factors in Table T13 may also be used.

h De = 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.
The depth of the channel is more important than the width.

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

TABLE T19 (continued)

Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
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[c,j]	Where 1.5 De ≤ 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[c,i,j]	Where 1.5 De ≤ 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[c,i,j]	Where 1.5 De ≤ V use B
45		Non-sheathed cables in cable ducting in masonry having a thermal resistivity not greater than 2 K.m/W[c,h,i]	Where 1.5 De ≤ V < 50 De use B
46		Single-core or multicore cable in cable ducting in masonry having a thermal resistivity not greater than 2 K.m/W[c,h,i]	Where 1.5 De ≤ V < 50 De use B
47		Single-core or multicore cable: - in a ceiling void - in a suspended floor[h,i]	Where 1.5 De ≤ V < 50 De use B
50		Non-sheathed cables in flush cable trunking in the floor	B

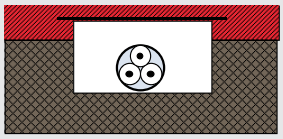
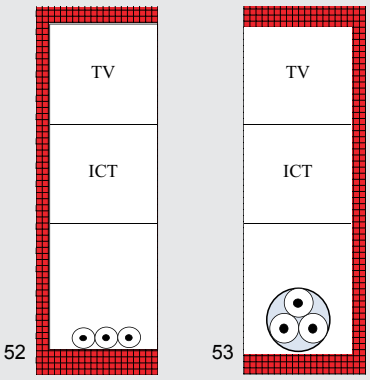
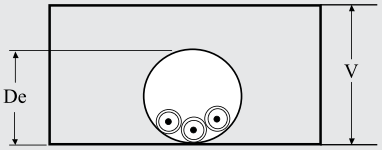
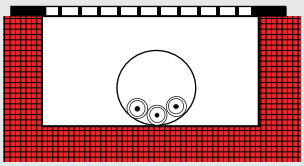
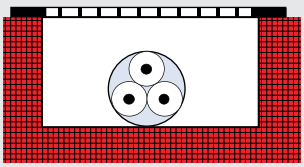
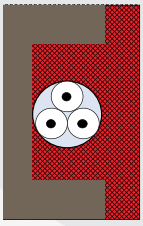
c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.

h De = 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 De = external diameter of conduit or vertical depth of cable ducting.

TABLE T19 (continued)

Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
51		Multicore cable in flush cable trunking in the floor	B
52		Non-sheathed cables in flush trunking[c]	B
53		Multicore cable in flush trunking[c]	B
54		Non-sheathed cables or single-core cables in conduit in an unventilated cable channel run horizontally or vertically[c,i,k,m]	Where 1.5 De ≤ V use B
55		Non-sheathed cables in conduit in an open or ventilated cable channel in the floor[l,m]	B
56		Sheathed single-core or multicore cable in an open or ventilated cable channel run horizontally or vertically[m]	B
57		Single-core or multicore direct cable in masonry having thermal resistivity not greater than 2K.m/W. - without added mechanical protection[n,o]	C

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.

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.

k De = external Diameter of conduit.

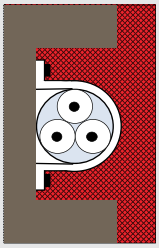
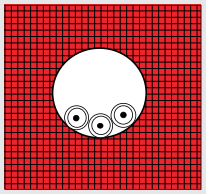
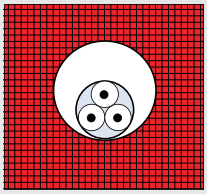
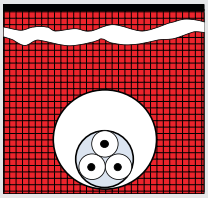
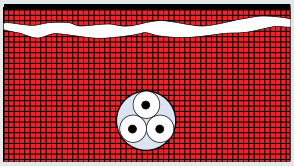
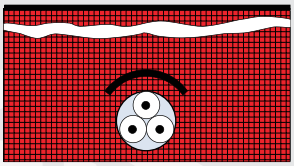
l For multicore cable installed as Method 55, use current rating for Reference Method B

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 16mm^2, 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 T19 (continued)

Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
58		Single-core or multicore cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - with added mechanical protection[n,o] (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[o]	B
60		Multicore cables in conduit in masonry having a thermal resistivity not greater than 2 K.m/W[o]	B
70		Multicore armoured cable in conduit or in cable ducting in the ground	D For multicore armoured cable only
72		Sheathed, armoured or multicore cables direct in the ground: - without added mechanical protection (see note)	D
73		Sheathed, armoured or multicore cables direct in the ground: - with added mechanical protection (e.g. cable covers) (see note)	D

n For cables having conductors not greater than 16mm², 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).

