



LOW VOLTAGE CABLE PRODUCTS

Specializing in designing, manufacturing cables
and providing customized services for our customers



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HOW TO READ THIS CATALOGUE

This catalogue consists of three types of Low Voltage Cables and they are categorized into three different sections, 1) PVC & XLPE Insulated Cables, 2) Low Smoke Zero Halogen Flame Retardant Cables and 3) Low Smoke Zero Halogen Flame Retardant Fire Resistant Cables. In each section, the cables are further categorized by its electrical component and conductor sizes, which ranges from 0.5mm² to 1000mm², armoured and non- armoured and with or without copper-taped screened.

In this catalogue we have given each cable a name accompanied with the various short and long descriptions based on its material used.

For example:

FR-XSH

CU / MGT / XLPE / LSZH / SWA / LSZH (2 CORES - 5 CORES)

Mica Taped, XLPE Insulated, LSZH Bedded, Galvanised Steel Wire Armoured, LSZH Sheathed Cable, 600/1000V, BS7846

← This is the short description

← Full description on the third line

To better understand the contents of the cable, we have included a 3-dimensional image plus a cross-sectional image of the cable for easy reference of its structure and components. The technical specifications and figures are provided by our quality team to ensure the accurate use of our products. Technical properties such as Current Rating Factor and Voltage drop, and other essential technical details are provided in the Appendices at the last section of this catalogue. The latest Cable Installation Methods as well as the new harmonized wiring colour codes (as per IEE Wiring Regulations, 17th Edition) are also provided in our Appendices for your easy reference.

For all other enquiries, please feel free to contact our friendly customer service hotline for further assistance.

APPLICABLE STANDARDS

Below are the applicable standards that are used as reference in the construction of our low voltage cables.

ASTM D 2863

Measuring the minimum oxygen concentration to support candle-like combustion of plastic (oxygen index).

BS2004 (Specification Withdrawn)

PVC insulated cables and exible cords for electric power and lighting.

BS6231

Electric cables, single-core PVC insulated exible cables of rated voltage 600/1000V for switchgear and control-gear wiring.

BS6346 (Specification Withdrawn)

(withdrawn with no replacement) Electric cables, PVC insulated, armoured cables for voltages of 600/1000V and 1900/3300V.

BS6360

Electric cables, single-core PVC insulated exible cables of rated voltage 600/1000V for switchgear and control-gear wiring.

BS6387 / SS299

Performance requirements for cables required to maintain circuit integrity under fire conditions.

BS6724

600/1000V armoured electric cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire.



APPLICABLE STANDARDS

Below are the applicable standards that are used as reference in the construction of our low voltage cables.

BS7629-1

300/500V re-resistant screened cables having low emission of smoke and corrosive gases when affected by fire.
Part 1: Multicore and Multi-pair Cables.

Bs7846

600/1000V armoured re-resistant electric cables having low emission of smoke and corrosive gases when affected by fire.

BS EN50288-7

300/500V re-resistant screened cables having low emission of smoke and corrosive gases when affected by fire.
Part 1: Multicore and Multi-pair Cables.

BS EN50525-2-31

Single core non-sheathed cables with thermoplastic PVC insulation.

BS EN50525-3-41

Single core non-sheathed cables with halogen-free crosslinked insulation, and low emission of smoke.

BS EN60228

Conductors of insulated cables.

IEC60227-3

Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V
Part 3: Non-sheathed cables for fixed wiring.

IEC60228

Conductors of insulated cables.

IEC60331

Fire-resistant characteristics of electric cables.

IEC60332-1 / BS EN60332-1

Tests in electric cables under fire conditions.
Part 1: Method of test on a single vertical insulated wire or cable.

IEC60332-3-22 / BS EN60332-3-22

Tests on electric and optical fibre cables under fire conditions.
Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables (Category A).

IEC60332-3-24 / BS EN60332-3-24

Tests on electric and optical fibre cables under fire conditions.
Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables (Category C).

IEC60502-1

Power cables with extruded insulation and their accessories for rated voltages from 1kV up to 30kV.
Part 1: Cables for Rated Voltages of 1kV and 30kV.

IEC60754-1 / BS EN60754-1

Tests on gases evolved during the combustion of materials from cables.
Part 1: Methods of determination of amount of halogen acid gas evolved during combustion of polymeric materials taken from cables.

IEC60754-2 / BS EN60754-2

Tests on gases evolved during combustion of materials from cables.
Part 2: Determination of degree of acidity (corrosive) of gases by measuring pH and conductivity.

IEC61034-2 / BS EN61034-2

Measurement of smoke density of electric cables burning under defined conditions.
Part 2: Test procedure and requirements.

SS358-3

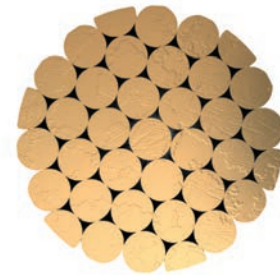
Polyvinyl Chloride insulated cables of rated voltages up to and including 450/750V.
Part 3: Non-sheathed cables for fixed wiring.



Bare Annealed Copper

STRANDED PLAIN ANNEALED COPPER CONDUCTOR **SINGLE CORE**

IEC60228, BS EN60228



CONSTRUCTION

Conductor: Plain Annealed Copper, Class 2 Stranded
Circular or Compacted

REFERENCE STANDARDS

Conductor: IEC60228, BS EN60228

Minimum Bending Radius: 3D for $D < 10\text{mm}$
4D for $10\text{mm} \leq D < 25\text{mm}$
6D for $D \geq 25\text{mm}$

Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Nominal Diameter of Conductor (mm)	Maximum Conductor Resistance at 20°C (Ω/km)	Nominal Weight per km of Conductor (kg/km)
1.0	7 / 0.43	1.29	18.1	9.2
1.5	7 / 0.53	1.59	12.1	14.0
2.5	7 / 0.67	2.01	7.41	22.4
4	7 / 0.85	2.55	4.61	36.1
6	7 / 1.04	3.12	3.08	54.0
10	7 / 1.35	4.05	1.83	90.8
16	7 / 1.70	4.69	1.15	145.0
25	7 / 2.14	5.90	0.727	229.0
35	7 / 2.52	6.95	0.524	317.0
50	19 / 1.78	8.40	0.387	429.0
70	19 / 2.14	10.10	0.268	620.0
95	19 / 2.52	11.90	0.193	860.0
120	37 / 2.03	13.50	0.153	1086.0
150	37 / 2.25	14.90	0.124	1334.0
185	37 / 2.52	16.90	0.0991	1673.0
240	61 / 2.25	19.20	0.0754	2199.0
300	61 / 2.52	21.50	0.0601	2759.0
400	61 / 2.85	24.30	0.0470	3528.0
500	61 / 3.20	27.30	0.0366	4448.0
630	127 / 2.52	32.76	0.0283	5744.0
800	127 / 2.85	37.05	0.0221	7346.0
1000	127 / 3.20	41.60	0.0176	9260.0



PVC

CU / PVC SINGLE CORE

PVC Insulated, Non-Sheathed Cable, 450/750V, SS358-3, BS EN50525-2-31, IEC60227-3



CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Polyvinyl Chloride (PVC) Compound Type PVC/C
Insulation Colour:	Black, Green/Yellow, Blue, White, Brown, Grey or Others

REFERENCE STANDARDS

Design Specification :	SS358-3, BS EN50525-2-31, IEC60227-3
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

ELECTRICAL CHARACTERISTICS

Operating Voltage, Uo/U:	450/750V
Operating Temperature:	-15°C to 70°C
Final Short Circuit Temperature:	160°C for cable ≤ 300mm ² 140°C for cable >300mm ²
Test Voltage:	2.5kV for 5 minutes

INSTALLATION REFERENCE

Min. Bending Radius (mm):	6 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Mean Overall Diameter (Upper Limit) (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 1.5	7 / 0.53	0.7	3.0	22.7
	1 x 2.5	7 / 0.67	0.8	3.6	34.0
	1 x 4	7 / 0.85	0.8	4.2	50.0
	1 x 6	7 / 1.04	0.8	4.7	70.9
	1 x 10	7 / 1.35	1.0	6.1	117.5
	1 x 16	7 / 1.70	1.0	6.7	177.4
	1 x 25	7 / 2.14	1.2	8.3	282.0
	1 x 35	7 / 2.52	1.2	9.4	380.3
	1 x 50	19 / 1.78	1.4	11.2	515.8
	1 x 70	19 / 2.14	1.4	12.9	726.4
	1 x 95	19 / 2.52	1.6	15.1	1002.9
	1 x 120	37 / 2.03	1.6	16.7	1251.0
	1 x 150	37 / 2.25	1.8	18.5	1538.7
	1 x 185	37 / 2.52	2.0	20.7	1927.9
	1 x 240	61 / 2.25	2.2	23.6	2522.6
	1 x 300	61 / 2.52	2.4	26.3	3155.2
	1 x 400	61 / 2.85	2.6	29.5	4018.0
	1 x 500	61 / 3.20	2.8	32.9	5044.9
	1 x 630	127 / 2.52	2.8	38.4	6443.4

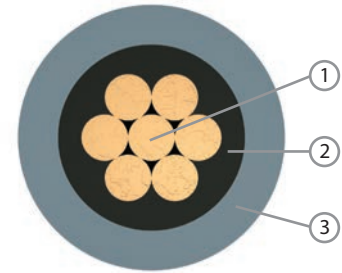
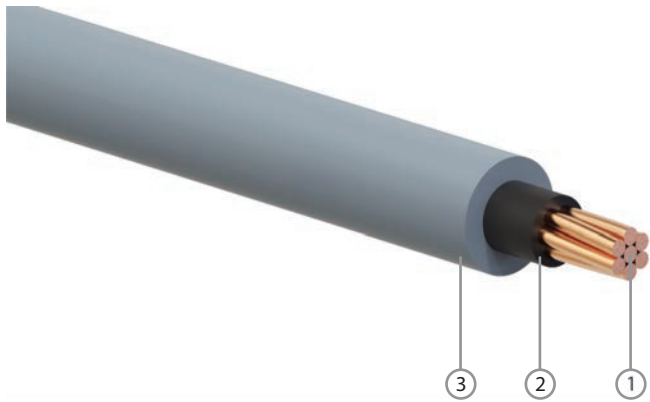
For current rating and voltage drop, please refer to Table B1.1 and B2.1 on Page 50.



PPS

CU / PVC / PVC SINGLE CORE

PVC Insulated, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. PVC Compound
3. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Polyvinyl Chloride (PVC) Compound Type PVC/A
Insulation Colour:	Black
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST1
Outer Sheath Colour:	Grey

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	6 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 70°C
Final Short Circuit Temperature:	160°C for cable ≤ 300mm ² 140°C for cable >300mm ²
Test Voltage:	3.5kV for 5 minutes

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 1.5	7 / 0.53	0.8	6.3	68
	1 x 2.5	7 / 0.67	0.8	6.7	80
	1 x 4	7 / 0.85	1.0	7.7	108
	1 x 6	7 / 1.04	1.0	8.2	133
	1 x 10	7 / 1.35	1.0	9.2	180
	1 x 16	7 / 1.70	1.0	10.2	245
	1 x 25	7 / 2.14	1.2	11.9	357
	1 x 35	7 / 2.52	1.2	13.1	460
	1 x 50	19 / 1.78	1.4	14.8	604
	1 x 70	19 / 2.14	1.4	16.6	818
	1 x 95	19 / 2.52	1.6	19.1	1113
	1 x 120	37 / 2.03	1.6	20.7	1363
	1 x 150	37 / 2.25	1.8	22.9	1668
	1 x 185	37 / 2.52	2.0	25.3	2077
	1 x 240	61 / 2.25	2.2	28.6	2692
	1 x 300	61 / 2.52	2.4	31.6	3345
	1 x 400	61 / 2.85	2.6	35.2	4228
	1 x 500	61 / 3.20	2.8	38.9	5275
	1 x 630	127 / 2.52	2.8	43.1	6682
	1 x 800	127 / 2.85	2.8	47.6	8407
	1 x 1000	127 / 3.20	3.0	52.9	10535

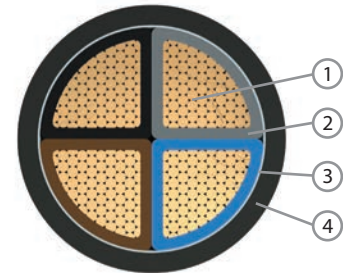
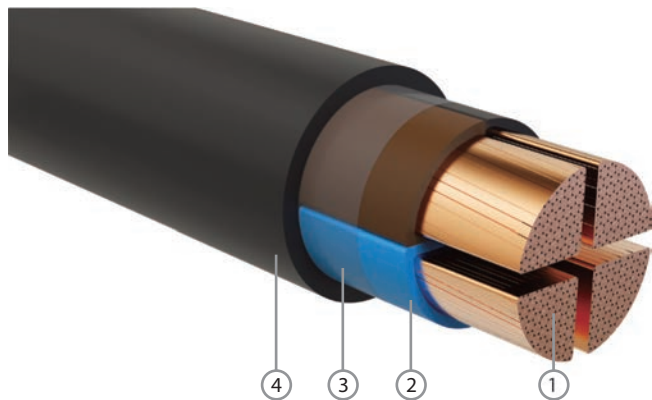
For current rating and voltage drop, please refer to Table B1.1 and B2.1 on Page 50.



PPM

CU / PVC / PVC **2 CORES - 5 CORES**

PVC Insulated, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. PVC Compound
3. Binder Tape
4. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Polyvinyl Chloride (PVC) Compound Type PVC/A
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST1
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 70°C
Final Short Circuit Temperature:	160°C for cable ≤ 300mm ² 140°C for cable >300mm ²
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2 CORES	2 x 1.5	7 / 0.53	0.8	10.4	153
	2 x 2.5	7 / 0.67	0.8	11.2	183
	2 x 4	7 / 0.85	1.0	13.3	250
	2 x 6	7 / 1.04	1.0	14.4	304
	2 x 10	7 / 1.35	1.0	16.3	409
	2 x 16	7 / 1.70	1.0	18.4	552
	2 x 25	7 / 2.14	1.2	21.8	789
	2 x 35	7 / 2.52	1.2	24.1	1007
	2 x 50 (S)	19 / 1.78	1.4	24.1	1278
	2 x 70 (S)	19 / 2.14	1.4	26.8	1731
	2 x 95 (S)	19 / 2.52	1.6	30.6	2323
	2 x 120 (S)	37 / 2.03	1.6	33.1	2851
	2 x 150 (S)	37 / 2.25	1.8	36.7	3467
	2 x 185 (S)	37 / 2.52	2.0	40.6	4302
	2 x 240 (S)	61 / 2.25	2.2	45.3	5536
	2 x 300 (S)	61 / 2.52	2.4	50.1	6868

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.2 and B2.2 on Page 51.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.8	10.9	182
	3 x 2.5	7 / 0.67	0.8	11.8	223
	3 x 4	7 / 0.85	1.0	14.1	311
	3 x 6	7 / 1.04	1.0	15.3	388
	3 x 10	7 / 1.35	1.0	17.3	535
	3 x 16	7 / 1.70	1.0	19.6	737
	3 x 25	7 / 2.14	1.2	23.3	1075
	3 x 35	7 / 2.52	1.2	25.7	1389
	3 x 50 (S)	19 / 1.78	1.4	28.3	1825
	3 x 70 (S)	19 / 2.14	1.4	31.7	2491
	3 x 95 (S)	19 / 2.52	1.6	36.4	3378
	3 x 120 (S)	37 / 2.03	1.6	39.5	4158
	3 x 150 (S)	37 / 2.25	1.8	43.8	5064
	3 x 185 (S)	37 / 2.52	2.0	48.5	6292
	3 x 240 (S)	61 / 2.25	2.2	54.5	8144
	3 x 300 (S)	61 / 2.52	2.4	60.1	10086
	3 x 400 (S)	61 / 2.85	2.6	68.2	12800
4 CORES	4 x 1.5	7 / 0.53	0.8	11.8	216
	4 x 2.5	7 / 0.67	0.8	12.8	267
	4 x 4	7 / 0.85	1.0	15.3	379
	4 x 6	7 / 1.04	1.0	16.7	477
	4 x 10	7 / 1.35	1.0	18.9	669
	4 x 16	7 / 1.70	1.0	21.5	932
	4 x 25	7 / 2.14	1.2	25.6	1372
	4 x 35	7 / 2.52	1.2	28.4	1785
	4 x 50 (S)	19 / 1.78	1.4	32.7	2388
	4 x 70 (S)	19 / 2.14	1.4	36.7	3269
	4 x 95 (S)	19 / 2.52	1.6	42.2	4437
	4 x 120 (S)	37 / 2.03	1.6	45.9	5469
	4 x 150 (S)	37 / 2.25	1.8	51.1	6690
	4 x 185 (S)	37 / 2.52	2.0	56.3	8287
	4 x 240 (S)	61 / 2.25	2.2	63.3	10766
	4 x 300 (S)	61 / 2.52	2.4	70.2	13373
	4 x 400 (S)	61 / 2.85	2.6	79.7	16968
	4 x 500 (S)	61 / 3.20	2.8	88.0	21161
5 CORES	5 x 1.5	7 / 0.53	0.8	12.7	250
	5 x 2.5	7 / 0.67	0.8	13.8	313
	5 x 4	7 / 0.85	1.0	16.6	448
	5 x 6	7 / 1.04	1.0	18.2	569
	5 x 10	7 / 1.35	1.0	20.7	804
	5 x 16	7 / 1.70	1.0	23.5	1129
	5 x 25	7 / 2.14	1.2	28.2	1672
	5 x 35	7 / 2.52	1.2	31.4	2198
	5 x 50	19 / 1.78	1.4	36.5	2946
	5 x 70	19 / 2.14	1.4	41.8	4068
	5 x 95	19 / 2.52	1.6	48.2	5506
	5 x 120	37 / 2.03	1.6	52.9	6820
	5 x 150	37 / 2.25	1.8	58.4	8306
	5 x 185	37 / 2.52	2.0	65.0	10331
	5 x 240	61 / 2.25	2.2	73.7	13425
	5 x 300	61 / 2.52	2.4	81.7	16683

Note: (S) - Sectoral Stranded Conductors.

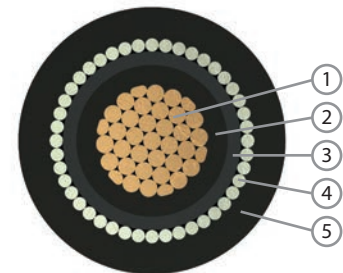
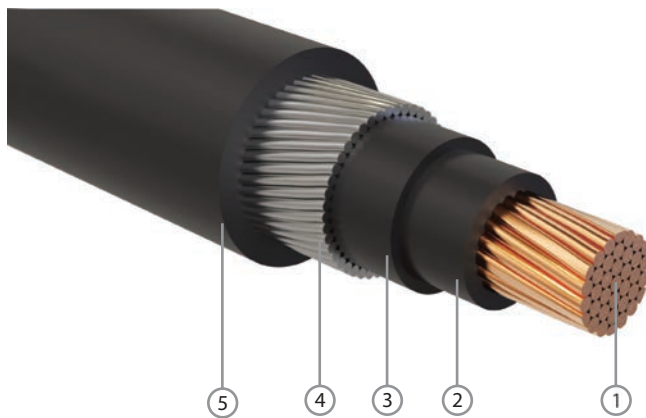
For current rating and voltage drop, please refer to Table B1.2 and B2.2 on Page 51.



PAP

CU / PVC / PVC / SWA / PVC 2 CORES - 5 CORES

PVC Insulated, PVC Bedded, Aluminium Wire Armoured, PVC Sheathed Cable, 600/1000V, Bs6346 (Specification Withdrawn)



1. Plain Annealed Copper Wire
2. PVC Compound
3. PVC Compound
4. Aluminium Wire Armoured
5. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Polyvinyl Chloride (PVC) Compound Type PVC/TI1
Insulation Colour:	Black
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/TM1
Bedding Colour:	Black
Armour:	Aluminium Wire Armoured (AWA)
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/TM1
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 70°C
Final Short Circuit Temperature:	160°C for cable ≤ 300mm ² 140°C for cable >300mm ²
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	BS6346 (Specification Withdrawn)
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 50	19 / 1.78	1.4	13.5	1.25	19.1	169
	1 x 70	19 / 2.14	1.4	15.3	1.25	21.1	1018
	1 x 95	19 / 2.52	1.6	17.6	1.25	23.4	1328
	1 x 120	37 / 2.03	1.6	19.6	1.60	26.3	1686
	1 x 150	37 / 2.25	1.8	21.6	1.60	28.3	2006
	1 x 185	37 / 2.52	2.0	23.8	1.60	30.7	2443
	1 x 240	61 / 2.25	2.2	26.9	1.60	34.0	3101
	1 x 300	61 / 2.52	2.4	29.7	1.60	36.8	3719
	1 x 400	61 / 2.85	2.6	33.5	2.00	41.8	4861
	1 x 500	61 / 3.20	2.8	37.0	2.00	45.3	5956
	1 x 630	127 / 2.52	2.8	41.0	2.00	49.5	7453
	1 x 800	127 / 2.85	2.8	45.7	2.50	55.6	9523
	1 x 1000	127 / 3.20	3.0	50.6	2.50	60.7	11749

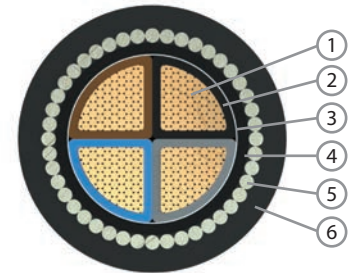
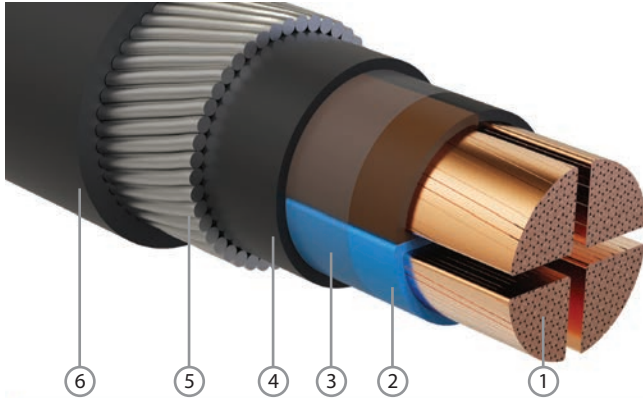
For current rating and voltage drop, please refer to Table B1.3 and B2.3 on Page 52.



