

LV FIRE RESISTANT CABLES

CONTENTS

GENERAL INTRODUCTION

3

LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

4

GENERAL

9

CABLE STRUCTURE

ELECTRICAL CHARACTERISTICS

12

CURRENT RATING

24

VOLTAGE DROP

26

SHORT CIRCUIT RATING

28

LV FIRE RESISTANT WIRES

29

CU/MICA/XLPE/LSOH

32

CU/MICA/XLPE/AWA/LSOH

33

CU/MICA/XLPE/SWA/LSOH

35

CU/MICA/XLPE/MICA/LSOH/MICA/SWA/LSOH





GENERAL INTRODUCTION

Bahra Cables Company was established in 2008 to serve Saudi & GCC Markets. It is based in Bahra industrial city located 25km from Jeddah. Bahra Cables Factory occupies over 500,000 square meters of prime manufacturing space together with associated design offices, laboratories and storage area is more than 100,000 square meters. It specializes in Manufacturing and Distributing Electric Cables.

Bahra Cables Company is committed to the production of the best product quality and service, utilizing cutting edge European Technology in its manufacturing. The core technologies in production processes, material applications and logistic procedures were provided by German experts with key functions being managed by German engineers.

The organization has a lean vertical management structure which is designed to integrate with a highly developed IT-based structure. This partnership allows the rapid flow of information through the management chain and facilitates timely response in the best traditions of 'hands on' management. Bahra Cables Company has the flexibility to provide a versatile product range to serve the construction, electric utilities, distribution, industrial, oil & gas and petrochemical sectors. The cables produced comply with both American standards (CSA , ANSI and ICEA) and European standards (IEC, BS, NF and VDE specifications.)

The scope of this catalogue is to provide an in depth view of the technical information of the low voltage Fire resistant cables 0.6/1.0KV, & low Voltage fire resistant wires rated 450/750V

Area:

Bahra Cables Company has a total land area of about 300,000sqm at disposal.

The built-up area, including offices and plant, of start up phase is more than 62,000sqm.

The factory extension under construction is more than 8,000sqm.

The total available stock yard for(drum) storage is more than 80,000sqm.

LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

GENERAL

QUALITY IS OUR MAIN TARGET

Bahra Cables Company is born to be one of the leading Power Cables Manufacturers in Saudi Arabia and the GCC area. We are working in different axes to completely fulfill customers satisfaction which is the milestone of our business, such axes are:

1. Product quality complying with the local and international standards
2. Product Reliability is starting from the time of product design to fit for the intended application and environmental conditions, to the selection of the raw material from only the highest class suppliers with internationally trusted reputation. Our state of art testing equipments and the strict quality procedures ensure the product quality and integrity so we can guarantee that our cables are defect free and suitable for the intended application through the cable service lifetime.
3. High Performance of the product and service through cooperation between experienced staff from Germany and local experts who are aware of the local market requirements and the highest international standards of cables manufacturing. Such cooperation in knowhow is invested to provide our customer with the best service and support.
4. Bahra Cables Company's Quality Management System conforms to the ISO 9001: 2008 International Management Quality System Standard with scope of Design and Manufacturing of Electrical Power Cables and Wires. BCC is certified by American Systems Registrar (ASR), ANAB Accredited.
5. Bahra Cables Company has a wide range of fire resistant cables & wires to different international specifications.
6. Bahra Cables Company is frequently testing it's products for fire performance at internationally reputable labs for e.g. Kema Netherland and BRE-Global United Kingdom.



LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

GENERAL

FIRE RESISTANT CABLES

Fire Resistant cables are that cables which intended to be used for wiring and interconnection where it is required to maintain circuit integrity under fire conditions for longer periods than can be achieved with cables of conventional construction.

These cables can withstand carrying electric current under specified nominal voltage at flame with a specified temperature (typically in the range of 750 °C to 950 °C) for a limited time (According to the applied standards and it could vary from 15minutes to 180minutes)

APPLICABLE STANDARDS

Fire resistant wires and cables will have the same electrical and physical features required by the international standards of non-fire resistant normal electric cables (as example IEC 60502-1 BS 6724 or BS 7211) in addition to fire resistant performance to (IEC 60331,BS 6387,BS8491,...) with its several fire tests categories

FIRE RESISTANT TESTS

IEC 60331 (part 21 and part 11) Rated Voltage up to and including 0.6/1kV:

The cable is connected to an electric source, with a voltage equals the cable's rated voltage from one end with indicator lamps at the other end as well as a fuse or circuit breaker. The cable is subjected to an action of linear gas burner for 90 minutes and the flame temperature equal to 750°C.

The test shall continue for 90 min, after which the flame shall be extinguished but the cable sample remain energised for a further 15 min. The total test duration shall be the flame application time together with the 15 min cooling period.

The cable shall be in conformity with this specification, if the time of test completed and there is no circuit failure or cutting-off for the current between the source and the load.

BS 6387, Rated Voltage up to and including 0.6/1kV:

1.Fire resistant test (Fire Alone):

The cable is connected to an electric source, with a voltage equals the cable's rated voltage from one end with indicator lamps at the other end as well as a fuse or circuit breaker. Part of the cable is to be exposed to fire with intensity and period according to the required resistance, as follow:

*Cat A: in 650 ± 40 °C, for 180 minutes

*Cat B: in 750 ± 40 °C, for 180 minutes

Cat C: in 950 ± 40 °C, for 180 minutes

*Cat S : in 950 ± 40 °C, for 20 minute (short duration).

The cable shall be in conformity with this specification, if the time of test completed and there is no circuit failure or cutting-off for the current between the source and the load.



*Note: Categories A, B & S were defined in BS 6387: 1994 and have been removed in BS 6387: 2013. However, Bahra cables company offers all categories

LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

GENERAL

2. Fire Test with Water Spray:

It is called Category W Test, where the cable is exposed to a fire test similar to the test mentioned in the previous paragraph but with a temperature of 650 °C and for 15 minutes, then the cable to be exposed to a water spray sprinkle (in addition to fire) for another 15 minute. The test shall be positive if there is no cut-off in the electric circuit during the test. This test is similar to what may happen when using water spray extinguishers which may affect the insulation of cables.

3. Fire Test with Mechanical Shock:

In this test, the cable to be placed on a board fixed to a stand in a flexible manner. The electric circuit for the samples to be connected such as the previous tests and exposing the cable to fire with a temperature as per the required degree for 15 minutes.

During the test, the board that carries the cable is subjected to mechanical shocks using a hammer with specified power; the circuit should keep working during the test.

Testing Categories are:

*Cat X: in 650 ± 40 °C, for 15 minutes

*Cat Y: in 750 ± 40 °C, for 15 minutes

Cat Z: in 950 ± 40 °C, for 15 minutes

This test is similar to what happens when wall parts collapsed according to the fall of breakdown parts.

Fire resistant cables may be in conforming to C fire test only, or to all the three tests categories (C, W, Z).

BS 7846 (category F-2), Multi cores armored cables only rated 0.6/1kV:

The cable is connected to an electric source, with a voltage equals the cable's rated voltage from one end with indicator lamps at the other end as well as a fuse or circuit breaker.

For this category, the complete cable shall be tested in accordance with BS 6387 Category C.

Additionally, complete cables of diameter not exceeding 20 mm, shall be tested in accordance with BS 6387 and shall conform to the requirements for category W and category Z at a rated voltage of 600/1000 volt. For complete cables of diameter exceeding 20 mm the same requirements shall be met, subject to the additional provisions given in BS 7846 Annex L.

The cable shall be in conformity with this specification, if the time of test completed and there is no circuit failure or cutting-off for the current between the source and the load.

Categories F-30, F-60 and F-120 to BS 7846, BS 8491 and BS 8519. Multi cores armored cables only rated 0.6/1kV with overall diameter exceeding 20 mm:

The cable is connected to an electric source, with a voltage equals the cable's rated voltage from one end with indicator lamps at the other end as well as a fuse or circuit breaker. Immediately after igniting the burner start the timer. Switch on the electricity supply. Constant temp. attack of 842 °C is used.

Subject the test specimen to an impact from the impact device 10 min \pm 10 s after lighting the burner. Subject the test specimen to further impacts 10 min \pm 10 s after the first impact and subsequently at intervals of 10 min \pm 10 s, so that the test specimen receives a minimum of three impacts in a 30 min test, six impacts in a 60 min test or 12 impacts in a 120 min test.

***Note:** Categories X & Y were defined in BS 6387: 1994 and have been removed in BS 6387: 2013. However, Bahra cables company offers all categories

LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

GENERAL

Five minutes before the end of the flame application with impact phase, activate the water jet device and apply a burst of water of 5 s duration. Sixty seconds after the start of this burst of water apply a further burst of water of 5 s duration. Repeat this procedure until a total of 5 bursts of water have been applied. Maintain the test voltage throughout the test.

