

LOW SMOKE HALOGEN FREE

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ELSEWEDY  
CABLES

Low Smoke Halogen Free



Elsewedy Cables was established in 1984 and is considered as one of the oldest and most successful industrial and trading business groups across the Middle East and Africa in the fields of energy, plastics and contracting. Elsewedy Cables is specialized mainly in Wires, Cables, Telecom Solutions, Electrical Products, Turnkey Projects, and recently Energy Generation. The group's turnover has been rapidly rising during the past few years to reach \$ 1.5 billion in 2007, also, the production capacity is the second highest one in the region, with 125000 tons/annum, expecting 212000 tons/annum in 2008.

Although the company began as an Egyptian local manufacturer, it has branched out regionally and internationally to include 23 production facilities for cables and electrical products that are located in 12 countries (Egypt, Sudan, Algeria, Zambia, Ghana, Syria, Saudi Arabia, Qatar, Slovenia, India and Malaysia), and it currently exports its wide range of high quality and safe products to more than 110 countries worldwide. Additionally, the group's outstanding human potential, which is more than 5000 employees, and its solid financial position, along with the strong geographical presence, have heavily contributed to the group's success and prosperity.

To strengthen its position world wide, and following the corporate strategy, on the one hand, Elsewedy Cables fully acquired by the end of 2007 ISKRAEMECO, a leader manufacturer of electrometers and currently the third largest player in the European market and the seventh largest globally; on the other hand, Elsewedy Cables is involved with 74% ownership jointly with Glencore International in a 850 \$US million project for the construction of a copper smelter to be located in Egypt.

Further more, Elsewedy Cables provides a complete portfolio of solutions and advanced technologies for sectors as diverse as the automotive and aerospace industries, railways, buildings, telecommunication and energy networks, oil and gas, submarine power systems, etc. Accordingly, Elsewedy Cables is divided in three segments in order to cover all those sectors: Wires & cables, electrical products, and turn-key projects. The group has obtained quality certificates from the most reputable laboratories, among them: ISO 9001-2000, ISO 14001, QS 9000, KEMA.a

Quality and safety are so much considered. Elsewedy Cables adopted a policy that assures maximum effectiveness and efficiency through processes and systems ensuring that every aspect of each company's activity is aligned to satisfy customer needs and all other objectives without wasting effort and with the use of the full potential of every person. Our organizational philosophy believes that customer satisfaction, health, safety, environmental considerations, and business objectives are mutually dependent.

In the industrial sector, we currently supply approximately 56% of Egypt's global market share of power cables, telecommunication cables, and lighting industries. In the export sector, as part of a worldwide marketing plan, Elsewedy Cables has branches throughout Africa, Middle East, Gulf Area, Europe, and Asia, and consistently showing dramatic increases; Egypt enjoys an important number of trade agreements with most of those countries (EU Agreement, Arab Free Trade Agreement, COMESA Agreement). Nowadays, Elsewedy Cables is exporting approximately 60% of its total turnover (export value of 550 \$US million in 2006, 1 \$US billion in 2007). For that reason, the group is concentrating efforts and making investments to target market segments and countries world wide with strong growth potential, such as Europe, Asia, or Latin America, although strengthen its leadership in Africa and Middle East.

Elsewedy Cables' mission is to become world expert in cables, with a strong financial basis and technical advanced product portfolio, making it an attractive partner for all its stakeholders: Shareholders, customers, suppliers, and employees.

## Group History

- 1938 ELSEWEDY family started its business as a trader in electrical equipment.
- 1960 The business was developed further by turning into a distributor for the only cables manufacturer at that time.
- 1984 Based on their experience in that field, the Family decided to build Egypt's first private sector cables factory "ARAB CABLES".
- 1986 Arab cables started production, as Egypt's and the Middle East's first private sector cables supplier.
- 1986-96 Arab cables' capacity quadruples from around 6.000 tons of copper cables in 1986 to 30.000 tons in 1996.
- 1996 ELSEWEDY family established their second cables factory, "EGYTECH CABLES", which is the most advanced cables production facility in the Middle East with an annual production capacity of 30.000 tons of copper cables and 15.000 tons of aluminum cables.
- ELSEWEDY family established their first plant for producing PVC compounds and master batch for cables insulation "SEDPLAST" considered as major component for the production of cables.
- 1997 ELSEWEDY family established "UNITED INDUSTRIES", the company consists of three different factories specialized in the production of special cables ( first factory in Egypt), Winding Wires & Fiber Glass Poles.
- ELSEWEDY family established "ELASTIMOLD EGYPT", as a joint venture with Elastimold, a unit of Thomas & Betts, one of the leading companies worldwide in the field of cable accessories, to produce power cable joints and Modular Terminators.
- 1998 ELSEWEDY family Established "UNITED METALS CO." Egypt's first factory to produce High Grade Copper Rods, the main component in the production of cables conductors. The factory is considered as the largest copper rod factory in the Middle East region.
- ELSEWEDY family established "ELSEWEDY SEDCO", as the first and only factory in Africa and the Middle East producing cable accessories.
- 2002 ELSEWEDY CABLES their first cable factory outside Egypt "GIAD ELSEWEDY CABLES" in partnership with the Sudanese company Giad for the production of power cables, over head conductors and telephone cables.

- 2003 ELSEWEDY CABLES further enhances their facilities outside Egypt by establishing the "SUDANESE EGYPTIAN ELECTRICAL INDUSTRIES CO" in partnership with Sudanese electricity authority.  
SUDATRAF (specialized in manufacturing transformers, electrical panels & cables joint and terminators).
- 2004 Together ELSEWEDY CABLES Group & Italsmea company (Italy) established a joint venture for the manufactory of explosion proof electrical equipment.  
"Italsmea ELSEWEDY co.
- 2005 ELSEWEDY established the Syria's latest cables factory "ELSEWEDY CABLES SYRIA" specialized in power cables manufacturing up to 400 Kv , relying on the growth in the area of: Syria,  
Lebanon, Jordan, Iraq, Iran, Palestine and all Arab countries near by.
- 2006 ELSEWEDY CABLES penetrated Ghana, by establishing "ELSEWEDY ELECTRIC-GHANA" the  
factory is specialized in Fiber Glass Road Lighting Poles manufacturing.
- 2007 ELSEWEDY CABLES established two new factories:  
1 "ELSEWEDY CABLES SAUDI ARABIA" specialized in wires and cables.  
2 "ELSEWEDY ELECTRIC SYRIA" specialized in transformers.  
3 Acquisition of ISKRAEMECO Specialized in energy measurement & management systems.
- 2008 ELSEWEDY CABLES established two new factories:  
1 "ELSEWEDY CABLES QATAR" specialized in power cables "Low & Medium".  
2 "ELSEWEDY CABLES ALGERIA" specialized in power cables "Low & Medium" in addition to instrumentation cables.

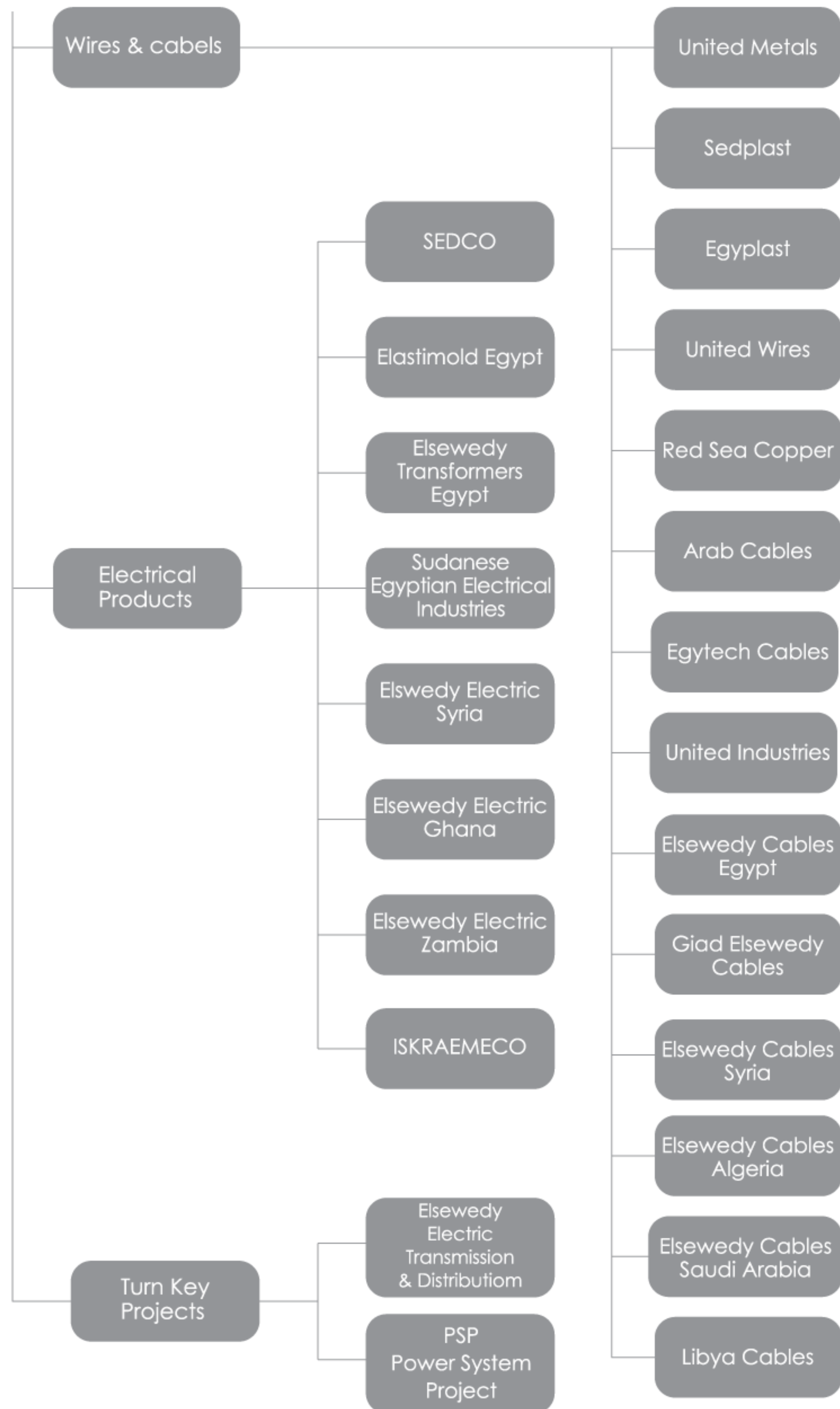


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# Group Structure



“In a fire accident some people die because of the Fire, other die because of the smoke.”

In theaters, hotels, hospitals and all closed public places we can not afford losing people by suffocation. Fire safety engineering in building design and execution plays a major role worldwide. Alongside this process comes the requirements for electrical installations to provide greater fire protection for buildings and a safer environment for the people who use them.

Elsewedy Cables has made its contribution to safe people life by reducing the smoke rate in the fire accidents by presenting a LSHF range for power and wiring cables.

## Why to use Elsewedy Cables LSHF

- 1 - Elsewedy Cables LSHF does not contain halogen:  
Hydrochloric acid is not formed during the fire, so there is no hazard of suffocation by inhalation of this highly irritant chemical.
- 2 - Elsewedy Cables LSHF reduces smoke to the minimum:  
Reducing the confusion, panic and suffocation ratio, which allow people to survive.
- 3 - Elsewedy Cables LSHF reduces fire propagation:  
By being slow to burn, Extending the escape time and reducing the immediate hazard.
- 4 - Elsewedy Cables LSHF resists ignition:  
Extending the time before cables start to burn in a fire providing people light, visibility and time to escape.

## Elsewedy Cables LSHF

- Allows people to see and breath safely for longer time.
- Increases time for people to escape.
- Reduces damage of buildings and electronic equipment.
- Elsewedy cables LSHF improves safety and human survival in a fire.

