

# Fire Resistant Cables





ISO 9001:2015  
Certificate No. CS1-249



ISO 9001:2015  
Certificate LPCB ref. 217



ISO 9001:2015  
n. 9125 CAVL

ISO 14001:2015  
n. 9191.CVCL



**Our commitment to environmentally friendly products.**

CAVICEL is committed to providing our customers with environmentally friendly products in compliance with the European Union (EU) RoHS Directive (Restriction of Hazardous Substances) and REACH Regulation (Registration, Evaluation, Authorization and Restriction of Chemicals).

# FIRECEL

## The Last Cable Standing

### Cables vs fire

Fires have a high cost in terms of loss of human life and damages to plants and structures.

Fire is the major cause of destruction, but we must consider that one of the main causes of death are the inhalation of toxic gas that develop and the presence of dense smoke, interfering with the identification of escape routes.

It has to be kept into consideration, then, that even the most sophisticated alarm systems or emergency systems can be useless if their performances are compromised by the destruction of the cables caused by the fire. This is the reason why, over the last few years, the companies have strongly invested in design and development of insulation materials and cables granting the best performances in case of fire, while reducing fumes and acid gases emission and granting the circuit integrity even in case of fire.

CaviceL has been present for more than 30 years onto the market with its own research, products and experience.

***Experience is our Power.***

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With this catalogue we try to show you our experience, our way of thinking and operating in the creation of fire resistant cables.

We believe the cables you will see are good practical examples.

When it comes to your own cable we can co-design it together: you let us know your specific situation and we will create your cable all around it.

***CaviceL can create it for you.***





# Fire Performance

CABLES HAVE TO BE PROPERLY DESIGNED, MANUFACTURED AND ALSO TESTED.

The behavior of cables concerning flame presence covers various aspects.

A first feature is how the cable reacts in these circumstances.

This brought us to consider two performances:

## FLAME RETARDANT FIRE RESISTANT

**Flame retardant cables** can resist the spread of fire, but due to fire the cable is fully destroyed and no circuit integrity is assured. All the systems connected to cables are completely out of work.

Flame retardant cables are not intended to assure service during a fire but are chosen to prevent the flame spreading.

**Fire resistant cables** maintain circuit integrity and continue to work in the presence of fire. It is important for fire alarm systems, emergency lighting, voice alarm systems.... In this case it is possible to assure building evacuation, alarm signals, activation of extinguishing systems.

Fire resistant cables are always as well Flame retardant as they assure the highest level of security during a fire.

## GAS EMISSION / SMOKE DENSITY

Other features should be considered in this context. More precisely, these are the quality and the quantity of gas that are developed during the fire.

In fact, the cause of fire victims often doesn't only consist in the presence of fire, but it's also due to the gases that develop from the burning of materials.

One of the most popular material used for insulation and jacket for electrical cables is PVC.

This material can show excellent flame retardant properties, due to the presence of chlorine in the compound, that is a flame suppressant. On the other hand, chlorine is a corrosive and toxic gas and it develops an heavy smoke. All of these characteristics have to be avoided in case of fire.

This is why the following features have to be considered:

### Absence of halogen (acid gas) in the cables

### Low emission of smoke

Specific tests, according to different standards, are therefore defined to verify this performance.

The tests are part of R&D, an extremely strategic activity for a Company and this is the reason why CAVICEL has invested in this field.

You can find here the main tests concerning the behaviour of cables under fire conditions, and our main test equipments.

It is important to verify all required performances and give the customers the full compliance to the requirements.

CAVICEL is proud of its own laboratories and customers are always welcome to visit them.



To guarantee the customer's requirements, and the maximum safety and reliability of the products supplied, it is important to be able to verify the performance of all products.

Quality Control is a strategic function, but it is also important to have a full equipped and reliable structure to certify all the required characteristics.

Cavicel has always invested in its laboratories and in staff training.

The Cavicel laboratory is recognized by IMQ, and this is the maximum guarantee for the customers.