- Category F30: Resistance to fire with direct mechanical impact and water assessed in combination when tested in accordance with BS 8491 for 30 min.
- Category F60: Resistance to fire with direct mechanical impact and water assessed in combination when tested in accordance with BS 8491 for 60 min.
- Category F120: Resistance to fire with direct mechanical impact and water assessed in combination when tested in accordance with BS 8491 for 120 min.

*Note: If a cable conforms to the requirement for category F60 it shall be deemed to conform to the requirements for category F30 as the tests are identical except for the test durations. If a cable conforms to the requirement for category F120 it shall be deemed to conform to the requirements for categories F30 and F60 as the tests are identical except for the test durations.

The cable shall be in conformity with this specification, if the time of test completed and there is no circuit failure or cutting-off for the current between the source and the load.

Fire resistant test to BSEN 50200 for overall diameter not exceeding 20 mm. Rated voltage up to and including 0.6/1kV:

The cable is connected to an electric source, with a voltage equals the cable's rated voltage from one end with indicator lamps at the other end as well as a fuse or circuit breaker.

The cable shall be bent to form an approximate 'U' shape mounted centrally on the wall using metal clips. Immediately after igniting the burner, switch on the electricity supply activate the shock producing device and start the test duration timer. The shock producing device shall impact the wall after 5 min \pm 10 s from activation and subsequently at 5 min \pm 10 s intervals.

The following classifications are introduced depending on the duration of survival:

PH 15,30,60,90,120 (i.e. 15,30,60,90 or 120 min)

The PH classification refers to a constant temperature attack of a notional 842 °C

*Note: Where the water spray requirement is needed, the duration of survival, measured in minutes, to the points of failure shall be recorded for each cable tested up to a maximum survival time of 30 min, with the water spray being applied for the last 15 min of the test.

Immediately after igniting the burner, switch on the electricity supply activate the shock producing device and start the test duration timer. The shock producing device shall impact the wall after 5 min \pm 10 s from activation and subsequently at 5 min \pm 10 s intervals.

After 15 min and with the flame and shock still being applied, the water spray shall be started. The application of water shall continue until the end-point of the test.

The Cable shall be in conformity with this specification, if the time of test completed and there is no circuit failure or cutting -off for the current between the source and load.

APPLICATION

Several critical buildings where safety against fire is mandatory to reduce the risk death or injured personals, as example:

MOSQUES

SCHOOLS &
UNIVERSITIES

HOSPITALS

MARKETS & MALLS



AIRPORTS

RECREATIONAL
PLACES &
AMUSEMENT PARKS

INDOOR WORK - PLACES

IMPORTANT NOTE:

This Fire Resistant Catalog should be used in conjunction with Bahra Cable's Low Smoke & Fume Zero Halogen Catalog for more reference of Tests.

1.0 CABLE STRUCTURE

1. CONDUCTORS

A conductor is the metallic part of cables that is carrying the electric current

Conductor materials are :

- 1.1** The conductor structure is complying to the requirements of BS EN 60228 (IEC 60228) class 2 stranded, compacted or compacted sector shaped conductors. The shape codes are:

rm, round stranded

rmc, round compacted stranded

sm, sectoral stranded

2.0 MICA TAPE

Each individual conductor is wrapped with a MICA tape to IEC 60371; such tape provides excellent Insulation characteristics under flame up to 1100 °C.

3.0 INSULATION

- 3.1** Each core conductor is insulated by extruded plastic material with a thickness based the requirements of the applied standard. (to IEC 60502-1 ,BS 7846 or BS 7211).

- 3.2** The insulation material is complying with the requirements of GP8 evaluation as specified in BS 7655-1.3

- 3.3** Bahra Cables' standard insulation color codes are described in Table-1 (i.e. used in the products of this catalogue), meanwhile the color code as per BS 7846is offered to our customers upon their request.

LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

CABLE STRUCTURE

Table 1: Insulated Core Color Codes

Number of Cores	Colors to IEC 60502-1	Colors to BS 7846
1	Red or Black	Brown or Blue
2	Red & Black	Brown & Blue
3	Red, Yellow and Blue	Brown, Black and Grey
4	Red, Yellow, Blue and Black	Blue, Brown, Black and Grey
5	Red, Yellow, Blue, Black and Green /Yellow	Green / Yellow, Blue, Brown, Black & Grey

4.0 CABLE ASSEMBLY

The Insulated cores are laid up together to form the laid up cable cores. Extruded suitable polymer compound or non-hygroscopic polypropylene filler is applied (when required) between laid up cores to provide a circular shape to the cable.

A suitable polymeric tape(s) is used as a barrier tape over the laid up cores (as applicable). Such tape(s) will bind the cores together and prevents them from opening out, acts as a separator between different polymers used in a cable and works as a heat barrier between the cores and the extruded bedding.

5.0 BEDDING

It could be also called inner sheath or inner jacket, which serves as a bedding under cable armouring to protect the laid up cores. The bedding is an extruded Low Smoke, zero halogen material (LSOH).

6.0 ARMOURING

The cable intended for tray application does not require armour in general, while it is recommended to have armour for the cables intended for Direct Burial application. The armour provides mechanical protection against crushing forces. Armour also can serve as an Earth Continuity Conductor (ECC). The armouring type

- 6.1 One layer of Galvanized Round Steel Wire to BS EN 10257 is applied helically over the bedding.
- 6.2 Aluminum wire armouring for a single Core Cable acts as non magnetic armour (Note , Aluminum armoured cables are recommended to comply with IEC 60331 fire test , due to the low melting temperature of Aluminum).

LV FIRE RESISTANT CABLES TECHNICAL INFORMATION

CABLE STRUCTURE

7.0 OUTERSHEATH (OUTERJACKET)

6.2.3 Low Smoke , zero halogen , Flame Retardant (LS0H) compounds complying with ST8 to IEC 60502-1 or Types LTS-1 to BS 7655 - 6.1: section 6 for cables installed in intrinsically safe locations and where the cables require to be low smoke, low fume and low toxic gas emitting in case of fire. Cables to this category are complying with the requirements of.

6.2.4 The standard sheath color is Black, meanwhile other colors such as Red and Blue can also be provided as per customer request and in this case suitable UV proved additive is added to the Master batch to ensure resistance to sunlight.

8.0 APPLICATION

8.1 Low voltage Fire Resistant cables are suitable for indoor and outdoor applications, where a high safety against fire is required .

8.2 A recommended minimum bending radius is included in Table 2, the cable jacket may be damaged if the cable is bended in diameters less than these values.

Table 2 : Cables bending radius

Cable Type	Cable Minimum Bending Radius
Circular Copper Conductors Armoured / Unarmoured	18 D
Shaped Copper Conductors Armoured / Unarmoured	18 D

D: Cable diameter

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS CURRENT RATING

1 CURRENT RATING ASSUMPTIONS

- 1.1** The calculation of the current ratings, Current rating equations (100% load factor) and calculation of losses are based on IEC 60287 series , and the values of Current ratings for under ground applications (In Duct or Direct Buried) are derived from the latest issue of ERA Report 'Current Rating Standards 69.30 Part V'. The ratings for a cable installed in Air are adopted from BS 7671 IEE Wiring Regulations, seventeenth edition.
- 1.2** The calculation is based on the standard dimensions of cables based on IEC 60502-1, which may have a slight difference from the applied cable dimension which are following the best common manufacturing practices.
- 1.3** The values given in the tables are for one circuit installed thermally isolated from other circuits or any other heat source.
- 1.4** The basis of the standard conditions is the climatic condition of the Kingdom of Saudi Arabia, which is:
Ambient Air Temperature: 40 °C
Ambient Ground Temperature: 35 °C
Depth of laying in ground: 0.50 m
Soil Thermal Resistivity 1.2 K.m/W
- 1.5** For other Installation conditions or any value of different air/ ground temperature, depth of laying, different soil thermal resistivity the customer is advised to multiply the tabulated current rating by the de-rating factor values as in tables 3 to 7 for direct buried cable in ground and tables 9 to 12 for cables installed in ducts.

2 INSTALLATION CONDITIONS FOR DIRECT BURIAL CABLES

For a cable installed direct buried in a part of its installed length, the following tables will be used to calculate the current rates based on the actual soil thermal resistivity, Ground ambient temperature and the Depth of Laying.