## LSHF Tests

Traditional PVC sheathed cable on burning emits acidic gases which cause intensive irritation to the eyes and lungs and cause long term damage to electronic equipments such as computers. Testing Halogen Free cables is conducted according to IEC 60754 and BS EN 50267 which specifies the weight of the cable material is decomposed and the evolved acidic gas is measured, it should be less Than 0.5%



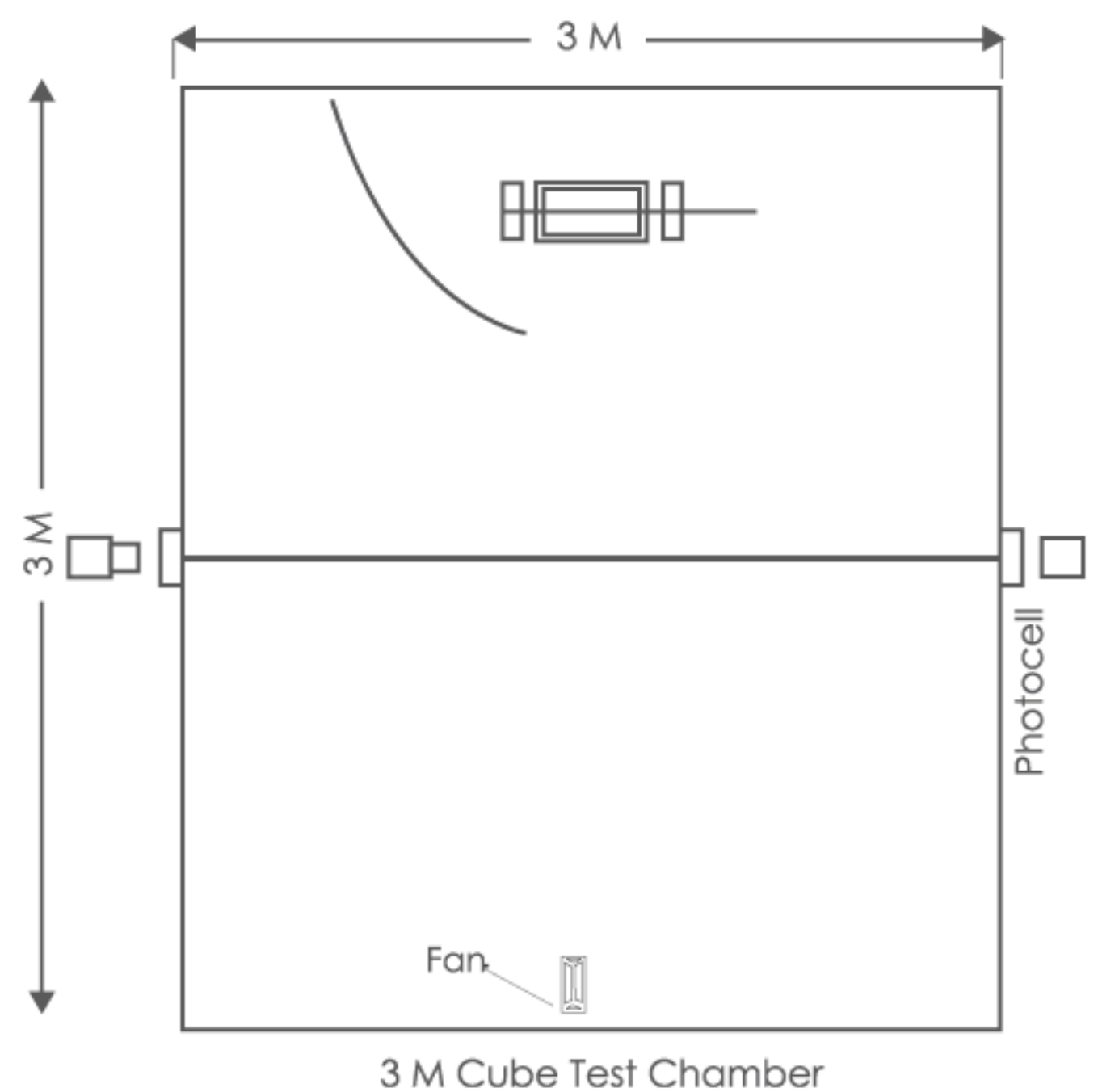
### Determination of the Amount of Halogen Acid Gas & Measurement of the Smoke Density of Cables:

It is a fact that most of the hazardous during fire comes from the black dense smoke emission which reduces the visibility to a point that people may not attempt to escape.

By the term low smoke we mean cables which on burning do not emit black dense smoke, so it makes the surroundings clearer and easier for people to escape during fire.

Testing of low smoke emission is conducted according to IEC 61034 & BS EN 61034 which specified as 3 M cube chamber as indicated in the figure where we start to burn a cable sample and measure the light transmission by means of photocell during the time of burning. The test is considered as ended when there is no decrease in light transmittance for 5 min. after the fire source has extinguished or when the test duration reaches 40 min.

The cable is considered as low smoke halogen free if the light transmission reduced to a certain value from the starting one at the end of the testing time.



Plan of Low Smoke Halogen Free test chamber according to IEC 61034 & BS EN 61034

## The 3 Meter Cube Smoke Test Chamber

Photos in the upper side for PVC sheathed cables and lower side shows the LSHF sheathed cables.



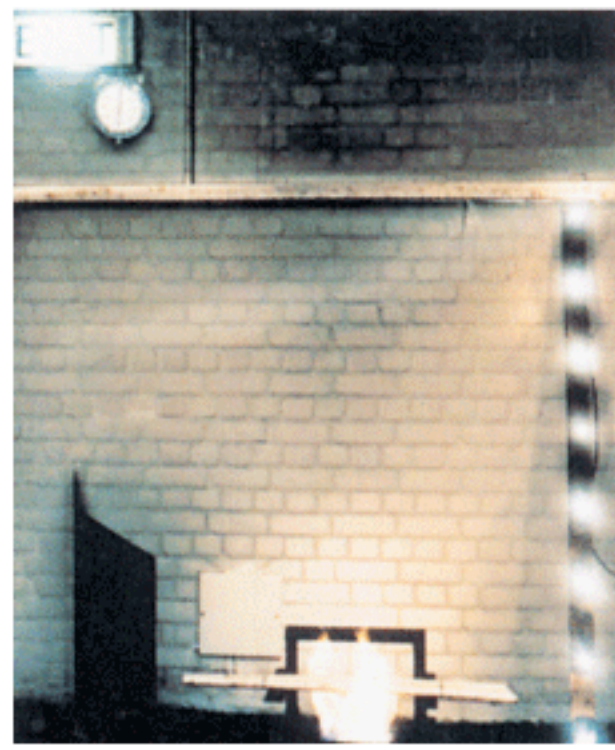
PVC Cables: 30 sec



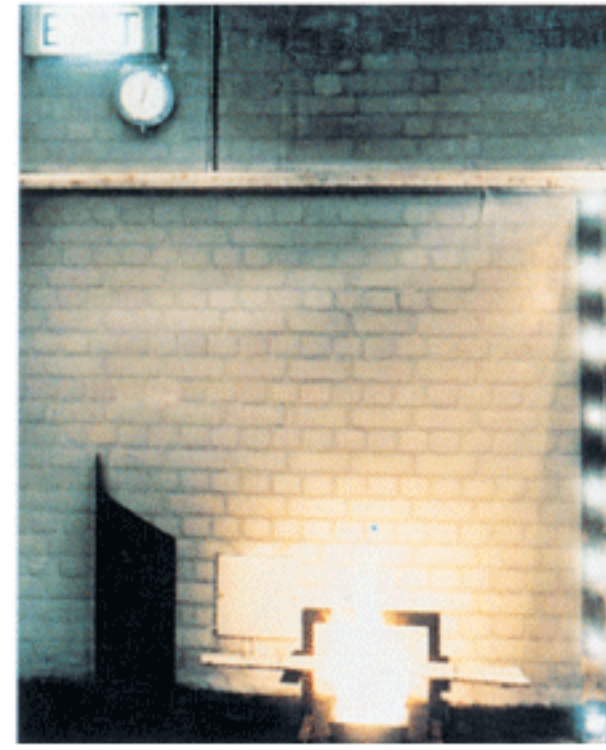
PVC Cables: 3 mins



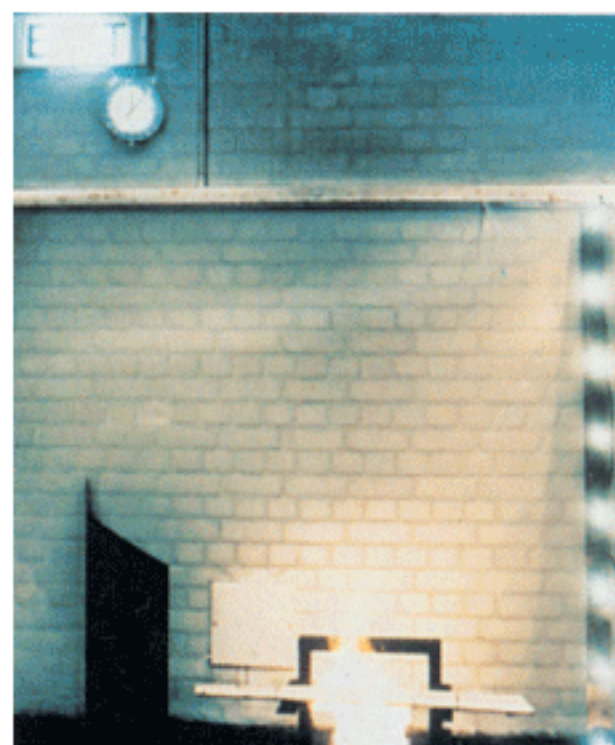
PVC Cables: 6 mins



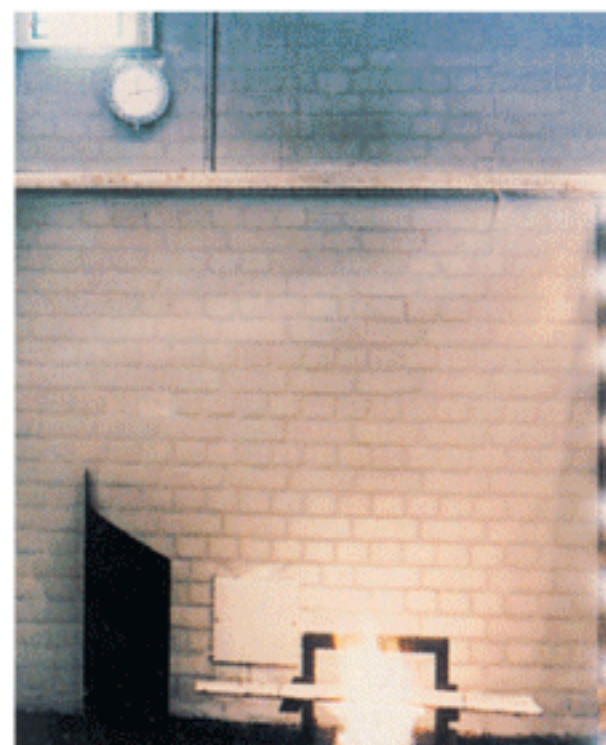
LSHF: 30 sec



LSHF: 3 mins



LSHF: 6 mins



LSHF: 12 mins

Comparison between traditional PVC & Low Smoke Halogen Free Cables when tested in accordance to IEC 61034

The comparative figure above shows the difference between the behaviour of traditional PVC and low smoke halogen free sheathed cables when tested for low smoke emission according to IEC 61034. This property helps making the public places like underground tunnels, hospitals, hotels, etc, more safer and easier for evacuation during the fire conditions.

## Flame Retardant Test

In fire condition, cables are acting as a network to propagate the flame along their length such that the traditional cables and the flame to spread everywhere beside the flame location. By the term flame retardant cables we mean using material in the cable manufacturing specially sheathing material to reduce the propagation of flame.

Testing flame retardant cables is done in accordance with IEC 60332 which specifies different parts for the test depending on the number of cables or wires, single or bunched. The figure shows the test chamber specified in IEC 60332 part 3 where a number of cable samples 3.5 meter length, determined by the total volume of non metallic material in the cable, are hanged and subjected to flame for 20 or 40 minutes and during the test time an air flow with specific rate is maintained by means of blower in the whole chamber.

The cable is considered as flame retardant if the flame did not propagate along the cable for more than 2.5 m after the flame is ceased.

### Application

- Power stations.
- Petrochemical plants.
- Off shore oil platforms.
- Industrial areas.