# Fire Resistance

CAVICEL FIRE LABORATORY

**BS 6387**

Following tests are carried out to verify if a cable is capable of maintaining circuit integrity under fire condition, fire with water, and fire with mechanical shocks. During the tests the cables are maintained at their rated voltage.

## Fire Resistance (CAT. A B **C** S)



The cable is exposed to fire at the specified temperature and time.



## Fire and Water Resistance (CAT. **W**)



The cable is exposed for 15 minutes to flame at 650°C and for additional 15 minutes to fire and water spray.



## Fire Resistance with Mechanical Shocks (CAT. XY **Z**)



The cable is mounted on a vertical panel and shocked with a steel bar for 15 minutes while submitted to the action of a flame.



### Performance Table

TEST	CATEGORY
<b>Fire Resistance</b>	
650 °C for 3 hours	A
750 °C for 3 hours	B
<b>950 °C for 3 hours</b>	<b>C</b>
950 °C for 20 minutes	S
TEST	CATEGORY
<b>Resistance to Fire and Water</b>	
<b>650 °C</b>	<b>W</b>
<b>Resistance to Fire with Mechanical Shock</b>	
650 °C	X
750 °C	Y
<b>950 °C</b>	<b>Z</b>

# Fire Resistance

CAVICEL FIRE LABORATORY

BS EN 50200

## Fire Resistance



This test is carried out to verify the circuit integrity of cables exposed to fire at 830°C and mechanical shocks.

Classification	
PH 15	flame exposure for 15 min
PH 30	flame exposure for 30 min
PH 60	flame exposure for 60 min
PH 90	flame exposure for 90 min
PH 120	flame exposure for 120 min



BS EN 50200 ANNEX E (STANDARD CABLE - BS 5839-1 - CLAUSE 26.2D)

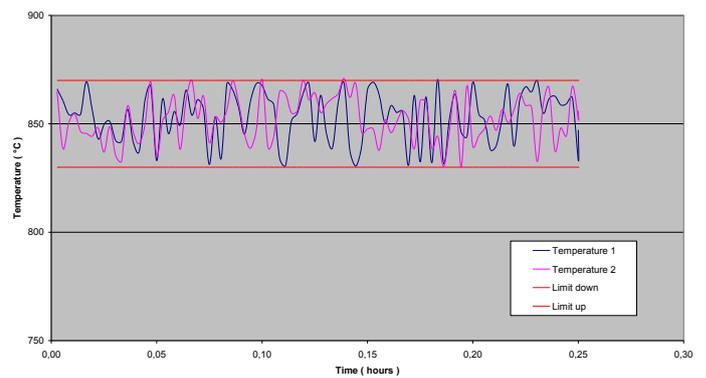
## Fire Resistance



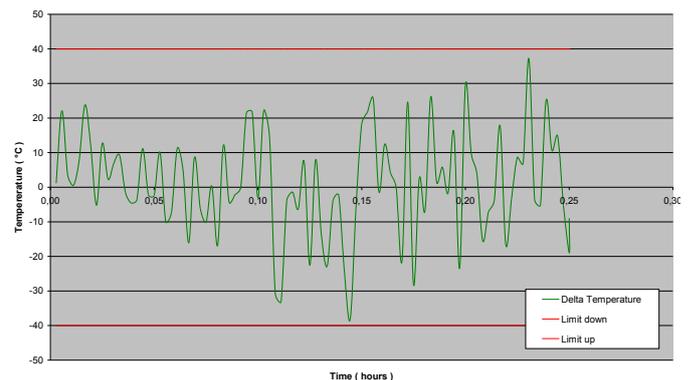
This test is carried out to verify circuit integrity during a fire. The cable is exposed to a flame at 830°C and mechanical shocks for 15 minutes and additional 15 minutes to flame, mechanical shocks and water spray.