PSP

CU / PVC / PVC / SWA / PVC **2 CORES - 5 CORES**

PVC Insulated, PVC Bedded, Galvanised Steel Wire Armoured, PVC Sheathed Cable, 600/1000V, BS6346 (Specification Withdrawn)



1. Plain Annealed Copper Wire
2. PVC Compound
3. Binder Tape
4. PVC Compound
5. Galvanised Steel Wire Armoured
6. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Polyvinyl Chloride (PVC) Compound Type PVC/T11
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/TM1
Bedding Colour:	Black
Armour:	Galvanized Steel Wire Armoured (SWA)

Outer Sheath: Polyvinyl Chloride (PVC) Compound Type PVC/TM1

Outer Sheath Colour: Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U _o /U:	600/1000V
Operating Temperature:	-15°C to 70°C
Final Short Circuit Temperature:	160°C for cable ≤ 300mm ² 140°C for cable >300mm ²
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	BS6346 (Specification Withdrawn)
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	70

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2 CORES	2 x 1.5	7 / 0.53	0.6	7.5	0.90	12.3	265
	2 x 2.5	7 / 0.67	0.7	8.7	0.90	13.5	319
	2 x 4	7 / 0.85	0.8	10.2	0.90	15.0	392
	2 x 6	7 / 1.04	0.8	11.3	0.90	16.3	471
	2 x 10	7 / 1.35	1.0	14.0	1.25	19.9	745
	2 x 16	7 / 1.70	1.0	16.1	1.25	22.0	933
	2 x 25	7 / 2.14	1.2	19.9	1.60	26.7	1435
	2 x 35	7 / 2.52	1.2	22.2	1.60	29.2	1730
	2 x 50 (S)	19 / 1.78	1.4	21.2	1.60	28.3	2053
	2 x 70 (S)	19 / 2.14	1.4	24.2	1.60	31.3	2613
	2 x 95 (S)	19 / 2.52	1.6	26.8	2.00	35.1	3527
	2 x 120 (S)	37 / 2.03	1.6	29.6	2.00	38.1	4180
	2 x 150 (S)	37 / 2.25	1.8	32.9	2.00	41.6	4939
	2 x 185 (S)	37 / 2.52	2.0	36.5	2.50	46.4	6271
	2 x 240 (S)	61 / 2.25	2.2	42.2	2.50	52.3	8068
	2 x 300 (S)	61 / 2.52	2.4	46.2	2.50	56.7	8635

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.4 and B2.4 on Page 53.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.6	7.9	0.90	12.7	293
	3 x 2.5	7 / 0.67	0.7	9.3	0.90	14.1	363
	3 x 4	7 / 0.85	0.8	10.9	0.90	15.7	454
	3 x 6	7 / 1.04	0.8	12.1	1.25	17.8	644
	3 x 10	7 / 1.35	1.0	15.0	1.25	20.9	884
	3 x 16	7 / 1.70	1.0	17.3	1.25	23.2	1141
	3 x 25	7 / 2.14	1.2	21.4	1.60	28.2	1746
	3 x 35	7 / 2.52	1.2	23.8	1.60	30.8	2155
	3 x 50 (S)	19 / 1.78	1.4	23.8	1.60	31.0	2666
	3 x 70 (S)	19 / 2.14	1.4	27.5	2.00	35.7	3709
	3 x 95 (S)	19 / 2.52	1.6	31.0	2.00	39.4	4710
	3 x 120 (S)	37 / 2.03	1.6	34.0	2.00	42.6	5634
	3 x 150 (S)	37 / 2.25	1.8	38.2	2.50	48.2	7144
	3 x 185 (S)	37 / 2.52	2.0	44.2	2.50	54.4	8894
	3 x 240 (S)	61 / 2.25	2.2	49.3	2.50	59.7	11004
	3 x 300 (S)	61 / 2.52	2.4	53.2	2.50	64.0	13182
	3 x 400 (S)	61 / 2.85	2.6	51.7	2.50	72.9	16480
4 CORES	4 x 1.5	7 / 0.53	0.6	8.7	0.90	13.5	344
	4 x 2.5	7 / 0.67	0.7	10.2	0.90	15.0	416
	4 x 4	7 / 0.85	0.8	12.0	1.25	17.7	629
	4 x 6	7 / 1.04	0.8	13.4	1.25	19.1	752
	4 x 10	7 / 1.35	1.0	16.6	1.25	22.5	1049
	4 x 16	7 / 1.70	1.0	19.5	1.60	26.3	1554
	4 x 25	7 / 2.14	1.2	23.7	1.60	30.7	2131
	4 x 35	7 / 2.52	1.2	26.4	1.60	33.6	2640
	4 x 50 (S)	19 / 1.78	1.4	25.8	2.00	34.0	3474
	4 x 70 (S)	19 / 2.14	1.4	29.8	2.00	38.2	4533
	4 x 95 (S)	19 / 2.52	1.6	33.5	2.00	42.1	5827
	4 x 120 (S)	37 / 2.03	1.6	36.9	2.50	46.9	7407
	4 x 150 (S)	37 / 2.25	1.8	44.0	2.50	54.2	9238
	4 x 185 (S)	37 / 2.52	2.0	48.6	2.50	59.0	11108
	4 x 240 (S)	61 / 2.25	2.2	55.5	2.50	66.3	13950
	4 x 300 (S)	61 / 2.52	2.4	61.4	2.50	72.6	16921
	4 x 400 (S)	61 / 2.85	2.6	70.7	3.15	83.3	21961
5 CORES	5 x 1.5	7 / 0.53	0.6	9.5	0.90	14.3	376
	5 x 2.5	7 / 0.67	0.7	11.2	0.90	16.2	483
	5 x 4	7 / 0.85	0.8	13.2	1.25	18.9	716
	5 x 6	7 / 1.04	0.8	14.7	1.25	20.6	870
	5 x 10	7 / 1.35	1.0	18.7	1.60	25.5	1389
	5 x 16	7 / 1.70	1.0	21.5	1.60	28.3	1810
	5 x 25	7 / 2.14	1.2	26.2	1.60	33.4	2520
	5 x 35	7 / 2.52	1.2	29.3	1.60	37.3	3137
	5 x 50	19 / 1.78	1.4	34.6	2.00	43.0	4377
	5 x 70	19 / 2.14	1.4	39.4	2.00	48.0	5669

Note: (S) - Sectoral Stranded Conductors.

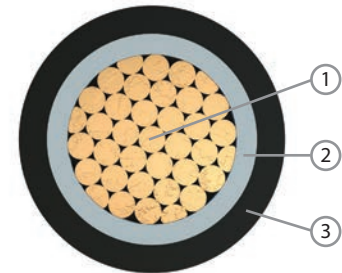
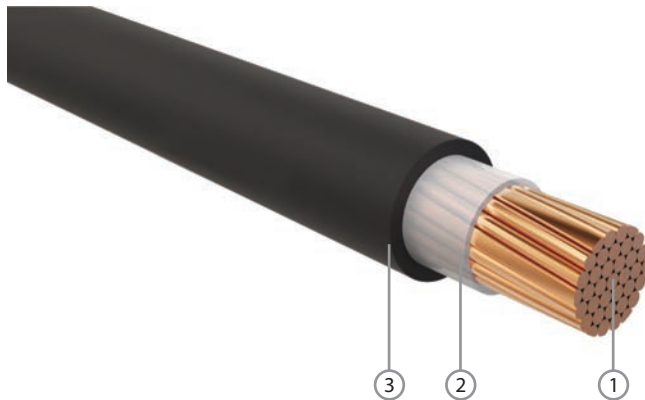
For current rating and voltage drop, please refer to Table B1.4 and B2.4 on Page 53.



XP

CU / XLPE / PVC SINGLE CORE

XLPE Insulated, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

SINGLE CORE	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	1 x 6	7 / 1.04	0.7	7.3	105
	1 x 10	7 / 1.35	0.7	8.3	150
	1 x 16	7 / 1.70	0.7	8.9	225
	1 x 25	7 / 2.14	0.9	10.5	338
	1 x 35	7 / 2.52	0.9	11.6	443
	1 x 50	19 / 1.78	1.0	13.2	582
	1 x 70	19 / 2.14	1.1	15.1	814
	1 x 95	19 / 2.52	1.1	17.1	1097
	1 x 120	37 / 2.03	1.2	18.9	1365
	1 x 150	37 / 2.25	1.4	20.9	1676
	1 x 185	37 / 2.52	1.6	23.1	2081
	1 x 240	61 / 2.25	1.7	26.0	2700
	1 x 300	61 / 2.52	1.8	29.7	3355
	1 x 400	61 / 2.85	2.0	32.1	4262
	1 x 500	61 / 3.20	2.2	35.7	5338
	1 x 630	127 / 2.52	2.4	42.0	6857
	1 x 800	127 / 2.85	2.6	46.9	8701
	1 x 1000	127 / 3.20	2.8	52.0	10891

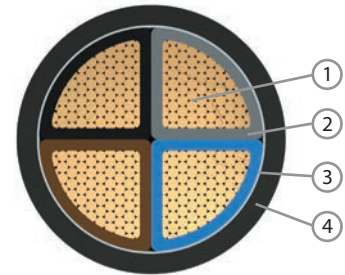
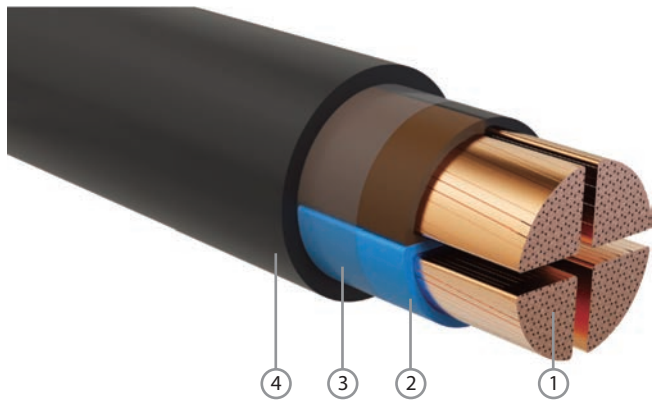
For current rating and voltage drop, please refer to Table B1.5 and B2.5 on Page 54.



XP

CU / XLPE / PVC 2 CORES - 5 CORES

XLPE Insulated, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/ Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2 CORES	2 x 1.5	7 / 0.53	0.7	10.0	123
	2 x 2.5	7 / 0.67	0.7	10.8	153
	2 x 4	7 / 0.85	0.7	11.9	197
	2 x 6	7 / 1.04	0.7	13.0	252
	2 x 10	7 / 1.35	0.7	14.9	358
	2 x 16	7 / 1.70	0.7	17.0	505
	2 x 25	7 / 2.14	0.9	20.4	754
	2 x 35	7 / 2.52	0.9	22.7	984
	2 x 50 (S)	19 / 1.78	1.0	22.4	1237
	2 x 70 (S)	19 / 2.14	1.1	25.4	1711
	2 x 95 (S)	19 / 2.52	1.1	28.2	2287
	2 x 120 (S)	37 / 2.03	1.2	31.2	2856
	2 x 150 (S)	37 / 2.25	1.4	34.9	3523
	2 x 185 (S)	37 / 2.52	1.6	38.1	4387
	2 x 240 (S)	61 / 2.25	1.7	43.2	5678
	2 x 300 (S)	61 / 2.52	1.8	47.4	7028

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.7	10.5	150
	3 x 2.5	7 / 0.67	0.7	11.4	190
	3 x 4	7 / 0.85	0.7	12.5	252
	3 x 6	7 / 1.04	0.7	13.8	328
	3 x 10	7 / 1.35	0.7	15.8	477
	3 x 16	7 / 1.70	0.7	18.1	684
	3 x 25	7 / 2.14	0.9	21.8	1035
	3 x 35	7 / 2.52	0.9	24.2	1364
	3 x 50 (S)	19 / 1.78	1.0	25.0	1766
	3 x 70 (S)	19 / 2.14	1.1	28.9	2480
	3 x 95 (S)	19 / 2.52	1.1	32.6	3338
	3 x 120 (S)	37 / 2.03	1.2	35.8	4166
	3 x 150 (S)	37 / 2.25	1.4	40.4	5147
	3 x 185 (S)	37 / 2.52	1.6	45.0	6424
	3 x 240 (S)	61 / 2.25	1.7	50.5	8335
	3 x 300 (S)	61 / 2.52	1.8	54.6	10297
	3 x 400 (S)	61 / 2.85	2.0	63.7	13234
4 CORES	4 x 1.5	7 / 0.53	0.7	11.3	182
	4 x 2.5	7 / 0.67	0.7	12.3	233
	4 x 4	7 / 0.85	0.7	13.6	312
	4 x 6	7 / 1.04	0.7	15.0	411
	4 x 10	7 / 1.35	0.7	17.2	605
	4 x 16	7 / 1.70	0.7	19.8	876
	4 x 25	7 / 2.14	0.9	23.9	1334
	4 x 35	7 / 2.52	0.9	26.7	1766
	4 x 50 (S)	19 / 1.78	1.0	27.0	2284
	4 x 70 (S)	19 / 2.14	1.1	31.4	3231
	4 x 95 (S)	19 / 2.52	1.1	35.3	4354
	4 x 120 (S)	37 / 2.03	1.2	39.1	5463
	4 x 150 (S)	37 / 2.25	1.4	44.8	6755
	4 x 185 (S)	37 / 2.52	1.6	49.8	8446
	4 x 240 (S)	61 / 2.25	1.7	57.1	11016
	4 x 300 (S)	61 / 2.52	1.8	63.4	13717
	4 x 400 (S)	61 / 2.85	2.0	72.8	17558
5 CORES	5 x 1.5	7 / 0.53	0.7	12.1	214
	5 x 2.5	7 / 0.67	0.7	13.3	278
	5 x 4	7 / 0.85	0.7	14.7	375
	5 x 6	7 / 1.04	0.7	16.6	496
	5 x 10	7 / 1.35	0.7	18.8	737
	5 x 16	7 / 1.70	0.7	21.6	1072
	5 x 25	7 / 2.14	0.9	26.3	1640
	5 x 35	7 / 2.52	0.9	29.3	2176
	5 x 50	19 / 1.78	1.0	34.2	2849
	5 x 70	19 / 2.14	1.1	40.0	4170
	5 x 95	19 / 2.52	1.1	45.3	5617
	5 x 120	37 / 2.03	1.2	50.6	7056
	5 x 150	37 / 2.25	1.4	56.2	8680
	5 x 185	37 / 2.52	1.6	62.8	10860
	5 x 240	61 / 2.25	1.7	70.8	14093
	5 x 300	61 / 2.52	1.8	78.3	17520

Note: (S) - Sectoral Stranded Conductors.

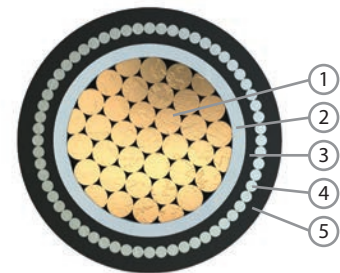
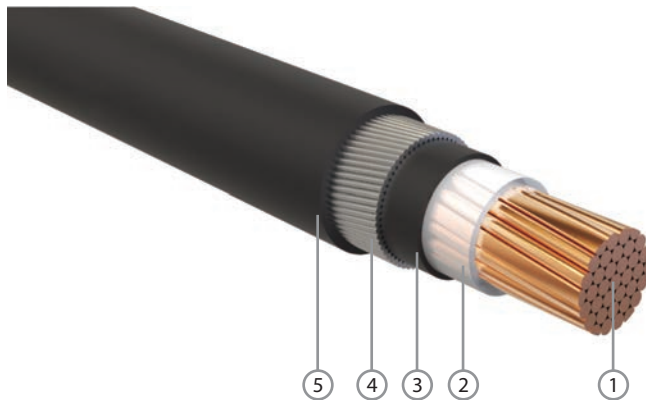
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



XAP

CU / XLPE / PVC / AWA / PVC **SINGLE CORE**

XLPE Insulated, PVC Bedded, Aluminium Wire Armoured, PVC Sheathed Cable,
600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. PVC Compound
4. Aluminium Wire Armoured
5. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Bedding Colour:	Black
Armour:	Aluminium Wire Armoured (AWA)
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	A Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 50	19 / 1.78	1.0	13.2	1.25	17.9	897
	1 x 70	19 / 2.14	1.1	15.2	1.25	19.8	1150
	1 x 95	19 / 2.52	1.1	17.1	1.25	21.8	1444
	1 x 120	37 / 2.03	1.2	18.9	1.6	24.5	1787
	1 x 150	37 / 2.25	1.4	20.9	1.6	26.3	2105
	1 x 185	37 / 2.52	1.6	23.1	1.6	28.7	2535
	1 x 240	61 / 2.25	1.7	26.0	1.6	31.6	3178
	1 x 300	61 / 2.52	1.8	28.6	1.6	34.1	3840
	1 x 400	61 / 2.85	2.0	32.4	2.0	38.9	4921
	1 x 500	61 / 3.20	2.2	35.9	2.0	42.5	6029
	1 x 630	127 / 2.52	2.4	40.3	2.0	48.6	7551
	1 x 800	127 / 2.85	2.6	45.4	2.5	55.1	9646
	1 x 1000	127 / 3.20	2.8	50.3	2.5	60.4	11897

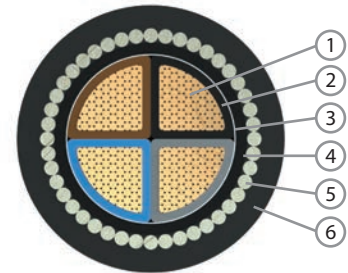
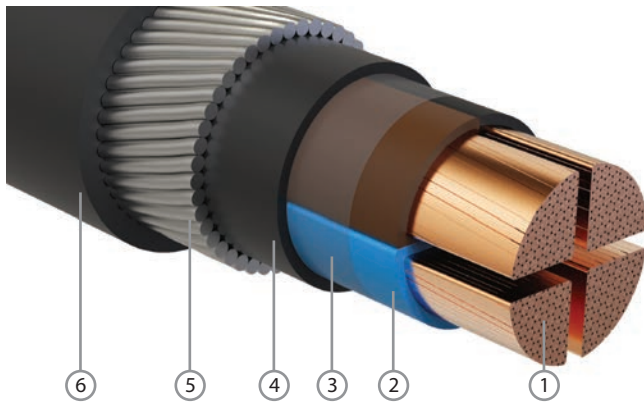
For current rating and voltage drop, please refer to Table B1.7 and B2.7 on Page 56.



XSP

CU / XLPE / PVC / AWA / PVC **2 CORES - 5 CORES**

XLPE Insulated, PVC Bedded, Galvanised Steel Wire Armoured, PVC Sheathed Cable,
600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. PVC Compound
5. Galvanised Steel Wire Armoured
6. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2 or PVC/ST2 Tape
Bedding Colour:	Black
Armour:	Galvanized Steel Wire Armoured (SWA)

Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, Uo/U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	70

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	A Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2 CORES	2 x 1.5	7 / 0.53	0.7	8.3	0.9	13.9	445
	2 x 2.5	7 / 0.67	0.7	9.1	0.9	14.7	498
	2 x 4	7 / 0.85	0.7	10.2	0.9	15.8	573
	2 x 6	7 / 1.04	0.7	11.3	0.9	16.9	658
	2 x 10	7 / 1.35	0.7	13.2	1.25	19.5	913
	2 x 16	7 / 1.70	0.7	15.3	1.25	21.6	1122
	2 x 25	7 / 2.14	0.9	18.7	1.6	25.7	1603
	2 x 35	7 / 2.52	0.9	21.0	1.6	28.0	1921
	2 x 50 (S)	19 / 1.78	1.0	21.2	1.6	28.3	2132
	2 x 70 (S)	19 / 2.14	1.1	24.2	2.0	31.7	2736
	2 x 95 (S)	19 / 2.52	1.1	26.8	2.0	35.3	3626
	2 x 120 (S)	37 / 2.03	1.2	29.6	2.0	38.3	4295
	2 x 150 (S)	37 / 2.25	1.4	32.9	2.0	41.8	5065
	2 x 185 (S)	37 / 2.52	1.6	36.5	2.5	46.8	6434
	2 x 240 (S)	61 / 2.25	1.7	42.2	2.5	52.9	8259
	2 x 300 (S)	61 / 2.52	1.8	46.2	2.5	57.1	9793

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	A Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.7	8.8	0.9	14.4	487
	3 x 2.5	7 / 0.67	0.7	9.7	0.9	15.3	551
	3 x 4	7 / 0.85	0.7	10.8	0.9	16.4	643
	3 x 6	7 / 1.04	0.7	12.1	0.9	17.7	755
	3 x 10	7 / 1.35	0.7	14.1	1.25	20.4	1057
	3 x 16	7 / 1.70	0.7	16.4	1.25	22.7	1337
	3 x 25	7 / 2.14	0.9	20.1	1.6	27.1	1937
	3 x 35	7 / 2.52	0.9	22.5	1.6	29.5	2353
	3 x 50 (S)	19 / 1.78	1.0	23.8	1.6	31.1	2759
	3 x 70 (S)	19 / 2.14	1.1	27.5	2.0	35.8	3827
	3 x 95 (S)	19 / 2.52	1.1	31.0	2.0	39.7	4825
	3 x 120 (S)	37 / 2.03	1.2	34.0	2.0	42.9	5771
	3 x 150 (S)	37 / 2.25	1.4	38.2	2.5	48.5	7301
	3 x 185 (S)	37 / 2.52	1.6	42.6	2.5	53.1	8741
	3 x 240 (S)	61 / 2.25	1.7	49.3	2.5	60.2	11198
	3 x 300 (S)	61 / 2.52	1.8	53.2	2.5	64.5	13357
	3 x 400 (S)	61 / 2.85	2.0	61.7	2.5	73.4	16606
4 CORES	4 x 1.5	7 / 0.53	0.7	9.6	0.9	15.2	541
	4 x 2.5	7 / 0.67	0.7	10.6	0.9	16.2	617
	4 x 4	7 / 0.85	0.7	11.9	0.9	17.5	733
	4 x 6	7 / 1.04	0.7	13.3	1.25	19.6	966
	4 x 10	7 / 1.35	0.7	15.5	1.25	21.8	1234
	4 x 16	7 / 1.70	0.7	18.1	1.6	25.1	1706
	4 x 25	7 / 2.14	0.9	22.2	1.6	29.2	2306
	4 x 35	7 / 2.52	0.9	25.0	1.6	32.2	2855
	4 x 50 (S)	19 / 1.78	1.0	25.8	1.6	33.3	3359
	4 x 70 (S)	19 / 2.14	1.1	29.8	2.0	38.5	4671
	4 x 95 (S)	19 / 2.52	1.1	33.5	2.0	42.4	5935
	4 x 120 (S)	37 / 2.03	1.2	36.9	2.5	47.2	7546
	4 x 150 (S)	37 / 2.25	1.4	44.0	2.5	54.5	9404
	4 x 185 (S)	37 / 2.52	1.6	48.6	2.5	59.5	11315
	4 x 240 (S)	61 / 2.25	1.7	55.5	2.5	66.8	14144
	4 x 300 (S)	61 / 2.52	1.8	61.4	2.5	73.1	17092
	4 x 400 (S)	61 / 2.85	2.0	70.2	3.15	83.8	22157
5 CORES	5 x 1.5	7 / 0.53	0.7	10.4	0.9	16.0	597
	5 x 2.5	7 / 0.67	0.7	11.6	0.9	17.2	690
	5 x 4	7 / 0.85	0.7	13.0	1.25	19.3	918
	5 x 6	7 / 1.04	0.7	14.6	1.25	20.9	1089
	5 x 10	7 / 1.35	0.7	17.1	1.25	23.4	1403
	5 x 16	7 / 1.70	0.7	19.9	1.6	26.9	1973
	5 x 25	7 / 2.14	0.9	24.6	1.6	31.6	2695
	5 x 35	7 / 2.52	0.9	27.6	1.6	34.8	3345
	5 x 50	19 / 1.78	1.0	32.8	2.0	41.3	4502
	5 x 70	19 / 2.14	1.1	38.2	2.0	47.1	5901
	5 x 95	19 / 2.52	1.1	43.3	2.5	53.4	7632
	5 x 120	37 / 2.03	1.2	48.2	2.5	58.7	9585
	5 x 150	37 / 2.25	1.4	55.0	2.5	65.9	11807
	5 x 185	37 / 2.52	1.6	61.2	2.5	72.5	14193
	5 x 240	61 / 2.25	1.7	68.6	2.5	80.5	17700

Note: (S) - Sectoral Stranded Conductors.