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

TABLE T19 (continued)
INSTALLATION METHODS FOR CABLES ENCLOSED IN INFLOOR CONCRETE TROUGHS

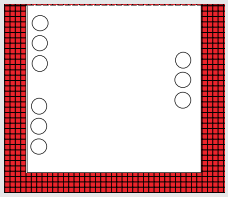
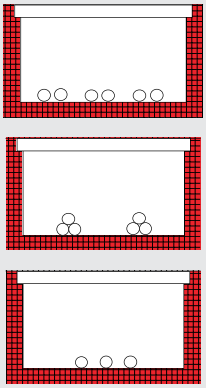
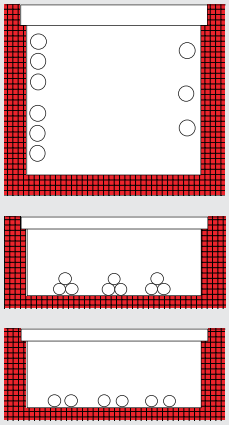
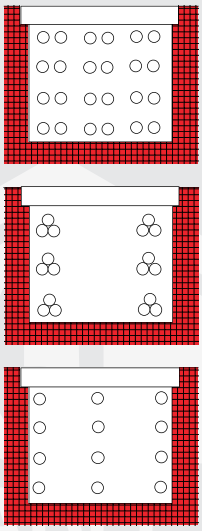
Installation Method			Reference Method to be used to determine current-carrying capacity
Number	Examples	Description	
117		Cable supported on the wall of an open or ventilated infloor - Sheathed single-core cables in free air(any supporting metal work under the cables occupying less than 10% of plan area). - Two or three cables vertically one above the other, minimum distance between cable surfaces equal to the overall cable diameter, distance from the wall not less than 1/2 the cable diameter. - Two of three cables horizontally with spacing as above	E or F
118		Cables in enclosed trench 450mm wide by 300mm deep(minimum dimensions) including 100mm cover. - Two to six single-core cables with surfaces separated by a minumum 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 minimum of 50mm	E or F using rating factors in Table T18
119		Cables enclosed in an infloor concrete trough 450mm wide by 600mm deep(minimum dimensions) including 100mm 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 50mm between groups. or Two to four groups of three single-core cables in trefoil formation with a minimum of 50mm 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 75mm. All cables spaced at least 25mm from trench wall.	E or F using rating factors in Table T18
120		Cables enclosed in an infloor concrete trough 600mm wide by 760mm deep(minimum dimensions) including 100mm 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 50mm either horizontally or vertically. or Single-core cables in trefoil formation with each group or trefoil formation separated by a minimum of 50mm 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 75mm either horizontally or vertically. All cables spaced at least 25mm from trench wall.	E or F using rating factors in Table T18

TABLE T20: IDENTIFICATION OF CONDUCTORS

Function	Alphanumeric	Colour
Protective conductors		Green-and-yellow
a.c. power circuit[1]		
Line of single-phase circuit	L	Brown
Neutral of single- or three-phase circuit	N	Blue
Line 1 of three-phase a.c circuit	L1	Brown
Line 2 of three-phase a.c circuit	L2	Black
Line 3 of three-phase a.c circuit	L3	Grey