Table 3 : Rating factors for ground temperature variation

Ground Temperature	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C
Cable Type									
XLPE Insulated	1.16	1.13	1.09	1.03	1	0.95	0.89	0.84	0.79

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS CURRENT RATING

Table 4 : Rating factors for depth of laying (to center of cable or trefoil group of cables)

Depth of Laying (m)	upto 70mm ²	95mm ² to 240mm ²	Above 300mm ²
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
2.50	0.90	0.87	0.84

Table 5 : Rating factors for variation in thermal resistivity of soil (average values)

Size of Cables mm ²	Soil Thermal Resistivity (°C.m/W)						
	0.8	0.9	1.0	1.5	2.0	2.5	3.0
Single Core Cables							
Upto 150	1.16	1.12	1.07	0.91	0.81	0.73	0.66
From 185 to 300	1.17	1.12	1.07	0.91	0.80	0.73	0.66
From 400 to 1000	1.17	1.12	1.07	0.91	0.80	0.73	0.66
Multi Core Cables							
Upto16	1.12	1.08	1.05	0.93	0.84	0.77	0.72
From 25 to 150	1.14	1.10	1.06	0.92	0.82	0.75	0.69
From 185 to 500	1.15	1.10	1.07	0.92	0.81	0.74	0.67

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

CURRENT RATING

Table 6 : Group rating factors for circuits of three single core cables in trefoil or laid flat touching, in horizontal formation

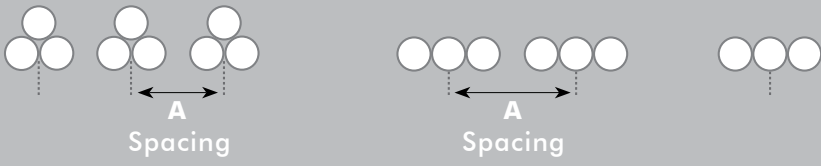
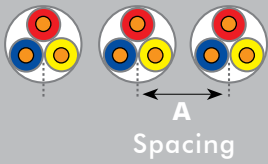
Number of Circuits						
	Nil (cables Touching)		Cable to Cable Clearance A			
	Trefoil	Flat Laying	0.15m	0.30m	0.45m	0.60m
2	0.78	0.81	0.83	0.88	0.91	0.93
3	0.66	0.7	0.73	0.79	0.84	0.87
4	0.61	0.64	0.68	0.73	0.79	0.85
5	0.56	0.6	0.64	0.73	0.79	0.85
6	0.53	0.57	0.61	0.71	0.78	0.82

Table 7 : Group rating factors for multicore cables in horizontal formation

Number of Cables in Group					
	Cable to Cable Clearance A				
	Touching	0.15m	0.30m	0.45m	0.60
2	0.81	0.87	0.91	0.93	0.95
3	0.70	0.78	0.84	0.88	0.90
4	0.63	0.74	0.81	0.86	0.89
5	0.59	0.70	0.78	0.84	0.87
6	0.55	0.68	0.77	0.83	0.87

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

CURRENT RATING

3 INSTALLATION CONDITIONS FOR CABLES IN DUCTS

A duct is an enclosure of metal or insulating material other than conduits or cable trunking, intended for the protection of cables which are drawn in after erection of the ducting. The recommended relation between the cable size and duct size is as in table 8

Table 8 : Recommended duct dimensions and cable sizes

Number of Cables in Group	Duct	
	Inside Diameter (mm)	Outside Diameter (mm)
Upto and including 65	100	130
Above 65 upto and including 90	125	160

As the same principal of cables installed in direct burial methods above, the current carrying capacities of cables depends on the installed condition, the rating is calculated based on the values in section 1.5 page 10.

The de-rating factors of other conditions should be considered to calculate the actual possible maximum current carrying capacity of the cables.

Tables 9-13 are for the factors to be multiplied by the tabulated current.

Table 9 : Rating factors for ground temperature variation

Ground Temperature	15°C	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C
Cable Type									
XLPE Insulated	1.16	1.13	1.09	1.03	1	0.95	0.89	0.84	0.79

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

CURRENT RATING

Table 10 : Rating factors for variation in thermal resistivity of soil (average values)

Size of Cables mm ²	Soil Thermal Resistivity (°C.m/W)						
	0.8	0.9	1.0	1.5	2.0	2.5	3.0
Single Core Cables							
Upto 150	1.10	1.07	1.04	0.94	0.86	0.80	0.76
From 185 to 300	1.11	1.08	1.05	0.93	0.85	0.79	0.75
From 400 to 1000	1.12	1.08	1.05	0.93	0.84	0.78	0.74
Multi Core Cables							
Upto16	1.04	1.03	1.02	0.97	0.92	0.88	0.86
From 25 to 150	1.06	1.04	1.03	0.95	0.90	0.85	0.81
From 185 to 500	1.07	1.05	1.03	0.95	0.88	0.83	0.78

Table 11 : Rating factors of depth of laying (to center of duct or trefoil group of ducts)

Depth of Laying (m)	Single Core	Multi Core
0.50	1.00	1.00
0.60	0.98	0.99
0.80	0.95	0.98
1.00	0.93	0.96
1.25	0.91	0.95
1.50	0.89	0.94
1.75	0.88	0.94
2.00	0.87	0.93
2.50	0.86	0.92
3.00 or more	0.85	0.91

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS CURRENT RATING

Table 12 : Group rating factors for single core cables in trefoil Single way ducts, horizontal (average values)

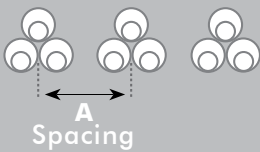
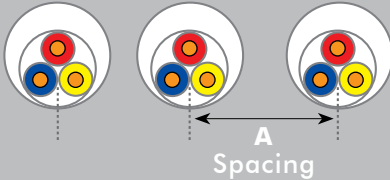
Number of Circuits				
	Cable to Cable Clearance A			
	Touching	0.45m	0.60m	0.60m
2	0.87	0.91	0.93	0.93
3	0.78	0.84	0.87	0.87
4	0.74	0.81	0.85	0.85
5	0.70	0.79	0.83	0.83
6	0.69	0.78	0.82	0.82

Table 13 : Group rating factors for multicore cables in single way ducts Horizontal formation (average values)

Number of Cables in Group				
	Cable to Cable Clearance A			
	Nil Cables Touching	0.30m	0.45m	0.60
2	0.90	0.93	0.95	0.96
3	0.83	0.88	0.91	0.93
4	0.79	0.85	0.89	0.92
5	0.75	0.83	0.88	0.91
6	0.73	0.82	0.87	0.90
2	0.88	0.91	0.93	0.94
3	0.80	0.85	0.88	0.90
4	0.76	0.81	0.85	0.88
5	0.72	0.78	0.83	0.86
6	0.69	0.76	0.81	0.85

TECHNICAL INFORMATION

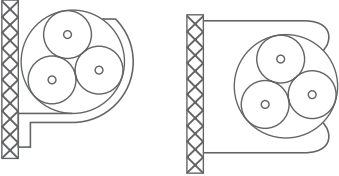
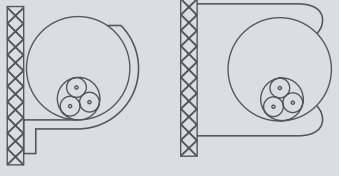
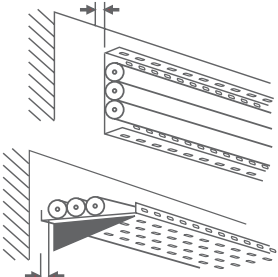
ELECTRICAL CHARACTERISTICS

CURRENT RATING

4 INSTALLATION CONDITIONS FOR CABLES IN AIR

Cables installed in air could have many forms of installation methods as described in BS 7671 IEE wiring regulation 17th edition. Some of these methods are like C or B (for cables on Trefoil format laying as in table 14) or like E or F (For cables laid Flat vertically or horizontally as in table 14). It is assumed that the cables are not exposed to the direct sunlight and away from any external heat sources. The de-rating factors for cables laid in free air are as in tables 15 through 17. Additionally there are more de-rating factors tables for other methods of installation, the user has to review BS7671- IEE Wiring Regulations for Electrical Installations, 17th Edition for detailed information.

Table 14 : Installation methods for cables

Installation Method	Description	Current Carrying Capacity Reference
	<p>Single Core or multi core cables: Fixed on (clipped direct) or spaced less than 0.3 times the cable diameter from a wall</p>	C
	<p>Multi core cable in conduit, spaced less than 0.3 x conduit diameter</p>	B
	<p>Cables run horizontally or vertically flat on perforated tray For multi core cable De = Cable diameter, And for 3 single core cables De = 3xcable diameter</p>	E or F

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS CURRENT RATING

Important note for single core cables:

The conductors of an A.C. circuit installed in a ferromagnetic enclosure shall be arranged so that all line conductors and the neutral conductor, if any, and the appropriate protective conductor are contained in the same enclosure.