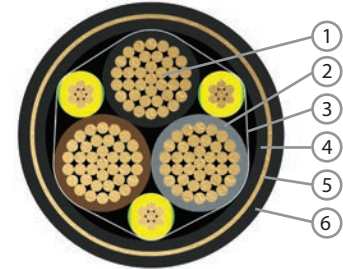
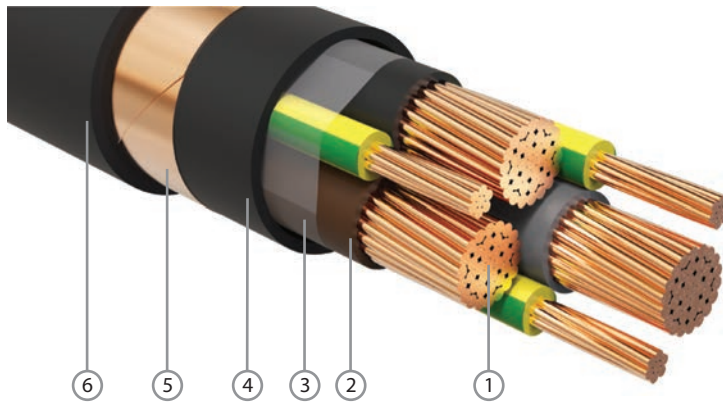
For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



XCP

CU / XLPE / PVC / CT / PVC **3 CORES + 3 EARTH**

XLPE Insulated, PVC Bedded, Copper Tape Screened, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. PVC Compound
5. Copper Tape
6. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Brown, Black, Grey, Green/Yellow (x3)
Assembly:	Cores cabled together with ller and bound with binder tape
Bedding:	Polyvinyl Chloride (PVC) Compound Type ST2
Bedding Colour:	Black
Screen:	Copper Tape
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U _o /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	Combined Earth Size (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES + 3 EARTH	3 x 1.5	4.5 (3 x 1.5)	7 / 0.53	0.7	11.7	16.8	490
	3 x 2.5	4.5 (3 x 1.5)	7 / 0.67	0.7	12.3	17.4	537
	3 x 4	4.5 (3 x 1.5)	7 / 0.85	0.7	13.1	18.2	606
	3 x 6	7.5 (3 x 2.5)	7 / 1.04	0.7	14.6	19.7	736
	3 x 10	12 (3 x 4)	7 / 1.35	0.7	16.8	21.9	964
	3 x 16	18 (3 x 6)	7 / 1.70	0.7	19.2	24.3	1263
	3 x 25	30 (3 x 10)	7 / 2.14	0.9	23.2	28.3	1782
	3 x 35	30 (3 x 10)	7 / 2.52	0.9	24.9	30.0	2111
	3 x 50	30 (3 x 10)	19 / 1.78	1.0	27.4	32.5	2554
	3 x 70	48 (3 x 16)	19 / 2.14	1.1	32.4	37.9	3544
	3 x 95	48 (3 x 16)	19 / 2.52	1.1	35.2	41.3	4569
	3 x 120	75 (3 x 25)	37 / 2.03	1.2	40.5	46.8	5791
	3 x 150	75 (3 x 25)	37 / 2.25	1.4	43.8	50.3	6785
	3 x 185	105 (3 x 35)	37 / 2.52	1.6	49.0	55.9	8415
	3 x 240	150 (3 x 50)	61 / 2.25	1.7	56.0	63.3	10837
	3 x 300	150 (3 x 50)	61 / 2.52	1.8	60.0	67.9	13082

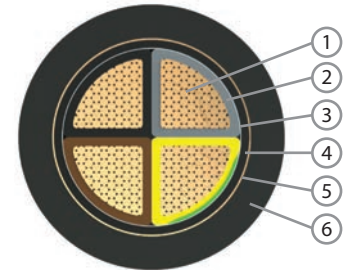
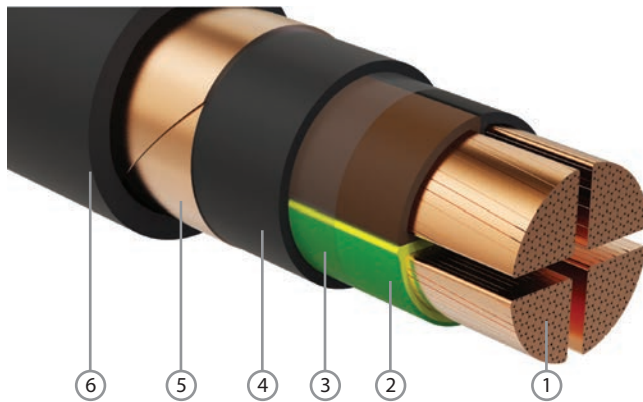
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



XCP

CU / XLPE / PVC / CT / PVC **4 CORES**

XLPE Insulated, PVC Bedded, Copper Tape Screened, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. PVC Compound
5. Copper Tape
6. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Brown, Black, Grey, Green/Yellow
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Bedding Colour:	Black
Screen:	Copper Tape
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
4 CORES	4 x 1.5	7 / 0.53	0.7	9.7	14.1	392
	4 x 2.5	7 / 0.67	0.7	10.7	15.1	460
	4 x 4	7 / 0.85	0.7	12.0	16.4	559
	4 x 6	7 / 1.04	0.7	13.4	17.8	679
	4 x 10	7 / 1.35	0.7	15.6	20.0	905
	4 x 16	7 / 1.70	0.7	18.2	22.6	1207
	4 x 25	7 / 2.14	0.9	22.3	26.7	1721
	4 x 35	7 / 2.52	0.9	25.1	29.5	2178
	4 x 50 (S)	19 / 1.78	1.0	25.4	30.0	2736
	4 x 70 (S)	19 / 2.14	1.1	29.8	34.6	3748
	4 x 95 (S)	19 / 2.52	1.1	33.5	39.1	5047
	4 x 120 (S)	37 / 2.03	1.2	37.3	43.1	6256
	4 x 150 (S)	37 / 2.25	1.4	42.8	49.0	7634
	4 x 185 (S)	37 / 2.52	1.6	47.4	53.8	9361
	4 x 240 (S)	61 / 2.25	1.7	54.7	61.5	12023
	4 x 300 (S)	61 / 2.52	1.8	60.6	68.2	15025

Note: (S) - Sectoral Stranded Conductors.

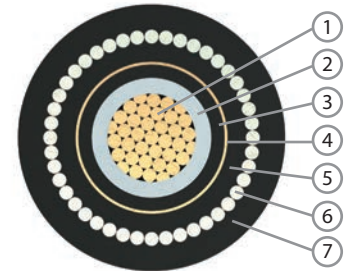
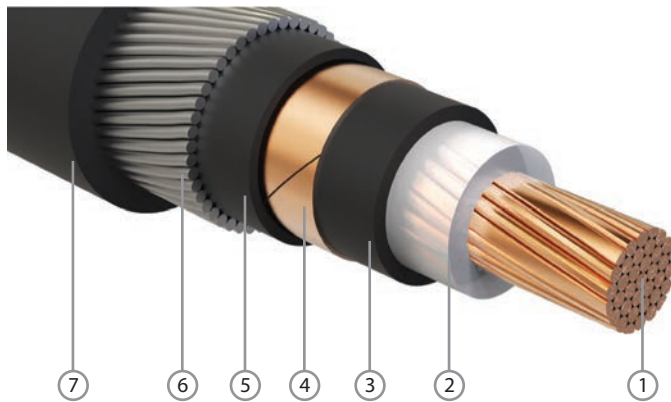
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



XCAP

CU / XLPE / PVC / CT / PVC / AWA / PVC **SINGLE CORE**

XLPE Insulated, PVC Bedded, Copper Tape Screened, PVC Separation Sheath, Aluminium Wire Armoured, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. PVC Compound
4. Copper Tape
5. PVC Compound
6. Aluminium Wire Armoured
7. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Bedding Colour:	Black
Screen:	Copper Tape
Separation Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Separation Sheath Colour:	Black
Armour:	Aluminium Wire Armoured (AWA)
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 70	19 / 2.14	1.1	15.2	18.7	1.6	25.7	1655
	1 x 95	19 / 2.52	1.1	17.2	20.6	1.6	27.6	2010
	1 x 120	37 / 2.03	1.2	19.0	22.4	1.6	29.4	2352
	1 x 150	37 / 2.25	1.4	21.0	24.6	1.6	31.6	2829
	1 x 185	37 / 2.52	1.6	23.2	26.8	1.6	34.0	3344
	1 x 240	61 / 2.25	1.7	26.1	29.7	2.0	37.9	4174
	1 x 300	61 / 2.52	1.8	28.7	32.3	2.0	40.7	5141
	1 x 400	61 / 2.85	2.0	32.5	36.1	2.0	44.7	6271
	1 x 500	61 / 3.20	2.2	36.0	39.6	2.0	48.4	7527
	1 x 630	127 / 2.52	2.4	40.4	44.2	2.5	54.4	9446
	1 x 800	127 / 2.85	2.6	45.5	49.5	2.5	59.9	11625
	1 x 1000	127 / 3.20	2.8	50.4	54.6	2.5	65.4	14114

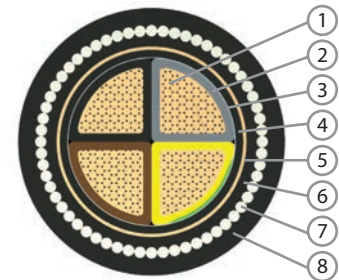
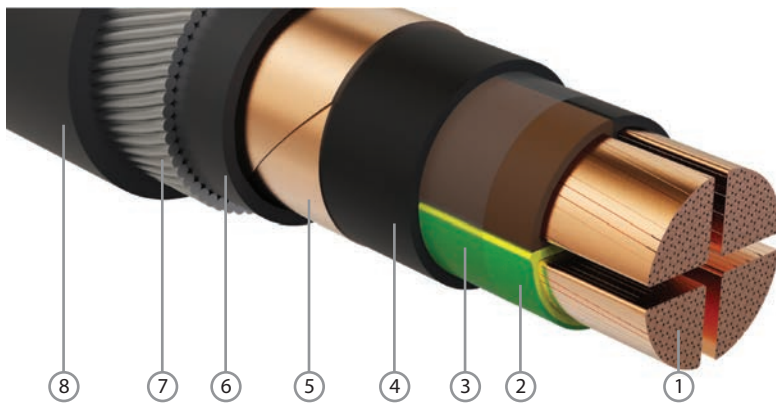
For current rating and voltage drop, please refer to Table B1.7 and B2.7 on Page 56.



XCSP

CU / XLPE / PVC / CT / PVC / SWA / PVC **4 CORES**

XLPE Insulated, PVC Bedded, Copper Tape Screened, PVC Separation Sheath, Galvanised Steel Wire Armoured, PVC Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. PVC Compound
5. Copper Tape
6. PVC Compound
7. Galvanised Steel Wire Armoured
8. PVC Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sected
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Brown, Black, Grey, Green/Yellow
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Bedding Colour:	Black
Screen:	Copper Tape
Separation Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Separation Sheath Colour:	Black
Armour:	Galvanized Steel Wire Armoured (SWA)
Outer Sheath:	Polyvinyl Chloride (PVC) Compound Type PVC/ST2
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U _o /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specication:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	70

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
4 CORES	4 x 1.5	7 / 0.53	0.7	1.25	19.5	880
	4 x 2.5	7 / 0.67	0.7	1.25	20.5	986
	4 x 4	7 / 0.85	0.7	1.25	21.8	1126
	4 x 6	7 / 1.04	0.7	1.25	23.2	1296
	4 x 10	7 / 1.35	0.7	1.60	26.1	1732
	4 x 16	7 / 1.70	0.7	1.60	28.7	2136
	4 x 25	7 / 2.14	0.9	1.60	33.0	2818
	4 x 35	7 / 2.52	0.9	1.60	36.0	3394
	4 x 50 (S)	19 / 1.78	1.0	2.00	37.3	4186
	4 x 70 (S)	19 / 2.14	1.1	2.00	42.1	5421
	4 x 95 (S)	19 / 2.52	1.1	2.50	47.6	7336
	4 x 120 (S)	37 / 2.03	1.2	2.50	52.0	8782
	4 x 150 (S)	37 / 2.25	1.4	2.50	58.1	10495
	4 x 185 (S)	37 / 2.52	1.6	2.50	62.9	12467
	4 x 240 (S)	61 / 2.25	1.7	2.50	71.0	15599
	4 x 300 (S)	61 / 2.52	1.8	3.15	79.0	19597

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



FRT-H

CU / LSZH SINGLE CORE

Cross-Linked Polyolen LSZH Insulated, Non-Sheathed Cable, 450/750V (600/1000V*),
BS EN50525-3-41, H07Z-R



CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyolen (LSZH) Low Smoke Zero Halogen Compound
Insulation Colour:	Black, Green/Yellow, Blue, White, Brown, Grey or Others

REFERENCE STANDARDS

Design Specification:	BS EN50525-3-41, H07Z-R
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

ELECTRICAL CHARACTERISTICS

Operating Voltage:	450/750V (600/1000V*)
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

INSTALLATION REFERENCE

Min. Bending Radius (mm):	6 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 1.5	7 / 0.53	0.7	3.0	25
	1 x 2.5	7 / 0.67	0.8	3.6	37
	1 x 4	7 / 0.85	0.8	4.2	53
	1 x 6	7 / 1.04	0.8	4.7	73
	1 x 10	7 / 1.35	1.0	6.1	121
	1 x 16	7 / 1.70	1.0	6.7	180
	1 x 25	7 / 2.14	1.2	8.3	283
	1 x 35	7 / 2.52	1.2	9.4	379
	1 x 50	19 / 1.78	1.4	11.2	513
	1 x 70	19 / 2.14	1.4	12.9	716
	1 x 95	19 / 2.52	1.6	15.1	987
	1 x 120	37 / 2.03	1.6	16.7	1227
	1 x 150	37 / 2.25	1.8	18.5	1509
	1 x 185	37 / 2.52	2.0	20.7	1889
	1 x 240	61 / 2.25	2.2	23.6	2468
	1 x 300	61 / 2.52	2.4	26.3	3084
	1 x 400	61 / 2.85	2.6	29.5	3923
	1 x 500	61 / 3.20	2.8	32.9	4920
	1 x 630	127 / 2.52	2.8	38.4	6269

Note: For FRT-H cables, Cross-Linked LSZH Compound will be used as the insulation material.

For current rating and voltage drop, please refer to Table B1.5 and B2.5 on Page 54.

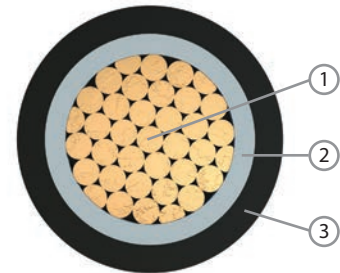
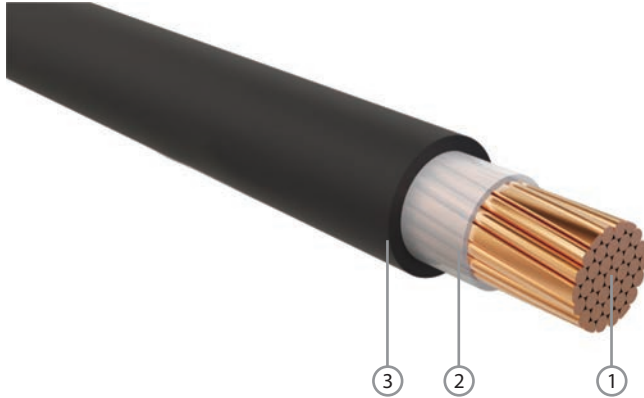
* Condition apply.



FRT-XH

CU / XLPE / LSZH **SINGLE CORE**

XLPE Insulated, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

SINGLE CORE	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	1 x 1.5	7 / 0.53	0.7	5.8	75
	1 x 2.5	7 / 0.67	0.7	6.2	89
	1 x 4	7 / 0.85	0.7	6.8	110
	1 x 6	7 / 1.04	0.7	7.3	136
	1 x 10	7 / 1.35	0.7	8.3	186
	1 x 16	7 / 1.70	0.7	8.9	254
	1 x 25	7 / 2.14	0.9	10.5	367
	1 x 35	7 / 2.52	0.9	11.6	472
	1 x 50	19 / 1.78	1.0	13.2	612
	1 x 70	19 / 2.14	1.1	15.1	837
	1 x 95	19 / 2.52	1.1	17.1	1114
	1 x 120	37 / 2.03	1.2	18.9	1374
	1 x 150	37 / 2.25	1.4	20.9	1675
	1 x 185	37 / 2.52	1.6	23.1	2066
	1 x 240	61 / 2.25	1.7	26.0	2661
	1 x 300	61 / 2.52	1.8	29.7	3291
	1 x 400	61 / 2.85	2.0	32.1	4159
	1 x 500	61 / 3.20	2.2	35.7	5188
	1 x 630	127 / 2.52	2.4	42.0	6638
	1 x 800	127 / 2.85	2.6	46.9	8394
	1 x 1000	127 / 3.20	2.8	52.0	10479

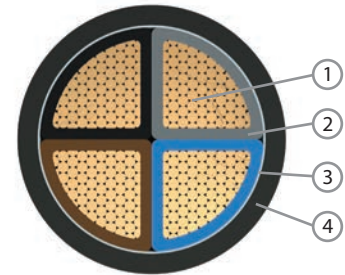
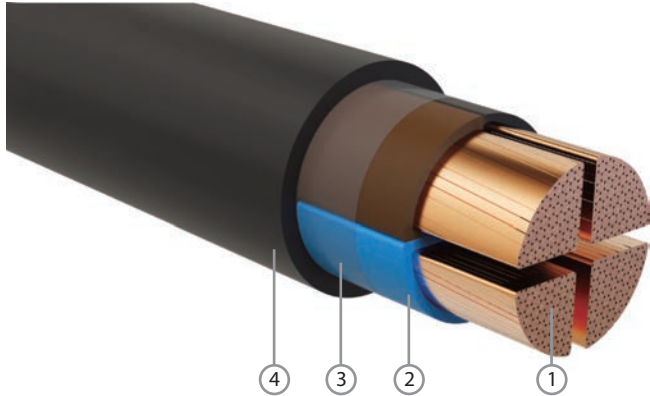
For current rating and voltage drop, please refer to Table B1.5 and B2.5 on Page 54.



FRT-XH

CU / XLPE / LSZH **2 CORES - 5 CORES**

XLPE Insulated, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectoral
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

2 CORES	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	2 x 1.5	7 / 0.53	0.7	10.0	137
	2 x 2.5	7 / 0.67	0.7	10.8	170
	2 x 4	7 / 0.85	0.7	11.9	220
	2 x 6	7 / 1.04	0.7	13.0	280
	2 x 10	7 / 1.35	0.7	14.9	399
	2 x 16	7 / 1.70	0.7	17.0	561
	2 x 25	7 / 2.14	0.9	20.4	841
	2 x 35	7 / 2.52	0.9	22.7	1096
	2 x 50 (S)	19 / 1.78	1.0	22.4	1240
	2 x 70 (S)	19 / 2.14	1.1	25.4	1694
	2 x 95 (S)	19 / 2.52	1.1	28.2	2248
	2 x 120 (S)	37 / 2.03	1.2	31.2	2782
	2 x 150 (S)	37 / 2.25	1.4	34.9	3418
	2 x 185 (S)	37 / 2.52	1.6	38.7	4233
	2 x 240 (S)	61 / 2.25	1.7	43.2	5458
	2 x 300 (S)	61 / 2.52	1.8	47.4	6736

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.7	10.5	159
	3 x 2.5	7 / 0.67	0.7	11.4	201
	3 x 4	7 / 0.85	0.7	12.5	265
	3 x 6	7 / 1.04	0.7	13.8	344
	3 x 10	7 / 1.35	0.7	15.8	500
	3 x 16	7 / 1.70	0.7	18.1	715
	3 x 25	7 / 2.14	0.9	21.8	1082
	3 x 35	7 / 2.52	0.9	24.2	1424
	3 x 50 (S)	19 / 1.78	1.0	25.0	1751
	3 x 70 (S)	19 / 2.14	1.1	28.9	2434
	3 x 95 (S)	19 / 2.52	1.1	32.6	3256
	3 x 120 (S)	37 / 2.03	1.2	35.8	4047
	3 x 150 (S)	37 / 2.25	1.4	40.4	4967
	3 x 185 (S)	37 / 2.52	1.6	45.0	6169
	3 x 240 (S)	61 / 2.25	1.7	50.5	7978
	3 x 300 (S)	61 / 2.52	1.8	54.6	9852
	3 x 400 (S)	61 / 2.85	2.0	63.7	12567
4 CORES	4 x 1.5	7 / 0.53	0.7	11.3	189
	4 x 2.5	7 / 0.67	0.7	12.3	242
	4 x 4	7 / 0.85	0.7	13.6	323
	4 x 6	7 / 1.04	0.7	15.0	425
	4 x 10	7 / 1.35	0.7	17.2	624
	4 x 16	7 / 1.70	0.7	19.8	901
	4 x 25	7 / 2.14	0.9	23.9	1373
	4 x 35	7 / 2.52	0.9	26.7	1815
	4 x 50 (S)	19 / 1.78	1.0	27.0	2254
	4 x 70 (S)	19 / 2.14	1.1	31.4	3162
	4 x 95 (S)	19 / 2.52	1.1	35.3	4241
	4 x 120 (S)	37 / 2.03	1.2	39.1	5302
	4 x 150 (S)	37 / 2.25	1.4	44.8	6503
	4 x 185 (S)	37 / 2.52	1.6	49.8	8104
	4 x 240 (S)	61 / 2.25	1.7	57.1	10515
	4 x 300 (S)	61 / 2.52	1.8	63.4	13058
	4 x 400 (S)	61 / 2.85	2.0	72.8	16625
5 CORES	5 x 1.5	7 / 0.53	0.7	12.1	223
	5 x 2.5	7 / 0.67	0.7	13.3	288
	5 x 4	7 / 0.85	0.7	14.7	388
	5 x 6	7 / 1.04	0.7	16.3	512
	5 x 10	7 / 1.35	0.7	18.8	759
	5 x 16	7 / 1.70	0.7	21.6	1102
	5 x 25	7 / 2.14	0.9	26.3	1685
	5 x 35	7 / 2.52	0.9	29.3	2234
	5 x 50	19 / 1.78	1.0	34.2	2845
	5 x 70	19 / 2.14	1.1	40.0	3989
	5 x 95	19 / 2.52	1.1	45.3	5348
	5 x 120	37 / 2.03	1.2	50.6	6689

Note: (S) - Sectoral Stranded Conductors.