Temperature graph - BS EN 50200



Difference between temperature - BS EN 50200



# Fire Resistance

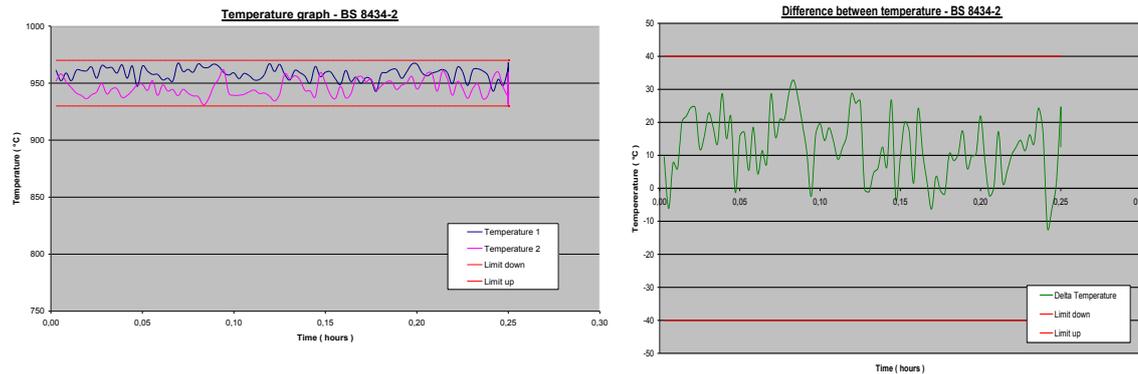
CAVICEL FIRE LABORATORY

**BS 8434-2 (ENHANCED CABLE - BS 5839-1 - CLAUSE 26.2E)**

## Fire Resistance



This test is carried out to verify circuit integrity during a fire. The cable is exposed to a flame at 930°C and mechanical shocks for 60 minutes and additional 60 minutes to flame, mechanical shocks and water spray.



**BS 8491:2008**

## Fire Resistance



Method for assessment of fire integrity of large diameter power cables. This test is carried out to verify circuit integrity of cables exposed to fire, mechanical shock and water spray. A sample of cable is held on a flame about 830°C, for a minimum of 120 minutes. The sample is subject of a mechanical shock, directly on the cable, every 10 minutes. 5 minutes before the end of the test, the cable is run over by a strong jet of water (2,5 l/min.) for a period of 5 seconds, at intervals of 60 seconds.



# Fire Resistance

CAVICEL FIRE LABORATORY

IEC 60331, CEI 20-36

## Fire Resistance



This test is carried out to verify circuit integrity even during a fire. A sample of cable is held on a flame at about 750°C for a period of minimum 90 min, under rated voltage. No break or short circuit should occur. The test can also be performed in more severe conditions, up to 1100 °C. Fibre optic cables can be tested in same conditions, monitoring the attenuation of the signal of one or more fibres.

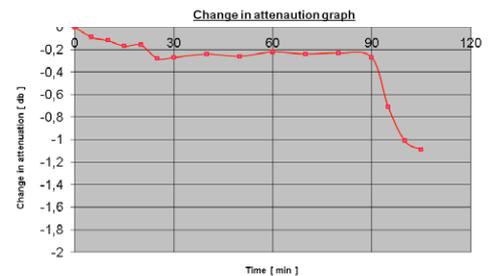
### Classification

- CEI 20-36/2-1 – IEC 60331-21 – Electrical cables up to 0,6/1 kV
- CEI 20-36/2-3 – IEC 60331-23 – Data cables
- CEI 20-36/2-5 – IEC 60331-25 – Fibre optic cables