### Standard Specification

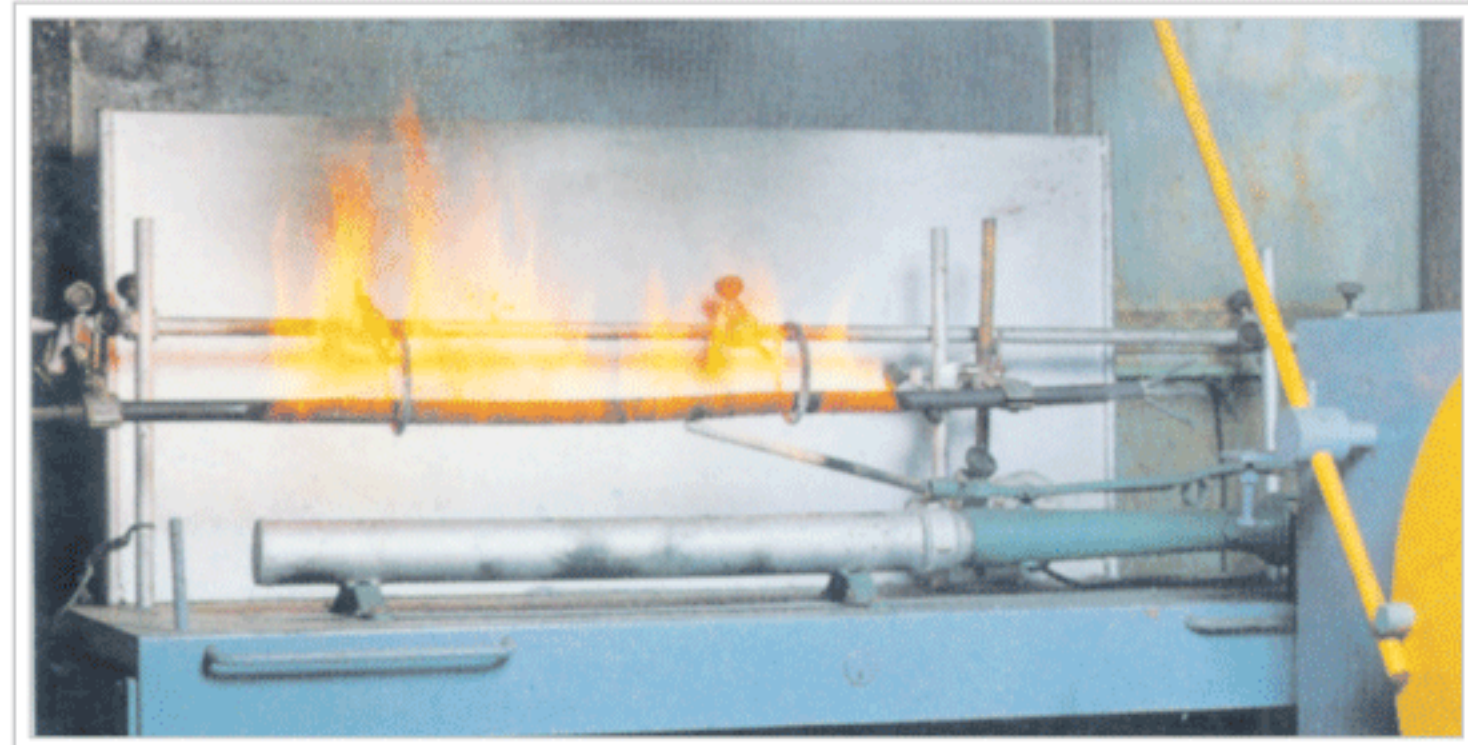
- IEC 60332
- BS EN 50266
- BS EN 60332



## Fire Resistant Cables

The most important feature during fire condition is that the fire alarm circuit is working under the fire, in case the cables connecting the fire alarm circuits are burnt the whole alarm system is useless.

So there was a great need for a type of cables which operate under the fire conditions. Fire resistance cables provide a good system for emergency circuits where the integrity of the electric network is maintained during the fire conditions.



Testing of this property is conducted according to IEC 60331 which requires one meter of cable to be hanged and subjected to flame at 750 C for 90 min. and also according to BS 6387-which required one meter cable to be hanged and subjected to flame at  $950 \pm 40C$  for 180 min.

## Fire Alarm Cables

Fire alarm cables are widely used in fire alarm systems, where the integrity of the circuit is required during the fire conditions for example:

- Hotels.
- Hospitals.
- Airport Terminals.
- Large public buildings.

## Standard Specification

IEC 60331.



# Metals Used for Cables

Table 1

## Electrical properties

Metal	Relative conductivity Copper 100	Electrical resistivity at 20 °C ohm. m (10 <sup>-8</sup> )	Temperature coefficient of resistance per °C
Copper (annealed)	100	1.7241	0.00393
Aluminium	61	2.8264	0.00403

## Physical properties

Property	Unit	Copper	Aluminium
Density at 20 °C	kg / m <sup>3</sup>	8890.0	2703.0
Coeff. thermal expansion	Per °C x 10 <sup>-6</sup>	17.0	23.0
Melting point	°C	1083.0	659.0
Thermal conductivity	W/cm °C	3.8	2.4
Ultimate tensile strength	Mn/m <sup>2</sup>	225.0	70-90

## Cable ampacity

Cable ampacity or current carrying capacity is defined as the continuous maximum current the cable can carry at its maximum operating temperature.

In the technical information tables the following installation conditions were assumed during the current calculation:

- Ambient air temperature = 40 °C
- Ground temperature = 35 °C
- Ground thermal resistivity = 120 °C. Cm/Watt
- Burial depth = 0.5 Mt.

- In case of different installation conditions from the stated, the derating factors tabulated in tables 2 to 9 must be used in calculating the new current carrying capacity.

## Derating Factors

Table 2

### Ground temperature derating factors

Ground temperature °C	15	20	25	30	35	40	45	50	55
XLPE cables rated 90 °C	1.16	1.13	1.09	1.04	1	0.95	0.9	0.85	0.8

Table 3

### Air temperature derating factors

Air temperature °C	20	25	30	35	40	45	50	55
XLPE cables rated 90 °C	1.18	1.14	1.1	1.05	1	0.9	0.89	0.84

Table 4

Burial depth derating factors

Depth of laying mt.	Cables cross section		
	Up to 70 mm <sup>2</sup>	95 upto 240 mm <sup>2</sup>	300 mm <sup>2</sup> & above
0.50	1.00	1.00	1.00
0.60	0.99	0.98	0.97
0.80	0.97	0.96	0.94
1.00	0.95	0.93	0.92
1.25	0.94	0.92	0.89
1.50	0.93	0.90	0.87
1.75	0.92	0.89	0.86
2.00	0.91	0.88	0.85

Table 5

Soil thermal resistivity derating factors

Soil thermal resistivity in °C. Cm/Watt	80	90	100	120	150	200	250	300
Rating factor	1.17	1.12	1.07	1.0	0.91	0.80	0.73	0.67



Table 6

## Trefoil or Flat Formation Derating Factors for Three Single Core Cables Laid Direct in Ground

Number of Circuits	Trefoil formation			Flat formation		
	Touching		Spacing = 0.15 M		Spacing = 0.30 M	
nr	Trefoil	Flat	Trefoil	Flat	Trefoil	Flat
2	0.77	0.80	0.82	0.85	0.88	0.91
3	0.66	0.69	0.73	0.76	0.80	0.83
4	0.60	0.63	0.68	0.71	0.74	0.77
5	0.56	0.59	0.64	0.67	0.72	0.75
6	0.53	0.57	0.61	0.64	0.70	0.73

\* L = Spacing

Table 7

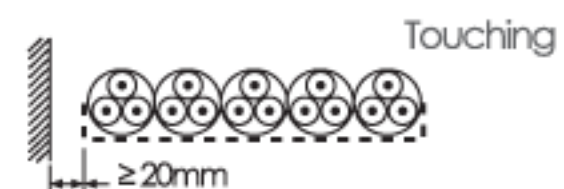
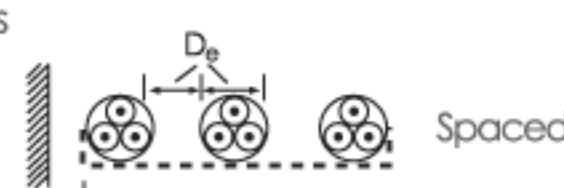
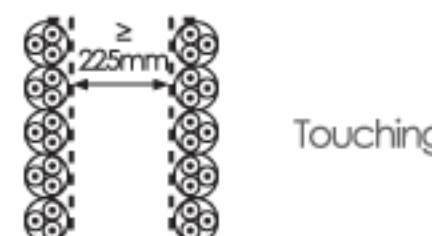
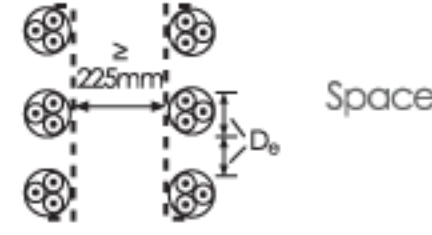
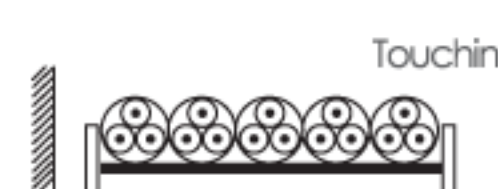
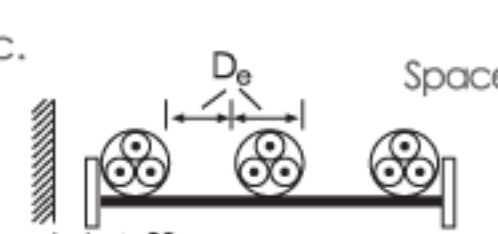
## Trefoil Formation Derating Factors for Multi-core Core Cables Laid Direct in Ground

Number of Circuits	Trefoil formation				Flat formation	
	Touching		Spacing = 0.15 M		Spacing = 0.30 M	
nr	Trefoil	Flat	Trefoil	Flat	Trefoil	Flat
2	0.81	0.81	0.87	0.87	0.91	0.91
3	0.69	0.70	0.76	0.78	0.82	0.84
4	0.62	0.63	0.72	0.74	0.77	0.81
5	0.58	0.60	0.66	0.70	0.73	0.78
6	0.54	0.56	0.63	0.67	0.70	0.76

\* L = Spacing

Table 8

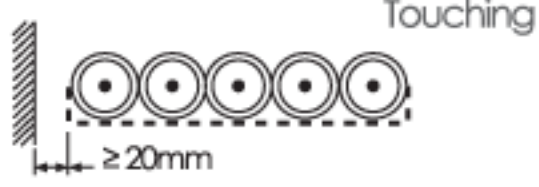

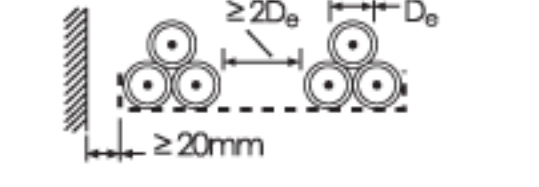
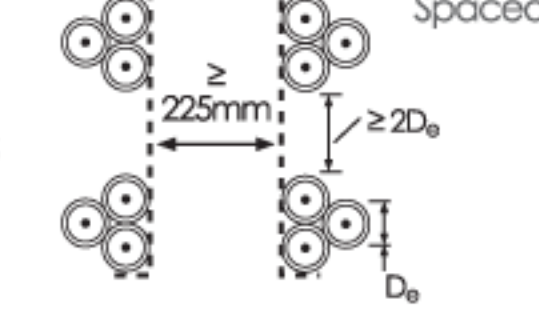
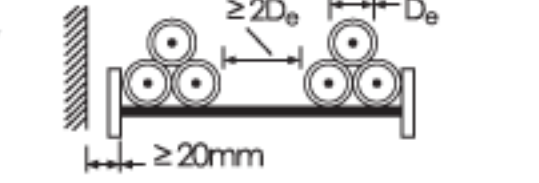
Reduction factors for groups of more than one multi-core cable in air  
To be applied to the current-carrying capacity for one multi-core cable in free air

Number of Trays	Number of circuits						Laying form
	1	2	3	4	6	9	
1	1.00	0.88	0.82	0.79	0.76	0.73	
2	1.00	0.87	0.80	0.77	0.73	0.68	
3	1.00	0.86	0.79	0.76	0.71	0.66	
Cables on perforated trays							
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	-	
Cables on vertical perforated trays							
1	1.00	0.88	0.82	0.78	0.73	0.72	
2	1.00	0.88	0.81	0.76	0.71	0.70	
1	1.00	0.91	0.89	0.88	0.87	-	
2	1.00	0.91	0.88	0.87	0.85	-	
Cables on ladder supports, cleats, etc.							
1	1.00	0.87	0.82	0.80	0.79	0.78	
2	1.00	0.86	0.80	0.78	0.76	0.73	
3	1.00	0.85	0.79	0.76	0.73	0.70	
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. The spread of values is generally less than 5%.
- NOTE 2 Factors apply to single layer groups of cables as shown above and do not apply when cables are installed in more than one layer touching each other. Values for such installations may be significantly lower and must be determined by an appropriate method.
- NOTE 3 Values are given for vertical spacing between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing, the factors should be reduced.
- NOTE 4 Values are given for horizontal spacing between trays of 225 mm with trays mounted back to back. For closer spacing the factors should be reduced.