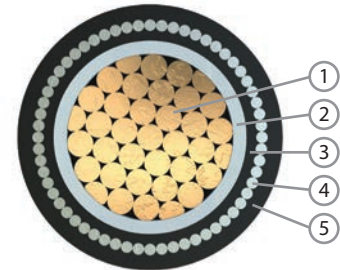
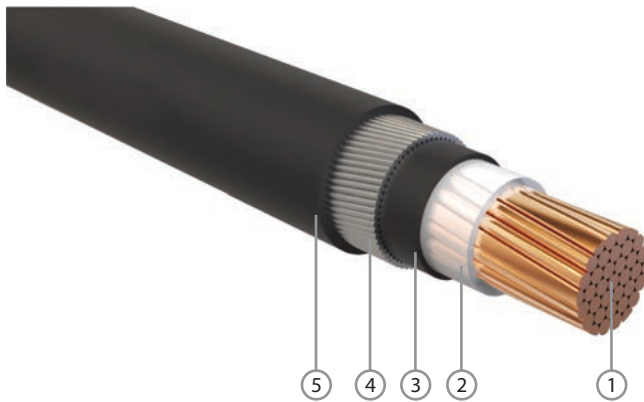
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



FRT-XAH

CU / XLPE / LSZH / AWA / LSZH **SINGLE CORE**

XLPE Insulated, LSZH Bedded, Aluminium Wire Armoured, LSZH Sheathed Cable,
600/1000V, BS6724



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Low Smoke Zero Halogen (LSZH) Compound
4. Aluminium Wire Armoured
5. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Armour:	Aluminium Wire Armoured (AWA)
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	BS6724
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 50	19 / 1.78	12.9	1.25	17.8	932
	1 x 70	19 / 2.14	14.9	1.25	20.4	1149
	1 x 95	19 / 2.52	16.8	1.25	22.4	1463
	1 x 120	37 / 2.03	18.6	1.25	24.2	1762
	1 x 150	37 / 2.25	21.0	1.6	27.3	2181
	1 x 185	37 / 2.52	23.2	1.6	29.8	2633
	1 x 240	61 / 2.25	26.1	1.6	32.5	3279
	1 x 300	61 / 2.52	28.7	1.6	35.2	3966
	1 x 400	61 / 2.85	32.5	2.0	40.0	5044
	1 x 500	61 / 3.20	36.0	2.0	43.6	6168
	1 x 630	127 / 2.52	40.4	2.0	49.7	7711
	1 x 800	127 / 2.85	45.5	2.5	56.1	9840
	1 x 1000	127 / 3.20	50.4	2.5	61.3	12071

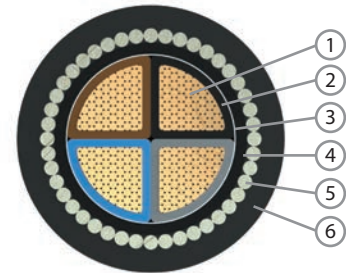
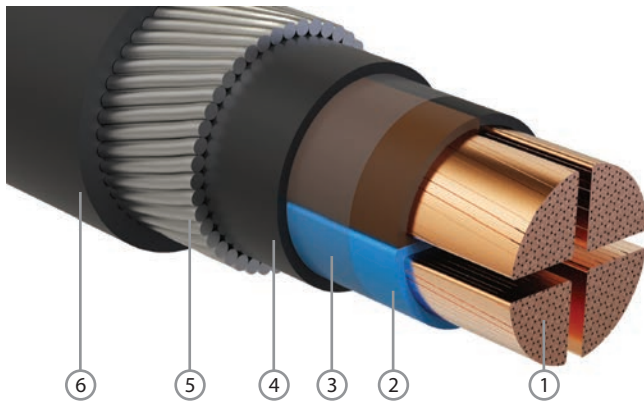
For current rating and voltage drop, please refer to Table B1.7 and B2.7 on Page 56.



FRT-XSH

CU / XLPE / LSZH / SWA / LSZH **2 CORES - 5 CORES**

XLPE Insulated, LSZH Bedded, Galvanised Steel Wire Armoured, LSZH Sheathed Cable, 600/1000V, BS6724



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. Low Smoke Zero Halogen (LSZH) Compound
5. Galvanised Steel Wire Armoured
6. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue Blue, Black 5 Cores: Brown, Black, Grey, Blue, Green/Yellow, or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Armour:	Galvanized Steel Wire Armoured (SWA)
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	BS6724
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	70

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2 CORES	2 x 1.5	7 / 0.53	0.6	7.6	0.9	12.3	341
	2 x 2.5	7 / 0.67	0.7	8.8	0.9	13.7	418
	2 x 4	7 / 0.85	0.7	9.9	0.9	14.8	496
	2 x 6	7 / 1.04	0.7	11.0	0.9	15.9	585
	2 x 10	7 / 1.35	0.7	12.9	0.9	18.7	769
	2 x 16	7 / 1.70	0.7	15.0	1.25	20.8	1081
	2 x 25	7 / 2.14	0.9	18.4	1.6	25.1	1496
	2 x 35	7 / 2.52	0.9	21.1	1.6	28.0	2014
	2 x 50 (S)	19 / 1.78	1.0	20.7	1.6	27.8	2135
	2 x 70 (S)	19 / 2.14	1.1	23.7	1.6	31.0	2728
	2 x 95 (S)	19 / 2.52	1.1	26.7	2.0	35.0	3642
	2 x 120 (S)	37 / 2.03	1.2	29.5	2.0	38.0	4341
	2 x 150 (S)	37 / 2.25	1.4	32.8	2.0	41.5	5117
	2 x 185 (S)	37 / 2.52	1.6	36.8	2.5	46.9	6574
	2 x 240 (S)	61 / 2.25	1.7	40.9	2.5	51.2	8025
	2 x 300 (S)	61 / 2.52	1.8	45.3	2.5	55.8	9596

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.6	8.0	0.9	12.7	375
	3 x 2.5	7 / 0.67	0.7	9.4	0.9	14.3	463
	3 x 4	7 / 0.85	0.7	10.5	0.9	15.4	556
	3 x 6	7 / 1.04	0.7	11.8	0.9	16.7	669
	3 x 10	7 / 1.35	0.7	13.8	1.25	19.6	981
	3 x 16	7 / 1.70	0.7	16.1	1.25	22.1	1283
	3 x 25	7 / 2.14	0.9	20.2	1.6	27.1	1959
	3 x 35	7 / 2.52	0.9	22.6	1.6	29.7	2418
	3 x 50 (S)	19 / 1.78	1.0	23.3	1.6	30.4	2751
	3 x 70 (S)	19 / 2.14	1.1	27.0	1.6	35.1	3610
	3 x 95 (S)	19 / 2.52	1.1	30.9	1.6	39.4	4873
	3 x 120 (S)	37 / 2.03	1.2	33.9	2.0	42.6	5824
	3 x 150 (S)	37 / 2.25	1.4	38.1	2.5	48.0	7300
	3 x 185 (S)	37 / 2.52	1.6	42.9	2.5	53.0	8832
	3 x 240 (S)	61 / 2.25	1.7	48.0	2.5	58.5	10979
	3 x 300 (S)	61 / 2.52	1.8	52.3	2.5	63.0	13153
	3 x 400 (S)	61 / 2.85	2.0	60.8	2.5	71.9	16378
4 CORES	4 x 1.5	7 / 0.53	0.6	8.8	0.9	13.5	416
	4 x 2.5	7 / 0.67	0.7	10.3	0.9	15.2	526
	4 x 4	7 / 0.85	0.7	11.6	0.9	16.5	642
	4 x 6	7 / 1.04	0.7	13.0	1.25	18.8	880
	4 x 10	7 / 1.35	0.7	15.2	1.25	21.0	1156
	4 x 16	7 / 1.70	0.7	17.8	1.25	24.5	1531
	4 x 25	7 / 2.14	0.9	22.3	1.6	29.2	2335
	4 x 35	7 / 2.52	0.9	25.1	1.6	32.2	2914
	4 x 50 (S)	19 / 1.78	1.0	25.3	1.6	32.6	3351
	4 x 70 (S)	19 / 2.14	1.1	29.7	2.0	38.2	4717
	4 x 95 (S)	19 / 2.52	1.1	33.4	2.0	42.1	5988
	4 x 120 (S)	37 / 2.03	1.2	37.2	2.5	47.1	7625
	4 x 150 (S)	37 / 2.25	1.4	42.7	2.5	52.8	9164
	4 x 185 (S)	37 / 2.52	1.6	47.3	2.5	57.8	11059
	4 x 240 (S)	61 / 2.25	1.7	54.6	2.5	65.3	13939
	4 x 300 (S)	61 / 2.52	1.8	60.5	2.5	71.6	16865
	4 x 400 (S)	61 / 2.85	2.0	69.7	3.15	82.7	21985
5 CORES	5 x 1.5	7 / 0.53	0.6	9.6	0.9	14.5	478
	5 x 2.5	7 / 0.67	0.7	11.3	0.9	16.2	599
	5 x 4	7 / 0.85	0.7	12.7	0.9	18.5	752
	5 x 6	7 / 1.04	0.7	14.3	1.25	20.1	1007
	5 x 10	7 / 1.35	0.7	16.8	1.25	22.8	1352
	5 x 16	7 / 1.70	0.7	20.0	1.6	26.9	1977
	5 x 25	7 / 2.14	0.9	24.7	1.6	31.8	2764
	5 x 35	7 / 2.52	0.9	27.7	1.6	35.0	3456
	5 x 50	19 / 1.78	1.0	32.7	2.0	41.0	4553
	5 x 70	19 / 2.14	1.1	38.1	2.0	46.8	5961

Note: (S) - Sectoral Stranded Conductors.

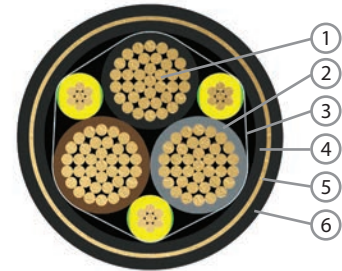
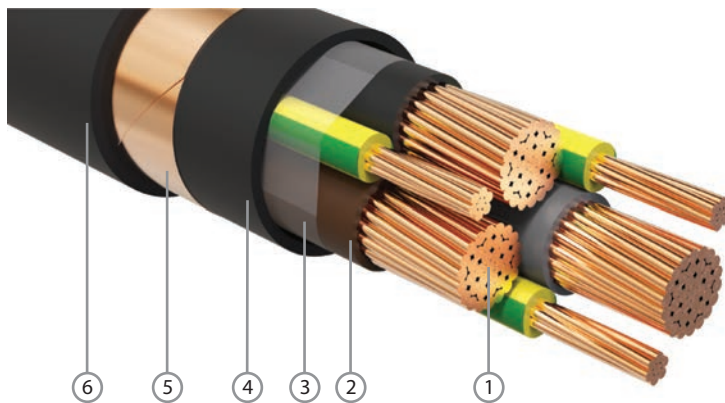
For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



FRT-XCH

CU / XLPE / LSZH / CT / LSZH **3 CORES + 3 EARTH**

XLPE Insulated, LSZH Bedded, Copper Tape Screened, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. Low Smoke Zero Halogen (LSZH) Compound
5. Copper Tape
6. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Brown, Black, Grey, Green/Yellow (x3)
Assembly:	Cores cabled together with ller and bound with binder tape
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Screen:	Copper Tape
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	Combined Earth Size (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES + 3 EARTH	3 x 1.5	4.5 (3 x 1.5)	7 / 0.53	0.7	11.7	16.8	485
	3 x 2.5	4.5 (3 x 1.5)	7 / 0.67	0.7	12.3	17.4	532
	3 x 4	4.5 (3 x 1.5)	7 / 0.85	0.7	13.1	18.2	602
	3 x 6	7.5 (3 x 2.5)	7 / 1.04	0.7	14.6	19.7	734
	3 x 10	12 (3 x 4)	7 / 1.35	0.7	16.8	21.9	966
	3 x 16	18 (3 x 6)	7 / 1.70	0.7	19.2	24.3	1271
	3 x 25	30 (3 x 10)	7 / 2.14	0.9	23.2	28.3	1796
	3 x 35	30 (3 x 10)	7 / 2.52	0.9	24.9	30.0	2131
	3 x 50	30 (3 x 10)	19 / 1.78	1.0	27.4	32.7	2743
	3 x 70	48 (3 x 16)	19 / 2.14	1.1	32.4	37.9	3763
	3 x 95	48 (3 x 16)	19 / 2.52	1.1	35.2	40.9	4658
	3 x 120	75 (3 x 25)	37 / 2.03	1.2	40.9	46.4	5905
	3 x 150	75 (3 x 25)	37 / 2.25	1.4	43.8	49.9	6919
	3 x 185	105 (3 x 35)	37 / 2.52	1.6	49.0	55.5	8584
	3 x 240	150 (3 x 50)	61 / 2.25	1.7	56.3	63.4	11343
	3 x 300	150 (3 x 50)	61 / 2.52	1.8	60.3	67.6	13373

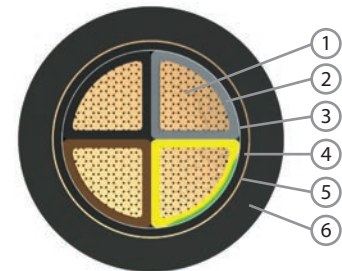
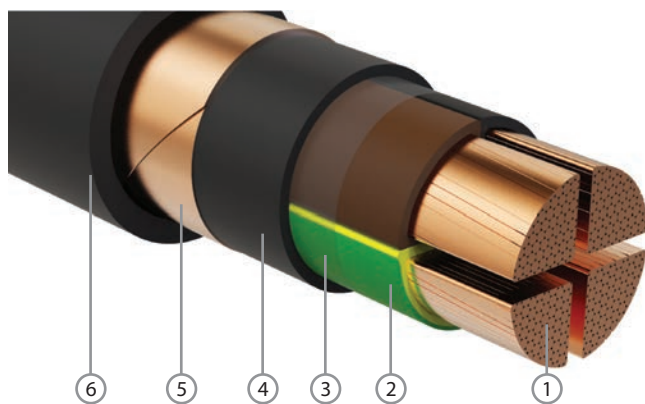
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



FRT-XCH

CU / XLPE / LSZH / CT / LSZH **4 CORES**

XLPE Insulated, LSZH Bedded, Copper Tape Screened, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. Low Smoke Zero Halogen (LSZH) Compound
5. Copper Tape
6. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Brown, Black, Grey, Green/Yellow
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Screen:	Copper Tape
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage, U ₀ /U:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-1, BS EN60332-1
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
4 CORES	4 x 1.5	7 / 0.53	0.7	9.7	14.4	371
	4 x 2.5	7 / 0.67	0.7	10.7	15.4	441
	4 x 4	7 / 0.85	0.7	12.0	16.7	544
	4 x 6	7 / 1.04	0.7	13.4	18.1	668
	4 x 10	7 / 1.35	0.7	15.6	20.3	907
	4 x 16	7 / 1.70	0.7	18.2	22.9	1229
	4 x 25	7 / 2.14	0.9	22.3	27.0	1770
	4 x 35	7 / 2.52	0.9	25.1	29.8	2264
	4 x 50 (S)	19 / 1.78	1.0	25.4	30.3	2721
	4 x 70 (S)	19 / 2.14	1.1	29.8	34.9	3734
	4 x 95 (S)	19 / 2.52	1.1	33.5	39.0	5069
	4 x 120 (S)	37 / 2.03	1.2	37.3	43.0	6254
	4 x 150 (S)	37 / 2.25	1.4	42.8	48.9	7622
	4 x 185 (S)	37 / 2.52	1.6	47.4	53.7	9333
	4 x 240 (S)	61 / 2.25	1.7	54.7	61.8	12296
	4 x 300 (S)	61 / 2.52	1.8	60.6	67.9	15030

Note: (S) - Sectoral Stranded Conductors.

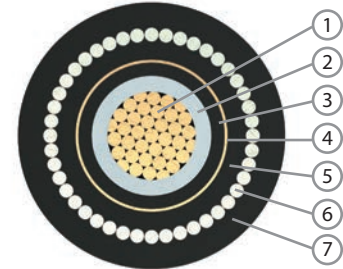
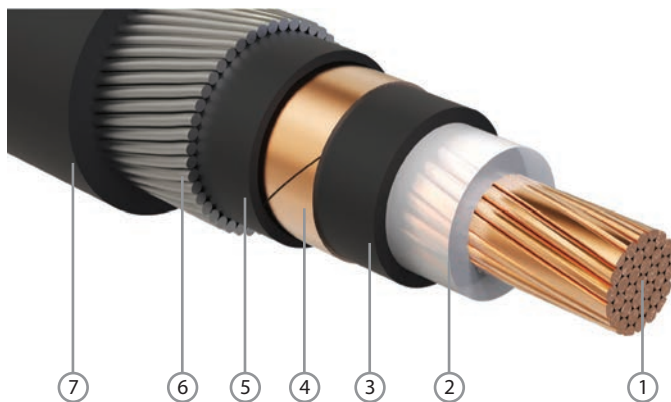
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



FRT-XCAH

CU / XLPE / LSZH / CT / LSZH / AWA / SWA / LSZH **SINGLE CORE**

XLPE Insulated, LSZH Bedded, Copper Tape Screened, LSZH Separation Sheath, Aluminium Wire Armoured, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Low Smoke Zero Halogen (LSZH) Compound
4. Copper Tape
5. Low Smoke Zero Halogen (LSZH) Compound
6. Aluminium Wire Armoured
7. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Screen:	Copper Tape
Separation Sheath:	Low Smoke Zero Halogen (LSZH) Compound
Separation Sheath Colour:	Black
Armour:	Aluminium Wire Armoured (AWA)
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 70	19 / 2.14	1.1	15.3	18.7	1.6	25.7	1677
	1 x 95	19 / 2.52	1.1	17.2	20.6	1.6	27.6	2111
	1 x 120	37 / 2.03	1.2	19.0	22.4	1.6	29.4	2463
	1 x 150	37 / 2.25	1.4	21.0	24.6	1.6	31.4	2846
	1 x 185	37 / 2.52	1.6	23.2	26.8	1.6	34.0	3533
	1 x 240	61 / 2.25	1.7	26.1	29.7	2.0	37.9	4383
	1 x 300	61 / 2.52	1.8	28.7	32.3	2.0	40.7	5181
	1 x 400	61 / 2.85	2.0	32.5	36.1	2.0	44.7	6317
	1 x 500	61 / 3.20	2.2	36.0	39.6	2.0	48.4	7578
	1 x 630	127 / 2.52	2.4	40.4	44.2	2.5	54.4	9505
	1 x 800	127 / 2.85	2.6	45.5	49.5	2.5	59.9	11694
	1 x 1000	127 / 3.20	2.8	50.4	54.6	2.5	65.4	14193

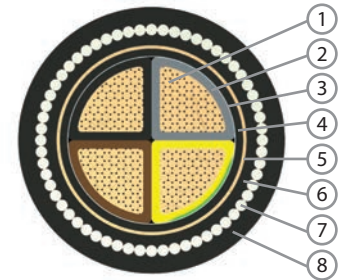
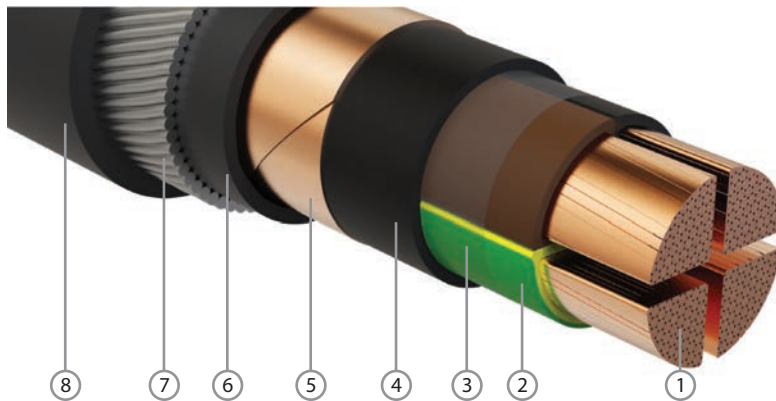
For current rating and voltage drop, please refer to Table B1.7 and B2.7 on Page56.



FRT-XCSH

CU / XLPE / LSZH / CT / LSZH / SWA / LSZH **4 CORES**

XLPE Insulated, LSZH Bedded, Copper Tape Screened, LSZH Separation Sheath, Galvanised Steel Wire Armoured, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Cross-linked Polyethylene Compound
3. Binder Tape
4. Low Smoke Zero Halogen (LSZH) Compound
5. Copper Tape
6. Low Smoke Zero Halogen (LSZH) Compound
7. Galvanised Steel Wire Armoured
8. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Brown, Black, Grey, Green/Yellow
Assembly:	Cores cabled together with ller and bound with binder tape
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Screen:	Copper Tape
Separation Sheath:	Low Smoke Zero Halogen (LSZH) Compound
Separation Sheath Colour:	Black
Armour:	Galvanized Steel Wire Armoured (SWA)
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Black

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specication:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	70

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Screen (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
4 CORES	4 x 1.5	7 / 0.53	0.7	9.7	13.1	1.25	19.9	871
	4 x 2.5	7 / 0.67	0.7	10.7	14.1	1.25	20.9	981
	4 x 4	7 / 0.85	0.7	12.0	15.4	1.25	22.2	1127
	4 x 6	7 / 1.04	0.7	13.4	16.8	1.25	23.6	1304
	4 x 10	7 / 1.35	0.7	15.6	19.0	1.6	26.5	1758
	4 x 16	7 / 1.70	0.7	18.2	21.6	1.6	29.1	2186
	4 x 25	7 / 2.14	0.9	22.3	25.7	1.6	33.4	2915
	4 x 35	7 / 2.52	0.9	25.1	28.5	1.6	36.4	3535
	4 x 50 (S)	19 / 1.78	1.0	25.4	28.8	2.0	37.7	4370
	4 x 70 (S)	19 / 2.14	1.1	29.8	33.2	2.0	42.5	5651
	4 x 95 (S)	19 / 2.52	1.1	33.5	37.1	2.5	47.6	7413
	4 x 120 (S)	37 / 2.03	1.2	37.3	41.1	2.5	52.0	8888
	4 x 150 (S)	37 / 2.25	1.4	42.8	46.8	2.5	58.1	10632
	4 x 185 (S)	37 / 2.52	1.6	47.4	51.4	2.5	62.9	12641
	4 x 240 (S)	61 / 2.25	1.7	54.7	59.3	2.5	71.2	16133
	4 x 300 (S)	61 / 2.52	1.8	60.6	65.4	3.15	79.2	20227

Note: (S) - Sectoral Stranded Conductors.