When such conductors enter a ferrous enclosure, they shall be arranged such that the conductors are only collectively surrounded by ferrous material.

Table 15 : Rating factors for other ambient air temperatures

Air Temperature	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
Cable Type								
XLPE Insulated	1.12	1.10	1.055	1.00	0.96	0.90	0.835	0.78



TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

CURRENT RATING

Table 16 : Rating factors of one or more circuits of single core cables laid in free air

Number of Trays	Number of three phases circuits			Installation form	Type
	1	2	3		
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		
1	0.96	0.86	-		Three cables in vertical formation
2	0.95	0.84	-		
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		
1	1.00	0.91	0.89		
2	1.00	0.90	0.86		

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

CURRENT RATING

Table 17 : Rating factors for groups of more than one multi core cable laid in free air

Number of Trays	Number of Cables			Installation form	Type
	1	2	3		
1	1.00	0.88	0.82	<p>TOUCHING</p>	Cables in horizontal formation
2	1.00	0.87	0.80		
3	1.00	0.86	0.79		
1	1.00	1.00	0.98	<p>SPACED</p>	
2	1.00	0.99	0.96		
3	1.00	0.98	0.95	<p>TOUCHING</p>	Cables in vertical formation
1	1.00	0.88	0.82		
2	1.00	0.88	0.81		
1	1.00	0.91	0.89	<p>SPACED</p>	
2	1.00	0.91	0.88		

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

CURRENT RATING

5 CURRENT CARRYING CAPACITY

Table 18 : Single core cables with copper conductor, MICA Wrapped, XLPE insulated and LS0H sheathed, **0.6/1 kV**

Conductor	Conductor Resistance			Current Carrying Capacity					
	Cross Sectional Area mm ²	DC at 20°C Maximum ohm/km	AC at 90°C in Flat Formation Approx ohm/km	AC at 90°C in Trefoil Formation Approx ohm/km	In Ground			In Air	
				Direct Laid (Flat) Approx Amps	Direct Laid (Trefoil) Approx Amps	In Duct Approx Amps	Free (Flat) Approx Amps	Free (Trefoil) Approx Amps	In Pipes Approx Amps
2.5	7.41	9.45	9.45	40	39	29	36	29	24
4	4.61	5.88	5.88	52	50	38	47	38	32
6	3.08	3.93	3.93	65	63	47	60	49	40
10	1.83	2.33	2.33	87	83	63	82	66	54
16	1.15	1.47	1.47	112	107	82	109	88	70
25	0.727	0.927	0.927	144	137	105	145	116	92
35	0.524	0.668	0.669	172	165	127	178	143	112
50	0.387	0.494	0.494	204	195	151	218	175	134
70	0.268	0.342	0.343	251	238	187	277	222	168
95	0.193	0.247	0.248	301	286	225	344	274	205
120	0.153	0.196	0.197	345	327	258	409	326	237
150	0.124	0.159	0.16	385	363	290	461	367	269
185	0.0991	0.128	0.129	436	410	330	534	425	308
240	0.0754	0.098	0.100	507	474	382	638	505	361
300	0.0601	0.079	0.0815	573	532	431	740	583	411
400	0.0470	0.0629	0.0661	645	600	489	865	676	469
500	0.0366	0.0504	0.0543	744	673	550	1009	779	533
630	0.0283	0.0407	0.0453	847	752	615	1184	900	603

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS CURRENT RATING

Table 19 : Three and four core cable with copper conductor, MICA Wrapped, XLPE insulated and LSOH sheathed 0.6/1 kV

Conductor Cross Sectional Area mm ²	Conductor Resistance		In Ground			In Air		
	DC at 20°C Maximum ohm/km	AC at 90°C Approx ohm/km	Unarmoured		Armoured	Unarmoured		Armoured
			Direct Laid Approx Amps	Laid in Duct Approx Amps	Direct Laid Approx Amps	Free Approx Amps	In pipes Approx Amps	Free Approx Amps
2.5	7.41	9.45	35	29	-	29	24	-
4	4.61	5.88	45	37	46	38	31	39
6	3.08	3.93	56	46	57	48	39	50
10	1.83	2.33	76	62	76	67	52	67
16	1.15	1.47	98	80	98	88	68	89
25	0.727	0.927	128	104	128	118	90	120
35	0.524	0.669	157	125	158	142	107	149
50	0.387	0.494	187	149	188	175	129	182
70	0.268	0.343	229	183	229	220	161	229
95	0.193	0.248	276	220	274	272	196	280
120	0.153	0.197	313	251	310	316	226	322
150	0.124	0.160	350	283	346	363	258	368
185	0.0991	0.129	395	321	387	418	295	420
240	0.0754	0.0998	458	372	444	496	346	491
300	0.0601	0.0812	516	420	494	571	394	557
400	0.0470	0.0656	584	478	549	665	454	635
500	0.0366	0.0536	655	538	597	760	515	705

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

VOLTAGE DROP

According to BS 7671 IEE wiring regulation 17th edition, under normal service conditions the voltage at the terminals of any fixed current-using equipment shall be greater than the lower limit corresponding to the product standard relevant to the equipment and where fixed current-using equipment is not the subject of a product standard the voltage at the terminals shall be such as not to impair the safe functioning of the equipment.

This infers the importance of the voltage drop calculation for the low voltage cables which is covered by this catalogue.

Table 20 : Approximate voltage drop at 60 HZ for single core stranded plain copper conductors, MICA Wrapped, XLPE insulated and LSOH sheathed

Nominal Area of Conductor mm ²	Copper Conductor mV/Amp/m	
	XLPE Rated 90°C	XLPE Rated 90°C
	Flat	Trefoil
2.5	14.1	14.1
4	8.8	8.7
6	5.90	5.90
10	3.60	3.60
16	2.30	2.30
25	1.50	1.50
35	1.10	1.10
50	0.84	0.83
70	0.61	0.60
95	0.47	0.46
120	0.39	0.38
150	0.34	0.33
185	0.29	0.28
240	0.25	0.24
300	0.22	0.21
400	0.19	0.18
500	0.17	0.16
630	0.16	0.15

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS VOLTAGE DROP

Table 21 : Approximate voltage drop at 60 HZ for three and four core stranded plain copper conductors, MICA Wrapped, XLPE insulated and LSOH sheathed

Nominal Area of Conductor	Copper Conductor mV/Amp/m
mm ²	XLPE Rated 90°C
2.5	14
4	8.7
6	5.90
10	3.50
16	2.20
25	1.50
35	1.10
50	0.81
70	0.58
95	0.44
120	0.37
150	0.31
185	0.27
240	0.23
300	0.20
400	0.18
500	0.15



TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

SHORT CIRCUIT RATING - CONDUCTORS

Short circuit characteristics is based on IEC 60724 , for an insulated conductor with operating temperature of 90 °C for XLPE cable , the maximum temperature during the fault is 250 °C. (5 Seconds maximum duration)

Table 22 Max. Short Circuit temperature for cable components

Material	Item	Temp. °C
Insulation	XLPE insulation	250
Sheathing	LSOH sheathing	180

Tables 23 represent the short circuit current rating at duration of fault time equal to 1 second. For any other values Graphs 1.