Table 9

Reduction factors for groups of more than one circuit of single-core cables (Note 2)  
To be applied to the current-carrying capacity for one circuit of single-core cables in free air

Number of Trays	Number of circuits			Use as a multiplier to rating for	Method of installation
	1	2	3		
1	0.98	0.91	0.87	Three cables in horizontal formation	Perforated trays (Note 3)  Touching
2	0.96	0.87	0.81		
3	0.95	0.85	0.78		
1	1.00	0.97	0.96	Three cables in horizontal formation	Ladder supports, cleats, etc. (Note 3)  Touching
2	0.98	0.93	0.89		
3	0.97	0.90	0.86		
1	1.00	0.98	0.96	Three cables in trefoil formation	Perforated trays (Note 3) 
2	0.97	0.93	0.89		
3	0.96	0.92	0.86		
1	1.00	0.91	0.89	Three cables in trefoil formation	Vertical perforated trays (Note 4)  Spaced
2	1.00	0.90	0.86		
3	1.00	1.00	1.00		
1	0.97	0.95	0.93	Three cables in trefoil formation	Ladder supports, cleats, etc. (Note 3) 
2	0.97	0.95	0.93		
3	0.96	0.94	0.90		

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

Table 10

## kA short circuit current - Copper conductor - XLPE insulated or LSHF insulated

C.S.A. mm <sup>2</sup>	Duration sec.									
	0.1	0.2	0.3	0.4	0.5	1.0	2.0	3.0	4.0	5.0
16	7.2	5.1	4.2	3.6	3.2	2.3	1.6	1.3	1.1	1.02
25	11.3	8.0	6.5	5.7	5.1	3.6	2.5	2.1	1.8	1.60
35	15.8	11.2	9.1	7.9	7.1	5.0	3.5	2.9	2.5	2.24
50	22.6	16.0	13.1	11.3	10.1	7.2	5.1	4.1	3.6	3.20
70	31.7	22.4	18.3	15.8	14.2	10.0	7.1	5.8	5.0	4.5
95	43.0	30.4	24.8	21.5	19.2	13.6	9.6	7.8	6.8	6.1
120	54.3	38.4	31.3	27.1	24.3	17.2	12.1	9.9	8.6	7.7
150	67.8	48.0	39.2	33.9	30.3	21.5	15.2	12.4	10.7	9.6
185	83.7	59.2	48.3	41.8	37.4	26.5	18.7	15.3	13.2	11.8
240	108.5	76.7	62.7	54.3	48.5	34.3	24.3	19.8	17.2	15.3
300	135.7	95.9	78.3	67.8	60.7	42.9	30.3	24.8	21.5	19.2
400	180.9	127.9	104.4	90.4	80.9	57.2	40.4	33.0	28.6	25.6
500	226.1	159.9	130.5	113.1	101.1	71.5	50.6	41.3	35.8	32.0
630	284.9	201.4	164.5	142.4	127.4	90.1	63.7	52.0	45.0	40.3
800	361.8	255.8	208.9	180.9	161.8	114.4	80.9	66.0	57.2	51.2
1000	452.2	319.8	261.1	226.1	202.2	143.0	101.1	82.6	71.5	64.0
1200	542.6	383.7	313.3	271.3	242.7	171.6	121.3	99.1	85.8	76.7
1600	723.5	511.6	417.7	361.8	323.6	228.8	161.8	132.1	114.4	102.3
2000	904.4	639.5	522.2	452.2	404.5	286	202.2	165.1	143	127.9

Table 11

## kA Short circuit current - Aluminium conductor - XLPE insulated or LSHF insulated

C.S.A. mm <sup>2</sup>	Duration sec.									
	0.1	0.2	0.3	0.4	0.5	1.0	2.0	3.0	4.0	5.0
16	4.7	3.4	2.7	2.4	2.1	1.5	1.1	0.9	0.75	0.67
25	7.4	5.2	4.3	3.7	3.3	2.3	1.7	1.4	1.2	1.0
35	10.4	7.3	6.0	5.2	4.6	3.3	2.3	1.9	1.6	1.5
50	14.8	10.5	8.6	7.4	6.6	4.7	3.3	2.7	2.3	2.1
70	20.7	14.7	12.0	10.4	9.3	6.6	4.6	3.8	3.3	2.9
95	28.1	19.9	16.3	14.1	12.6	8.9	6.3	5.1	4.5	4.0
120	35.6	25.1	20.5	17.8	15.9	11.2	8.0	6.5	5.6	5.0
150	44.4	31.4	25.7	22.2	19.9	14.1	9.9	8.1	7.0	6.3
185	54.8	38.8	31.6	27.4	24.5	17.3	12.3	10.0	8.7	7.8
240	71.1	50.3	41.1	35.6	31.8	22.5	15.9	13.0	11.2	10.1
300	88.9	62.9	51.3	44.4	39.8	28.1	19.9	16.2	14.1	12.6
400	118.5	83.8	68.4	59.3	53.0	37.5	26.5	21.6	18.7	16.8
500	148.2	104.8	85.5	74.1	66.3	46.9	33.1	27.0	23.4	21.0
630	186.7	132.0	107.8	93.3	83.5	59.0	41.7	34.1	29.5	26.4
800	237.0	167.6	136.9	118.5	106.0	75.0	53.0	43.3	37.5	33.5
1000	296.3	209.5	171.1	148.2	132.5	93.7	66.3	54.1	46.9	41.9
1200	355.6	251.4	205.3	177.8	159.0	112.4	79.5	64.9	56.2	50.3
1600	474.1	335.2	273.7	237	212	149.9	106	86.6	75	67
2000	592.6	419	342.1	296.3	265	187.4	132.5	108.2	93.7	83.8



Conductor temperature before short Circuit = 90° C



Maximum conductor temperature during short Circuit = 250° C

# Voltage Drop

Table 12

## Voltage drop for single core L.V cables

C.S.A mm <sup>2</sup>	Copper conductor	
	Voltage drop (mv / AMP / Meter )	
	XLPE or LSHF insulation & LSHF sheathed	
	Flat 	Trefoil 
4	8.337	8.277
6	5.628	5.568
10	3.401	3.341
16	2.203	2.142
25	1.440	1.380
35	1.085	1.024
50	0.836	0.776
70	0.624	0.564
95	0.490	0.430
120	0.417	0.357
150	0.366	0.305
185	0.322	0.262
240	0.278	0.218
300	0.253	0.192
400	0.220	0.159
500	0.211	0.150
630	0.191	0.131

C.S.A mm <sup>2</sup>	Aluminium conductor	
	Voltage drop (mv / AMP / Meter )	
	XLPE or LSHF insulation & LSHF sheathed	
	Flat 	Trefoil 
16	3.561	3.500
25	2.296	2.235
35	1.700	1.640
50	1.291	1.230
70	0.937	0.877
95	0.719	0.655
120	0.594	0.534
150	0.511	0.451
185	0.437	0.377
240	0.367	0.307
300	0.322	0.262
400	0.278	0.218
500	0.260	0.199
630	0.223	0.163

The above data are based on:  
 Max. operating temp: 90 °C for XLPE  
 Power factor: 0.8    Rated frequency: 50 HZ  
 Cables are touched in flat formation

Table 13

## Voltage drop for multi core L.V cables

C.S.A mm <sup>2</sup>	Copper conductor	
	Voltage drop (mv / AMP / Meter )	
	XLPE insulation & LSHF sheathed	
1.5	20.341	
2.5	13.197	
4	7.731	
6	5.191	
10	3.094	
16	1.982	
25	1.276	
35	0.955	
50	0.715	
70	0.520	
95	0.394	
120	0.337	
150	0.282	
185	0.241	
240	0.201	
300	0.177	
400	0.155	

C.S.A mm <sup>2</sup>	Aluminium conductor	
	Voltage drop (mv / AMP / Meter )	
	XLPE insulation & LSHF sheathed	
16	3.479	
25	2.218	
35	1.624	
50	1.217	
70	0.865	
95	0.645	
120	0.524	
150	0.442	
185	0.369	
240	0.299	
300	0.255	
400	0.211	

The above data are based on:  
 Max. operating temp: 90 °C for XLPE  
 Power factor : 0.8    Rated frequency: 50 HZ  
 Cables are touched in flat formation

# LSHF Cables Types

## Low Voltage LSHF Cables

### Operating Voltage (up to 0.6/1 kV)

#### Cable Construction

**1. Conductor:**

Copper or Aluminium conductors, solid, flexible or stranded with round or sectoral shaped conductors.

**2. Insulation:**

An extruded layer of XLPE is applied over the conductor. Insulated cables are suitable for maximum conductor operating temperature of 90 °C.

**3. Assembly:**

In case of multicore cables cores are assembled together.

**4. Bedding:**

In case of armoured cables an extruded layer of LSHF is applied as bedding.

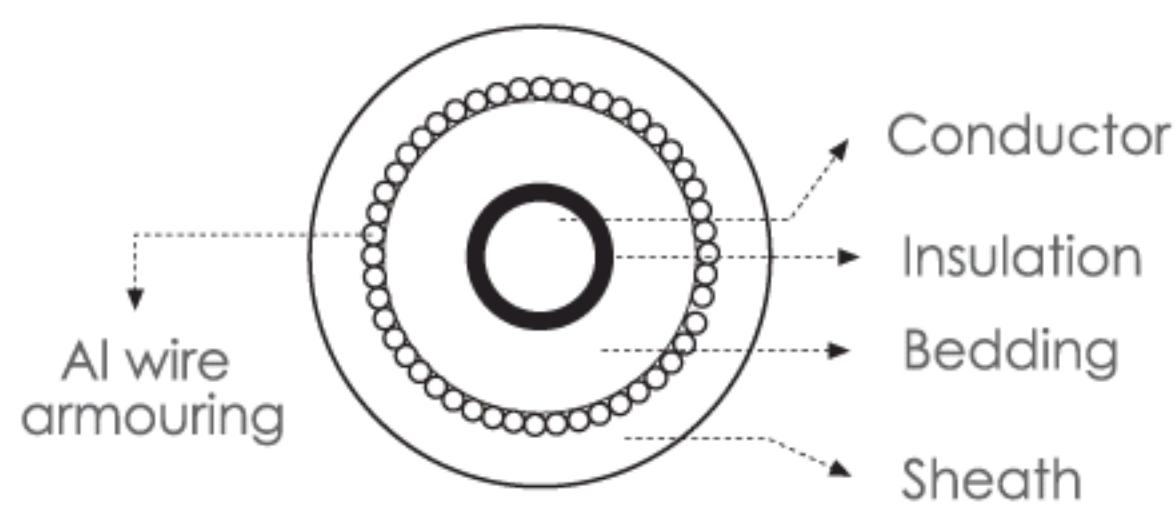
**5. Armouring:**

Steel Wire: Galvanized steel wires are applied helically.

**6. Sheath:**

An extruded layer of LSHF is applied as an outer sheath.

#### Armouring of single Core Cable



#### Armouring of Single Core Cable

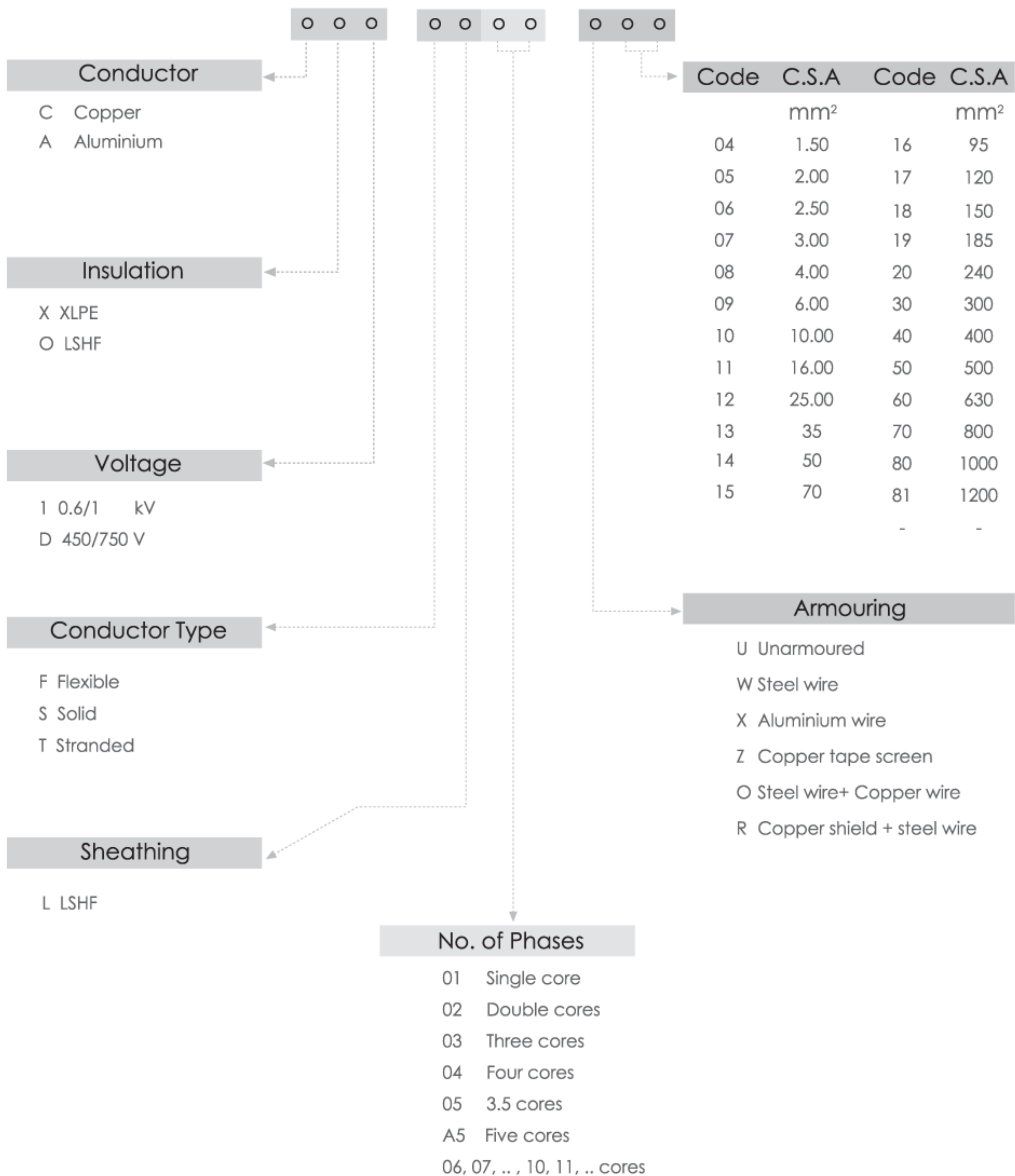
Armouring by non- magnetic material such as Aluminium Wire armouring to reduce the magnetic losses.



