

# دوكاب Ducab

## الكابلات FlamBICC FlamBICC Cables



حلول متقدمة للكابلات من خلال التقنية والابداع  
Advanced Cable Solutions Through Technology and Innovation

**BICC**

## Complete Fire Safety Solutions

### BS CODES OF PRACTICE BS 8519

**BS 8519 provides recommendations for the selection and installation of fire resistant power and control system cables for life safety and fire fighting applications.**

BS 8519 is full revision of BS 7346-6, the code of practice for smoke and heat control systems (which is now withdrawn) and provides a more comprehensive coverage of fire engineering systems. It highlights various factors to be considered by engineers while designing systems and selecting cables to meet appropriate life safety and fire fighting objectives.

In the standard BS 8519, cables are classified suitable for LS (Life Safety) and FF (Fire Fighting) system. It separates cables in three categories.

**Category 1: 30 minutes fire survival**

**Category 2: 60 minutes fire survival**

**Category 3: 120 minutes fire survival**

In general Life Safety system cables are required to have fire survival time of 30 minutes for single stage evacuation and 60 minutes in case of phased evacuation. The cables for these systems would include fire protection systems, smoke ventilator system etc.

All Fire Fighting systems are required to function for 120 minutes. Cables for these systems would aid fire fighters in carrying their role and shall include SHEVS (Smoke & Heat Exhaust Ventilation System), smoke curtains, sprinkler system and fire-fighting lift.

#### **BS 8519 covers information on:**

- Fire survival times
- Power Supplies
- Dual circuits/diverse routes
- Fire protective enclosures
- Automatic change over devices
- Motor control panels
- Cable selection
- Fire protective enclosures for cables
- Effects of fire temperature on cable size
- Use of circuit protective conductors (CPCs)
- Cable Installation Practice
- Cable support systems
- Inverters
- Multizoned smoke ventilation systems
- Junction boxes
- Areas of special fire risk



As can be noted, BS 8519 contains mainly six different categories of cables, three each for power and control cables depending upon escape / survival times of 30, 60 or 120 minutes . The table below will simplify the task of cable selection from DUCAB range of products.

## CATEGORIES OF CABLE AS SPECIFIED IN BS 8519

			Applicable fire test	Applicable product
Life Safety (LS)	LS 30 mins	Category 1 Power	BS 8491 30 min	FlamBICC 6
		Category 1 Control	BS EN 50200 PH30 & 30 mins annex E	FlamBICC 4, FlamBICC 2
	LS 60 mins	Category 2 Power	BS 8491 60 min	FlamBICC 6
		Category 2 Control	BS EN 50200 PH60 & 120 mins to BS 8434-2	FlamBICC 4
Fire Fighting (FF)	FF 120 mins	Category 3 Power	BS 8491 120 mins	FlamBICC 6
		Category 3 Control	BS EN 50200 Ph120 & BS 8591 annex B	FlamBICC 4



## Fire Performance Cable Selection Guide

		FlamBICC 2	FlamBICC 1	FlamBICC 3	FlamBICC 4	FlamBICC 6
<b>Codes of Practice</b>						
Emergency Lighting	BS 5266 Emergency Lighting cable	√			√	√
	BS5266 Enhanced Emergency Lighting cable				√	√
	BS 5266 Emergency Lighting cable system	√	√	√	√	√
	BS 5266 Enhanced Emergency Lighting cable system	√	√	√	√	√
Fire Alarm	BS 5839 Standard Grade	√			√	√
	BS 5839 Enhanced Grade				√	√
Smoke, Heat & Exhaust Ventilation System (SHEVS)	BS 8519					√
Power and Control	BS 8519 Catagory 1 Control	√			√	√
	BS 8519 Catagory 2 Control				√	√
	BS 8519 Catagory 3 Control				√	√
	BS 8519 Catagory 1 Power					√
	BS 8519 Catagory 2 Power					√
	BS 8519 Catagory 3 Power					√
General	BS 9999					√
<b>Manufacturing Standards</b>						
	BS 7629	√				
	BS 7846				√	√
<b>Fire Resistance Tests</b>						
	BS 6387 C W & Z	√	√	√	√	√
	BS EN 50200 PH30	√			√	√
	BS EN 50200 PH60	√			√	√
	BS EN 50200 PH120	√			√	√
	BS 8434-2				√	√
	BS 7846 F2				√	√
	BS 7846 F30, F60, F120					√
	BS 8491					√
	IEC 60331	√	√	√	√	√
<b>Fire Reaction Tests</b>						
Low Smoke Zero Halogen (LSZH)	BS EN 50267, (IEC 60754) BS EN 50268, (IEC 61034)		√	√	√	√



## INTRODUCTION

Ducab FlamBICC cables are special fire resistant cables designed to survive and operate during fire conditions. In order to suit different application requirements Ducab offers FlamBICC cables in the following range,

**FlamBICC 1:** These are single core Fire Resistant cables with XL-LSZH insulation to meet C-W-Z test as per BS 6387 for small sizes and IEC 60331 for large sizes.