### COPPER CABLE



### FIBER CABLE

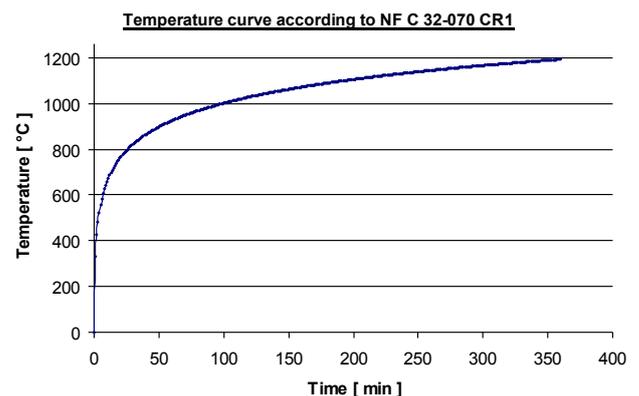
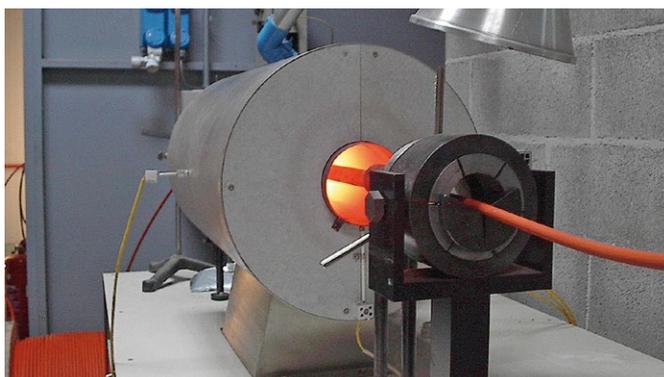


NF C 32-070 CR1

## Fire Resistance



This test is carried out to verify circuit integrity during a fire. The cable is into a tubular oven with gradually increasing of temperature up to 920°C. The cable is stressed by mechanical shocks and subjected to tensile