## System designation for Low Voltage Cable

You can order our product by giving the following information:

1. Cable code as per the catalogue.
2. If your required cable is out of our catalogue range, you can use the following codes to determine your cable.





### Description

- Soft annealed solid or stranded Copper conductors insulated with LSHF compound rated 90 °c according to BS 7211 and BS EN 60332-1.



### Application

For indoor fixed installations in dry locations, laid in conduits, as well as in steel support brackets.

Product - code	Nominal cross sectional area		Max. Conductor resistance		Current rating in air				
					Free Air			Pipes	
					Horizontal flat spaced	Vertical flat spaced	Terfoil	Enclosed in conduit on a wall or in turnking etc.	
					2 cables, Single phase a.c. or d.c. or 3 cables three phases	2 cables, Single phase a.c. or d.c. or 3 cables three phases	3 cables, terfoil, three phases	2 cables, Single phase a.c. or d.c.	3 or 4 cables, three phase
mm <sup>2</sup>		Ω/km	Ω/km	A	A	A	A	A	
COD-S001-U04	1.5	re	12.1000	15.4000	-	-	-	20	17
COD-T001-U04	1.5	rm	12.1000	15.4000	-	-	-	20	17
COD-S001-U06	2.5	re	7.4100	9.4500	-	-	-	27	23
COD-T001-U06	2.5	rm	7.4100	9.4500	-	-	-	27	23
COD-S001-U08	4	re	4.6100	5.8800	-	-	-	36	31
COD-T001-U08	4	rm	4.6100	5.8800	-	-	-	36	31
COD-S001-U09	6	re	3.0800	3.9300	-	-	-	46	40
COD-T001-U09	6	rm	3.0800	3.9300	-	-	-	46	40
COD-T001-U10	10	rm	1.8300	2.3300	-	-	-	64	57
COD-T001-U11	16	rm	1.1500	1.4700	-	-	-	86	77
COD-T001-U12	25	rm	0.7270	0.9270	166	148	125	114	101
COD-T001-U13	35	rm	0.5240	0.6690	205	184	155	141	125
COD-T001-U14	50	rm	0.3870	0.4940	249	223	190	171	152
COD-T001-U15	70	rm	0.2680	0.3430	319	289	245	218	194
COD-T001-U16	95	rm	0.1930	0.2480	387	353	300	263	235
COD-T001-U17	120	rm	0.1533	0.1970	450	412	350	305	272
COD-T001-U18	150	rm	0.1240	0.1600	518	476	404	341	298
COD-T001-U19	185	rm	0.0991	0.1290	592	546	465	387	336
COD-T001-U20	240	rm	0.0754	0.0990	699	647	551	455	394
COD-T001-U30	300	rm	0.0601	0.0810	805	749	637	520	448
COD-T001-U40	400	rm	0.0470	0.0638	968	903	745	620	530

The above data is approximate and subjected to manufacturing tolerance.

re : round, Solid  
rm : round, Stranded

### Description

- Soft annealed Copper fine wires, bunched together in sub - units or stranded bunched groups into a main units, which forms the flexible conductor. Insulated with LSHF compound rated 90 °C.
- Cables are produced according to BS 7211 and BS EN 60332-1



### Application

For indoor fixed installations in dry locations, where particular flexibility is required. For electrical panels connection or for electrical apparatus they can be laid in groups around steel sheets.

Product - code	Nominal cross sectional area	Max. Conductor resistance		Current rating in air				
				Free Air			Pipes	
		DC at 20 °C	AC at 90 °C	Horizontal flat spaced	Vertical flat spaced	Terfoil	Enclosed in conduit on a wall or in trunking etc.	
				2 cables, Single phase a.c. or d.c. or 3 cables three phases	2 cables, Single phase a.c. or d.c. or 3 cables three phases	3 cables, terfoil, three phases	2 cables, Single phase a.c. or d.c.	3 or 4 cables, three phases
mm <sup>2</sup>	Ω/km	Ω/km	A	A	A	A	A	
COD-F001-U04	1.5	13.3000	16.9590	-	-	-	20	17
COD-F001-U06	2.5	7.9800	10.1750	-	-	-	27	23
COD-F001-U08	4	4.9500	6.3120	-	-	-	36	31
COD-F001-U09	6	3.3000	4.2080	-	-	-	46	40
COD-F001-U10	10	1.9100	2.4360	-	-	-	64	57
COD-F001-U11	16	1.2100	1.5430	-	-	-	86	77
COD-F001-U12	25	0.7800	0.9550	166	148	125	114	101
COD-F001-U13	35	0.5540	0.7070	205	184	155	141	125
COD-F001-U14	50	0.3860	0.4930	249	223	190	171	152
COD-F001-U15	70	0.2720	0.3480	319	289	245	218	194
COD-F001-U16	95	0.2060	0.2640	387	353	300	263	235
COD-F001-U17	120	0.1610	0.2070	450	412	350	305	272
COD-F001-U18	150	0.1290	0.1670	518	476	404	341	298
COD-F001-U19	185	0.1060	0.1380	592	546	465	387	336
COD-F001-U20	240	0.0801	0.1050	699	647	551	455	394

The above data is approximate and subjected to manufacturing tolerance.

# Single Core Cables, with Stranded Circular Copper Conductors, XLPE Insulated and LSHF Sheathed

## Description

- Soft annealed stranded Copper or Aluminium conductor. Insulated with XLPE compound rated 90 °C and sheathed with LSHF Compound layer.
- Cables are produced according to IEC 60502-1 and IEC 60332-1




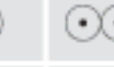

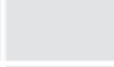
## Application

For outdoor and indoor installations in damp and wet locations. They are normally used for power distribution in urban networks, industrial plants, as well as in thermopower and hydropower stations.



Product - code	Nominal cross sectional area mm <sup>2</sup>	Max. Conductor resistance		Current rating						Approx. overall diameter mm	Approx. weight kg/km
		DC at 20 °C Ω/km	AC at 90 °C Ω/km	Laid in ground			Laid in free air				
				A	A	A	A	A	A		
a - Copper conductors											
CX1-TL01-U08	4	4.6100	5.8800	55	51	40	53	47	40	6.8	80
CX1-TL01-U09	6	3.0800	3.9300	68	65	53	65	59	53	7.3	105
CX1-TL01-U10	10	1.8300	2.3300	98	86	68	84	79	68	8.3	150
CX1-TL01-U11	16	1.1500	1.4700	116	111	87	116	110	95	9.3	210
CX1-TL01-U12	25	0.7270	0.9270	150	142	110	143	137	121	11.0	315
CX1-TL01-U13	35	0.5240	0.6690	179	172	137	179	173	152	12.1	410
CX1-TL01-U14	50	0.3870	0.4940	210	200	163	221	210	184	13.8	555
CX1-TL01-U15	70	0.2680	0.3430	263	247	200	278	268	236	15.7	760
CX1-TL01-U16	95	0.1930	0.2480	310	294	242	347	336	289	17.7	1015
CX1-TL01-U17	120	0.1530	0.1970	357	336	273	404	394	341	19.6	1280
CX1-TL01-U18	150	0.1240	0.1600	394	373	310	457	446	389	21.8	1570
CX1-TL01-U19	185	0.0991	0.1290	452	425	352	530	520	441	23.9	1920
CX1-TL01-U20	240	0.0754	0.0990	520	488	404	651	641	536	27.1	2530
CX1-TL01-U30	300	0.0601	0.0810	588	546	457	824	756	620	29.7	3105
CX1-TL01-U40	400	0.0470	0.0638	672	620	515	893	872	714	33.9	4135
CX1-TL01-U50	500	0.0366	0.0517	761	693	572	1008	987	814	37.4	5110
CX1-TL01-U60	630	0.0283	0.0425	872	777	651	1155	1134	956	41.9	6455
CX1-TL01-U70	800	0.0221	0.0292	957	861	735	1313	1292	1092	46.8	8260
CX1-TL01-U80	1000	0.0176	0.0234	1082	935	798	1449	1428	1208	51.5	10075

The above data is approximate and subjected to manufacturing tolerance.

Product - code	Nominal cross sectional area	Max. Conductor resistance		Current rating						Approx. overall diameter	Approx. weight
		DC at 20 °C	AC at 90 °C	Laid in ground			Laid in free air				
	mm <sup>2</sup>			Ω/km	Ω/km						

b - Aluminium conductors

AX1-TL01-U11	16	1.9100	2.4500	89	87	66	89	84	63	9.3	115
AX1-TL01-U12	25	1.2000	1.5400	113	110	84	116	110	95	11.0	165
AX1-TL01-U13	35	0.8680	1.1130	137	131	105	142	137	121	12.1	205
AX1-TL01-U14	50	0.6410	0.8220	163	155	121	173	168	147	13.8	260
AX1-TL01-U15	70	0.4430	0.5690	200	189	152	221	215	179	15.7	340
AX1-TL01-U16	95	0.3200	0.4110	236	226	179	284	273	215	17.7	450
AX1-TL01-U17	120	0.2530	0.3250	278	263	215	326	315	242	19.6	550
AX1-TL01-U18	150	0.2060	0.2650	310	294	236	373	362	299	21.8	670
AX1-TL01-U19	185	0.1640	0.2120	352	336	267	436	420	336	23.9	830
AX1-TL01-U20	240	0.1250	0.1630	410	389	315	515	499	399	27.1	1050
AX1-TL01-U30	300	0.1000	0.1310	467	436	357	578	567	462	29.7	1300
AX1-TL01-U40	400	0.0778	0.1000	541	504	410	693	677	541	33.9	1610
AX1-TL01-U50	500	0.0605	0.0870	609	567	467	809	788	630	37.4	2000
AX1-TL01-U60	630	0.0469	0.0620	698	646	536	945	924	746	41.9	2520
AX1-TL01-U70	800	0.0367	0.0560	788	704	599	1071	1050	851	46.8	3150
AX1-TL01-U80	1000	0.0291	0.0470	872	767	651	1176	1155	966	51.5	3870

The above data is approximate and subjected to manufacturing tolerance.



# Multicore Cables, with Stranded, Copper Conductors, XLPE Insulated and LSHF Sheathed

## Description

- Multicore cables of stranded Copper conductors are insulated with XLPE compound, assembled together and covered with an overall jacket of LSHF compound.
- Cables are produced according to IEC 60502-1.

## Application

For outdoor and indoor installations in damp and wet locations. They are normally used for power distribution in urban networks, in industrial plants, as well as in Thermopower and Hydropower stations.