**FlamBICC 2:** These are screened cables designed as per BS 7629 and are mainly used in fire detection, voice alarm, emergency lighting etc.

**FlamBICC 3:** These are single and multicore Fire Resistant cables with insulation and sheath to meet C-W-Z test as per BS 6387 for small sizes and IEC 60331 for large sizes.

**FlamBICC 4:** These are multi-core armoured cables designed as per BS 7846 with steel wire armour construction to meet category F2 fire test (C-W-Z test as per BS 6387)

**FlamBICC 6:** These are multi-core armoured cables designed as per BS 7846 with steel wire armour construction to meet category F120 fire test as per BS 8491. During F120 fire test direct mechanical impact and water jet is provided on the cable during fire test.

The selection of FlamBICC cables needs to be done in accordance with BS 5839 Part 1 and BS 8519 which lay down the selection and installation criterion for fire resistant cables.

For detailed product description and characteristics, reference can be made to the respective FlamBICC product data in this catalog. As a responsible organisation, all the FlamBICC range products from Ducab are designed with Low Smoke and Zero Halogen (LSZH / LSHF / LSOH) feature. Thus in the event of fire, the FlamBICC cable shall not emit heavy smoke or toxic halogen gases. The low smoke generation gives better visibility in a fire situation aiding the rescue operation and enabling the EXIT path to be seen clearly for escape. As there is no halogen or acidic gas emission during burning of the cable, the sensitive equipment in the surrounding areas are not affected adversely.



BS 6387 fire testing in progress at Ducab



IEC 60332-3 fire test

Fire Test after 6 minutes



PVC Cable



Ducab Smokemaster cable

Ducab range of FlamBICC cable is a highly sophisticated product for use in special application. There are various areas of application for Fire Resistant cables, which include:

- Areas where people will remain in occupation for short time eg. schools, shopping malls, mass transit systems like metro stations etc.
- Services where circuit integrity is very important under fire conditions eg. special equipment in hospital
- Essential safety circuit eg. fire detection, fire alarm, voice alarm etc.
- Power supply to equipment used in fire-fighting eg. sprinkler pumps
- In large buildings where fire strategy involves evacuation of occupants in phased manner.

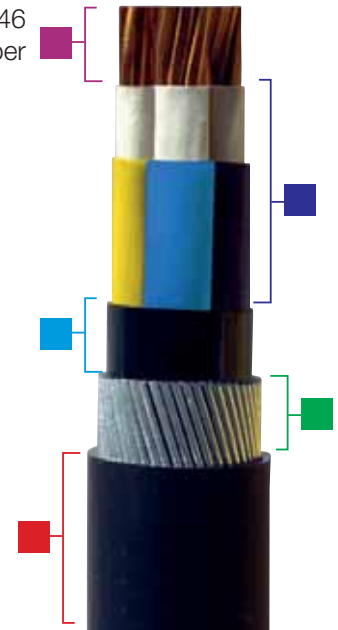


## DUCAB FLAMBICC 4

Ducab FlamBICC 4 cables are multi-core armoured cables designed as per BS 7846 with steel wire armour construction to meet category F2 fire test (C-W-Z test as per BS 6387).

### CONSTRUCTION

- **Conductor:** Plain annealed Copper, stranded class 2 conductor to BS EN 60228
- **Dual Insulation:** Special grade of Mica Glass tape + XLPE
- **Bedding:** LSZH
- **Armour:** Galvanised steel wire armoured
- **Outer Sheath:** Robust LSZH sheath with Black colour as standard, other colours upon request



### CHARACTERISTICS

General:	Ducab FlamBICC 4 are armoured cables designed as per BS 7846 to meet C-W-Z fire test as per BS 6387.
Approvals:	LPCB and BASEC approved for 2, 3 and 4 core cable designs
Voltage grade:	600 / 1000 V
Fire resistance:	C-W-Z test as per BS 6387
Flame propagation:	BS EN / IEC 60332-1 and BS EN / IEC 60332-3 Categories A, B & C
Acid gas emission:	Less than 0.5% when tested to IEC 60754 & BS EN 50267
Low smoke emission:	As per IEC 61034 & BS EN 50268
Cable operating temperature:	Maximum 90°C
Short circuit temperature	Maximum 250°C
Bending radius:	6 x Cable diameter for circular and 8 x Cable diameter for sector shaped cables