Table 23 : XLPE cables copper conductor

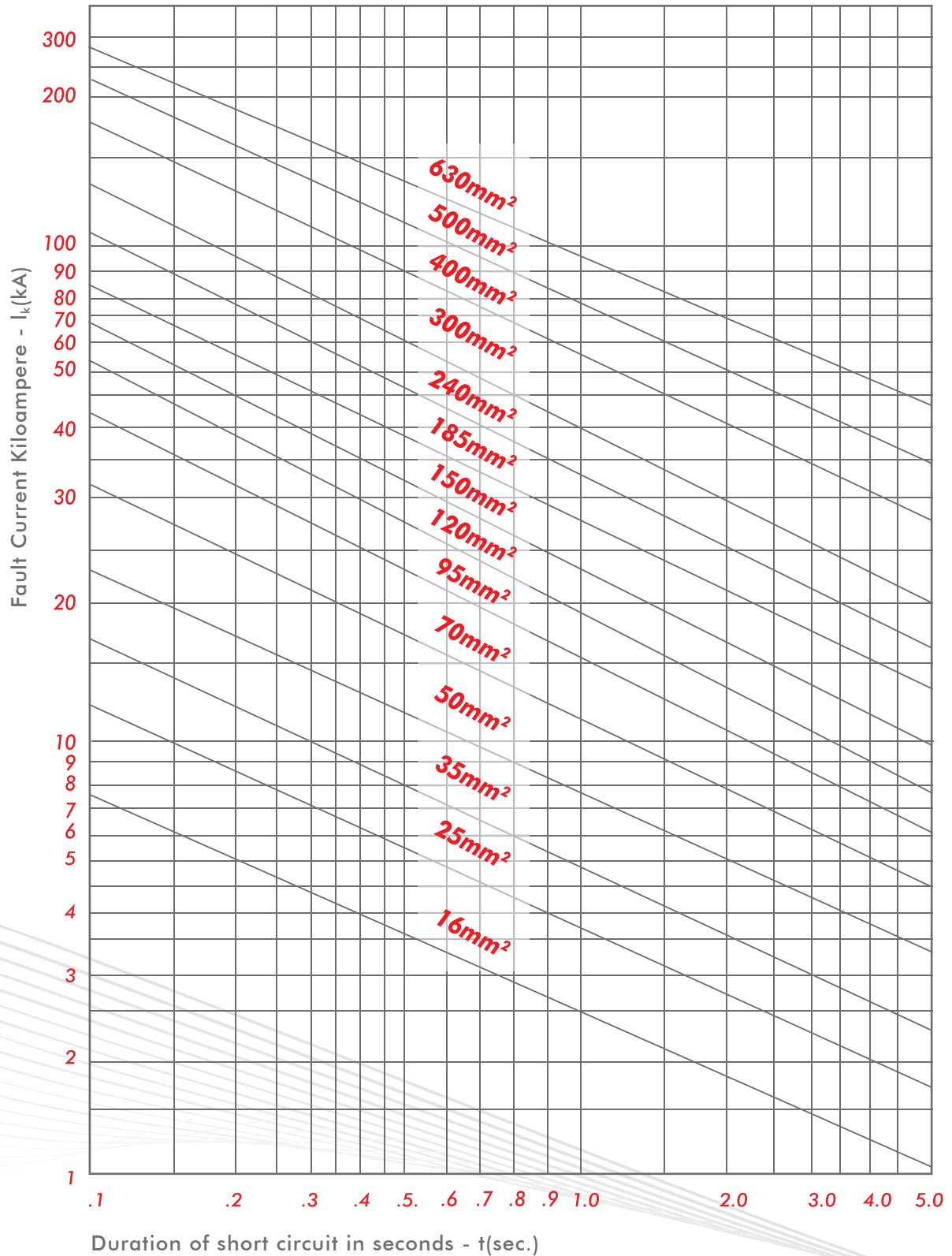
Conductor Size	Short Circuit Ratings for 1 second in k Amp
	Copper Conductor
2.5	0.35
4	0.57
6	0.85
10	1.43
16	2.29
25	3.58
35	5.00
50	7.15
70	10.01
95	13.59
120	17.16
150	21.45
185	26.46
240	34.32
300	42.90
400	57.20
500	71.5
630	90.09
800	114.40
1000	143.00

TECHNICAL INFORMATION

ELECTRICAL CHARACTERISTICS

SHORT CIRCUIT RATING - CONDUCTORS

Graph 1 : XLPE Insulated cables short circuit (Copper Conductor with MICA Wrapped)

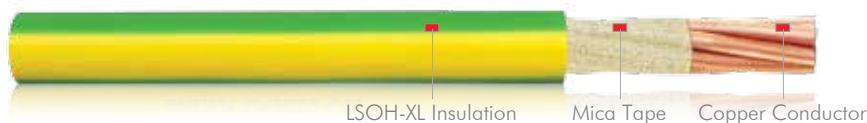


LV FIRE RESISTANT WIRE

LPCB 1069f
BASEC Approved

ANNEALED STRANDED COPPER WIRES/MICA/LSOH-XL INSULATION RATED 90°C

STRUCTURE TO BS 7211 | FIRE TEST PERFORMANCE ADAPTED* TO BS 6387 (CWZ)**



IEC 60331-21,
BS EN 50200(PH-120)***
450/750 V

Catalogue Code	Size mm*2	Conductor Construction No. of Wires X Nominal Wire Diameter mm	Maximum Conductor Resistance ohm/km at 20°C	Insulation Thickness mm	Nominal Outer Diameter mm	Current Carrying Capacity	Packaging
17161004	1.5	7 X 0.518	12.1	0.7	4.0	23	100 Yard/Coil
17161005	2.5	7 X 0.672	7.41	0.8	4.6	31	100 Yard/Coil
17161006	4.0	7 X 0.844	4.61	0.8	5.2	42	100 Yard/Coil
17161007	6.0	7 X 1.04	3.08	0.8	5.7	54	100 Yard/Coil
17161008	10	7 X 1.35	1.83	1.0	7.1	75	100 Yard/Coil
17161009	16	7 X 1.7	1.15	1.0	8.1	100	100 Yard/Coil
17160004	1.5	7 X 0.518	12.1	0.7	4.0	23	3000 M/Drum
17160005	2.5	7 X 0.672	7.41	0.8	4.6	31	3000 M/Drum
17160006	4.0	7 X 0.844	4.61	0.8	5.2	42	3000 M/Drum
17160007	6.0	7 X 1.04	3.08	0.8	5.7	54	3000 M/Drum
17160008	10	7 X 1.35	1.83	1.0	7.1	75	3000 M/Drum
17160009	16	7 X 1.7	1.15	1.0	8.1	100	3000 M/Drum
17160010	25	7 X 2.13	0.727	1.2	9.8	133	3000 M/Drum
17160011	35	7 X 2.5	0.542	1.2	10.9	164	3000 M/Drum
17160012	50	19 X 1.78	0.387	1.4	12.7	198	3000 M/Drum
17160013	70	19 X 2.13	0.268	1.4	14.4	253	3000 M/Drum
17160014	95	19 X 2.5	0.193	1.6	16.7	306	3000 M/Drum
17160015	120	37 X 2.02	0.153	1.6	18.3	354	2000 M/Drum
17160016	150	37 X 2.23	0.124	1.8	20.1	393	2000 M/Drum
17160017	185	37 X 2.5	0.0991	2.0	22.4	449	2000 M/Drum
17160018	240	61 X 2.25	0.0754	2.2	25.3	528	1000 M/Drum
17160019	300	61 X 2.54	0.0601	2.4	28.1	603	1000 M/Drum
17160020	400	61 X 2.85	0.047	2.6	31.7	683	500 M/Drum
17160021	500	61 X 3.2	0.0366	2.8	35.2	783	500 M/Drum
17160022	630	61 X 3.79	0.0286	2.8	36.6	900	500 M/Drum

Note: Current carrying capacity based on IEE wiring regulation method B,2 cables single phase AC or DC, enclosed in conduit on a wall or in trunking etc. at 30 °C ambient temperature. ref(IEE Wiring regulations 17th edition Table 4E1A)

SPECIFICATION:

International standards BS 7211, IEC 60332-1, IEC 60754, IEC 61034 & *BS 6387, BSEN 50200, IEC 60331-21.

CONDUCTOR:

Soft annealed copper to BS-EN 60228, class 2 stranded conductor wrapped with mica tapes.

INSULATION:

Halogen free, cross linked insulating compound type EI5 in accordance with BS 50363-5

PACKING:

Very modern packing with standard length on coils or drums (or according to the requirement) with strong wrapping plastic easy to open and easy to use up to the last meter, Light weight environment friendly.

COLOR:

Available colors for wires Red, yellow, blue, black, brown, green, green, yellow, white & grey. Other colors are available upon request



The fourth digit of the product catalogue code number is for wire color identification.

* Note : BS 6387 tests are not applied to cables having one insulated conductor but no other metallic elements, however the test is adapted using test inside metallic conduit.

**Note : To satisfy the requirement of BS 6387, testing for C,W&Z categories was conducted using 20 mm stainless steel conduit as the other metallic element. (Which is approx. corresponding to CSA 70 mm²). To satisfy the requirement of BS 6387, testing C category was conducted using 38mm stainless steel conduit as the other metallic element.

***Note : For wires overll diameter less than 20mm which is approx. corresponding to CSA 95mm².

Color Codes:

0	1	2
3	4	5
6	7	8

LV FIRE RESISTANT CABLES

LPCB 1069d
BASEC Approved

COPPER CONDUCTOR | UNARMoured | 0.6/1kV

CU/MICA/XLPE/LSOH | IEC 60502-1, IEC 60331-21, BS 6387 CAT CW&Z**

FSB 3000



Single core

Cable Code	Conductor		Insulation Thickness Nominal mm	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires		Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16510071	2.5rm	7	0.7	1.8	8.0	92	1000
16510072	4rm	7	0.7	1.8	8.5	111	1000
16510073	6rm	7	0.7	1.8	9.1	136	1000
16510074	10rm	7	0.7	1.8	10.1	185	1000
16510075	16rm	7	0.7	1.8	11.1	239	1000
16510076	25rm	7	0.9	1.8	12.7	342	1000
16510077	35rm	7	0.9	1.8	13.9	440	1000
16510078	50rm	19	1	1.8	15.4	571	1000
16510079	70rm	19	1.1	1.8	17.3	777	1000
16510080	95rm	19	1.1	1.8	19.2	1034	1000
16510081	120rm	37	1.2	1.8	21.0	1275	1000
16510082	150rm	37	1.4	1.8	22.8	1540	1000
16510083	185rm	37	1.6	1.8	25.2	1918	1000
16510084	240rm	61	1.7	1.8	27.8	2463	1000
16510085	300rm	61	1.8	1.8	30.5	3057	500
16510086	400rm	61	2.0	1.9	34.2	3885	500
16510087	500rm	61	2.2	2.0	37.9	4939	500
16510088	630rmc	61	2.4	2.2	40.1	6242	500

* **Note** : BS 6387 tests are not applied to cables having one insulated conductor but no other metallic elements, however the test is adapted using test inside metallic conduit.