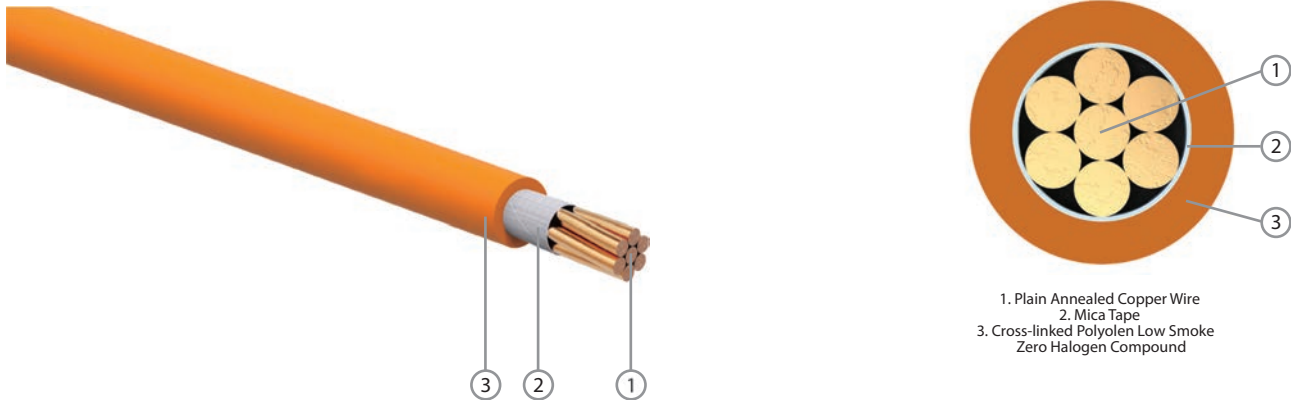
For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



FR-H 110

CU / MGT / LSZH **SINGLE CORE**

Mica Taped, Cross-linked Polyolen LSZH Insulated, Non-Sheathed Cable, 450/750V (600/1000V*),
BS EN50525-3-41



CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyolen (LSZH) Low Smoke Zero Halogen Compound
Insulation Colour:	Orange or Others

REFERENCE STANDARDS

Design Specification:	BS EN50525-3-41
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C,W,Z), SS299 (C), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

ELECTRICAL CHARACTERISTICS

Operating Voltage:	450/750V (600/1000V*)
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

SINGLE CORE	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	1 x 1.5	7 / 0.53	0.7	4.0	32
	1 x 2.5	7 / 0.67	0.8	4.7	46
	1 x 4	7 / 0.85	0.8	5.2	62
	1 x 6	7 / 1.04	0.8	5.8	84
	1 x 10	7 / 1.35	1.0	7.1	135
	1 x 16	7 / 1.70	1.0	7.7	195
	1 x 25	7 / 2.14	1.2	9.3	299
	1 x 35	7 / 2.52	1.2	10.4	397
	1 x 50	19 / 1.78	1.4	12.3	533
	1 x 70	19 / 2.14	1.4	14.0	740
	1 x 95	19 / 2.52	1.6	16.2	1015
	1 x 120	37 / 2.03	1.6	17.8	1257
	1 x 150	37 / 2.25	1.8	19.6	1524
	1 x 185	37 / 2.52	2.0	21.8	1926
	1 x 240	61 / 2.25	2.2	24.7	2510
	1 x 300	61 / 2.52	2.4	27.4	3131
	1 x 400	61 / 2.85	2.6	30.6	3975
	1 x 500	61 / 3.20	2.8	34.0	4978
	1 x 630	127 / 2.52	2.8	39.5	6333

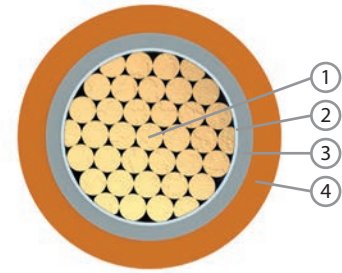
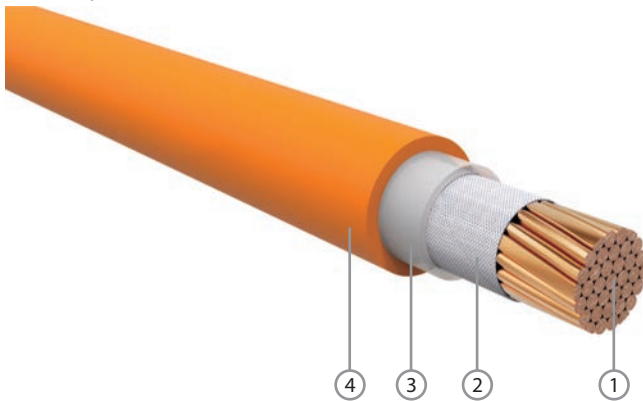
Note: For FR-H cables, Cross-linked LSZH Compound will be used as the insulation material.
For current rating and voltage drop, please refer to Table B1.5 and B2.5 on Page 54.
* Condition apply.



FR-XH

CU / MGT / XLPE / LSZH **SINGLE CORE**

Mica Taped, XLPE Insulated, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Mica Tape
3. Cross-linked Polyethylene Compound
4. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Orange or Others

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C,W,Z), SS299 (C), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

SINGLE CORE	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	1 x 1.5	7 / 0.53	0.7	6.8	78
	1 x 2.5	7 / 0.67	0.7	7.3	92
	1 x 4	7 / 0.85	0.7	7.8	114
	1 x 6	7 / 1.04	0.7	8.4	141
	1 x 10	7 / 1.35	0.7	9.3	192
	1 x 16	7 / 1.70	0.7	9.9	261
	1 x 25	7 / 2.14	0.9	11.5	376
	1 x 35	7 / 2.52	0.9	12.6	482
	1 x 50	19 / 1.78	1.0	14.3	624
	1 x 70	19 / 2.14	1.1	16.2	851
	1 x 95	19 / 2.52	1.1	18.2	1131
	1 x 120	37 / 2.03	1.2	20.0	1393
	1 x 150	37 / 2.25	1.4	22.0	1695
	1 x 185	37 / 2.52	1.6	24.2	2088
	1 x 240	61 / 2.25	1.7	27.1	2687
	1 x 300	61 / 2.52	1.8	29.8	3319
	1 x 400	61 / 2.85	2.0	33.2	4190
	1 x 500	61 / 3.20	2.2	36.8	5222
	1 x 630	127 / 2.52	2.4	43.1	6675
	1 x 800	127 / 2.85	2.6	48.0	8436
	1 x 1000	127 / 3.20	2.8	53.1	10525

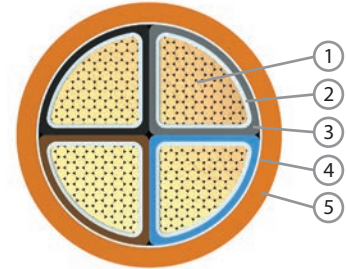
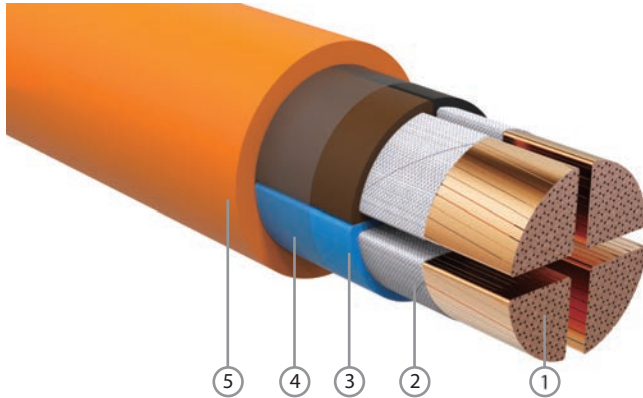
For current rating and voltage drop, please refer to Table B1.5 and B2.5 on Page 54.



FR-XH

CU / MGT / XLPE / LSZH **2 CORES - 5 CORES**

Mica Taped, XLPE Insulated, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Mica Tape
3. Cross-linked Polyethylene Compound
4. Binder Tape
5. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Orange or Others

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C,W,Z), SS299 (C,W,Z), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2 CORES	2 x 1.5	7 / 0.53	0.7	12.1	186
	2 x 2.5	7 / 0.67	0.7	12.9	223
	2 x 4	7 / 0.85	0.7	14.0	277
	2 x 6	7 / 1.04	0.7	15.1	343
	2 x 10	7 / 1.35	0.7	17.0	409
	2 x 16	7 / 1.70	0.7	19.1	639
	2 x 25	7 / 2.14	0.9	22.5	933
	2 x 35	7 / 2.52	0.9	24.8	1196
	2 x 50 (S)	19 / 1.78	1.0	23.4	1292
	2 x 70 (S)	19 / 2.14	1.1	26.4	1750
	2 x 95 (S)	19 / 2.52	1.1	29.2	2308
	2 x 120 (S)	37 / 2.03	1.2	32.2	2852
	2 x 150 (S)	37 / 2.25	1.4	36.0	3484
	2 x 185 (S)	37 / 2.52	1.6	39.8	4302
	2 x 240 (S)	61 / 2.25	1.7	44.2	5528
	2 x 300 (S)	61 / 2.52	1.8	48.4	6806

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.7	12.7	213
	3 x 2.5	7 / 0.67	0.7	13.6	259
	3 x 4	7 / 0.85	0.7	14.8	328
	3 x 6	7 / 1.04	0.7	16.0	413
	3 x 10	7 / 1.35	0.7	18.0	577
	3 x 16	7 / 1.70	0.7	20.3	801
	3 x 25	7 / 2.14	0.9	24.0	1183
	3 x 35	7 / 2.52	0.9	26.5	1534
	3 x 50 (S)	19 / 1.78	1.0	26.3	1826
	3 x 70 (S)	19 / 2.14	1.1	29.9	2511
	3 x 95 (S)	19 / 2.52	1.1	33.2	3331
	3 x 120 (S)	37 / 2.03	1.2	36.4	4127
	3 x 150 (S)	37 / 2.25	1.4	41.3	5056
	3 x 185 (S)	37 / 2.52	1.6	45.6	6256
	3 x 240 (S)	61 / 2.25	1.7	51.9	8082
	3 x 300 (S)	61 / 2.52	1.8	55.8	9952
	3 x 400 (S)	61 / 2.85	2.0	65.2	12671
	3 x 500 (S)	61 / 3.20	2.2	71.4	15789
4 CORES	4 x 1.5	7 / 0.53	0.7	13.8	254
	4 x 2.5	7 / 0.67	0.7	14.8	312
	4 x 4	7 / 0.85	0.7	16.1	400
	4 x 6	7 / 1.04	0.7	17.5	508
	4 x 10	7 / 1.35	0.7	19.7	718
	4 x 16	7 / 1.70	0.7	22.3	1006
	4 x 25	7 / 2.14	0.9	26.5	1496
	4 x 35	7 / 2.52	0.9	29.2	1949
	4 x 50 (S)	19 / 1.78	1.0	29.7	2367
	4 x 70 (S)	19 / 2.14	1.1	33.7	3280
	4 x 95 (S)	19 / 2.52	1.1	37.5	4364
	4 x 120 (S)	37 / 2.03	1.2	41.7	5430
	4 x 150 (S)	37 / 2.25	1.4	46.7	6634
	4 x 185 (S)	37 / 2.52	1.6	51.5	8239
	4 x 240 (S)	61 / 2.25	1.7	58.6	10648
	4 x 300 (S)	61 / 2.52	1.8	64.2	13177
	4 x 400 (S)	61 / 2.85	2.0	74.1	16752
	4 x 500 (S)	61 / 3.20	2.2	84.9	20967
5 CORES	5 x 1.5	7 / 0.53	0.7	15.0	301
	5 x 2.5	7 / 0.67	0.7	16.1	372
	5 x 4	7 / 0.85	0.7	17.5	480
	5 x 6	7 / 1.04	0.7	19.1	613
	5 x 10	7 / 1.35	0.7	21.6	872
	5 x 16	7 / 1.70	0.7	24.4	1229
	5 x 25	7 / 2.14	0.9	29.1	1835
	5 x 35	7 / 2.52	0.9	32.2	2397
	5 x 50	19 / 1.78	1.0	37.0	2979
	5 x 70	19 / 2.14	1.1	42.8	4137
	5 x 95	19 / 2.52	1.1	48.1	5505
	5 x 120	37 / 2.03	1.2	53.4	6855

Note: (S) - Sectoral Stranded Conductors.

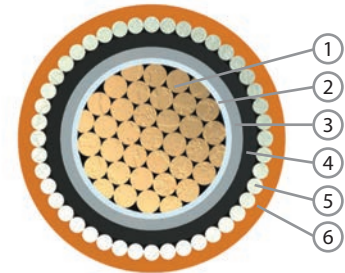
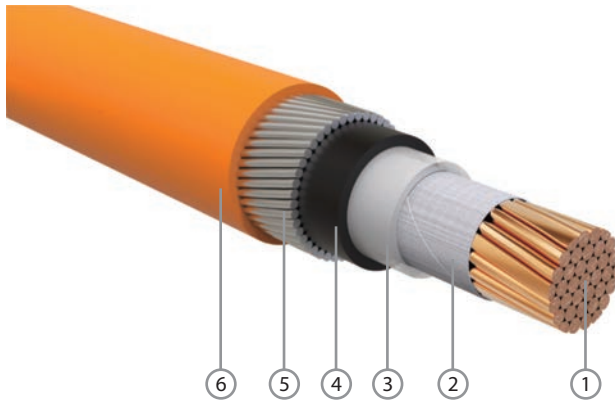
For current rating and voltage drop, please refer to Table B1.6 and B2.6 on Page 55.



FR-XAH

CU / MGT / XLPE / LSZH / AWA / LSZH SINGLE CORE

Mica Taped, XLPE Insulated, LSZH Bedded, Aluminium Wire Armoured, LSZH Sheathed Cable, 600/1000V, IEC60502-1



1. Plain Annealed Copper Wire
2. Mica Tape
3. Cross-linked Polyethylene Compound
4. Low Smoke Zero Halogen (LSZH) Compound
5. Aluminium Wire Armoured
6. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Natural
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Armour:	Aluminium Wire Armoured (AWA)
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Orange or Others

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	IEC60502-1
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C,W,Z), SS299 (C,W,Z), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	10 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE CORE	1 x 50	19 / 1.78	1.0	14.3	1.25	20.0	996
	1 x 70	19 / 2.14	1.1	16.3	1.25	21.7	1265
	1 x 95	19 / 2.52	1.1	18.2	1.25	23.7	1573
	1 x 120	37 / 2.03	1.2	20.1	1.6	26.4	1931
	1 x 150	37 / 2.25	1.4	22.0	1.6	28.2	2269
	1 x 185	37 / 2.52	1.6	24.3	1.6	30.6	2711
	1 x 240	61 / 2.25	1.7	27.1	1.6	33.5	3379
	1 x 300	61 / 2.52	1.8	29.7	1.6	36.0	4056
	1 x 400	61 / 2.85	2.0	33.5	2.0	40.8	5168
	1 x 500	61 / 3.20	2.2	37.0	2.0	44.4	6302
	1 x 630	127 / 2.52	2.4	41.4	2.0	50.5	7856
	1 x 800	127 / 2.85	2.6	46.5	2.5	57.0	9996
	1 x 1000	127 / 3.20	2.8	51.4	2.5	62.3	12269

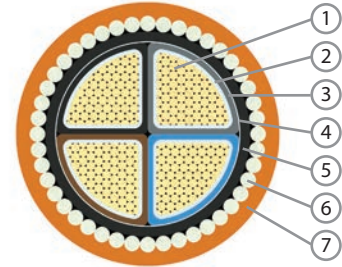
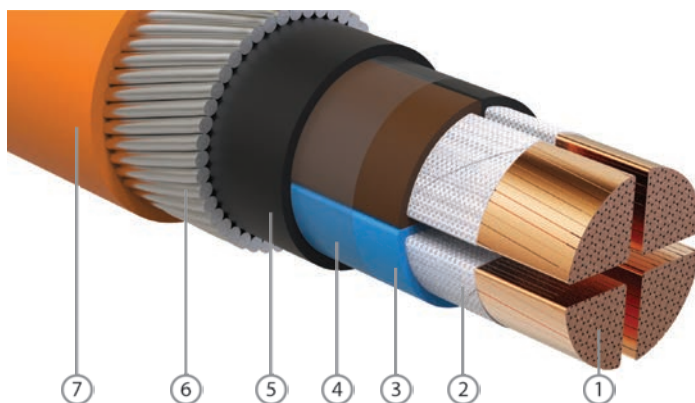
For current rating and voltage drop, please refer to Table B1.7 and B2.7 on Page 56.



FR-XSH

CU / MGT / XLPE / LSZH / SWA / LSZH **2 CORES - 5 CORES**

Mica Taped, XLPE Insulated, LSZH Bedded, Galvanised Steel Wire Armoured, LSZH Sheathed Cable, 600/1000V, BS7846



1. Plain Annealed Copper Wire
2. Mica Tape
3. Cross-linked Polyethylene Compound
4. Binder Tape
5. Low Smoke Zero Halogen (LSZH) Compound
6. Galvanised Steel Wire Armoured
7. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular, Compacted or Sectored
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow or White with Black numbering
Assembly:	Cores cabled together with Iler and bound with binder tape
Bedding:	Low Smoke Zero Halogen (LSZH) Compound
Bedding Colour:	Black
Armour:	Galvanized Steel Wire Armoured (SWA)
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Orange or Others

ELECTRICAL CHARACTERISTICS

Operating Voltage:	600/1000V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	3.5kV for 5 minutes

REFERENCE STANDARDS

Design Specification:	BS7846
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C,W,Z), SS299 (C,W,Z), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	10 x cable overall diameter
Max. Pulling Tension (N/mm ²):	70

2 CORES	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	2 x 1.5	7 / 0.53	0.6	9.6	0.9	11.4	438
	2 x 2.5	7 / 0.67	0.7	11.0	0.9	16.0	531
	2 x 4	7 / 0.85	0.7	12.6	0.9	17.0	607
	2 x 6	7 / 1.04	0.7	13.2	0.9	18.2	709
	2 x 10	7 / 1.35	0.7	15.0	1.25	20.2	888
	2 x 16	7 / 1.70	0.7	17.0	1.25	22.9	1228
	2 x 25	7 / 2.14	0.9	20.6	1.6	26.7	1657
	2 x 35	7 / 2.52	0.9	23.2	1.6	30.2	2210
	2 x 50 (S)	19 / 1.78	1.0	21.8	1.6	29.0	2256
	2 x 70 (S)	19 / 2.14	1.1	24.8	1.6	32.2	2859
	2 x 95 (S)	19 / 2.52	1.1	27.8	2.0	36.2	3804
	2 x 120 (S)	37 / 2.03	1.2	30.6	2.0	39.2	4512
	2 x 150 (S)	37 / 2.25	1.4	34.0	2.0	42.8	5298
	2 x 185 (S)	37 / 2.52	1.6	38.0	2.5	48.2	6756
	2 x 240 (S)	61 / 2.25	1.7	42.0	2.5	52.4	8222
	2 x 300 (S)	61 / 2.52	1.8	46.4	2.5	57.0	9847

Note: (S) - Sectoral Stranded Conductors.

For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Diameter Under Armour (mm)	Armour Wire Diameter (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
3 CORES	3 x 1.5	7 / 0.53	0.6	10.2	0.9	15.0	477
	3 x 2.5	7 / 0.67	0.7	11.7	0.9	16.7	581
	3 x 4	7 / 0.85	0.7	12.8	0.9	17.8	677
	3 x 6	7 / 1.04	0.7	14.1	0.9	19.1	799
	3 x 10	7 / 1.35	0.7	16.1	1.25	22.0	1139
	3 x 16	7 / 1.70	0.7	18.2	1.25	24.3	1440
	3 x 25	7 / 2.14	0.9	22.5	1.6	29.5	2174
	3 x 35	7 / 2.52	0.9	24.9	1.6	32.1	2627
	3 x 50 (S)	19 / 1.78	1.0	24.7	1.6	31.9	2916
	3 x 70 (S)	19 / 2.14	1.1	28.1	1.6	35.5	3756
	3 x 95 (S)	19 / 2.52	1.1	31.6	2.0	40.2	5029
	3 x 120 (S)	37 / 2.03	1.2	34.6	2.0	43.4	5993
	3 x 150 (S)	37 / 2.25	1.4	39.1	2.5	49.1	7514
	3 x 185 (S)	37 / 2.52	1.6	43.6	2.5	53.8	9046
	3 x 240 (S)	61 / 2.25	1.7	49.5	2.5	60.1	11276
	3 x 300 (S)	61 / 2.52	1.8	53.6	2.5	64.4	13464
	3 x 400 (S)	61 / 2.85	2.0	62.4	2.5	73.6	16724
4 CORES	4 x 1.5	7 / 0.53	0.6	11.2	0.9	16.0	541
	4 x 2.5	7 / 0.67	0.7	12.9	0.9	17.9	667
	4 x 4	7 / 0.85	0.7	14.1	0.9	19.1	782
	4 x 6	7 / 1.04	0.7	15.6	1.25	21.5	1055
	4 x 10	7 / 1.35	0.7	17.8	1.25	23.7	1331
	4 x 16	7 / 1.70	0.7	20.2	1.25	26.3	1709
	4 x 25	7 / 2.14	0.9	24.9	1.6	31.9	2574
	4 x 35	7 / 2.52	0.9	27.6	1.6	34.8	3167
	4 x 50 (S)	19 / 1.78	1.0	28.1	1.6	35.5	3622
	4 x 70 (S)	19 / 2.14	1.1	32.1	2.0	40.7	5005
	4 x 95 (S)	19 / 2.52	1.1	35.7	2.0	44.5	6293
	4 x 120 (S)	37 / 2.03	1.2	39.3	2.5	49.3	7961
	4 x 150 (S)	37 / 2.25	1.4	44.7	2.5	54.9	9516
	4 x 185 (S)	37 / 2.52	1.6	49.1	2.5	59.7	11386
	4 x 240 (S)	61 / 2.25	1.7	56.2	2.5	67.0	14284
	4 x 300 (S)	61 / 2.52	1.8	61.4	2.5	72.6	17179
	4 x 400 (S)	61 / 2.85	2.0	71.1	3.15	84.2	22343
5 CORES	5 x 1.5	7 / 0.53	0.6	12.3	0.9	17.3	619
	5 x 2.5	7 / 0.67	0.7	14.2	0.9	19.2	755
	5 x 4	7 / 0.85	0.7	15.6	0.9	20.8	906
	5 x 6	7 / 1.04	0.7	17.2	1.25	23.1	1210
	5 x 10	7 / 1.35	0.7	19.6	1.25	25.7	1560
	5 x 16	7 / 1.70	0.7	22.7	1.6	29.7	2215
	5 x 25	7 / 2.14	0.9	27.6	1.6	34.8	3051
	5 x 35	7 / 2.52	0.9	30.6	1.6	38.0	3743
	5 x 50	19 / 1.78	1.0	35.5	2.0	43.9	4858
	5 x 70	19 / 2.14	1.1	40.9	2.0	49.7	6317
	5 x 95	19 / 2.52	1.1	46.4	2.5	56.4	8521
	5 x 120	37 / 2.03	1.2	51.5	2.5	61.9	10194

Note: (S) - Sectoral Stranded Conductors.