NOTE: Power circuits include lighting circuits

TABLE T21: CONDUCTOR RESISTANCE & SHORT CIRCUIT CURRENT

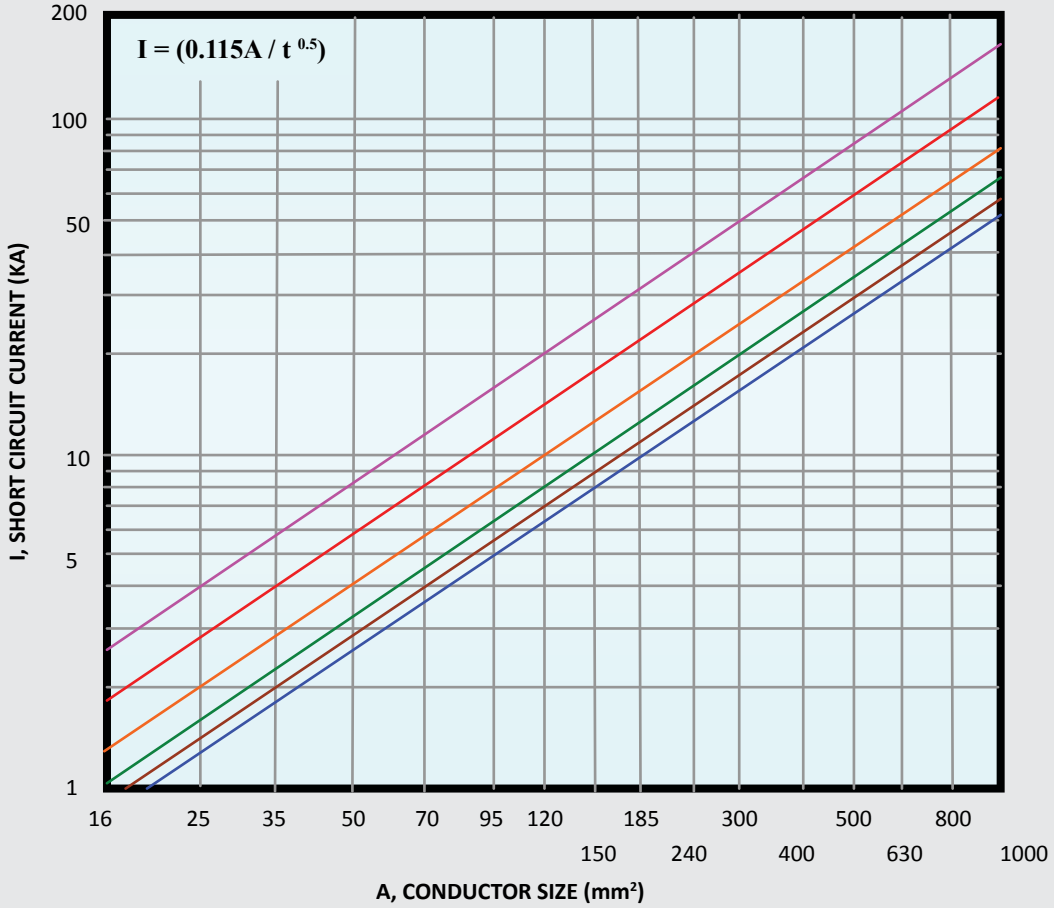
Conductor	Max. Conductor Resistance at 20°C		Short Circuit Current Rating at 1 second			
			Copper		Aluminium	
Size mm²	Copper ohm/km	Aluminium ohm/km	XLPE or LSHF Cable KA	PVC Cable KA	XLPE or LSHF Cable KA	PVC Cable KA
1.5	12.1		0.215	0.173	0.141	0.114
2.5	7.41		0.358	0.288	0.235	0.190
4	4.61	7.41	0.572	0.460	0.376	0.304
6	3.08	4.61	0.858	0.690	0.564	0.456
10	1.83	3.08	1.430	1.150	0.940	0.760
16	1.15	1.91	2.288	1.840	1.504	1.216
25	0.727	1.20	3.575	2.875	2.350	1.900
35	0.524	0.868	5.005	4.025	3.290	2.660
50	0.387	0.641	7.150	5.750	4.700	3.800
70	0.268	0.443	10.010	8.050	6.580	5.320
95	0.193	0.320	13.585	10.925	8.930	7.220
120	0.153	0.253	17.160	13.800	11.280	9.120
150	0.124	0.206	21.450	17.250	14.100	11.400
185	0.0991	0.164	26.455	21.275	17.390	14.060
240	0.0754	0.125	34.320	27.600	22.560	18.240
300	0.0601	0.100	42.900	34.500	28.200	22.800
400	0.0470	0.0778	57.200	41.200	37.600	27.200
500	0.0366	0.0605	71.500	51.500	47.000	34.000
630	0.0283	0.0469	90.090	64.890	59.220	42.840
800	0.0221	0.0367	114.400	82.400	75.200	54.400
1000	0.0176	0.0291	143.000	103.000	94.000	68.000
NOTES:			$I = 0.143A / t^{0.5}$	$I = 0.115A / t^{0.5}$ for ≤ 300mm² $I = 0.103A / t^{0.5}$ for ≥ 400mm²	$I = 0.094A / t^{0.5}$	$I = 0.076A / t^{0.5}$ for ≤ 300mm² $I = 0.068A / t^{0.5}$ for ≥ 400mm²