Product - code	Nominal cross sectional area mm <sup>2</sup>	Max. conductor resistance		Current rating			Approx. overall diameter mm	Approx. weight kg/km
		DC at 20 °C Ω/km	AC at 90 °C Ω/km	Laid direct in ground A	Laid in ducts A	Laid in free air A		
Two core cables								
CX1-TL02-U04	1.5 rm	12.1000	15.4000	30	25	25	9.6	105
CX1-TL02-U06	2.5 rm	7.4100	9.4500	37	32	34	10.5	135
CX1-TL02-U08	4 rm	4.6100	5.8800	50	40	46	11.7	175
CX1-TL02-U09	6 rm	3.0800	3.9300	63	52	60	12.7	225
CX1-TL02-U10	10 rm	1.8300	2.3300	82	69	79	14.7	340
CX1-TL02-U11	16 rm	1.1500	1.4700	106	83	105	16.7	470
CX1-TL02-U12	25 rm	0.7270	0.9270	139	107	139	20.1	695
CX1-TL02-U13	35 rm	0.5240	0.6690	166	134	166	22.3	875
Three core cables								
CX1-TL03-U04	1.5 rm	12.1000	15.4000	26	23	22	10.1	130
CX1-TL03-U06	2.5 rm	7.4100	9.4500	35	29	32	11.0	165
CX1-TL03-U08	4 rm	4.6100	5.8800	45	36	41	12.3	225
CX1-TL03-U09	6 rm	3.0800	3.9300	57	45	50	13.4	295
CX1-TL03-U10	10 rm	1.8300	2.3300	75	60	68	15.6	455
CX1-TL03-U11	16 rm	1.1500	1.4700	97	75	89	17.7	645
CX1-TL03-U12	25 rm	0.7270	0.9270	128	102	120	21.4	965
CX1-TL03-U13	35 rm	0.5240	0.6690	155	120	145	23.8	1260

The above data is approximate and subjected to manufacturing tolerance.

Product - code	Nominal cross sectional area	Max. conductor resistance		Current rating			Approx. overall diameter	Approx. weight
		DC at 20 °C	AC at 90 °C	Laid direct in ground	Laid in ducts	Laid in free air		
	mm <sup>2</sup>	Ω/km	Ω/km	A	A	A	mm	kg/km

## Four core cables

CX1-TL04-U04	1.5	rm	12.1000	15.4000	26	23	22	10.6	150
CX1-TL04-U06	2.5	rm	7.4100	9.4500	35	29	32	11.9	205
CX1-TL04-U08	4	rm	4.6100	5.8800	45	36	41	13.4	280
CX1-TL04-U09	6	rm	3.0800	3.9300	57	45	50	14.6	365
CX1-TL04-U10	10	rm	1.8300	2.3300	75	60	68	17.0	575
CX1-TL04-U11	16	rm	1.1500	1.4700	97	75	89	19.4	825
CX1-TL04-U12	25	rm	0.7270	0.9270	128	102	120	23.5	1245
CX1-TL04-U13	35	rm	0.5240	0.6690	155	120	145	23.6	1530
CX1-TL04-U14	50	sm	0.3870	0.4940	185	145	179	27.1	2060
CX1-TL04-U15	70	sm	0.2680	0.3430	220	180	225	31.4	2905
CX1-TL04-U16	95	sm	0.1930	0.2480	265	210	268	35.1	3910
CX1-TL04-U17	120	sm	0.1530	0.1970	305	245	310	39.2	4915
CX1-TL04-U18	150	sm	0.1240	0.1600	335	275	352	43.7	6035
CX1-TL04-U19	185	sm	0.0991	0.1290	375	310	404	48.7	7540
CX1-TL04-U20	240	sm	0.0754	0.0990	435	365	483	54.5	9785
CX1-TL04-U30	300	sm	0.0601	0.0810	490	405	562	60.1	12190
CX1-TL04-U40	400	sm	0.0470	0.0642	579	476	660	66.9	15540
CX1-TL04-U50	500	sm	0.0366	0.0519	653	546	762	74.4	20075

## Four core cables with reduced neutral

CX1-TL05-U13	35	rm	16	rm	0.5240/1.1500	0.6690/1.4700	155	120	142	22.5	1360
CX1-TL05-U14	50	sm	25	rm	0.3870/0.7270	0.4940/0.9270	185	145	179	25.9	1835
CX1-TL05-U15	70	sm	35	rm	0.2680/0.5240	0.3430/0.6690	220	180	215	29.7	2540
CX1-TL05-U16	95	sm	50	sm	0.1930/0.3870	0.2480/0.4940	265	210	268	33.6	3435
CX1-TL05-U17	120	sm	70	sm	0.1530/0.2680	0.1970/0.3430	305	245	310	37.5	4400
CX1-TL05-U18	150	sm	70	sm	0.1240/0.2680	0.1600/0.3430	335	275	352	41.3	5255
CX1-TL05-U19	185	sm	95	sm	0.0991/0.1930	0.1290/0.2480	375	310	404	46.2	6640
CX1-TL05-U20	240	sm	120	sm	0.0754/0.1530	0.0990/0.1970	435	365	483	51.5	8555
CX1-TL05-U30	300	sm	150	sm	0.0601/0.1240	0.0810/0.1600	490	405	562	56.8	10640
CX1-TL05-U40	400	sm	185	sm	0.0470/0.0991	0.0642/0.1290	579	476	660	62.8	14440
CX1-TL05-U50	500	sm	240	sm	0.0366/0.0754	0.0519/0.0990	653	546	762	70.1	18295

The above data is approximate and subjected to manufacturing tolerance.

rm : round, Stranded  
sm : Sector, Stranded

# Multicore Cables, with Stranded, Aluminum Conductors, XLPE Insulated and LSHF Sheathed

## Description

- Multicore cables of stranded Aluminium conductors are insulated with XLPE compound, assembled together and covered with an overall jacket of LSHF compound.
- Cables are produced according to IEC 60502.

## Application

For outdoor and indoor installations in damp and wet locations. They are normally used for power distribution in urban networks, in industrial plants, as well as in Thermopower and Hydropower stations.

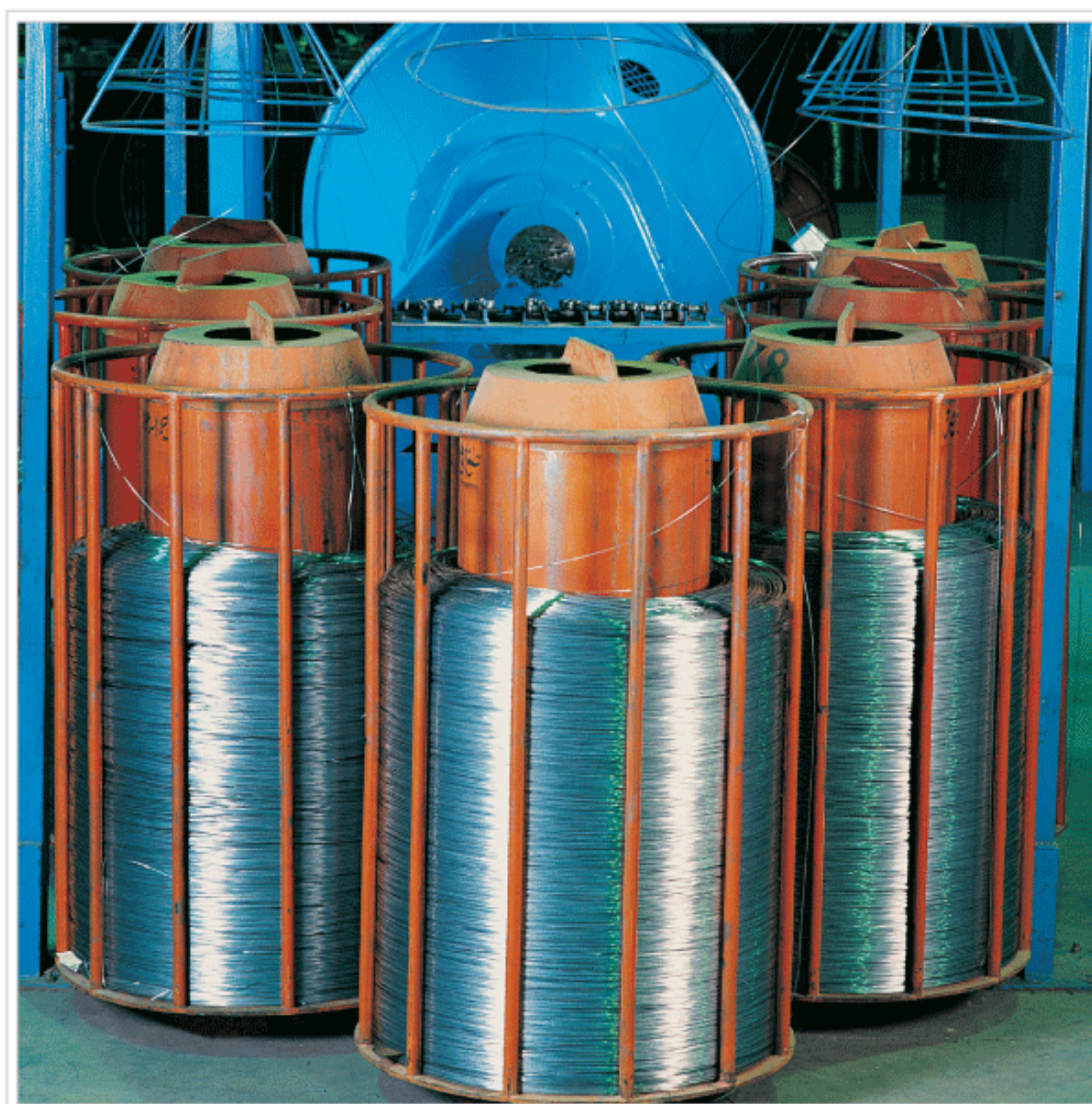


Product - code	Nominal cross sectional area mm <sup>2</sup>	Max. conductor resistance		Current rating			Approx. overall diameter mm	Approx. weight kg/km
		DC at 20 °C	AC at 90 °C	Laid direct in ground	Laid in ducts	Laid in free air		
		Ω/km	Ω/km	A	A	A		
Two core cables								
AX1-TL02-U10	10 rm	3.0800	3.9500	57	48	55	14.7	335
AX1-TL02-U11	16 rm	1.9100	2.4500	74	58	73	16.7	450
AX1-TL02-U12	25 rm	1.2000	1.5400	97	75	97	20.1	640
AX1-TL02-U13	35 rm	0.8680	1.1130	128	106	120	22.3	780
Three core cables								
AX1-TL03-U10	10 rm	3.0800	3.9500	52	42	48	15.6	375
AX1-TL03-U11	16 rm	1.9100	2.4500	68	52	62	17.7	605
AX1-TL03-U12	25 rm	1.2000	1.5400	90	71	84	21.4	835
AX1-TL03-U13	35 rm	0.8680	1.1130	120	95	105	23.8	1050
Four core cables								
AX1-TL04-U10	10 rm	3.0800	3.9500	52	42	48	17.0	450
AX1-TL04-U11	16 rm	1.9100	2.4500	68	52	62	19.4	700
AX1-TL04-U12	25 rm	1.2000	1.5400	90	71	84	23.5	925
AX1-TL04-U13	35 rm	0.8680	1.1130	120	95	110	23.6	800
AX1-TL04-U14	50 sm	0.6410	0.8220	145	110	136	27.1	950
AX1-TL04-U15	70 sm	0.4430	0.5690	175	140	168	31.4	1260
AX1-TL04-U16	95 sm	0.3200	0.4110	210	165	205	35.1	1650
AX1-TL04-U17	120 sm	0.2530	0.3250	235	190	236	39.2	2060
AX1-TL04-U18	150 sm	0.2060	0.2650	265	215	278	43.7	2520
AX1-TL04-U19	185 sm	0.1640	0.2120	290	240	315	48.7	3140
AX1-TL04-U20	240 sm	0.1250	0.1630	340	280	378	54.5	4020
AX1-TL04-U30	300 sm	0.1000	0.1310	390	315	446	60.1	4930
AX1-TL04-U40	400 sm	0.0778	0.1025	461	379	526	66.9	5975
AX1-TL04-U50	500 sm	0.0605	0.0810	527	441	615	74.4	7485

The above data is approximate and subjected to manufacturing tolerance.

Product - code	Nominal cross sectional area		Max. conductor resistance		Current rating			Approx. overall diameter	Approx. weight
			DC at 20 °C	AC at 90 °C	Laid direct in ground	Laid in ducts	Laid in free air		
	mm <sup>2</sup>	Ω/km	Ω/km	A	A	A	mm	kg/km	
Four core cables with reduced neutral									
AX1-TL05-U13	35 sm	16 sm	0.8680/1.9100	1.1130/2.4500	121	96	110	22.5	610
AX1-TL05-U14	50 sm	25 sm	0.6410/1.2000	0.8220/1.5400	145	116	136	25.9	925
AX1-TL05-U15	70 sm	35 sm	0.4430/0.8680	0.5690/1.1130	178	142	171	29.7	1255
AX1-TL05-U16	95 sm	50 sm	0.3200/0.6410	0.4110/0.8220	214	171	211	33.6	1630
AX1-TL05-U17	120 sm	70 sm	0.2530/0.4430	0.3250/0.5690	243	195	246	37.5	2030
AX1-TL05-U18	150 sm	70 sm	0.2060/0.4430	0.2650/0.5690	272	220	282	41.3	2515
AX1-TL05-U19	185 sm	95 sm	0.1640/0.3200	0.2120/0.4110	309	250	326	46.2	3095
AX1-TL05-U20	240 sm	120 sm	0.1250/0.2530	0.1630/0.3250	359	292	388	51.5	3900
AX1-TL05-U30	300 sm	150 sm	0.1000/0.2060	0.1310/0.2650	406	331	449	56.8	4795
AX1-TL05-U40	400 sm	185 sm	0.0778/0.1640	0.1025/0.2120	461	379	526	62.8	6100
AX1-TL05-U50	500 sm	240 sm	0.0605/0.1250	0.0810/0.1630	527	441	615	70.1	6545

The above data is approximate and subjected to manufacturing tolerance.