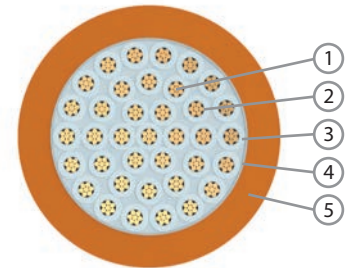
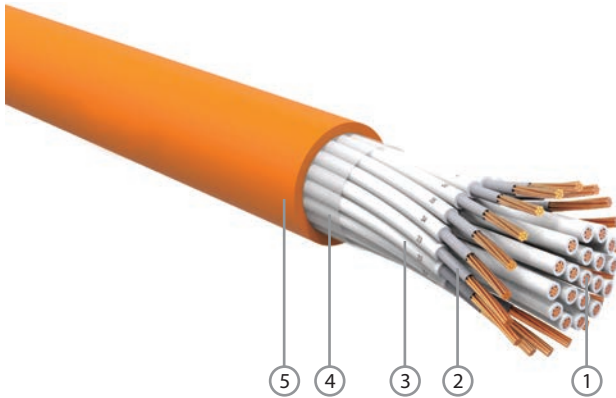
For current rating and voltage drop, please refer to Table B1.8 and B2.8 on Page 57.



FR-XL

CU / MGT / XLPE / LSZH MULTI-CORES

Mica Taped, XLPE Insulated, LSZH Sheathed Cable, 300/500V, BS EN50288-7



1. Plain Annealed Copper Wire
2. Mica Tape
3. Cross-linked Polyethylene Compound
4. Binder Tape
5. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular or Compacted
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	2 Cores: Brown, Blue 3 Cores: Brown, Black, Grey or Brown, Blue, Green/Yellow 4 Cores: Brown, Black, Grey, Blue 5 Cores: Brown, Black, Grey, Blue, Green/Yellow 6 Cores and above: White with Black numberings
Assembly:	Cores cabled together and bound with binder tape
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Orange or Others

ELECTRICAL CHARACTERISTICS

Operating Voltage:	300/500kV
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	2kV for 1 minute

REFERENCE STANDARDS

Design Specification:	BS EN50288-7
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C,W,Z), SS299 (C,W,Z), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

No. of Cores	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
2	1.0	7 / 0.43	0.6	9.3	90
3		7 / 0.43	0.6	9.8	116
4		7 / 0.43	0.6	10.8	143
5		7 / 0.43	0.6	12.0	177
7		7 / 0.43	0.6	13.2	232
10		7 / 0.43	0.6	17.0	330
12		7 / 0.43	0.6	17.6	380



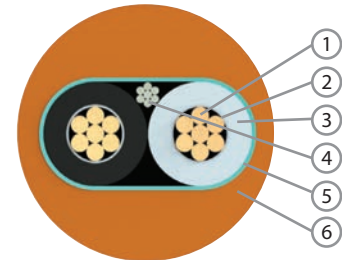
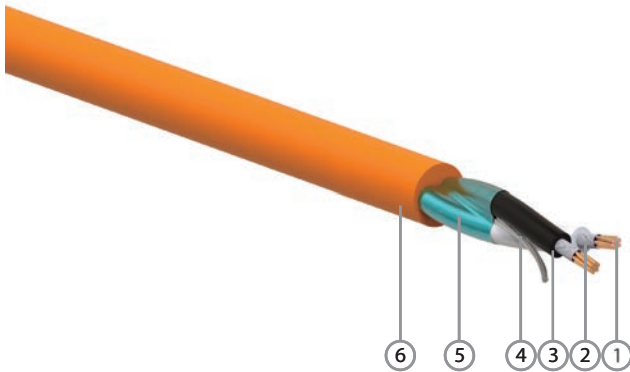
MULTI-CORES	No. of Cores	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
	2	1.5	7 / 0.53	0.6	9.9	105
	3		7 / 0.53	0.6	10.5	138
	4		7 / 0.53	0.6	11.7	179
	5		7 / 0.53	0.6	12.8	214
	7		7 / 0.53	0.6	14.1	282
	10		7 / 0.53	0.6	18.2	402
	12		7 / 0.53	0.6	18.8	464
	2	2.5	7 / 0.67	0.7	11.3	142
	3		7 / 0.67	0.7	12.0	188
	4		7 / 0.67	0.7	13.2	236
	5		7 / 0.67	0.7	14.5	285
	7		7 / 0.67	0.7	16.2	388
	10		7 / 0.67	0.7	20.9	551
	12		7 / 0.67	0.7	21.6	640
	2	4.0	7 / 0.85	0.7	12.4	182
	3		7 / 0.85	0.7	13.2	245
	4		7 / 0.85	0.7	14.5	310
	5		7 / 0.85	0.7	15.9	376



FR-XOL

CU / MGT / XLPE / OS / LSZH **SINGLE PAIR**

Mica Taped, XLPE Insulated, Overall Aluminium Foil Screened, LSZH Sheathed Cable,
300/500V, BS EN50288-7



1. Plain Annealed Copper Wire
2. Mica Tape
3. Cross-linked Polyethylene Compound
4. Tinned Copper Drain Wire
5. Aluminium / Polyester Tape
6. Low Smoke Zero Halogen (LSZH) Compound

CONSTRUCTION

Conductor:	Plain Annealed Copper, Class 2 Stranded Circular
Fire Barrier:	Mica Tape (MGT)
Insulation:	Cross-linked Polyethylene (XLPE) Compound
Insulation Colour:	Black, White or Others
Lay Up:	Pair - Cores twisted to pair
Wrap Film:	Polyester Binder Tape
Overall Screen:	Aluminium/Polyester Tape, with a Tinned Copper Drain Wire 0.5mm ² (7/0.3mm) (
Outer Sheath:	Low Smoke Zero Halogen (LSZH) Compound with Anti-Termite Characteristic and UV Resistant
Outer Sheath Colour:	Orange or Others

ELECTRICAL CHARACTERISTICS

Operating Voltage, U _o /U:	300/500V
Operating Temperature:	-15°C to 90°C
Final Short Circuit Temperature:	250°C
Test Voltage:	2kV for 1 minute

REFERENCE STANDARDS

Design Specification:	BS EN50288-7
Conductor:	IEC60228, BS EN60228
Fire Resistance:	BS6387 (C, W, Z), SS299 (C, W, Z), IEC60331
Flame Retardancy:	IEC60332-3-22, BS EN60332-3-22
Low Smoke Zero Halogen:	IEC61034-2, BS EN61034-2 IEC60754-1, IEC60754-2 BS EN60754-1, BS EN60754-2

INSTALLATION REFERENCE

Min. Bending Radius (mm):	8 x cable overall diameter
Max. Pulling Tension (N/mm ²):	50

	No. of Pairs	Nominal Conductor Area (mm ²)	No. and Diameter of Wires (no./mm)	Radial Thickness of Insulation (mm)	Cable Overall Diameter (mm)	Approximate Weight (kg/km)
SINGLE PAIR	1P	1.0	7 / 0.43	0.6	10.0	98
	1P	1.5	7 / 0.53	0.6	10.6	113
	1P	2.5	7 / 0.67	0.7	12.0	150

Note: Class 5 conductors are available upon request.



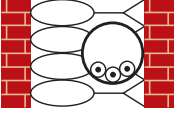
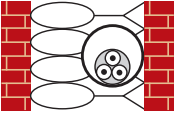
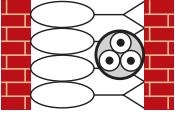
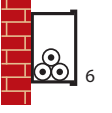
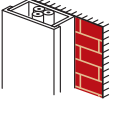
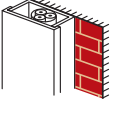
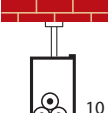
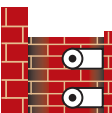
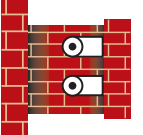
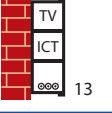
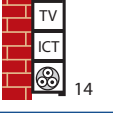
APPENDIX A

Table A1.1

Schedule of Installation Methods of cables (including Reference Methods) for determining current-carrying capacity

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.

Installation Method		Description	Reference Method to be used to determine current-carrying capacity
Number	Examples		
1	 ROOM	Non-sheathed cables in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m²k	A
2	 ROOM	Multicore cable in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m²k	A
3	 ROOM	Multicore cable direct in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m²k	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 cables in cable trunking on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it ^c	B
6	 6	Non-sheathed cables run horizontally ^b	B
7	 7	Non-sheathed cables run vertically ^b	B
8	 8	Multicore cables in cable trunking on a wooden or masonry wall	B*
9	 9	Multicore cables in suspended cable trunking on a wooden or masonry wall	B*
10		Non-sheathed cables in suspended cable trunking ^b	B
11	 10	Multicore cables run in mouldings ^{c, e}	B
12		Non-sheathed cables in a wall with an internal barrier or partition	A
13	 13	Multicore cable in skirting trunking	B
14	 14	Multicore cable in skirting trunking	B

^b Values given for Installation Method B in Appendix A are for a single circuit. Where there is more than one circuit in the trunking the group rating factor given in Table C2.1 is applicable, irrespective of the presence of an internal barrier or partition.

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

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

* Still under consideration in IEC.



APPENDIX A

Table A1.2

Schedule of Installation Methods of cables (including Reference Methods)
for determining current-carrying capacity

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.

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 -core or multicore cables:
21		Single Fixed directly under wooden or masonry ceiling
22		Single-core or multicore cables: Spaced from a ceiling
30		Single-core or multicore cables: On unperforated tray run horizontally or vertically ^{c, h} -core or multicore cables:
31		Single On unperforated tray run horizontally or vertically ^{c, h} -core or multicore cables:
32		Single On brackets or on a wire mesh tray run horizontally or vertically ^{c, h} -core or multicore cables:
33		Single Spaced more than 0.3 x the cable diameter from a wall
34		Single-core or multicore cables: On a ladder ^c
35		Single-core or multicore cable suspended from or incorporating a support wire or harness

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

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

^g The factor in Table C2.1 may also be used.

^h D_e = the external diameter of a multicore cable:
– 2.2 x the cable diameter when three single-core cables are bound in trefoil, or
– 3 x the cable diameter when three single-core cables are laid in at formation.

* Still under consideration in IEC.



APPENDIX A

Table A1.3

Schedule of Installation Methods of cables (including Reference Methods)
for determining current-carrying capacity

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.

Number	Examples	Installation Method	Description	Reference Method to be used to determine current-carrying capacity
36		Bare or non-sheathed cables on insulators		G
40		Single-core or multicore cables: In a building void	c, h, i	Where $1.5 D_e \leq V \leq 20 D_e$ 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 $1.5 D_e \leq V$ Use B
42		Single-core or multicore cables: - In conduit - In a building void - In masonry having a thermal resistivity not greater than 2 K.m/W	c, j	Where $1.5 D_e \leq V$ 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 $1.5 D_e \leq V$ Use B
44		Single-core or multicore 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 $1.5 D_e \leq V$ 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 $1.5 D_e \leq V \leq 50 D_e$ Use B
46		Single-core or multicore cables: - In cable ducting - In masonry having a thermal resistivity not greater than 2 K.m/W	c, h, i	Where $1.5 D_e \leq V \leq 50 D_e$ Use B
47		Single-core or multicore cables: - In a ceiling void - In a suspended oor	h, i	Where $1.5 D_e \leq V \leq 50 D_e$ Use B
50		Non-sheathed cables in ush cable trunking in the oor		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 C2.1 may also be used.

h D_e = the external diameter of a multicore cable:
- $2.2x$ the cable diameter when three single-core cables are bound in trefoil, or
- $3x$ the cable diameter when three single-core cables are laid in at formation.

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

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



APPENDIX A

Table A1.4

Schedule of Installation Methods of cables (including Reference Methods)
for determining current-carrying capacity

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.

Number	Examples	Installation Method	Description	Reference Method to be used to determine current-carrying capacity
51			Multicore cable in U-shaped cable trunking in the floor	B
52			Non-sheathed cables in U-shaped trunking ^c	B
53			Multicore cable in U-shaped 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 $1.5 D_e \leq V$ 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 cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - Without added mechanical protection ^{n, o}	C
58			Single-core or multicore cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - With added mechanical protection ^{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

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

^k D_e = external diameter of conduit.

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

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

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

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).



APPENDIX A

Table A1.5

Schedule of Installation Methods of cables (including Reference Methods)
for determining current-carrying capacity

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.

Installation Method		Reference Method to be used to determine current-carrying capacity
Number	Examples	
70		D
71		D
72		D
73		D

Note: The inclusion of directly buried cables is satisfactory 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.



APPENDIX B

Table B1.1: Current Carrying Capacity (IN AMPERES)

Single-core copper conductor, 70°C PVC insulated, non-armoured, with or without sheathed cables

Ambient air temperature: 30°C, Ground ambient temperature: 15°C,

Soil thermal resistivity (cable buried in ground): 1.2K.m/W

BS 6231
SS 358-3
IEC 60227-3
IEC 60502-1
BS EN50525-2-31

Conductor Cross-Sectional Area	Reference Method A (enclosed in conduit in thermally insulating wall etc)		Reference Method B (enclosed in conduit on wall or in trunking etc)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray horizontal or vertical)				
	2 Cables, Single-Phase a.c. or d.c.	3 or 4 Cables, 3-Phase a.c.	2 Cables, Single-Phase a.c. or d.c.	3 or 4 Cables, 3-Phase a.c.	2 Cables, Single-Phase a.c. or d.c. Flat and Touching	3 or 4 Cables, 3-Phase a.c. Flat and Touching or Trefoil	Touching			Spaced by One Cable Diameter	
							2 Cables, Single-Phase a.c. or d.c. Flat	3 Cables, 3-Phase a.c. Flat	3 Cables, 3-Phase a.c. Trefoil	2 Cables, Single-Phase a.c. or d.c., or 3 Cables, 3-Phase a.c. Flat	
mm ²	A	A	A	A	A	A	A	A	A	Horizontal	Vertical
1.0	11	10.5	13.5	12	15.5	14	–	–	–	–	–
1.5	14.5	13.5	17.5	15.5	20	18	–	–	–	–	–
2.5	20	18	24	21	27	25	–	–	–	–	–
4	26	24	32	28	37	33	–	–	–	–	–
6	34	31	41	36	47	43	–	–	–	–	–
10	46	42	57	50	65	59	–	–	–	–	–
16	61	56	76	68	87	79	–	–	–	–	–
25	80	73	101	89	114	104	131	114	110	146	130
35	99	89	125	110	141	129	162	143	137	181	162
50	119	108	151	134	182	167	196	174	167	219	197
70	151	136	192	171	234	214	251	225	216	281	254
95	182	164	232	207	284	261	304	275	264	341	311
120	210	188	269	239	330	303	352	321	308	396	362
150	240	216	300	262	381	349	406	372	356	456	419
185	273	245	341	296	436	400	463	427	409	521	480
240	321	286	400	346	515	472	546	507	485	615	569
300	367	328	458	394	594	545	629	587	561	709	659
400	–	–	546	467	694	634	754	689	656	852	795
500	–	–	626	533	792	723	868	789	749	982	920
630	–	–	720	611	904	826	1005	905	855	1138	1070
800	–	–	–	–	1030	943	1086	1020	971	1265	1188
1000	–	–	–	–	1154	1058	1216	1149	1079	1420	1337

Table B2.1: Voltage Drop (IN mV/A/m)

Single-core copper conductor, 70°C PVC insulated, non-armoured, with or without sheathed cables

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

Conductor Cross-Sectional Area	2 Cables d.c.	2 Cables, Single-Phase a.c.										3 or 4 Cables, 3-Phase a.c.													
		Reference Methods A & B (enclosed in conduit or trunking)	Reference Methods C & F (clipped direct, on tray or in free air)										Reference Methods A & B (enclosed in conduit or trunking)	Reference Methods C & F (clipped direct, on tray or in free air)											
			Cables Touching					Cables Spaced*						Cables Touching, Trefoil				Cables Touching, Flat				Cables Spaced*, Flat			
mm ²	mV/A/m	mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m					
1.0	44	44			44			44			38			38			38			38					
1.5	29	29			29			29			25			25			25			25					
2.5	18	18			18			18			15			15			15			15					
4	11	11			11			11			9.5			9.5			9.5			9.5					
6	7.3	7.3			7.3			7.3			6.4			6.4			6.4			6.4					
10	4.4	4.4			4.4			4.4			3.8			3.8			3.8			3.8					
16	2.8	2.8			2.8			2.8			2.4			2.4			2.4			2.4					
					r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z			
25	1.75	1.80	0.33	1.80	1.75	0.20	1.75	1.75	0.29	1.80	1.50	0.29	1.55	1.50	0.175	1.50	1.50	0.25	1.55	1.50	0.32	1.55			
35	1.25	1.30	0.31	1.30	1.25	0.195	1.25	1.25	0.28	1.30	1.10	0.27	1.10	1.10	0.170	1.10	1.10	0.24	1.10	1.10	0.32	1.15			
50	0.93	0.95	0.30	1.00	0.93	0.190	0.95	0.93	0.28	0.97	0.81	0.26	0.85	0.80	0.165	0.82	0.80	0.24	0.84	0.80	0.32	0.86			
70	0.63	0.65	0.29	0.72	0.63	0.185	0.66	0.63	0.27	0.69	0.56	0.25	0.61	0.55	0.160	0.57	0.55	0.24	0.60	0.55	0.31	0.63			
95	0.46	0.49	0.28	0.56	0.47	0.180	0.50	0.47	0.27	0.54	0.42	0.24	0.48	0.41	0.155	0.43	0.41	0.23	0.47	0.40	0.31	0.51			
120	0.36	0.39	0.27	0.47	0.37	0.175	0.41	0.37	0.26	0.45	0.33	0.23	0.41	0.32	0.150	0.36	0.32	0.23	0.40	0.32	0.30	0.44			
150	0.29	0.31	0.27	0.41	0.30	0.175	0.34	0.29	0.26	0.39	0.27	0.23	0.36	0.26	0.150	0.30	0.26	0.23	0.34	0.26	0.30	0.40			
185	0.23	0.25	0.27	0.37	0.24	0.170	0.29	0.24	0.26	0.35	0.22	0.23	0.32	0.21	0.145	0.26	0.21	0.22	0.31	0.21	0.30	0.36			
240	0.180	0.195	0.26	0.33	0.185	0.165	0.25	0.185	0.25	0.31	0.17	0.23	0.29	0.160	0.145	0.22	0.160	0.22	0.27	0.160	0.29	0.34			
300	0.145	0.160	0.29	0.31	0.150	0.165	0.22	0.150	0.25	0.29	0.14	0.23	0.27	0.130	0.140	0.190	0.130	0.22	0.25	0.130	0.29	0.32			
400	0.105	0.130	0.26	0.29	0.120	0.160	0.20	0.115	0.25	0.27	0.12	0.22	0.25	0.105	0.140	0.175	0.105	0.21	0.24	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	0.160	0.086	0.21	0.23	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	0.150	0.072	0.21	0.22	0.066	0.28	0.29			
800	0.053	–			0.068			0.150	0.165	0.061	0.24	–			0.060			0.130	0.145	0.060	0.21	0.22	0.053	0.28	0.29
1000	0.042	–			0.059			0.150	0.160	0.050	0.24	–			0.052			0.130	0.140	0.052	0.20	0.21	0.044	0.28	0.28

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



APPENDIX B

BS 6346
IEC60502-1

Table B1.2: Current Carrying Capacity (IN AMPERES)

Multi-core, 70°C PVC insulated, PVC sheathed non-armoured cables

Ambient air temperature: 30°C, Ground ambient temperature: 15°C,

Soil thermal resistivity (cable buried in ground): 1.2K.m/W

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 horizontal or vertical)	
	One 2-Core Cable*, Single-Phase a.c. or d.c.	One 3-Core Cable* or One 4-Core Cable, 3-Phase a.c.	One 2-Core Cable*, Single-Phase a.c. or d.c.	One 3-core Cable* or One 4-Core Cable, 3-Phase a.c.	One 2-Core Cable*, Single-Phase a.c. or d.c.	One 3-Core Cable* or One 4-Core Cable, 3-Phase a.c.	One 2-Core Cable*, Single-Phase a.c. or d.c.	One 3-Core Cable* or One 4-Core Cable, 3-Phase a.c.
mm ²	A	A	A	A	A	A	A	A
1.0	11	10	13	11.5	15	13.5	17	14.5
1.5	14	13	16.5	15	19.5	17.5	22	18.5
2.5	18.5	17.5	23	20	27	24	30	25
4	25	23	30	27	36	32	40	34
6	32	29	38	34	46	41	51	43
10	43	39	52	46	63	57	70	60
16	57	52	69	62	85	76	94	80
25	75	68	90	80	112	96	119	101
35	92	83	111	99	138	119	148	126
50	110	99	133	118	168	144	180	153
70	139	125	168	149	213	184	232	196
95	167	150	201	179	258	223	282	238
120	192	172	232	206	299	259	328	276
150	219	196	258	225	344	299	379	319
185	248	223	294	255	392	341	434	364
240	291	261	344	297	461	403	514	430
300	334	298	394	339	530	464	593	497
400	–	–	470	402	634	557	715	597

*With or without a protective conductor.