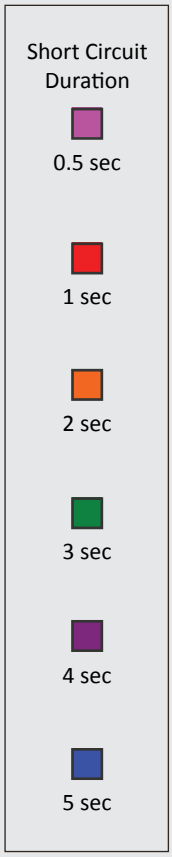
Where I: SHORT CIRCUIT CURRENT in KA.
A: CONDUCTOR CROSS-SECTION AREA in mm².
t: TIME OF SHORT CIRCUIT in second

SHORT CIRCUIT CURRENT FOR PVC INSULATED & XLPE INSULATED CABLES

ALLOWABLE SHORT CIRCUIT CURRENTS FOR PVC INSULATED CABLES

CONDUCTOR: COPPER
INSULATION: PVC





ALLOWABLE SHORT CIRCUIT CURRENTS FOR XLPE INSULATED CABLES

CONDUCTOR: COPPER
INSULATION: XLPE

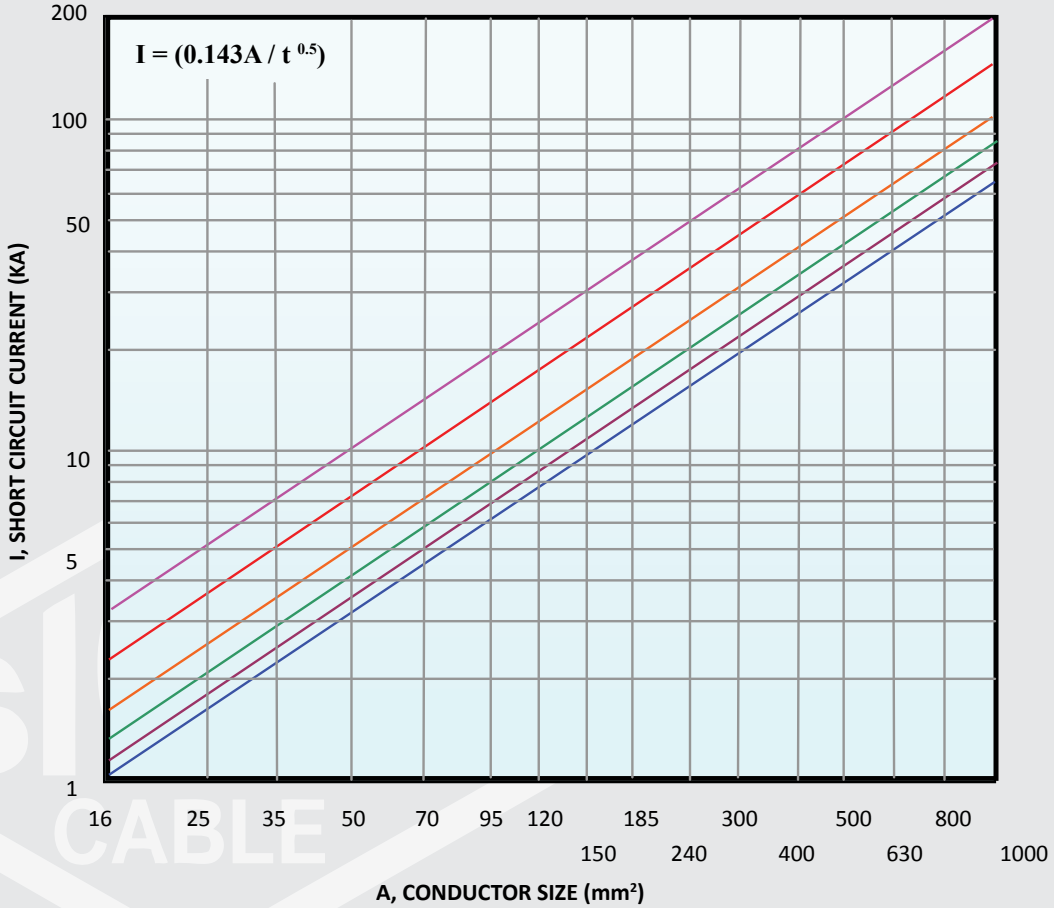


TABLE T22: MINIMUM BENDING RADIUS

	Construction	Overall Diameter of Cable (mm)	Min. Internal Radius of Bend(x OD of Cable)
1	Circular copper conductor (unarmoured cable).	Up to and include 25	4
		Above 25	6
2	Circular copper conductor (armoured cable).	Any	6
	All Fire resistant cable with Circular copper conductor	Any	8
3	All cable with Solid aluminium or shaped compacted copper conductor.	Any	8
	All fire resistant cable with compacted copper conductor	Any	10

NOTE: Wherever possible, larger installation radii should be used.

TABLE T23: CONVERSION TABLES
(A) CONDUCTOR WIRE GUAGES

AWG	SWG	Diameter		Cross-sectional Area		AWG	SWG	Diameter		Cross-sectional Area	
		mm	mil	mm^2	MCM			mm	mil	mm^2	MCM
6/0		14.732	580.0	170.5	336.40	10		2.588	101.90	5.261	10.380
5/0		13.119	516.5	135.2	266.80		13	2.337	92.00	4.289	8.465
	7/0	12.700	500.0	126.7	250.00	11		2.305	90.74	4.172	8.234
	6/0	11.786	464.0	109.1	215.30	12		2.053	80.81	3.309	6.531
4/0		11.684	460.0	107.2	211.60		14	2.032	80.00	3.243	6.400
	5/0	10.973	432.0	94.56	186.60		15	1.829	72.00	2.627	5.185
3/0		10.404	409.6	85.01	167.80	13		1.828	71.96	2.624	5.178
	4/0	10.160	400.0	81.07	160.00	14		1.628	64.08	2.081	4.107
	3/0	9.449	372.0	70.12	138.40		16	1.626	64.00	2.075	4.096
2/0		9.266	364.8	67.43	133.10	15		1.450	57.07	1.650	3.257
	2/0	8.839	348.0	61.36	121.10		17	1.422	56.00	1.589	3.136