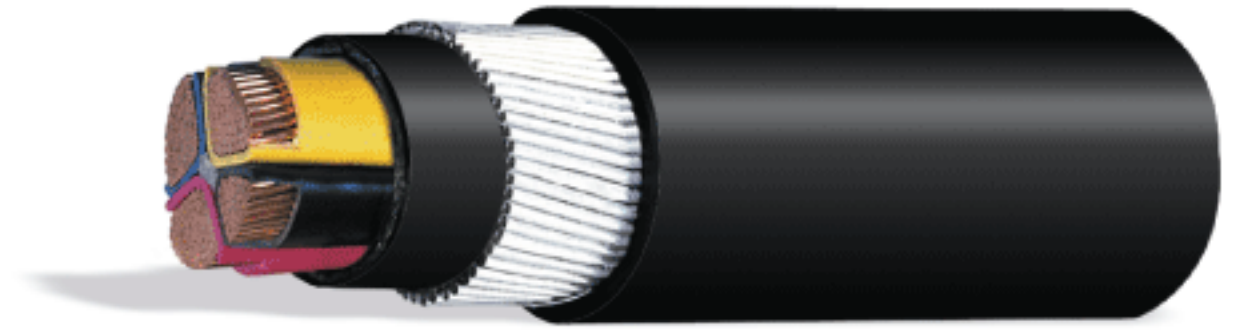




# Multicore Cables, with Stranded Copper Conductors, XLPE Insulated, Steel Wire Armoured and LSHF Sheathed

## Description

- Multicore cables of stranded Copper conductors are insulated with XLPE compound, cores are assembled together, extruded LSHF bedding armoured with steel wires and covered with an overall jacket of LSHF compound.
- Cables are produced according to IEC 60502-1 or BS 6724



## Application

For outdoor installations in damp wet locations where mechanical damages are expected to occur.

Product - code	Nominal cross sectional area mm <sup>2</sup>	Max. conductor resistance		Current rating			Approx. overall diameter mm	Approx. weight kg/km
		DC at 20 °C Ω/km	AC at 90 °C Ω/km	Laid direct in ground A	Laid in ducts A	Laid in free air A		
Two core cables								
CX1-TL02-W08	4 rm	4.6100	5.8800	51	41	47	16.6	580
CX1-TL02-W09	6 rm	3.0800	3.9300	64	53	61	17.6	660
CX1-TL02-W10	10 rm	1.8300	2.3300	83	70	80	19.6	835
CX1-TL02-W11	16 rm	1.1500	1.4700	107	84	106	21.6	1020
CX1-TL02-W12	25 rm	0.7270	0.9270	140	108	140	24.2	1335
CX1-TL02-W13	35 rm	0.5240	0.6690	168	135	168	27.5	1755
Three core cables								
CX1-TL03-W08	4 rm	4.6100	5.8800	46	37	42	17.2	650
CX1-TL03-W09	6 rm	3.0800	3.9300	58	46	51	18.3	755
CX1-TL03-W10	10 rm	1.8300	2.3300	76	61	69	20.5	965
CX1-TL03-W11	16 rm	1.1500	1.4700	98	76	90	22.6	1240
CX1-TL03-W12	25 rm	0.7270	0.9270	130	103	120	27.0	1850
CX1-TL03-W13	35 rm	0.5240	0.6690	158	122	147	29.4	2220
Four core cables								
CX1-TL04-W08	4 rm	4.6100	5.8800	46	37	42	18.3	740
CX1-TL04-W09	6 rm	3.0800	3.9300	58	46	51	19.5	860
CX1-TL04-W10	10 rm	1.8300	2.3300	76	61	69	21.9	1155
CX1-TL04-W11	16 rm	1.1500	1.4700	98	76	90	25.0	1630
CX1-TL04-W12	25 rm	0.7270	0.9270	130	103	122	29.1	2220
CX1-TL04-W13	35 rm	0.5240	0.6690	158	122	147	29.4	2520
CX1-TL04-W14	50 sm	0.3870	0.4940	185	145	184	33.1	3200
CX1-TL04-W15	70 sm	0.2680	0.3430	220	180	220	39.2	4645
CX1-TL04-W16	95 sm	0.1930	0.2480	265	210	273	42.9	5870
CX1-TL04-W17	120 sm	0.1530	0.1970	305	245	315	48.4	7555
CX1-TL04-W18	150 sm	0.1240	0.1600	335	275	375	53.1	8985
CX1-TL04-W19	185 sm	0.0991	0.1290	375	310	410	57.9	10760
CX1-TL04-W20	240 sm	0.0754	0.0990	435	365	488	64.1	13480
CX1-TL04-W30	300 sm	0.0601	0.0810	490	405	562	69.7	16215
CX1-TL04-W40	400 sm	0.0470	0.0642	547	459	634	76.8	20190
CX1-TL04-W50	500 sm	0.0366	0.0519	605	514	716	84.5	25375

The above data is approximate and subjected to manufacturing tolerance.

Product - code	Nominal cross sectional area		Max. conductor resistance		Current rating			Approx. overall diameter	Approx. weight
			DC at 20 °C	AC at 90 °C	Laid direct in ground	Laid in ducts	Laid in free air		
	mm <sup>2</sup>	Ω/km	Ω/km	A	A	A	mm	kg/km	

Four core cables with reduced neutral

CX1-TL05-W13	35 rm	16 rm	0.5240/1.1500	0.6690/1.4700	158	122	147	27.7	2250
CX1-TL05-W14	50 sm	25 rm	0.3870/0.7270	0.4940/0.9270	185	145	184	31.3	2860
CX1-TL05-W15	70 sm	35 rm	0.2680/0.5240	0.3430/0.6690	220	180	220	37.5	4240
CX1-TL05-W16	95 sm	50 sm	0.1930/0.3870	0.2480/0.4940	265	210	273	41.2	5290
CX1-TL05-W17	120 sm	70 sm	0.1530/0.2680	0.1970/0.3430	305	245	315	45.3	6475
CX1-TL05-W18	150 sm	70 sm	0.1240/0.2680	0.1600/0.3430	335	275	375	50.5	8055
CX1-TL05-W19	185 sm	95 sm	0.0991/0.1930	0.1290/0.2480	375	310	410	55.4	9735
CX1-TL05-W20	240 sm	120 sm	0.0754/0.1530	0.0990/0.1970	435	365	488	60.3	11780
CX1-TL05-W30	300 sm	150 sm	0.0601/0.1240	0.0810/0.1600	490	405	562	66.4	14435
CX1-TL05-W40	400 sm	185 sm	0.0470/0.0991	0.0642/0.1290	547	459	634	72.7	18500
CX1-TL05-W50	500 sm	240 sm	0.0366/0.0754	0.0519/0.0990	605	514	716	80.2	27080

The above data is approximate and subjected to manufacturing tolerance.

rm : Round, Stranded  
sm : Sector, Stranded



# Multicore Cables, with Stranded, Aluminium Conductors, XLPE Insulated, Steel Wire Armoured and LSHF Sheathed

## Description

- Multicore cables of stranded Aluminium conductors are insulated with XLPE compound, cores are assembled together extruded LSHF Bedding, armoured with steel wire and covered with an overall jacket of LSHF compound.
- Cables are produced according to IEC 60502-1 or BS 6724



## Application

For outdoor installations in damp wet locations where mechanical damages are expected to occur.

Product - code	Nominal cross sectional area mm <sup>2</sup>	Max. conductor resistance		Current rating			Approx. overall diameter mm	Approx. weight kg/km
		DC at 20 °C	AC at 90 °C	Laid direct in ground	Laid in ducts	Laid in free air		
		Ω/km	Ω/km	A	A	A		
<b>Two core cables</b>								
AX1-TL02-W10	10 rm	3.0800	3.9500	56	47	60	19.6	635
AX1-TL02-W11	16 rm	1.9100	2.4500	73	57	79	21.6	770
AX1-TL02-W12	25 rm	1.2000	1.5400	96	74	101	24.2	1370
AX1-TL02-W13	35 rm	0.8680	1.1130	129	105	131	27.5	1560
<b>Three core cables</b>								
AX1-TL03-W10	10 rm	3.0800	3.9500	52	41	52	20.5	715
AX1-TL03-W11	16 rm	1.9100	2.4500	67	52	67	22.6	870
AX1-TL03-W12	25 rm	1.2000	1.5400	89	70	89	27.0	1515
AX1-TL03-W13	35 rm	0.8680	1.1130	120	95	115	29.4	1770
<b>Four core cables</b>								
AX1-TL04-W10	10 rm	3.0800	3.9500	52	41	52	21.9	785
AX1-TL04-W11	16 rm	1.9100	2.4500	67	52	67	25.0	1335
AX1-TL04-W12	25 rm	1.2000	1.5400	89	70	89	29.1	1630
AX1-TL04-W13	35 rm	0.8680	1.1130	120	95	115	29.4	1700
AX1-TL04-W14	50 sm	0.6410	0.8220	145	110	141	33.1	2330
AX1-TL04-W15	70 sm	0.4430	0.5690	175	140	173	39.2	2760
AX1-TL04-W16	95 sm	0.3200	0.4110	210	165	210	42.9	3340
AX1-TL04-W17	120 sm	0.2520	0.3250	235	190	241	48.4	4320
AX1-TL04-W18	150 sm	0.2060	0.2650	265	215	283	53.1	5080
AX1-TL04-W19	185 sm	0.1640	0.2120	290	240	320	57.9	5990
AX1-TL04-W20	240 sm	0.1250	0.1630	340	280	383	64.1	7220
AX1-TL04-W30	300 sm	0.1000	0.1310	390	315	451	69.7	8440
AX1-TL04-W40	400 sm	0.0778	0.1025	444	373	513	76.8	10630
AX1-TL04-W50	500 sm	0.0605	0.0810	500	426	591	84.5	12785

The above data is approximate and subjected to manufacturing tolerance.

Product - code	Nominal cross sectional area		Max. conductor resistance		Current rating			Approx. overall diameter	Approx. weight
			DC at 20 °C	AC at 90 °C	Laid direct in ground	Laid in ducts	Laid in free air		
	mm <sup>2</sup>	Ω/km	Ω/km	A	A	A	mm	kg/km	

## Four core cables with reduced neutral

AX1-TL05-W13	35 rm	16 rm	0.8680/1.9100	1.1130/2.4500	120	95	115	27.7	1500
AX1-TL05-W14	50 sm	25 rm	0.6410/1.2000	0.8220/1.5400	145	110	141	31.3	1870
AX1-TL05-W15	70 sm	35 rm	0.4430/0.8680	0.5690/1.1130	175	140	173	37.5	2600
AX1-TL05-W16	95 sm	50 sm	0.3200/0.6410	0.4110/0.8220	210	165	210	41.2	3090
AX1-TL05-W17	120 sm	70 sm	0.2530/0.4430	0.3250/0.5690	235	190	241	45.3	3690
AX1-TL05-W18	150 sm	70 sm	0.2060/0.4430	0.2650/0.5690	265	215	283	50.5	4700
AX1-TL05-W19	185 sm	95 sm	0.1640/0.3200	0.2120/0.4110	290	240	320	55.4	5550
AX1-TL05-W20	240 sm	120 sm	0.1250/0.2530	0.1630/0.3250	340	280	383	60.3	6560
AX1-TL05-W30	300 sm	150 sm	0.1000/0.2060	0.1310/0.2650	390	315	451	66.4	7820
AX1-TL05-W40	400 sm	185 sm	0.0778/0.1640	0.1025/0.2120	444	373	513	72.7	9845
AX1-TL05-W50	500 sm	240 sm	0.0605/0.1250	0.0809/0.1630	500	426	591	80.2	11620

The above data is approximate and subjected to manufacturing tolerance.

rm : Round, Stranded  
sm : Sector, Stranded



# Certifications

## System





### CERTIFICATE OF COMPLIANCE

No.2090885.00

Applicant:	United Industry El Sewedy Heliopolis, 16 El Khartoum Street Cairo Egypt
Cable type:	3x10 MM2 0,6/1kV CU/MICA/XLPE/LSOH FIRE RESISTANCE CABLE
Manufactured by:	Same as applicant
Performance requirements:	BS 6387 (1994) Performance requirements for cables required to maintain circuit integrity under fire conditions For the category C, the flame temperature is 950 ± 40 °C and the duration of the test is 3 hours. For the category Z, the flame temperature is 950 ± 40 °C and the duration of the test is 15 minutes.
Testdate:	February 16, 2006

This certificate is granted on account of tests made in laboratory of BRE and witnessed by KEMA, the results of which are laid down in our report nos.: 2090885.01 and 2090885.02

The tests have been carried out on one single specimen of the product, submitted by the manufacturer. The certificate does not include an assessment of the manufacturer's production. Conformity of his production with the specimen tested by KEMA is not the responsibility of KEMA.