** **Note** : To satisfy the requirement of BS 6387, testing for category C was conducted using a 38 mm stainless steel conduit as the other metallic element.

To satisfy the requirement of BS 6387 testing for category C,W & Z was conducted using a 20 mm stainless steel conduit as the other metallic element. (which is approx .corresponding to a CSA 50 mm²)

LV FIRE RESISTANT CABLES

COPPER CONDUCTOR | UNARMoured | 0.6/1kV

CU/MICA/XLPE/LSOH | IEC 60502-1 / IEC 60331 -21, BS 6387 CAT CW&Z

LPCB 1069d

BASEC APPROVED

FSB 3000

Two cores

Cable Code	Conductor		Insulation Thickness Nominal mm	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires		Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16518103	2.5rm	7	0.7	1.8	12.5	208	1000
16518105	4rm	7	0.7	1.8	13.5	256	1000
16518107	6rm	7	0.7	1.8	14.6	319	1000
16518108	10rm	7	0.7	1.8	17.8	529	1000
16518109	16rm	7	0.7	1.8	19.8	700	1000
16518110	25rm	7	0.9	1.8	23.2	1003	1000
16518111	35rm	7	0.9	1.8	24.5	943	1000
16518122	50sm	19	1.0	1.8	21.9	1140	1000
16518123	70sm	19	1.1	1.8	24.5	1539	1000
16518124	95sm	19	1.1	1.9	27.1	2102	1000
16518125	120sm	37	1.2	2.0	30.3	2614	500
16518126	150sm	37	1.4	2.2	33.5	3215	500
16518127	185sm	37	1.6	2.3	36.9	3975	500
16518128	240sm	61	1.7	2.5	41.9	5036	500
16518129	300sm	61	1.8	2.6	44.8	6252	500

Three cores

16518203	2.5rm	7	0.7	1.8	13.2	239	1000
16518205	4rm	7	0.7	1.8	14.3	300	1000
16518207	6rm	7	0.7	1.8	15.5	380	1000
16518208	10rm	7	0.7	1.8	18.8	626	1000
16518209	16rm	7	0.7	1.8	21.0	843	1000
16518210	25rm	7	0.9	1.8	24.6	1223	1000
16518211	35rm	7	0.9	1.8	26.1	1272	1000
16518212	50sm	7	1.0	1.8	24.9	1600	1000
16518213	70sm	19	1.1	1.9	28.5	2236	1000
16518214	95sm	19	1.1	2.0	31.8	3009	1000
16518215	120sm	37	1.2	2.1	35.1	3744	500
16518216	150sm	37	1.4	2.3	38.9	4639	500
16518217	185sm	37	1.6	2.4	43.0	5728	500
16518218	240sm	61	1.7	2.6	48.1	7473	500
16518219	300sm	61	1.8	2.7	52.7	9264	500
16518220	400sm	61	2.0	3.0	60.3	11920	300

LV FIRE RESISTANT CABLES

COPPER CONDUCTOR | UNARMoured | 0.6/1kV

CU/MICA/XLPE/LSOH | IEC 60502-1, BS 6387 CAT CW&Z, IEC 60331-21

LPCB 1069d
BASEC APPROVED

FSB 3000



Four cores

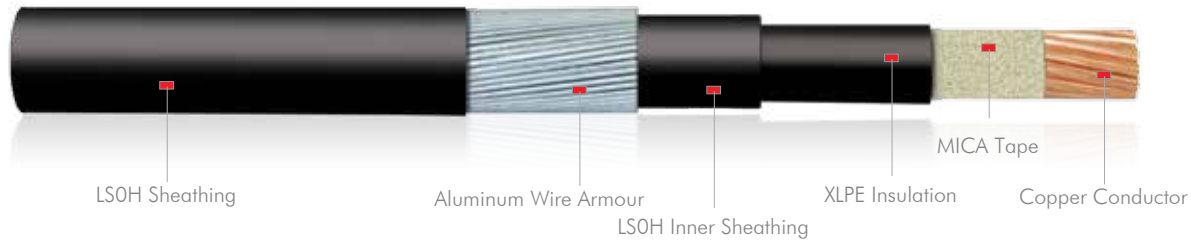
Cable Code	Conductor		Insulation Thickness Nominal mm	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires		Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16518303	2.5rm	7	0.7	1.8	14.3	282	1000
16518305	4rm	7	0.7	1.8	15.6	357	1000
16518307	6rm	7	0.7	1.8	16.9	460	1000
16518308	10rm	7	0.7	1.8	20.5	753	1000
16518309	16rm	7	0.7	1.8	23.0	1026	1000
16518310	25rm	7	0.9	1.8	27.0	1500	1000
16518311	35sm	7	0.9	1.8	24.8	1578	1000
16518312	50sm	7	1.0	1.8	27.6	2062	1000
16518313	70sm	19	1.1	2.0	31.9	2914	1000
16518314	95sm	19	1.1	2.1	35.6	3962	500
16518315	120sm	37	1.2	2.3	39.6	4913	500
16518316	150sm	37	1.4	2.4	43.6	6048	500
16518317	185sm	37	1.6	2.6	48.5	7561	500
16518318	240sm	61	1.7	2.8	54.4	9852	500
16518319	300sm	61	1.8	3.0	61.1	12187	300
16518320	400sm	61	2.0	3.3	67.6	15614	300

LV FIRE RESISTANT CABLES

LPCB 1069e

COPPER CONDUCTOR | ALUMINUM WIRE ARMoured | 0.6/1kV
 CU/MICA/XLPE/AWA/LSOH | IEC 60502-1, IEC 60331- 21, BS 6387 CAT CW&Z

FSB 5000



Single core

Cable Code	Conductor		Insulation Thickness Nominal mm	Armouring Dia. of Aluminum wire Nominal mm	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires			Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16603001	35rm	7	0.9	1.8	1.8	19.8	696	1000
16603002	50rm	19	1	1.8	1.8	21.4	849	1000
16603003	70rm	19	1.1	1.8	1.8	23.3	1087	1000
16603004	95rm	19	1.1	1.8	1.8	25.1	1375	1000
16603005	120rm	37	1.2	1.8	1.8	26.9	1647	1000
16603006	150rm	37	1.4	1.8	1.8	28.7	1944	1000
16603007	185rm	37	1.6	1.8	1.8	31.1	2363	1000
16603008	240rm	61	1.7	1.8	1.9	33.9	2974	1000
16603009	300rm	61	1.8	1.8	2	36.8	3630	500
16603010	400rm	61	2.0	2.0	2.1	41.4	4611	500
16603011	500rm	61	2.2	2.0	2.2	45	5737	500
16603012	630rmc	61	2.4	2.0	2.3	47	7064	500



LV FIRE RESISTANT CABLES

LPCB 1069b
BASEC APPROVED

COPPER CONDUCTOR | STEEL WIRE ARMoured | 0.6/1kV

CU/MICA/XLPE/SWA/LSOH | BS 7846-F2, IEC 60331 - 21, BS 6387 CAT CW&Z
FSB 4000

Two cores

Cable Code	Conductor		Insulation Thickness Nominal mm	Armouring Dia. of Steel wire Nominal mm	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires			Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16310041	2.5rm	7	0.7	0.9	1.4	15.1	417	1000
16310042	4rm	7	0.7	0.9	2.4	20	681	1000
16310043	6rm	7	0.7	0.9	2.1	20	706	1000
16310044	10rm	7	0.7	0.9	1.7	20.1	776	1000
16310045	16rm	7	0.7	1.25	1.5	22	1046	1000
16310046	25rm	7	0.9	1.25	1.6	25.6	1421	1000
16310047	35rm	7	0.9	1.6	1.7	29.7	1782	1000
16310048	50sm	19	1	1.6	1.8	27.3	1862	1000
16310049	70sm	19	1.1	1.6	1.9	30.1	2394	500
16310050	95sm	19	1.1	2	2	33.9	3312	500
16310051	120sm	37	1.2	2	2.1	37	3877	500
16310052	150sm	37	1.4	2	2.2	40.1	4659	500
16310053	185sm	37	1.6	2.5	2.4	45.1	5934	500
16310054	240sm	61	1.7	2.5	2.5	49.9	7401	300
16310055	300sm	61	1.8	2.5	2.6	53.2	8755	300