### CORE IDENTIFICATIONS

STANDARD				ALTERNATIVE*			
Red	Black			Brown	Blue		
Red	Yellow	Blue		Brown	Black	Grey	
Red	Yellow	Blue	Black	Blue	Brown	Black	Grey



## 2 Core Cables

Fire resistant cables. Two Core Armoured Cables 600/1000 V Grade with stranded copper conductors (BS 7846)

Nominal conductor area	Approximate Diameter			Approximate cable weight	Maximum conductor resistance at 20°C	Maximum armour resistance at 20°C	Current rating on perforated cable trays / free air	Voltage drop (1φ AC)
	Under armour	Over armour	Overall diameter					
mm <sup>2</sup>	mm	mm	mm	kg/km	Ohm/km	Ohm/km	Amp	mV/A/m
<b>600/1000 V Copper power and control cables</b>								
1.5*	8.7	10.5	12.4	315	12.1	10.2	29	31
2.5*	9.9	11.7	13.8	385	7.41	8.8	39	19
4*	11.1	12.9	15.0	460	4.61	7.9	52	12
6*	12.1	13.9	16.0	535	3.08	7.0	66	7.9
10*	13.9	15.7	18.0	690	1.83	6.0	90	4.7
16*	15.7	18.2	20.5	920	1.15	3.7	115	2.9
25*	19.7	22.2	24.7	1270	0.727	3.7	152	1.9
35*	21.9	25.1	27.8	1720	0.524	2.6	188	1.35
50	19.5	22.6	25.4	1810	0.387	2.3	228	1
70	22.1	25.2	28.2	2305	0.268	2.0	291	0.69
95	24.5	28.4	31.6	3105	0.193	1.4	354	0.52
120	29.1	33.0	36.4	3820	0.153	1.3	410	0.42
150	31.1	35.0	38.6	4475	0.124	1.2	472	0.35
185	33.4	38.3	42.2	5675	0.0991	0.82	539	0.29
240	38.0	42.9	47.0	7090	0.0754	0.73	636	0.24
300	43.0	47.8	52.2	8570	0.0601	0.67	732	0.21

\* Circular conductors, all others are sector shaped

• Installation conditions for above rating:

• Ambient Air Temperature 30°C

• Conductor operating temperature 90°C





## 3 Core Cables

Fire resistant cables. Three Core Armoured Cables 600/1000 V Grade with stranded copper conductors (BS 7846)

Nominal conductor area	Approximate Diameter			Approximate cable weight	Maximum conductor resistance at 20°C	Maximum armour resistance at 20°C	Current rating on perforated cable trays / free air	Voltage drop (3φ AC)
	Under armour	Over armour	Overall diameter					
mm <sup>2</sup>	mm	mm	mm	kg/km	Ohm/km	Ohm/km	Amp	mV/A/m
<b>600/1000 V Copper power and control cables</b>								
1.5*	9.2	11.0	12.9	345	12.1	9.5	25	27
2.5*	10.5	12.3	14.4	425	7.41	8.2	33	16
4*	11.8	13.6	15.7	515	4.61	7.5	44	10
6*	12.9	14.7	16.8	610	3.08	6.7	56	6.8
10*	14.8	17.3	19.6	910	1.83	4.0	78	4.0
16*	16.8	19.3	21.8	1110	1.15	3.5	99	2.5
25*	21.1	24.3	27.0	1720	0.727	2.5	131	1.65
35*	23.5	26.7	29.6	2105	0.524	2.3	162	1.15
50	24.9	28.0	30.8	2480	0.387	2.0	197	0.87
70	26.9	30.0	33.0	3145	0.268	1.8	251	0.60
95	30.6	34.5	37.9	4310	0.193	1.3	304	0.45
120	33.9	37.8	41.4	5170	0.153	1.2	353	0.37
150	37.8	42.7	46.5	6555	0.124	0.78	406	0.30
185	42.2	47.1	51.0	7915	0.0991	0.71	463	0.26
240	46.4	51.3	55.6	9815	0.0754	0.63	546	0.21
300	52.8	57.6	62.1	12030	0.0601	0.58	628	0.185
400	58.0	62.8	67.7	14740	0.0470	0.52	728	0.165