1/0 (0)		8.252	324.9	53.49	105.60	16		1.291	50.82	1.309	2.583
	0	8.230	324.0	53.19	105.00		18	1.219	48.00	1.167	2.304
	1	7.620	300.0	45.60	90.00	17		1.150	45.26	1.038	2.048
1		7.348	289.3	42.41	83.69	18		1.024	40.30	0.8227	1.624
	2	7.011	276.0	38.60	76.18		19	1.016	40.00	0.8107	1.600
2		6.544	257.6	33.63	66.37		20	0.9144	36.00	0.6567	1.296
	3	6.401	252.0	32.18	63.50	19		0.9117	35.89	0.6529	1.288
	4	5.893	232.0	27.27	53.82		21	0.8128	32.00	0.5189	1.024
3		5.827	229.4	26.66	52.62	20		0.8116	31.95	0.5174	1.021
	5	5.385	212.0	22.77	44.94	21		0.7230	28.46	0.4015	0.8101
4		5.189	204.3	21.15	41.73		22	0.7112	28.00	0.3973	0.7840
	6	4.877	192.0	18.68	36.86	22		0.6439	25.35	0.3256	0.6426
5		4.621	181.9	16.77	33.10		23	0.6096	24.00	0.2919	0.5760
	7	4.470	176.0	15.69	30.97	23		0.5733	22.57	0.2581	0.5094
6		4.115	162.0	13.30	26.25		24	0.5588	22.00	0.2452	0.4840
	8	4.064	160.0	12.97	25.60	24		0.5106	20.10	0.2047	0.4040
7		3.665	144.3	10.55	20.82		25	0.5080	20.00	0.2027	0.4000
	9	3.658	144.0	10.51	20.74		26	0.4572	18.00	0.1642	0.3240
8		3.264	128.5	8.367	16.51	25		0.4546	17.90	0.1623	0.3204
	10	3.251	128.0	8.302	16.38		27	0.4166	16.40	0.1363	0.2690
	11	2.946	116.0	6.818	13.46	26		0.4049	15.94	0.1288	0.2541
9		2.906	114.4	6.633	13.09		28	0.3759	14.80	0.1110	0.2190
	12	2.642	104.0	5.481	10.82	27		0.3606	14.20	0.1021	0.2015

NOTE: 1MCM = 0.5067 mm^2

Selection of Cable Based on Voltage Drops and Current-Carrying Capacity

Voltage drop is normally only of importance for cables of voltage rating not exceeding 600/1000 volts. If the voltage drops is to be in compliance with the Regulations of CP5/IEE Wiring Regulations, then the voltage drop for any particular cable run must be such that the total voltage drop in the circuit of which the cable forms a part does not exceed 4% of the nominal voltage.