Three cores

16310121	2.5rm	7	0.7	0.9	1.4	15.8	460	1000
16310122	4rm	7	0.7	0.9	2.2	20	702	1000
16310123	6rm	7	0.7	0.9	1.9	20.1	749	1000
16310124	10rm	7	0.7	1.25	1.5	21	966	1000
16310125	16rm	7	0.7	1.25	1.6	23.4	1237	1000
16310126	25rm	7	0.9	1.6	1.7	28.3	1893	1000
16310127	35rm	7	0.9	1.6	1.8	31.5	2183	1000
16310128	50sm	7	1.0	1.6	1.8	30.3	2471	1000
16310129	70sm	19	1.1	1.6	1.9	33.9	3225	500
16310130	95sm	19	1.1	2.0	2.1	38.6	4433	500
16310131	120sm	37	1.2	2.0	2.2	41.9	5294	500
16310132	150sm	37	1.4	2.5	2.3	46.9	6766	500
16310133	185sm	37	1.6	2.5	2.4	51	8088	500
16310134	240sm	61	1.7	2.5	2.6	56.1	10075	300
16310135	300sm	61	1.8	2.5	2.7	61.1	12196	300
16310136	400sm	61	2.0	2.5	2.9	68.5	15544	300

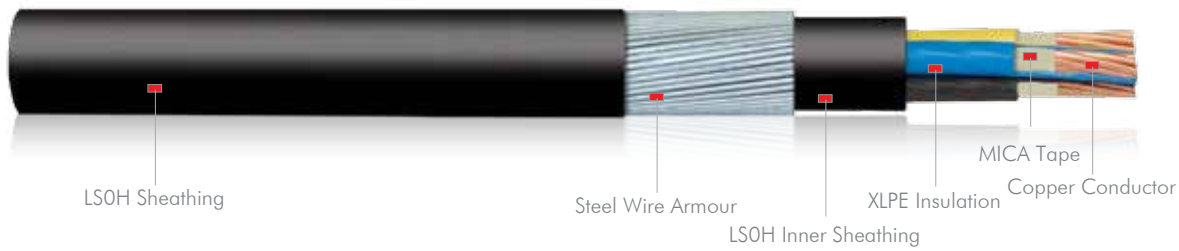
LV FIRE RESISTANT CABLES

LPCB 1069b
BASEC APPROVED

COPPER CONDUCTOR | STEEL WIRE ARMoured | 0.6/1kV

CU/MICA/XLPE/SWA/LSOH | BS 7846-F2, IEC 60331 - 21, BS 6387 CAT CW&Z

FSB 4000 LPCB 1069b BASEC APPROVED



Four cores

Cable Code	Conductor		Insulation	Armouring	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires	Thickness Nominal mm	Diameter of Steel Wire Nominal mm	Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16310221	2.5rm	7	0.7	0.9	1.4	17	526	1000
16310222	4rm	7	0.7	0.9	1.4	18.2	625	1000
16310223	6rm	7	0.7	1.25	1.5	20.4	864	1000
16310224	10rm	7	0.7	1.25	1.5	22.7	1133	1000
16310225	16rm	7	0.7	1.25	1.6	25.4	1458	1000
16310226	25rm	7	0.9	1.6	1.7	30.7	2238	1000
16310227	35sm	7	0.9	1.6	1.8	30.2	2432	1000
16310228	50sm	7	1	1.6	1.9	33.2	3045	500
16310229	70sm	19	1.1	2.0	2.1	38.7	4338	500
16310230	95sm	19	1.1	2.0	2.2	42.4	5542	500
16310231	120sm	37	1.2	2.5	2.3	47.6	7084	500
16310232	150sm	37	1.4	2.5	2.4	51.6	8412	500
16310233	185sm	37	1.6	2.5	2.6	56.5	10207	500
16310234	240sm	61	1.7	2.5	2.7	62.5	12844	300
16310235	300sm	61	1.8	2.5	2.9	69.3	15524	250
16310236	400sm	61	2.0	3.15	3.2	77.5	20236	250

LV FIRE RESISTANT CABLES

LPCB 1069c
BASEC APPROVED

COPPER CONDUCTOR | STEEL WIRE ARMoured | 0.6/1kV

CU/MICA/XLPE/MICA/LSOH/MICA/SWA/LSOH | BS 7846 - F120, IEC 60331 - 21, BS 6387 CAT CW&Z, BS 8491, BS 8519

FSB 6000

Two cores

Cable Code	Conductor		Insulation	Armouring	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires	Thickness Nominal mm	Diameter of Steel Wire Nominal mm	Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16311022	4rm	7	0.7	0.9	1.9	20	708	1000
16311023	6rm	7	0.7	0.9	1.6	20.1	740	1000
16311024	10rm	7	0.7	0.9	1.5	21.4	865	1000
16311025	16rm	7	0.7	1.25	1.5	24.1	1205	1000
16311026	25rm	7	0.9	1.25	1.6	27.8	1606	1000
16311027	35rm	7	0.9	1.6	1.7	30.2	1834	1000
16311028	50 sm	19	1.0	1.6	1.8	27.8	1911	1000
16311029	70 sm	19	1.1	1.6	1.9	30.6	2446	500
16311030	95 sm	19	1.1	2.0	2	34.4	3320	500
16311031	120 sm	37	1.2	2.0	2.1	37.6	3948	500
16311032	150 sm	37	1.4	2.0	2.2	40.6	4749	500
16311033	185 sm	37	1.6	2.5	2.4	45.6	6102	500
16311034	240 sm	61	1.7	2.5	2.5	50.5	7545	300
16311035	300 sm	61	1.8	2.5	2.6	53.7	8955	300
16311036	400 sm	61	2.0	2.5	2.8	60.7	11057	300

LV FIRE RESISTANT CABLES

LPCB 1069c
BASEC APPROVED

COPPER CONDUCTOR | STEEL WIRE ARMoured | 0.6/1kV

CU/MICA/XLPE/MICA/LSOH/MICA/SWA/LSOH | BS 7846 - F120, IEC 60331 - 21, BS 6387 CAT CW&Z, BS 8491, BS 8519
FSB 6000

Three cores

Cable Code	Conductor		Insulation	Armouring	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires	Thickness Nominal mm	Diameter of Steel Wire Nominal mm	Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16311122	4rm	7	0.7	0.9	1.7	20.23	742	1000
16311123	6rm	7	0.7	0.9	1.4	20.24	791	1000
16311124	10rm	7	0.7	1.25	1.5	23.2	1118	1000
16311125	16rm	7	0.7	1.25	1.6	25.58	1407	1000
16311126	25rm	7	0.9	1.6	1.7	30.61	2112	1000
16311127	35rm	7	0.9	1.6	1.8	32.00	2238	1000
16311128	50 sm	7	1.0	1.6	1.8	30.85	2524	1000
16311129	70 sm	19	1.1	1.6	1.9	34.43	3331	500
16311130	95 sm	19	1.1	2.0	2.1	39.15	4588	500
16311131	120 sm	37	1.2	2.0	2.2	42.41	5372	500
16311132	150 sm	37	1.4	2.5	2.3	47.40	6863	500
16311133	185 sm	37	1.6	2.5	2.4	51.56	8150	500
16311134	240 sm	61	1.7	2.5	2.6	56.66	10186	300
16311135	300 sm	61	1.8	2.5	2.7	61.67	12314	300
16311136	400 sm	61	2.0	2.5	2.9	69.00	15338	300