\* Circular conductors, all others are sector shaped

- Installation conditions for above rating:
- Ambient Air Temperature 30°C
- Conductor operating temperature 90°C



## 4 Core Cables

Fire resistant cables. Four Core Armoured Cables 600/1000 V Grade with stranded copper conductors (BS 7846)

Nominal conductor area	Approximate Diameter			Approximate cable weight	Maximum conductor resistance at 20°C	Maximum armour resistance at 20°C	Current rating on perforated cable trays / free air	Voltage drop (3φ AC)
	Under armour	Over armour	Overall diameter					
mm <sup>2</sup>	mm	mm	mm	kg/km	Ohm/km	Ohm/km	Amp	mV/A/m
<b>600/1000 V Copper power and control cables</b>								
1.5*	10.1	11.9	13.8	390	12.1	8.8	25	27
2.5*	11.5	13.3	15.4	480	7.41	7.7	33	16
4*	13.0	14.8	16.9	590	4.61	6.8	44	10
6*	14.2	16.7	19.0	825	3.08	4.3	56	6.8
10*	16.4	18.9	21.2	1065	1.83	3.7	78	4.0
16*	18.6	21.1	23.6	1335	1.15	3.1	99	2.5
25*	23.4	26.6	29.3	2070	0.727	2.3	131	1.65
35*	26.1	29.3	32.2	2550	0.524	2.0	162	1.15
50	26.5	29.6	32.6	3015	0.387	1.8	197	0.87
70	30.7	34.6	38.0	4240	0.268	1.2	251	0.60
95	34.5	38.4	42.0	5420	0.193	1.1	304	0.45
120	38.1	43.0	46.8	6935	0.153	0.76	353	0.37
150	42.8	47.7	51.6	8270	0.124	0.68	406	0.30
185	47.2	52.1	56.4	10000	0.0991	0.61	463	0.26
240	52.5	57.3	61.8	12485	0.0754	0.54	546	0.21
300	58.2	63.0	67.9	15175	0.0601	0.49	628	0.185
400	66.5	72.6	78.0	19800	0.0470	0.35	728	0.165

\* Circular conductors, all others are sector shaped

- Installation conditions for above rating:
- Ambient Air Temperature 30°C
- Conductor operating temperature 90°C

## Multicore Cables

Fire resistant cables. Armoured Auxiliary Cables 600/1000 V Grade with stranded copper conductors (BS 7846)

Number of cores	Nominal conductor area	Approximate Diameter			Approximate cable weight	Maximum conductor resistance at 20°C	Maximum armour resistance at 20°C	Current rating on perforated cable trays / free air (Multi circuit operation)	Current rating on perforated cable trays / free air (Single circuit operation)	Voltage drop (3φ AC)
		Under armour	Over armour	Overall diameter						
	mm <sup>2</sup>	mm	mm	mm	kg/km	Ohm/km	Ohm/km	Amp	Amp	mV/A/m
<b>600/1000 V Copper power and control cables</b>										
7	1.5	12.0	13.7	15.9	485	12.1	7.5	19	29	27
12		15.8	18.3	20.6	820	12.1	4.0	16	29	27
19		18.6	21.1	23.6	1060	12.1	3.5	14	29	27
27		22.4	25.6	28.3	1525	12.1	2.3	12	29	27
37		25.2	28.4	31.1	1840	12.1	2.0	11	29	27
48		29.0	32.2	35.1	2240	12.1	1.8	10	29	27
7	2.5	13.8	15.5	17.7	610	7.41	6.3	25	39	16
12		18.3	20.8	23.3	1040	7.41	3.5	21	39	16
19		21.6	24.8	27.5	1525	7.41	2.3	18	39	16
27		26.1	29.3	32.2	1980	7.41	1.9	17	39	16
37		29.4	32.6	35.5	2425	7.41	1.7	15	39	16
48		33.9	37.9	41.1	3260	7.41	1.2	14	39	16
7	4	15.6	18.0	20.3	885	4.61	4.0	33	52	10
12		20.8	24.0	26.5	1450	4.61	2.3	28	52	10
19		24.6	27.8	30.5	1940	4.61	2.0	24	52	10
27		29.8	33.0	36.0	2560	4.61	1.7	22	52	10
37		33.6	37.6	40.8	3445	4.61	1.2	19	52	10
48		38.8	42.8	46.2	4240	4.61	1.0	17	52	10

\* Multi circuit means all conductors are loaded equally and operating in close vicinity

- Installation conditions for above rating:
- Ambient Air Temperature 30°C
- Conductor operating temperature 90°C