KEMA Quality B.V.,  
Arnhem, February 28, 2006



H.R.M. Barends  
Certification Manager

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**KEMA Quality B.V.**  
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Telephone +31 26 356 20 07, Telefax +31 26 352 58 03.



### TEST REPORT

Report no. Client	70870099-HVL DS-1228 ELSEWEDY CABLES 10 <sup>th</sup> of Ramadan City Egypt
Reference	-
Concerning Date Place	test 26 July – 14 August 2006 High-Voltage Laboratory of KEMA Nederland B.V., Arnhem, the Netherlands
Object Type Manufacturer	0,6/1 kV electric cable 3x35 mm <sup>2</sup> CU/XLPE/SWA/LSHF same as client

**REQUIREMENTS**  
The requirements as specified in the standards BS EN 50267-2-1 (1999), BS EN 50267-2-2 (1999), BS EN 61034-1 (2005), BS EN 61034-2 (2005) and BS EN 50266-2-4 (2001).


**TEST PROGRAMME**  
The programme was specified by the client and was as follows:  
1 Determination of the amount of halogen acid gas  
2 Determination of degree of acidity of gases by measuring pH and conductivity  
3 Measurement of smoke density of cables burning under defined conditions  
4 Test for vertical flame spread of vertically-mounted bunched wires or cables - category C

**SUMMARY AND CONCLUSION**  
The results obtained relate only to the work ordered and to the material tested.  
The tests were passed.

Author R.J.B. Gruntjes	 P.G.A. Bus KEMA T&D Testing Services Managing Director Arnhem, 13 September 2006
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This report consists of:  
7 pages  
1 appendix

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### TEST REPORT

Report no. Client	70870140-HVL 06-1365 Egytech Cables - Elsewedy PC. # 36A, South (A1), Industrial Region (A1) 10th Of Ramadan City Egypt
Concerning Date Place	tests 13 November up to and including 22 December 2006 KEMA High-Voltage Laboratory, Arnhem, the Netherlands
Object Type Manufacturer	600/1000 V LV cable 4x300 mm <sup>2</sup> , CU/XLPE/SWA/LSHF Egytech Cables - Elsewedy, Egypt

**REQUIREMENTS**  
The requirements as specified in the standard BS 6724 (1997).

**TEST PROGRAMME**  
For the test programme we refer to pages 2 and 3.

**SUMMARY AND CONCLUSION**  
The results obtained relate only to the work ordered and to the material tested.  
The tests as mentioned in the test programme were passed.


Author P.J. Hülkenberg	 P.G.A. Bus KEMA T&D Testing Services Managing Director Arnhem, 18 January 2008
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This report consists of:  
28 pages  
1 appendix (appendix A)


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# Certifications

## Products



DN EN ISO 9001:2001  
Institute of Excellence




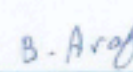
LABORATORIES OF PYRAMID EXTRA  
HIGH VOLTAGE RESEARCH CENTER  
KM 27 Cairo- Alex. Desert Road  
Report No. (66/2006)  
Page 1 of 17

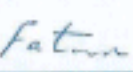
### TEST REPORT

REPORT No. (66/2006)

- **CLIENT:** EGYTECH Cable Co., (EL ESWEDY).
- **Report Date:** 28/5/2006
- **Place:**
  - Extra High Voltage Research Center.
  - Internal code : TO - AC - 06 - 04 - 03 - 01
- **Requirements:**
  - Type tests according to IEC 60502-2.
- **Standard Specification:**
  - IEC (60502-2), IEC (60228), IEC (811-1-1), IEC (811-1-2), IEC (811-1-3), IEC (811-3-1)
- **Description of the Specimen :**
  - 6.35/11 kV Power cable with the following specification:
    - Manufacturer : EL ESWEDY CABLES Co.,Cairo, Egypt.
    - Type : 6.35/11 kV/ CU / XLPE / CW / Lead /LS0H / 1 × 800 mm<sup>2</sup>
    - Year of Manufacture : 2006
    - No. of Phases : 1
    - Insulation : XLPE
    - Conductor Material : Copper
    - Conductor cross-section : 800 mm<sup>2</sup>
    - Screening Material : Copper
    - Metallic sheath Material : Lead
    - Sheath Material : LS0H
    - Rated Frequency : 50 Hz
    - Water Penetration Design : A water blocking is included, which prevents longitudinal water penetration along the gap between the conductor and the conductor screen, between the insulation screen and metallic screen and between the metallic screen and metallic sheath.










BRITISH APPROVALS SERVICE FOR CABLES

### Product Certification Schedule

Schedule No:	140/001/002
Licensee:	EL SEWEDY CABLES GROUP, 10TH OF RAMADAN CITY, INDUSTRIAL ZONE A3, EGYPT,
Factory:	EGYTECH CABLES COMPANY, 10TH OF RAMADAN CITY, INDUSTRIAL ZONE A3, EGYPT,
Specification:	BS 7211:1998 incorporating Amendments Nos. 1 & 2:1998 - Electric cables - Thermosetting insulated, non-armoured cables for voltages up to and including 450/750V, for electric power, lighting and internal wiring, and having low emission of smoke and corrosive gases when affected by fire.
Type of Cable:	Table 3a - Thermosetting insulated, non-sheathed cable, 450/750V, single-core (Rigid copper conductor)
HAR Document:	Not applicable
HAR Specification:	Not applicable
Range of Approval:	630sqmm nominal cross-sectional area of conductor. Single-core. Insulation - EI5.
Origin Thread:	Not applicable
Origin Mark:	-EL SEWEDY CABLES-



**PERMISSIBLE MARKS**

**BASEC**

YELLOW ACETATE THREAD

Please refer to the BASEC Product Certification Requirements

Expiry Date: 07/02/2010



Signed for and on behalf of the British Approvals Service for Cables



Date: 29/08/2007



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This Certificate & Schedule(s) remains the property of BASEC, and shall be returned when required.



BRITISH APPROVALS SERVICE FOR CABLES

### Product Certification Schedule

Schedule No:	140/001/005
Licensee:	EL SEWEDY CABLES GROUP, 10TH OF RAMADAN CITY, INDUSTRIAL ZONE A3, EGYPT,
Factory:	EGYTECH CABLES COMPANY, 10TH OF RAMADAN CITY, INDUSTRIAL ZONE A3, EGYPT,
Specification:	BS 6724:1997 incorporating Amendment Nos. 1 & 2 - Electric cables - Thermosetting insulated, armoured cables for voltages of 600/1000V and 1900/3300V having low emission of smoke and corrosive gases when affected by fire
Type of Cable:	Tables 8 and 10 - Three-core and four-core 600/1000V cables with stranded copper conductors
HAR Document:	Not applicable
HAR Specification:	Not applicable
Range of Approval:	25sqmm to 400sqmm nominal cross-sectional area of conductors inclusive. Three-core and four-core. Sheath - LTS1. Insulation - GP8.
Origin Thread:	Not applicable
Origin Mark:	-EL SEWEDY CABLES-



**PERMISSIBLE MARKS**

**BASEC**

YELLOW ACETATE THREAD

Please refer to the BASEC Product Certification Requirements

Expiry Date: 07/02/2010



Signed for and on behalf of the British Approvals Service for Cables



Date: 17/03/2008



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## Power Cables Catalogue

- Overhead Conductors
- Service Drop Cables
- Low Voltage Cables
- Medium Voltage Cables
- High Voltage Cables
- Extra High Voltage Cables

## Special Cables Catalogue

- Control Cables
- Instrumentation Cables
- Flame Retardant Cables
- Fire Resistance Cables
- Telephone Cables
- Lan Cables
- Co-axial Cables
- Audio Cables
- Profibus Cables
- Irrigation Cables
- Pilot Cables
- Flat Cables
- Automotive Wires
- Appliance Cables & Cords

## Winding Wires Catalogue

- Enameled Copper Wires
- Paper Insulated Flat Wires
- Plain Copper Wires
- Tinned Copper Wires
- Bare Copper Wires
- Welding Wires

## Low Smoke Halogen Free (LSHF) Catalogue

- Single Core Cable
- Multi Core Cable

## Telecom Cables Catalogue

- OPGW
- Fiber Optics Cables
- Comcore



# Elsewedy Cables Contacts

## Elsewedy Cables Head Office

**Local**  
14 Baghdad st. -EL Korba - Heliopolis . Cairo . Egypt  
Tel.: (202) 22909430 Fax: (202) 22917078  
Email: info@Elsewedy.com

**Export**  
14 Baghdad st. -EL Korba - Heliopolis . Cairo . Egypt  
Tel.: (202) 26904310/1-2-3 Fax: (202) 24170173  
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## Wires & cables Sector:

**Arab Cables (Power Cables)**  
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Tel.: +(202) 22909430 - 24187371 - 24187372, 24187361, 24187362  
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**Egytech cables (Power Cables)**  
16 Baghdad St. El Korba, Heliopolis, Cairo - Egypt  
Tel.: +(202) 24148366, 24148370 Fax: +(202) 24148373  
E-mail: egypt@elsewedy.com

**United Industries**  
(Enameled Wires - Special Cables - Fiber Glass Poles)  
Add. 68 El Tayran St., Nasr City, Cairo  
Tel.: +202 22 60 3196 - 22 61 8908 - 24 01 3606  
Fax: +202 22 62 0473

**United Metal (Copper Rods)**  
14 Baghdad St. El Korba, Heliopolis, Cairo - Egypt  
Tel.: +(202) 24148369 - 22916507 Fax: +(202) 24196116  
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**Sedplast (PVC Compounds)**  
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E-mail: syria@elsewedy.com

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a.awad@elsewedy.com

**Elsewedy Cables Algeria (Power Cables)**  
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**Elsewedy Cables Qatar (Power Cables)**  
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Tel +974 4652645 \ 4568612 Fax +974 4653892 \ +974 5899047  
E-mail: a.fathy@elsewedy.com

## Electrical Products Sector:

**SEDCO (Cables Accessories)**  
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**Elastimold**  
Elastimold Egypt Elsewedy - Elastimold J.V. (Cables Accessories)  
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E-mail: elastimold@Elsewedy.com

**Sudanese Egypt Electrical Industries SUDATRAF (Transformers)**  
El Kuwaiti Buildings -4th tower - 7th stage Khartoum  
Sudan P.O.B 1380 Khartoum  
Tel.: +00249 183 2764118

**Elsewedy Electric Ghana**  
9, Light Industrial Area No. A/36/2B Tema - Ghana  
Tel.: +022311101 -311102 Fax: +022311103  
E-mail: ghana@Elsewedy.com

**Elsewedy Electric Syria**  
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Email: Elsewedy-sales@Elsewedy.com

## Elsewedy Transformers

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uic-marketing@uic-Elsewedy.com

## Italsmia (Explosion Proof Equipment)

Tel.: 015411141 Fax: 015 411142  
E-mail: italsmea@elsewedy.com

## ISKRAEMECO

Iskraemeco Savska loka 4 SI-4000 Kranj, Slovenia  
Phone: +386 4 206 40 00  
E-mail: info@iskraemeco.si

## Turn Key Projects Sector:

### Power System Projects (PSP)

31, Ramy Tower, El Shatr EL Sades, Zahraa El Maadi, Cairo, Egypt.  
Tel.: +202 25215810 / 20 / 30 Fax: +202 25165122  
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### Elsewedy Electric Transmission & Distribution

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## International Operations Sector:

### Jordan & Iraq

**Elsewedy Cables - Jordan & Iraq**  
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### Malawi

**Elsewedy Cables - Southern Africa**  
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### Ethiopia

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s.maher@elsewedy.com

### Yemen

**Elsewedy Cables - Yemen**  
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### Guinea

**Elsewedy Electric - Guinea**  
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### Nigeria

**Elsewedy Cables - Nigeria**  
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### Libya

**Elsewedy Cables - Libya**  
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### India

**Elsewedy Cables - India**  
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