Table B2.2: Voltage Drop (IN mV/A/m)

Multi-core 70°C PVC insulated, PVC sheathed non-armoured cables

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

Conductor Cross-Sectional Area	2-Core Cable, d.c.	2-Core Cable, Single-Phase a.c.			3 or 4 Core Cable, 3-Phase a.c.		
	mV/A/m	mV/A/m			mV/A/m		
mm ²							
1.0	44			44			38
1.5	29			29			25
2.5	18			18			15
4	11			11			9.5
6	7.3			7.3			6.4
10	4.4			4.4			3.8
16	2.8			2.8			2.4
		r	x	z	r	x	z
25	1.75	1.75	0.170	1.75	1.50	0.145	1.50
35	1.25	1.25	0.165	1.25	1.10	0.145	1.10
50	0.93	0.93	0.165	0.94	0.80	0.140	0.81
70	0.63	0.63	0.160	0.65	0.55	0.140	0.57
95	0.46	0.47	0.155	0.50	0.41	0.135	0.43
120	0.36	0.38	0.155	0.41	0.33	0.135	0.35
150	0.29	0.30	0.155	0.34	0.26	0.130	0.29
185	0.23	0.25	0.150	0.29	0.21	0.130	0.25
240	0.180	0.190	0.150	0.24	0.165	0.130	0.21
300	0.145	0.155	0.145	0.21	0.135	0.130	0.185
400	0.105	0.115	0.145	0.185	0.100	0.125	0.160

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



APPENDIX B

BS 6346

Table B1.3: Current Carrying Capacity (IN AMPERES)

Single-core 70°C PVC insulated, PVC sheathed armoured cables (non-magnetic armour)

Ambient air temperature: 30°C, Ground ambient temperature: 15°C,

Soil thermal resistivity (cable buried in ground): 1.2K.m/W

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

Table B2.3: Voltage Drop (IN mV/A/m)

Single-core 70°C PVC insulated, PVC sheathed armoured cables (non-magnetic armour)

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

Conductor Cross- Sectional Area	2 Cables, d.c.	Reference Method C & F (clipped direct, on tray or free air)														
		2 Cables, Single-Phase a.c.						3 or 4 Cables, 3-Phase a.c.								
		Touching			Spaced*			Trefoil and Touching			Flat and Touching			Flat and Spaced*		
		mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m		
mm ²	mV/A/m	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z
50	0.93	0.93	0.22	0.95	0.92	0.30	0.97	0.80	0.190	0.82	0.79	0.26	0.84	0.79	0.34	0.86
70	0.63	0.64	0.21	0.68	0.66	0.29	0.72	0.56	0.180	0.58	0.57	0.25	0.62	0.59	0.32	0.68
95	0.46	0.48	0.20	0.52	0.51	0.28	0.58	0.42	0.175	0.45	0.44	0.25	0.50	0.47	0.31	0.57
120	0.36	0.39	0.195	0.43	0.42	0.28	0.50	0.33	0.170	0.37	0.36	0.24	0.43	0.40	0.30	0.50
150	0.29	0.31	0.190	0.37	0.34	0.27	0.44	0.27	0.165	0.32	0.30	0.24	0.38	0.34	0.30	0.45
185	0.23	0.26	0.190	0.32	0.29	0.27	0.39	0.22	0.160	0.27	0.25	0.23	0.34	0.29	0.29	0.41
240	0.180	0.20	0.180	0.27	0.23	0.26	0.35	0.175	0.160	0.23	0.20	0.23	0.30	0.24	0.28	0.37
300	0.145	0.160	0.180	0.24	0.190	0.26	0.32	0.140	0.155	0.21	0.165	0.22	0.28	0.20	0.28	0.34
400	0.105	0.140	0.175	0.22	0.180	0.24	0.30	0.120	0.130	0.195	0.160	0.21	0.26	0.21	0.25	0.32
500	0.086	0.120	0.170	0.21	0.165	0.23	0.29	0.105	0.145	0.180	0.145	0.20	0.25	0.190	0.24	0.30
630	0.068	0.105	0.165	0.195	0.150	0.22	0.27	0.091	0.145	0.170	0.135	0.195	0.23	0.175	0.22	0.28
800	0.053	0.095	0.160	0.185	0.145	0.21	0.25	0.082	0.140	0.160	0.125	0.180	0.22	0.170	0.195	0.26
1000	0.042	0.091	0.155	0.180	0.140	0.190	0.24	0.079	0.135	0.155	0.125	0.165	0.21	0.165	0.170	0.24

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



APPENDIX B

BS 6346

Table B1.4: Current Carrying Capacity (IN AMPERES)

Table B1.4: Multi-core 70°C PVC insulated, PVC sheathed armoured cables

Ambient air temperature: 30°C, Ground ambient temperature: 15°C,

Soil thermal resistivity (cable buried in ground): 1.2K.m/W

Conductor Cross-Sectional Area	Reference Method C (clipped direct)		Reference Method E (in free air or on a perforated cable tray etc, horizontal or vertical)		Reference Method D (direct in ground or in ducting in ground, in or around buildings)	
	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable, 3-Phase a.c.	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable, 3-Phase a.c.	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable, 3-Phase a.c.
mm ²	A	A	A	A	A	A
1.5	21	18	22	19	23	20
2.5	28	25	31	26	33	28
4	38	33	41	35	43	36
6	49	42	53	45	55	46
10	67	58	72	62	73	61
16	89	77	97	83	125	106
25	118	102	128	110	162	138
35	145	125	157	135	196	165
50	175	151	190	163	232	196
70	222	192	241	207	285	241
95	269	231	291	251	342	289
120	310	267	336	290	391	330
150	356	306	386	332	438	370
185	405	348	439	378	494	417
240	476	409	516	445	572	482
300	547	469	592	510	645	542
400	621	540	683	590	729	613

Table B2.4: Voltage Drop (IN mV/A/m)

Table B2.4: Multi-core 70°C PVC insulated, PVC sheathed armoured cables

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

Conductor Cross-Sectional Area		2-Core Cable, d.c.	2- Single-Phase a.c.			3 or 4-Core Cable, 3-Phase a.c.		
mm ²	Core Cable,	mV/A/m	mV/A/m			mV/A/m		
1.5		29	29			25		
2.5		18	18			15		
4		11	11			9.5		
6		7.3	7.3			6.4		
10		4.4	4.4			3.8		
16		2.8	2.8			2.4		
			r	x	z	r	x	z
25		1.75	1.75	0.170	1.75	1.50	0.145	1.50
35		1.25	1.25	0.165	1.25	1.10	0.145	1.10
50		0.93	0.93	0.165	0.94	0.80	0.140	0.81
70		0.63	0.63	0.160	0.65	0.55	0.140	0.57
95		0.46	0.47	0.155	0.50	0.41	0.135	0.43
120		0.36	0.38	0.155	0.41	0.33	0.135	0.35
150		0.29	0.30	0.155	0.34	0.26	0.130	0.29
185		0.23	0.25	0.150	0.29	0.21	0.130	0.25
240		0.180	0.190	0.150	0.24	0.165	0.130	0.21
300		0.145	0.155	0.145	0.21	0.135	0.130	0.185
400		0.105	0.115	0.145	0.185	0.100	0.125	0.160

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



APPENDIX B

Table B1.5: Current Carrying Capacity (IN AMPERES)

Table B1.5: Single-core 90°C XLPE / Cross-Linked LSZH / EPR insulated, unarmoured, with or without sheath (PVC / LSZH) cables

Ambient air temperature: 30°C, Ground ambient temperature: 15°C, Soil thermal resistivity (cable buried in ground): 1.2K.m/W

IEC 60502-1
BS EN50525-3-41
*based on
600/1000V
application
BS 7889

Conductor Cross-Sectional Area mm ²	Reference Method A (enclosed in conduit in thermally insulating wall etc)		Reference Method B (enclosed in conduit on a wall or in trunking etc)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray etc, horizontal or vertical etc)			Reference Method G (in free air)	
	2 Cables, Single-Phase a.c. or d.c.	3 or 4 Cables, 3-Phase a.c.	2 Cables, Single-Phase a.c. or d.c.	3 or 4 Cables, 3-Phase a.c.	2 Cables, Single-Phase a.c. or d.c. Flat and Touching	3 or 4 Cables, 3-Phase a.c. Flat and Touching or Trefoil	Touching			Spaced by One Cable Diameter	
							2 Cables, Single-Phase a.c. or d.c. Flat	3 Cables, 3-Phase a.c. Flat	3 Cables, 3-Phase a.c. Trefoil	2 Cables, Single-Phase a.c. or d.c., or 3 Cables, 3-Phase a.c. Flat	
	A	A	A	A	A	A	A	A	A	Horizontal	Vertical
1.0	14	13	17	15	19	17.5	–	–	–	–	–
1.5	19	17	23	20	25	23	–	–	–	–	–
2.5	26	23	31	28	34	31	–	–	–	–	–
4	35	31	42	37	46	41	–	–	–	–	–
6	45	40	54	48	59	54	–	–	–	–	–
10	61	54	75	66	81	74	–	–	–	–	–
16	81	73	100	88	109	99	–	–	–	–	–
25	106	95	133	117	143	130	161	141	135	182	161
35	131	117	164	144	176	161	200	176	169	226	201
50	158	141	198	175	228	209	242	216	207	275	246
70	200	179	253	222	293	268	310	279	268	353	318
95	241	216	306	269	355	326	377	342	328	430	389
120	278	249	354	312	413	379	437	400	383	500	454
150	318	285	393	342	476	436	504	464	444	577	527
185	362	324	449	384	545	500	575	533	510	661	605
240	424	380	528	450	644	590	679	634	607	781	719
300	486	435	603	514	743	681	783	736	703	902	833
400	–	–	683	584	868	793	940	868	823	1085	1008
500	–	–	783	666	990	904	1083	998	946	1253	1169
630	–	–	900	764	1130	1033	1254	1151	1088	1454	1362
800	–	–	–	–	1288	1179	1358	1275	1214	1581	1485
1000	–	–	–	–	1443	1323	1520	1436	1349	1775	1671

Note: 1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature.
2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C, the current ratings given in the equivalent table for 70°C thermoplastic insulated cables must be used.

Table B2.5: Voltage Drop (IN mV/A/m)

Table B2.5: Single-core 90°C XLPE / Cross-Linked LSZH / EPR insulated, unarmoured, with or without sheath (PVC / LSZH) cables

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

Conductor Cross-Sectional Area mm ²	2 Cables d.c.	2 Cables, Single-Phase a.c.				3 or 4 Cables, 3-Phase a.c.							
		Reference Methods A & B (enclosed in conduit or trunking)		Reference Methods C, F & G (clipped direct, on tray or in free air)		Reference Methods A & B (enclosed in conduit or trunking)		Reference Methods C, F & G (clipped direct, on tray or in free air)					
		mV/A/m		mV/A/m		mV/A/m		Cables Touching, Trefoil		Cables Touching, Flat		Cables Spaced *, Flat	
1.0	46	46	46	46	46	40	40	40	40	40	40	40	40
1.5	31	31	31	31	31	27	27	27	27	27	27	27	27
2.5	19	19	19	19	19	16	16	16	16	16	16	16	16
4	12	12	12	12	12	10	10	10	10	10	10	10	10
6	7.9	7.9	7.9	7.9	7.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
10	4.7	4.7	4.7	4.7	4.7	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
16	2.9	2.9	2.9	2.9	2.9	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
25	1.85	1.85	0.31	1.90	1.85	0.190	1.85	0.28	1.85	1.60	0.27	1.65	1.65
35	1.35	1.35	0.29	1.35	1.35	0.180	1.35	0.32	1.35	1.15	0.26	1.20	1.20
50	0.99	1.00	0.29	1.05	0.99	0.180	1.00	0.99	0.27	1.00	0.86	0.26	0.89
70	0.68	0.70	0.28	0.75	0.68	0.175	0.71	0.68	0.26	0.73	0.59	0.25	0.65
95	0.49	0.51	0.27	0.58	0.49	0.170	0.52	0.49	0.26	0.56	0.43	0.25	0.49
120	0.39	0.41	0.26	0.48	0.39	0.165	0.43	0.39	0.25	0.47	0.34	0.24	0.42
150	0.32	0.33	0.26	0.43	0.32	0.165	0.36	0.32	0.25	0.41	0.28	0.24	0.37
185	0.25	0.27	0.26	0.37	0.26	0.165	0.30	0.25	0.25	0.36	0.22	0.24	0.33
240	0.190	0.21	0.26	0.33	0.20	0.160	0.25	0.195	0.25	0.31	0.17	0.24	0.29
300	0.155	0.175	0.25	0.31	0.160	0.160	0.22	0.155	0.25	0.29	0.135	0.24	0.27
400	0.120	0.140	0.25	0.29	0.130	0.155	0.20	0.125	0.24	0.27	0.110	0.24	0.26
500	0.093	0.120	0.25	0.28	0.105	0.155	0.185	0.098	0.24	0.26	0.088	0.24	0.25
630	0.072	0.100	0.25	0.27	0.086	0.155	0.175	0.078	0.24	0.25	0.074	0.23	0.24
800	0.056	–	–	–	0.072	0.150	0.170	0.064	0.24	0.25	–	0.23	0.24
1000	0.045	–	–	–	0.063	0.150	0.165	0.054	0.24	0.24	–	0.23	0.24

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



APPENDIX B

IEC 60502-1
BS 7629-1

Table B1.6: Current Carrying Capacity (IN AMPERES)

Table B1.6: Multi-core 90°C XLPE / Cross-Linked LSZH / EPR insulated, unarmoured, thermoplastic (PVC / LSZH) sheathed cables

Ambient air temperature: 30°C, Ground ambient temperature: 15°C,

Soil thermal resistivity (cable buried in ground): 1.2K.m/W

Conductor Cross-Sectional Area mm ²	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)	
	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable, 3-Phase a.c.	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable, 3-Phase a.c.	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable, 3-Phase a.c.	One 2-Core Cable, Single-Phase a.c. or d.c.	One 3 or 4-Core Cable*, 3-Phase a.c.
A	A	A	A	A	A	A	A	A
1.0	14.5	13	17	15	19	17	21	18
1.5	18.5	16.5	22	19.5	24	22	26	23
2.5	25	22	30	26	33	30	36	32
4	33	30	40	35	45	40	49	42
6	42	38	51	44	58	52	63	54
10	57	51	69	60	80	71	86	75
16	76	68	91	80	107	96	115	100
25	99	89	119	105	138	119	149	127
35	121	109	146	128	171	147	185	158
50	145	130	175	154	209	179	225	192
70	183	164	221	194	269	229	289	246
95	220	197	265	233	328	278	352	298
120	253	227	305	268	382	322	410	346
150	290	259	334	300	441	371	473	399
185	329	295	384	340	506	424	542	456
240	386	346	459	398	599	500	641	538
300	442	396	532	455	693	576	741	621
400	–	–	625	536	803	667	865	741

Note: 1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature.
2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C, the current ratings given in the equivalent table for 70°C thermoplastic insulated cables must be used.

Table B2.6: Voltage Drop (IN mV/A/m)

Table B2.6: Multi-core 90°C XLPE / Cross-Linked LSZH / EPR insulated, unarmoured, thermoplastic (PVC / LSZH) sheathed cables

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

Conductor Cross-Sectional Area		2-Core Cable, d.c.	2- Single-Phase a.c.			3 or 4-Core Cable, 3-Phase a.c.		
mm ²	Core Cable,	mV/A/m	mV/A/m			mV/A/m		
1.0		46	46			40		
1.5		31	31			27		
2.5		19	19			16		
4		12	12			10		
6		7.9	7.9			6.8		
10		4.7	4.7			4.0		
16		2.9	2.9			2.5		
			r	x	z	r	x	z
25		1.85	1.85	0.160	1.90	1.60	0.140	1.65
35		1.35	1.35	0.155	1.35	1.15	0.135	1.15
50		0.98	0.99	0.155	1.00	0.86	0.135	0.87
70		0.67	0.67	0.150	0.69	0.59	0.130	0.60
95		0.49	0.50	0.150	0.52	0.43	0.130	0.45
120		0.39	0.40	0.145	0.42	0.34	0.130	0.37
150		0.31	0.32	0.145	0.35	0.28	0.125	0.30
185		0.25	0.26	0.145	0.29	0.22	0.125	0.26
240		0.195	0.200	0.140	0.24	0.175	0.125	0.21
300		0.155	0.160	0.140	0.21	0.140	0.120	0.185
400		0.120	0.130	0.140	0.190	0.115	0.120	0.165

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



APPENDIX B

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Table B1.7: Current Carrying Capacity (IN AMPERES)

Table B1.7: Single-core 90°C XLPE / Cross-Linked LSZH / EPR insulated, armoured (non-magnetic armour), thermoplastic (PVC / LSZH) sheathed cables

Ambient air temperature: 30°C, Ground ambient temperature: 15°C, Soil thermal resistivity (cable buried in ground): 1.2K.m/W

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

Note: 1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature.
2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C, the current ratings given in the equivalent table for 70°C thermoplastic insulated cables must be used.

Table B2.7: Voltage Drop (IN mV/A/m)

Table B2.7: Single-core 90°C XLPE / Cross-Linked LSZH / EPR insulated, armoured (non-magnetic armour), thermoplastic (PVC / LSZH) sheathed cables

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

Conductor Cross- Sectional Area	2 Cables, d.c.	Reference Method C & F (clipped direct, on tray or in free air)														
		2 Cables, Single-Phase a.c.						3 or 4 Cables, 3-Phase a.c.								
		Touching			Spaced*			Trefoil and Touching			Flat and Touching			Flat and Spaced*		
		mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m		
mm ²	mV/A/m	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z
50	0.98	0.99	0.21	1.00	0.98	0.29	1.00	0.86	0.180	0.87	0.84	0.25	0.88	0.84	0.33	0.90
70	0.67	0.68	0.200	0.71	0.69	0.29	0.75	0.59	0.170	0.62	0.60	0.25	0.65	0.62	0.32	0.70
95	0.49	0.51	0.195	0.55	0.53	0.28	0.60	0.44	0.170	0.47	0.46	0.24	0.52	0.49	0.31	0.58
120	0.39	0.41	0.190	0.45	0.43	0.27	0.51	0.35	0.165	0.39	0.38	0.24	0.44	0.41	0.30	0.51
150	0.31	0.33	0.185	0.38	0.36	0.27	0.45	0.29	0.160	0.33	0.31	0.23	0.39	0.34	0.29	0.45
185	0.25	0.27	0.185	0.33	0.30	0.26	0.40	0.23	0.160	0.28	0.26	0.23	0.34	0.29	0.29	0.41
240	0.195	0.21	0.180	0.28	0.24	0.26	0.35	0.180	0.155	0.24	0.21	0.22	0.30	0.24	0.28	0.37
300	0.155	0.170	0.175	0.25	0.195	0.25	0.32	0.145	0.150	0.21	0.170	0.22	0.28	0.20	0.27	0.34
400	0.115	0.145	0.170	0.22	0.180	0.24	0.30	0.125	0.150	0.195	0.160	0.21	0.27	0.20	0.27	0.33
500	0.093	0.125	0.170	0.21	0.165	0.24	0.29	0.105	0.145	0.180	0.145	0.20	0.25	0.190	0.24	0.31
630	0.073	0.105	0.165	0.195	0.150	0.23	0.27	0.092	0.145	0.170	0.135	0.195	0.24	0.175	0.23	0.29
800	0.056	0.090	0.160	0.190	0.145	0.23	0.27	0.086	0.140	0.165	0.130	0.180	0.23	0.175	0.195	0.26
1000	0.045	0.092	0.155	0.180	0.140	0.21	0.25	0.080	0.135	0.155	0.125	0.170	0.21	0.165	0.180	0.24

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



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Ambient air temperature: 30°C, Ground ambient temperature: 15°C, Soil thermal resistivity (cable buried in ground): 1.2K.m/W



APPENDIX B

Table B3.1: Short Circuit Ratings

Short Circuit Ratings for Low Voltage Cables

Nominal Conductor Area (mm ²)	Short Circuit Rating for 1 second XLPE & XLSZH (kA)	Short Circuit Rating for 1 second PVC (kA)
1.5	0.2145	0.1725
2.5	0.3575	0.2875
4	0.572	0.46
6	0.858	0.69
10	1.43	1.15
16	2.288	1.84
25	3.575	2.875
35	5.005	4.025
50	7.15	5.75
70	10.01	8.05
95	13.585	10.925
120	17.16	13.8
150	21.45	17.25
185	26.455	21.275
240	34.32	27.6
300	42.9	34.5
400	57.2	41.2
500	71.5	51.5
630	90.09	64.89
800	114.4	82.4
1000	143	103

The maximum permissible short circuit current of cables up to 1kV with copper conductors could be calculated with the following formula

$$I \text{ (kA)} = \frac{S}{\sqrt{t}} \times K$$

Where I = Short Circuit Rating (kA)

S = Nominal Conductor Area (mm²)

t = Duration of Short Circuit (Sec)

K = Insulation Material Specific Constant

XLPE & Cross-linked Polyolefin (XLSZH) Insulated Cable

$$K = 0.143$$

PVC Insulated Cable

$$K = 0.115 \text{ (} S \leq 300 \text{ mm}^2 \text{)}$$

$$K = 0.103 \text{ (} S > 300 \text{ mm}^2 \text{)}$$

APPENDIX C

Rating Factor for Ambient Temperature

The current-carrying capacities in this work standard are based upon the following reference ambient temperatures:

- For non-sheathed and sheathed cables in air, irrespective of the installation method : 30°C
- For buried cables, either directly in the soil or in ducts in the ground : 15°C

When the ambient temperature in the intended location of the non-sheathed or sheathed cables differs from the reference ambient temperature, please refer to the appropriate rating factors as below table (Table C1.1 and C1.2). Rating factors for ambient air temperatures other

Table C1.1

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

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

Table C1.2

Rating factors for ambient ground temperatures other than 15°C to be applied to the current-carrying capacities for cables buried to ground.

Ground Temperature °C	PVC	XLPE
10	–	1.04
15	1.00	1.00
20	0.95	0.96
25	0.90	0.93
30	0.85	0.91
35	0.80	0.87
40	0.74	0.83
45	0.67	–
50	0.60	–
55	–	–
60	–	–
65	–	–
70	–	–
75	–	–
80	–	–



APPENDIX C

Table C1.3: Rating Factor for Soil Thermal Resistivities

Rating factors for cables buried direct in the ground or in an underground conduit system for soil thermal resistivities other than 1.2K.m/W to be applied to the current-carrying capacities for Reference Method D thermal resistivity K.m/W

T	0.8	0.9	1.0	1.2	1.5	2.0	2.5	3.0
Rating factor for cables in buried ducts	1.03	1.02	1.02	1.00	0.95	0.88	0.83	0.78
Rating factor for direct buried cables	1.09	1.07	1.04	1.00	0.92	0.81	0.74	0.69

Note:

1. The rating factors given have been averaged over the range of conductor sizes and types of installation included in the relevant tables in this appendix. The overall accuracy of rating factors is within $\pm 5\%$.
2. The rating factors are applicable to cables drawn into buried ducts For cables laid direct in the ground the rating factors for thermal resistivities less than 1.2K.m/W will be higher. Where more precise values, are required they may be calculated by methods given in BS7769 (BS IEC60287).
3. The rating factors are applicable to ducts buried at depths of up to 0.8 m.