LV FIRE RESISTANT CABLES

LPCB 1069c
BASEC APPROVED

COPPER CONDUCTOR | STEEL WIRE ARMoured | 0.6/1kV

CU/MICA/XLPE/MICA/LSOH/MICA/SWA/LSOH | BS 7846 - F120, IEC 60331 - 21, BS 6387 CAT CW&Z, BS 8491, BS 8519

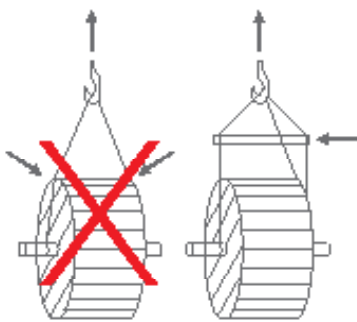
FSB 6000

Four cores

Cable Code	Conductor		Insulation	Armouring	Outer Sheath		Packaging	
	Cross Sectional Area Nominal mm ²	Number of Wires	Thickness Nominal mm	Diameter of Steel Wire Nominal mm	Thickness Nominal mm	Overall Diameter Approx mm	Net Weight Approx kg/km	Standard Drum m +/-2%
16311222	4rm	7	0.7	0.9	1.4	20.45	777	1000
16311223	6rm	7	0.7	1.25	1.5	22.71	1051	1000
16311224	10rm	7	0.7	1.25	1.5	25	1297	1000
16311225	16rm	7	0.7	1.25	1.6	28.91	1753	1000
16311226	25rm	7	0.9	1.6	1.7	34.14	2481	1000
16311227	35sm	7	0.9	1.6	1.8	30.07	2485	1000
16311228	50sm	7	1.0	1.6	1.9	33.74	3103	500
16311229	70sm	19	1.1	2.0	2.1	39.20	4385	500
16311230	95sm	19	1.1	2.0	2.2	42.98	5621	500
16311231	120sm	37	1.2	2.5	2.3	48.10	7142	500
16311232	150sm	37	1.4	2.5	2.4	52.16	8517	500
16311233	185sm	37	1.6	2.5	2.6	57.00	10277	500
16311234	240sm	61	1.7	2.5	2.7	63.00	12922	300
16311235	300sm	61	1.8	2.5	2.9	69.85	15653	250
16311236	400sm	61	2.0	3.15	3.2	78.00	20333	250

DRUM HANDLING INSTRUCTIONS

Cables and Conductors should be installed by trained personnel in accordance with good engineering practices, recognized codes of practise, statutory local requirements, IEE wiring regulations and where relevant, in accordance with any specific instructions issued by the company. Cables are often supplied in heavy cable reels and handling these reels can constitute a safety hazard. In particular, dangers may arise during the removal of steel binding straps and during the removal of retaining battens and timbers which may expose projecting nails.



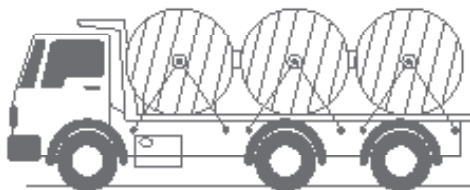
Lifting cable drums using crane.



Do not lay drums flat on their sides, use proper stops to prevent drums rolling.



Lift drums on fork trucks correctly.



Secure drums adequately before transportation.



Roll in the direction shown by the arrow.

DRUM HANDLING INSTRUCTIONS

IMPORTANT!!!

This cable is jacketed with Low Smoke and Fume, Zero Halogen (LSOH) material which is a special product produced with the highest material quality for ultimate fire performance and safety, however to have such improved fire characteristics could have different mechanical characteristics than of the PVC sheathed cable.

Accordingly, to avoid any sheath damage or cracks the following instructions must be followed:

1. Store the drums in shaded area, and not exposed to direct sunlight for long period, unless the drums are covered with the protective cover.
2. Do not pull the cable directly from the sheath, ensure that the pulling force is distributed through the conductor or armour metallic parts.
3. During installation, don't run the cable on rollers / wheels that have sharp edges, and when cable tray installation is used, avoid the sheath contact with any sharp objects.
4. The recommended minimum bending radius of this cable is about 1.5 times that of PVC cables.

For more Information, please contact Bahra Cables Company – Technology Department, or call Toll free at **800 124 8111**

RECOMMENDATIONS FOR CABLES INSTALLATION

PRODUCT LIFE DATA

Low Voltage cables is not subjected to high electric stress, the XLPE insulating material has a dielectric strength voltage of about 22kV, with the best manufacturing and testing practice applied in Bahra Cables Company to ensure good quality insulation . As Insulation treeing is uncommon problem for LV cables, the chance of electric break down is very minor. The cables have to be selected and installed as per the recommendation mentioned below. By keeping such standard of installation and operation, Low Voltage cables can survive in service for a time of 25 years or more without failure.

RECOMMENDATIONS FOR THE SELECTION, INSTALLATIONS AND OPERATION OF CABLES

- The cables are intended to be installed in air, or for burial in free draining soil Conditions. Where the cables are to be laid in any other environment, reference should be made to the cable Bahra Cables Company.
- The rated voltage of the cable for a given application should be suitable for the operating conditions in the system in which the cable is used. To facilitate the selection of the cable, systems are divided into three categories as follows.

a) Category A

This category comprises those systems in which any phase conductor that comes in contact with earth or an earth conductor is disconnected from the system within 1 min.

b) Category B

This category comprises those systems which, under fault conditions, are operated for a short time with one phase earthed. This period, according to IEC 60183, should not exceed 1 h. For cables specified in this standard, a longer period, not exceeding 8 h on any occasion, can be tolerated. The total duration of earth faults in any year should not exceed 125 h.

c) Category C

This category comprises all systems which do not fall into categories A and B.

The nominal system voltage U , (up to 1.0 kV) is the nominal voltage between phases, The maximum sustained system voltage, U_m (1.2 kV) is the highest voltage between phases that can be sustained under normal operating conditions at any time and at any point in the system. It excludes transient voltage variations, due, for example, to lightning impulses, fault conditions and rapid connection of loads.

Single-core cables are suitable for d.c. systems operating at up to 1 000 V to earth and two-core 600/1 000 V cables at up to 1 500 V between conductors.

CABLES INSTALLED IN HAZARDOUS AREAS

Where cables are required to be installed in areas classified as hazardous, i.e. potentially explosive gas

atmospheres, reference should be made to IEC 60079-14.

CURRENT RATINGS

The current rates introduced previously in this catalogue have to be followed.

- Cables should be installed and used in association with other equipment in accordance with BS7671 and/or the Electricity Safety, Quality and Continuity Regulations, as appropriate.

In special environments, the appropriate regulations and codes of practice should be observed.

- Minimum temperature during installation

It is recommended that the cables be installed only when both the cable and ambient temperatures are above 0 °C and have been so for the previous 24 h, or where special precautions have been taken to maintain the cable above this temperature.

MINIMUM INSTALLATION RADIUS

None of the cables specified in this catalogue should be bent during installation to a radius smaller than that given in BCC product Catalogues and the offered data sheets, wherever possible, larger installation radii should be used.

PREVENTION OF MOISTURE INGRESS

Care should be exercised during installation to avoid any damage to cable coverings. This is important in wet or other aggressive environments. The protective cable end cap should not be removed from the ends of the cable until immediately prior to termination or jointing, especially for cables that do not have extruded bedding. When the end caps have been removed the unprotected ends of the cable should not be exposed to any kind of moisture.

TEST AFTER INSTALLATION

Tests after installation are made, if required, when the installation of the cable and its accessories has been completed. A d.c. voltage equal to $4 U_0$ shall be applied for 15 min..

The requirement is : No breakdown should occur.

The test voltages given above are intended for cables immediately after installation and not for cables that have been in service. When testing is required after cables have been in service, regardless of service duration, Bahra Cables Company - Technology Department should be consulted for the appropriate test conditions, which depend on the individual circumstances.

CABLES FAULTS PREVENTION

The Low Voltage Cables faults are possible due to different reasons:

1. Physical damage due to mishandling or misuse
2. Physical Damage during operations.
3. Over current.
4. Fire or excessive temperature at the cables location.
5. Manufacturing malfunction, which Bahra Cables Company guarantees its product against any defect or wrong workmanship, meanwhile in case of damage due to this reason, the action will be taken as per the submitted warranty letter, and the company will apply the required corrective and preventive actions.

Recommendation for failures:

Insulation failure, the defected section is recommended to be replaced , the replacement should be from joint to joint.

Serving/ jacketing failure, if the water did not ingress through the cable, the jacket will be repaired using proper repairing techniques carried out by skilled technician. If the water came inside the cables to insulation, for cables suitable for wet location, practically dry the defected portion before repair.

If the cable is not suitable for wet applications and the underground water engrossed inside it, replacing the defected section from joint to joint is the recommend solution.

ORDERING INFORMATION

To serve our customer in minimum time and high efficiency, our valuable customers are requested to provide the following details along with their enquiries and orders:

1. Number of phases/cores.
2. Conductor required cross sectional area (conductor size along with size of neutral phase).
3. System Voltage Rate .
4. Applicable customer specification or International Standard / Norm.
5. Insulation Material (XLPE/LSZH).
6. Bedding / Inner Sheathing (Inner Jacketing (LSOH).
7. Armouring Type (SWA or AWA).
8. Cable jacketing material (LSOH).
9. Fire Resistance Normal (IEC 60331 or BS6387) and Fire categories please see page no. 4.
10. Required length of cables (drum schedules)



LOCATION MAP