Since the actual power factor of the load is usually not known, the most practical approach to the question of the voltage drop is to assume the worst conditions, i.e. power factor equal to one and the conductor is at maximum operating temperature. The voltage drop value given in the tables are based on these assumptions and tabulated for a current of 1 amp for a 1 metre run, i.e. for a distance of 1 metre along the route taken by the cables, and represent the result of the voltage drops in all the circuit conductors.

For a balanced three phase a.c. circuits, the values relate to the line voltage. For any given run, the values need to be multiplied by the length of the run (in metres) and by the current (in amps) that the cables are to carry.

Voltage drop can be calculated using the following formulas:

$$V_{max} = 4\% \times \text{supply voltage} \quad \text{.....(1)}$$

$$V_d = \frac{V_{max} \times 1000}{I \times L} \quad \text{.....(2)}$$

$$V_c \leq V_d \quad \text{.....(3)}$$

$$V_t = \frac{V_c \times I \times L}{1000} \quad \text{.....(4)}$$

Where

I	=	Current (A)
L	=	Length of cable installed (m)
V_{max}	=	Max. permissible volt drop in the circuit (V)
V_d	=	Max. volt drop in the circuit (mV/A/m)
V_c	=	Volt drop of the selected cable (mV/A/m)
V_t	=	Total volt drop in the circuit (V)

Example:

Consider a route of 200 metres of cable to be laid on a perforated cable tray and to carry a 200-amp load, the supply voltage being 415 V, three phase a.c. and the cable to be copper conductor, XLPE insulated unarmoured type

1. V_{max} = **Max. permissible volt drop in the circuit = 4% x 415V = 16.6V**
2. V_d = **Max. volt drop in the circuit** $\frac{16.6 \times 1000}{200 \times 200}$ **= 0.415mV/A/m**
3. Select a cable from Table T1a, such that the V_c value is equal to, or less than V_d, the 0.415mV/A/m calculated, at the same time ensuring that it would carry the current. It will be seen and this value (V_c) is 0.37mV/A/m (under Z in column 6 of Table T1a) giving a cable size of 120 mm^2.
4. V_t = **Total volt drop in the circuit =** $\frac{0.37 \times 200 \times 200}{1000}$ **= 14.8V**

Project References

Residential / Commercial

IR Sands Marina & Resort World in Sentosa
Interlace Condominium
The Sail Condo
The Metroplis @ Buona Vista
Ardmore Residence
Capitagreen
Connexion (Asia 1st Medical Centre and Hotel)
Crowne Plaza Hotel Changi Airport
Great World City
Fusionpolis @ Buona Vista
Paragon
Vivo City
Livia Condominium
Costa Del Sol Condo
Meritus Mandarin Hotel

Institution

National University Hospital
NTU
River Valley High School
Changi Prison Complex
Nee Soon Camp
Paya Lebar Airbase and etc
Evergreen Primary School
Nan Chiau Primary School
Monfort Secondary School
CHIJ St. Theresa's Convent

Overseas

New Shangrila Hotel in Yangon
Sedona Hotel in Yangon
Shanghai Nextage Shopping Complex in China
Various Resort Islands in Maldives
Shell Petronas in Brunei
Public housing in Brunei
Various project in Cambodia
Supply wide range of cables to Australia market

Industrial

Wyeth Pharmaceutical
GSK
UMCI
IMFS, Micron
Seletar Aerospace Park
Tuas Power Station
Tech Semi Conductor
Pulau Ayer Chewan - Exxon

Government

Changi Airport T1, T2 and T3
Woodbridge Hospital
Bishan MRT Station
Boon Lay MRT Extension
Circle Line Stage 3 C853
KK Hospital
PSA Terminals
Various HDB Projects
Power Grid Projects / Tenders (NDC 46,58,63 and etc)

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