Table C2.1

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 B1.1 to Tables B1.8.

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

Note:

1. These factors are applicable to uniform groups of cables, equally loaded.
2. Where horizontal clearances between adjacent cables exceeds twice their overall diameter, no rating factor need be applied.
3. The same factors are applied to:
 - groups of two or three single-core cables;
 - multicore cables.
4. If a system 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.
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.
6. The rating factors given have been averaged over the range of conductor sizes and types of installation included in Tables B1.1 to B1.8 the overall accuracy of tabulated values is within 5%.
7. For some installations and for other methods not provided for in the above table, it may be appropriate to use factors calculated for specific cases, see for example Table C3.1 to C3.2.
8. When 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.
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_{glt} amperes the other cables can be sized by using the group rating factor corresponding to (N-M) cables.



APPENDIX C Rating factors for more than one circuit, cables laid directly in the ground

Table C2.2

R

- Reference Method D in Tables A1.1 to A1.5. Single-core or multicore cables.

Number of circuits	Cable-to-cable clearance (a)				
	Nil (cables touching)	One cable diameter	0.125m	0.25m	0.5m
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

Multic
Cables



Single-Core
Cables



Note:

1. Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 2.5K.m/W. These are average values for the range of cable sizes and types quoted for Table B1.1 to B1.8. The process of averaging, together with rounding o, can result in some cases in errors of up to $\pm 10\%$. (Where more precise values are required they may be calculated by methods given in BS7769 (BS IEC60287)).

2. In case of a thermal resistivity lower than 2.5 K.m/W the rating factors can, in general, be increased and can be calculated by the methods given in BS7769 (BS IEC60287).

ores

Table C2.3

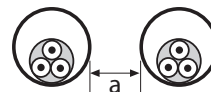
Rating factors for more than one circuit, cables laid in ducts in the ground

- Reference Method D in Tables B1.1 to B1.8

i. Multicore Cables in a Single-Way Ducts

Number of cables	Duct-to-duct Clearance (a)			
	Nil (ducts touching)	0.25m	0.5m	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

Multicores
Cables



Note:

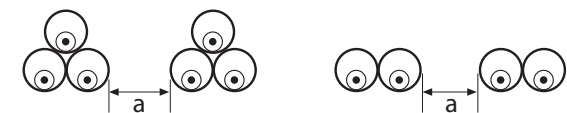
1. Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 2.5K.m/W. These are average values for the range of cable sizes and types quoted for Table B1.1 to B1.8. The process of averaging, together with rounding o, can result in some cases in errors of up to $\pm 10\%$. (Where more precise values are required they may be calculated by methods given in BS7769 (BS IEC60287)).

2. In case of a thermal resistivity lower than 2.5 K.m/W the rating factors can, in general, be increased and can be calculated by the methods given in BS7769 (BS IEC60287).

ii. Single-Core Cables in Non-Ferrous Single-Way Ducts

Number of single-core circuits of 2 or 3 cables	Duct-to-duct Clearance (a)			
	Nil (ducts touching)	0.25m	0.5m	1.0m
2	0.80	0.90	0.90	0.95
3	0.70	0.80	0.85	0.90
4	0.65	0.75	0.80	0.90
5	0.60	0.70	0.80	0.90
6	0.60	0.70	0.80	0.90

Single-Cores
Cables



Note:

1. Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 2.5K.m/W. These are average values for the range of cable sizes and types quoted for Table B1.1 to B1.8. The process of averaging, together with rounding o, can result in some cases in errors of up to $\pm 10\%$. (Where more precise values are required they may be calculated by methods given in BS7769 (BS IEC60287)).

2. In case of a thermal resistivity lower than 2.5 K.m/W the rating factors can, in general, be increased and can be calculated by the methods given in BS7769 (BS IEC60287).



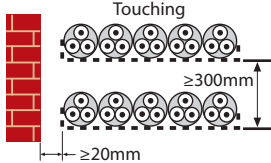
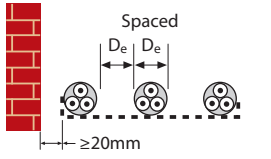
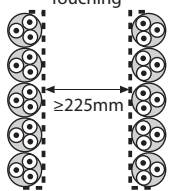
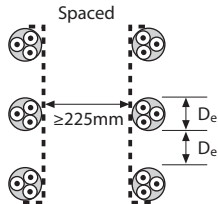
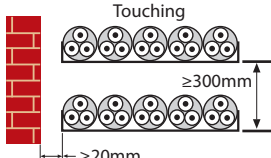
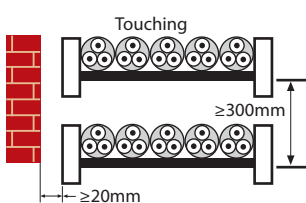
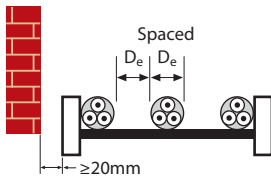
APPENDIX C

Table C3.1 Rating factors for groups of more than one multicore cables, to be applied to reference

R

current-carrying capacities for multicore cables in free air

- Reference Method E in Tables B 1.1 to B1.8

Installation Method in Table A1.1 to A1.5		Number of trays or ladders	Number of cables per tray or ladder					
			1	2	3	4	6	9
Perforated cable tray systems (Note 3)		1	See item 4 of Table C2.1					
		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
Perforated cable tray systems (Note 3)		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)		1	See item 4 of Table C2.1					
		2	1.00	0.88	0.81	0.76	0.71	0.70
Vertical perforated cable tray systems (Note 4)		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		1	0.97	0.84	0.78	0.75	0.71	0.68
		2	0.97	0.83	0.76	0.72	0.68	0.63
		3	0.97	0.82	0.75	0.71	0.66	0.61
		6	0.97	0.81	0.73	0.69	0.63	0.58
Cable ladder systems, cleats, wire mesh tray, etc (Note 3)		1	See item 4 of Table C2.1					
		2	1.00	0.86	0.80	0.78	0.76	0.73
		3	1.00	0.85	0.79	0.76	0.73	0.70
		6	1.00	0.84	0.77	0.73	0.68	0.64
Cable ladder systems, cleats, wire mesh tray, etc (Note 3)		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 B1.1 to B1.8. The spread of values is generally less than 5%.

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

Note 3: Values are given for the 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.

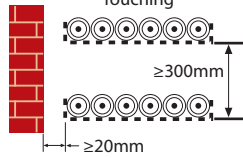
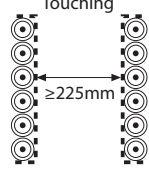
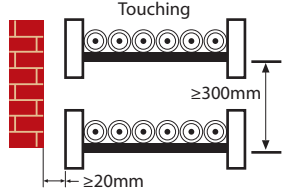
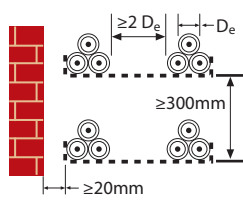
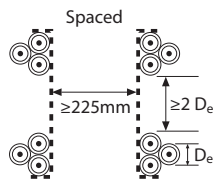
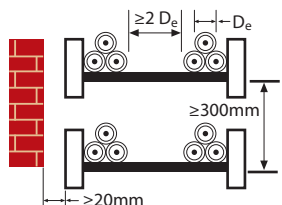


APPENDIX C

Table C3.2

Rating factors for groups of one or more circuits of single-core cables to be applied to reference current-carrying capacity for one circuit of single-core cables in free air

- Reference Method F in Tables B1.1 to B1.8

Installation Method in Table A1.1 to A1.5			Number of trays or ladders	Number of Three-Phase circuits per tray or ladder			Use as a multiplier to rating for:
				1	2	3	
Perforated cable tray systems (Note 3)	31		1	0.98	0.91	0.87	Three cables in horizontal formation
			2	0.96	0.87	0.81	
			3	0.95	0.85	0.78	
Vertical perforated cable tray systems (Note 4)	31		1	0.96	0.86	–	Three cables in vertical formation
			2	0.95	0.84	–	
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32		1	1.00	0.97	0.96	Three cables in horizontal formation
	33		2	0.98	0.93	0.89	
	34		3	0.97	0.90	0.86	
Perforated cable tray systems (Note 3)	31		1	1.00	0.98	0.96	Three cables in trefoil formation
			2	0.97	0.93	0.89	
			3	0.96	0.92	0.86	
Vertical perforated cable tray systems (note 4)	31		1	1.00	0.91	0.89	Three cables in trefoil formation
			2	1.00	0.90	0.86	
Cable ladder systems, cleats, wire mesh tray, etc. (Note 3)	32		1	1.00	1.00	1.00	Three cables in trefoil formation
	33		2	0.97	0.95	0.93	
	34		3	0.96	0.94	0.90	

Note 1: Values given are averages for the cable types and range of conductor sizes considered in Tables B1.1 to B1.8. The spread of values is generally 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 significantly 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.



APPENDIX D

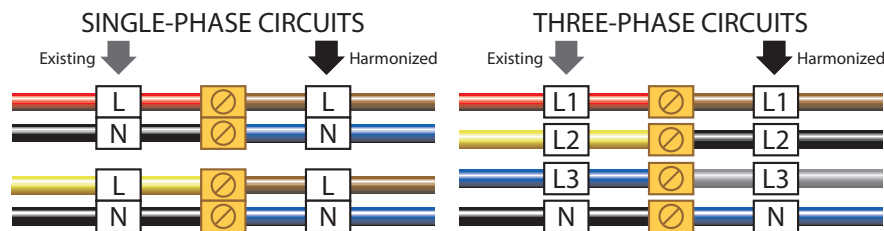
Table D1.1

Cable Cores Colour Code

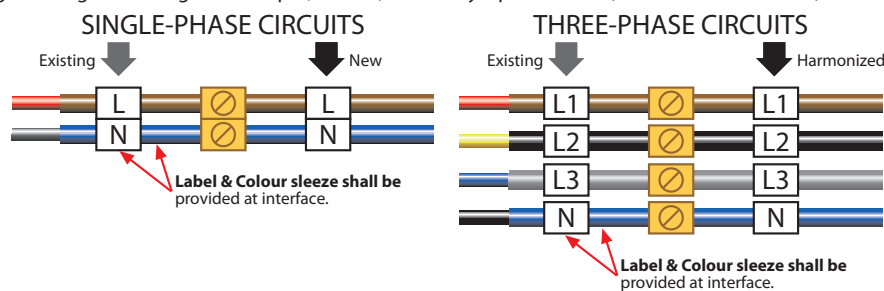
Identification of Cores in Cables

In March 2004, the Amendment No.2: AMD 14905 to BS7671:2001 (IEE Wiring Regulations Sixteenth Edition) has been harmonized with the CENELEC Standard HD 384.5.514: Identification including 514.3: Identification of conductor and with the CENELEC Harmonization Document HD 308 S2: 2001 Identification of cores in cables and exible cords.

The change in cable core colours is a major development that will affect the way wiring cable colours are distinguished and installed. Currently, for three phase fixed electrical installations, the wiring cable colours for the line connections are red, yellow and blue respectively. The new three phase harmonized cable core colours will be brown, black and grey, following that of the new BS 7671:2008 Requirements for electrical installations, IEE Wiring Regulations, 17th Edition. A number of countries in the European Union as well as Hong Kong and Singapore have implemented these harmonized cable core colours.



For any new electrical installation that involved extension from existing wiring system, BS 7671 has been modified to align with these cable core colours where suitable marking/labelling method eg. Colour tapes, sleeves, discs or by alphanumeric (letters and/or numbers) is allowed See below figures:-



Function	Alpha-Numeric	Existing Core Colours	New Harmonized Core Colour
Protective conductor	–	Green / Yellow	Green / Yellow
Functional earthing conductor	–	Cream	Cream
AC Power Circuit			
Single Phase Circuit			
- Phase	L	Red	Brown
- Neutral	N	Black	Blue
Three Phase Circuit			
- Phase1	L1	Red	Brown
- Phase2	L2	Yellow	Black
- Phase3	L3	Blue	Grey
- Neutral	N	Black	Blue
DC Two-Wire Unearthed Circuit			
- Positive	L+	Red	Brown
- Negative	L–	Black	Grey
DC Two-Wire Earthed Circuit			
- Positive (of negative earth)	L+	Red	Brown
- Negative (of negative earth)	M	Black	Blue
- Positive (of positive earth)	N	Black	Blue
- Negative (of positive earth)	L–	Blue	Grey
DC Three-Wire Circuit			
- Positive	L+	Red	Brown
- Mid-wire (may be earthed)	M	Black	Blue
- Negative	L–	Blue	Grey



APPENDIX E

A GUIDE TO FIRE PERFORMANCE TESTS & STANDARDS FOR CABLES

Cables and wires are like blood vessels in the body which keep us alive. They supply the essential energy to every part of residential, public, commercial and industrial buildings as well as vital infrastructure facilities, to provide power for lighting, computer systems, electrical appliances and machinery, etc. Comply with various relevant performance standards to ensure integrity and reliability.

This guide provides you with an idea of the mandated tests and standards to ensure cables and wires meet international performance requirements.

TYPES OF FIRE PERFORMANCE CABLES

It is important for cables to have fire survival properties because they are widely distributed throughout a building and can be the main cause of fire transmission to unaffected areas. There are 2 types of characteristics for Fire Performance: Active - which ensures the cable continues to transmit power and signals during a fire, and Passive - which limits the spread of fire that can cause severe damage to property and reduces the emission of fumes and toxic gases that can lead to loss of human lives.

These safety features are necessary to allow occupants of buildings and facilities to have the time to evacuate without being hurt or overcome by fire, toxic gases and fumes.

In Europe and the United States, where most of the fire performance standards originated, there is a slight difference in concerns over fire behaviour. The European countries are concerned about all aspects of fire-affected cables, including harmful halogen, smoke and gas contents, whereas the concern over in the United States is the flame spread and smoke characteristics from cables.

Cables are therefore rated for their various Fire Resistant, Flame Retardant, Low Smoke Zero Halogen (LSZH) and Low Smoke Fume (LSF) characteristics.

FLAME RETARDANT CABLES

Flame Retardant cables are designed to minimise the spread of flame in the event of a fire. Whether it is a single wire or a bundled wire cable, it is supposed to retard flame spread so that the fire may ideally be limited to a small area and allow for emergency response to put it out. Our PVC-based cables have this characteristic and are widely used for their low cost.

LOW SMOKE AND FUME CABLES (LSF)

LSF cables are slow to ignite and they burn slowly. LSF cables emit much smaller amount of smoke and fumes, with characteristics similar to that of LSZH-FRT cables. Although its emission will still have halogen but the content is much lesser than that from PVC cables. To ensure better performance, LSF cables are manufactured with flame retardant PVC blended with HCL and smoke absorbent material for maximum efficiency. Low Smoke Zero Halogen Flame Retardant Cables (LSZH-FRT)

Halogens are harmful non-metal elements such as fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At). FRT cables are designed with special materials not only with self-extinguishing property, but also with low smoke and fume emissions without halogens, as well as an absence of toxic gas emission in case of combustion. Thus, LSZH-FRT cables outperform PVC and LSF cables with additional protection from fire spread and the emission of toxic gas and corrosive elements. These cables are suitable for use in inadequately ventilated areas such as those in aircraft, ships, and military facilities.

FIRE RESISTANT CABLES

Fire Resistant cables are designed with superior fire resistant property to continue to operate in the event of a fire for a specific period of time (usually between 30 and 180 minutes). They are specified for used in vital installations and essential support facilities, such as a fire alarm system, as they are designed to withstand fire and maintain circuit integrity. In such cables the stranded annealed copper conductor is sealed with a fire-resisting mica tape wrap, so that even after the insulation has been burnt phase-to-phase and phase-to-earth contact can be prevented. They are also designed to withstand mechanical shock and perform under wet condition.

STANDARDS FOR FLAME RETARDANCY (European & British Standards)

There are three classes of tests for flame propagation in cables. They are the IEC60332-1, IEC60332-2 and IEC60332-3 standards. The European Committee for Electromechanical Standardization (CENELEC) - which adopts the standards of the International Electro-technical Committee (IEC) - uses the first two to assess flame propagation characteristics of a single wire, and the IEC60332-3 for similar characteristics test for bundled cables, which is more stringent.

The British Standards for flame propagation test for single wire and bundled wires and cables are the BS EN60332-1 (formerly known as BS4066-1) and BS EN50266-2 (formerly known as BS4066-3).

FLAME TEST ON SINGLE VERTICAL INSULATED WIRE/CABLE (IEC60332-1, BS EN60332-1)

The flame propagation characteristic of a single wire or cable is tested using a 60cm cable specimen that is fixed vertically in a metal chamber. A calibrated gas burner adjusted with the recommended flow rates of gas and air is lighted and applied at 45-degree angle on the surface of the test sample at 475 mm (+/- 5mm) from the lower edge of the upper horizontal clamp. The flame is applied continuously for a duration (60 - 480 sec) corresponding to the diameter of the wire/cable. After the flame has been extinguished, the specimen is cleaned and examined. It passes the test if the charring does not reach 50mm from the lower edge of the top clamp, or the charring does not extend beyond 475mm from the point of flame application.

FLAME TEST ON BUNDLED WIRES/CABLES (IEC60332-3, BS EN50266-2)

This test comprises four categories (A, B, C & D) according to the volume of combustible material per metre of cable. It determines the bunched cable's ability to limit flame spread.

The test sample consists of several pieces of cable each 3.5 m long, in order to have the required quantity of combustible material per metre of specimen. The cables are installed in a metal chamber on the front of a vertical ladder and are subjected to a gas burner flame for a specified time under controlled air flow. At the end of the specified duration, the burnt and charred portion of the cable must not be more than 2.5 m from the burner point.



APPENDIX E

STANDARDS FOR FIRE RESISTANCE

IEC60331-11 (APPARATUS 750°C)

IEC60331-21 (CABLES RATED UP TO 0.6/1.0kV)

To verify circuit integrity in the event of a fire, the cable sample is held on a frame at about 750°C for 3 hours under its rated voltage. The sample must then be re-energised in not less than 12 hours after the test, and to pass, the specimen must not breakdown and circuit integrity must be maintained.

BS6387

This test is performed to investigate the cable's ability to maintain circuit integrity under three conditions - fire only, fire with spray of water, and fire with mechanical shock.

Resistance to fire - the cable while performing at its rated voltage is subjected to gas burner fire at the specified temperature for the respective categories - Category A - 3 hours at 650°C, Category B - 3 hours at 750°C and Category C - 3 hours at 950°C.

Resistance to fire and water (Category W) is another cable specimen with rated voltage running is exposed for 15 minutes to fire at 650°C and a further 15 minutes to fire and a continuous spray of water.

Resistance to fire and mechanical shock in this test a new cable sample with rated voltage running is mounted on a vertical panel which is struck with a steel bar for 15 minutes while subjected to fire. The burning temperatures required for the respective categories are Category X (650°C), Category Y (750°C) and Category Z (950°C).

STANDARDS FOR HALOGEN, SMOKE EMISSION, CORROSIVITY AND TOXICITY

SMOKE DENSITY

(IEC61034-2, BS EN61034-2)

To measure the density of smoke from a burning cable, samples are placed horizontally in a 3 square metre metal cabinet and burned by flame from 100 cubic cm of alcohol in a metal tray. A fan is used to ensure uniformity of the smoke and light transmittance is measured by a photometric system in the cabinet. The result is expressed as percentage light transmittance and the specimen is rated to have passed the test if the value is more than 60%, as the higher the percentage the less smoke is emitted.

HALOGEN EMISSION

(IEC60754-1, BS EN60754-1)

To determine the amount of corrosive gases, such as hydrogen chloride, chlorine, bromine, antimony and iodine released by the cable, samples of non-metallic materials (1g) are burned in a tubular oven at up to 800°C. Controlled air flow inside the chamber absorbs the resulting gases in water, which is tested for its acidity. If the specimen yields less than 5 mg/g of hydrochloric acid it is rated Halogen Free, but if the yield is between 5 mg/g and 15 mg/g it is classed as Low Smoke & Fumes. The results do not determine whether the specimen is totally halogen free.

SMOKE CORROSIVELY

(IEC60754-2, BS EN60754-2)

This method determines the corrosiveness of the gases released from the cables by burning the insulation material in a furnace at ≤935°C with rated air supply for 30 minutes. The evolved gases are absorbed into distilled water, which is then measured for its pH and conductivity. A pH-value of above 4.3 and conductivity of over 10µS / mm must be achieved.

TOXICITY INDEX

(ES713)

This Naval Engineering Standard method is used to analyse noxious gas emitted from the burning specimen and the amount that each of the gas can cause fatality. Sample of the cable insulating material (~1.0 g) is burned in a chamber with a volume of 0.7-1m³ and the gases emitted during combustion are detected and collected in order to determine the quantities of the elements, such as carbon dioxide, carbon monoxide, sulphur dioxide, nitric oxide, acids, ammonia, etc. The Toxicity Index is derived from the calculated quantity of each gas produced when 100g (scaled up) of the material is burnt in air in a volume of 1m³ and the particular resulting concentration fatal to human when exposed to it for 30 minutes, thus determining the critical toxicity factor. The higher the index, the more toxic the insulating material when burnt in fire. For example, the toxicity index of a FRT cable is generally known to be lower than 5.

OTHER RELEVANT STANDARDS

LIMITING OXYGEN INDEX (LOI)

(BS EN ISO4589-2)

LOI is defined as the minimum concentration of oxygen required to support flaming combustion in a flowing air mixture of oxygen and nitrogen (in this instance, the downward burning of a vertically-mounted test specimen such as a candle.) The oxygen concentration is recorded as volume percentage. A higher LOI value (oxygen concentration) means better flame retardancy. For example, with 21% oxygen index the material will burn by itself automatically at room temperature; LSZH cables require a higher index between 33% and 42%. The test method allows accuracy of + 0.5% to be achieved.

TEMPERATURE INDEX (TI)

(BS EN ISO4589-3)

Research has shown that compared to the conventional oxygen index, higher temperature at which a material will burn in air is a better determinant of combustibility. When air temperature rises, the Oxygen Index Value falls, thus, the test for Temperature Index (TI) has been developed from the LOI method. The apparatus used for the TI test is essentially similar to that of the LOI test but the incoming combustion gas is heated. It tests the flammability of the sample with a small flame to find the optimum temperature at which the specimen will burn automatically. When a specimen burns automatically in the air with 21% oxygen, the temperature at this point is known as the TI. In the case of coal, the oxygen index will drop to 21% and it will burn automatically when the air temperature reaches 150°C. This temperature for coal is recorded as its TI.

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