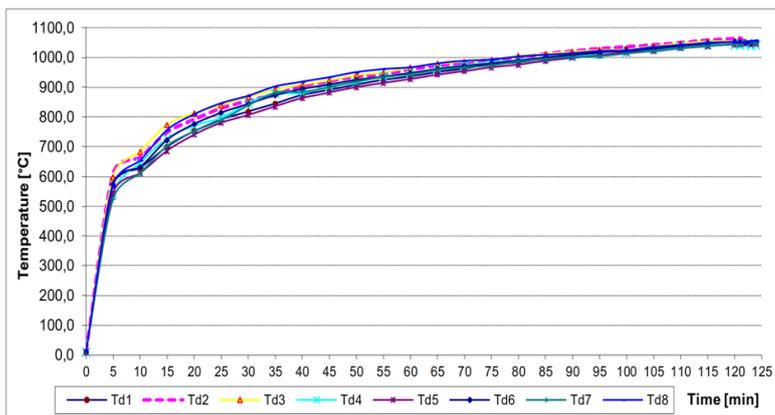
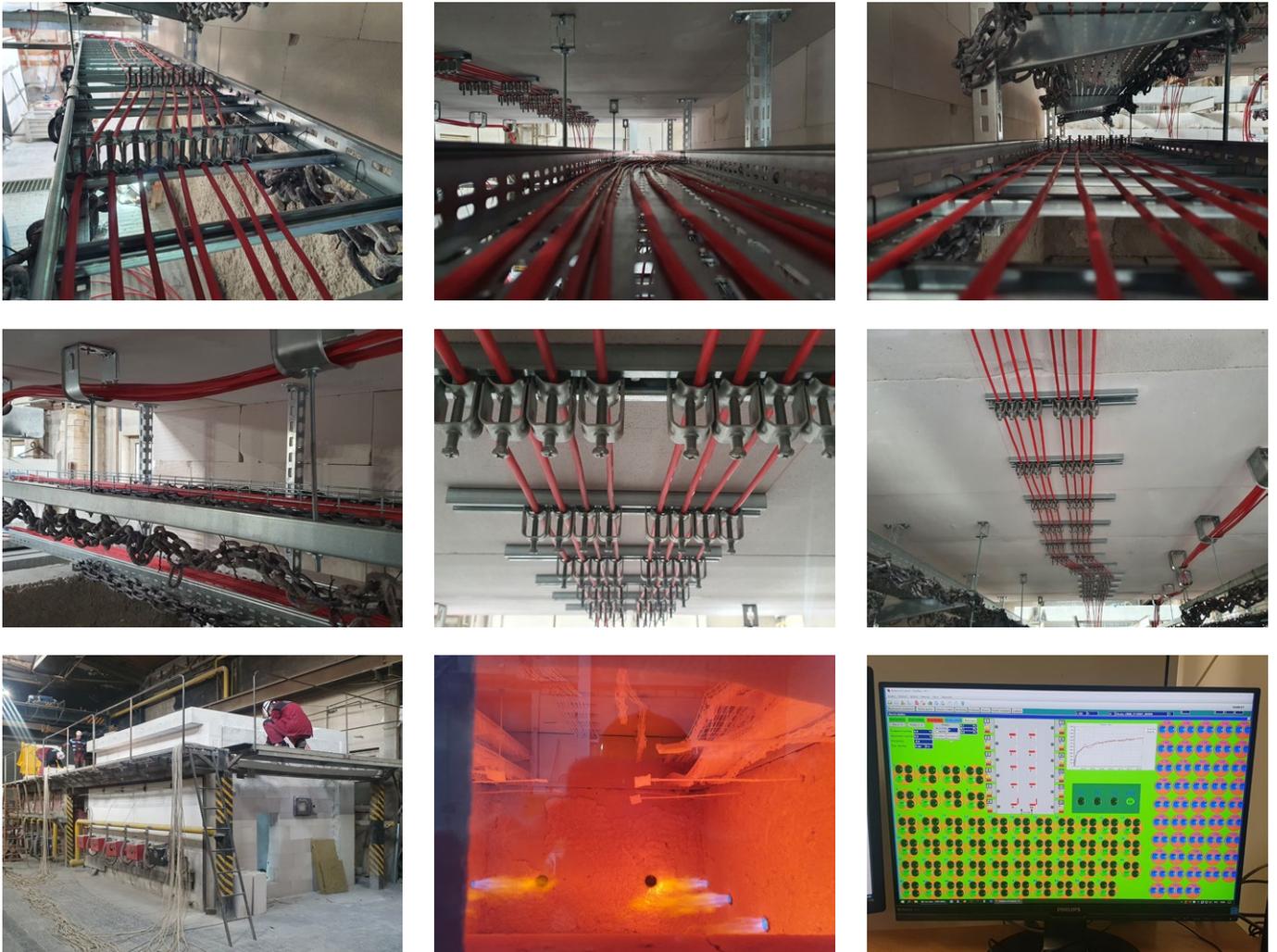
# Fire Resistance

FIRES - INDEPENDENT TEST LABORATORY

BS 4102-12

## Functional Resistance in Fire

In order to verify a complete electrical installation, the cables are installed inside a furnace of 3 m length mounted on cable ducts, cable ladder, and clips. Therefore, a real installation is simulated. The oven temperature goes up to over 1000 degrees according to a predetermined curve. The aim is to check the functioning of the cables after 30 60 or 90 minutes.





# Fire and flame propagation

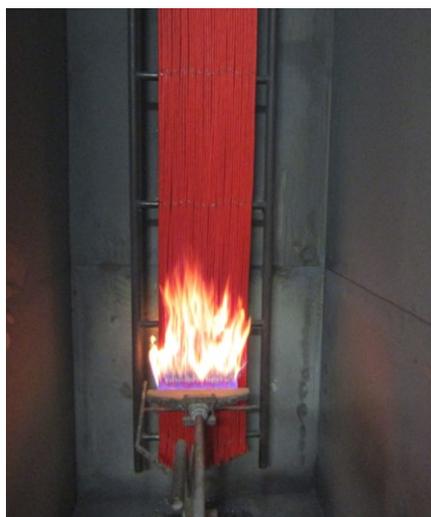
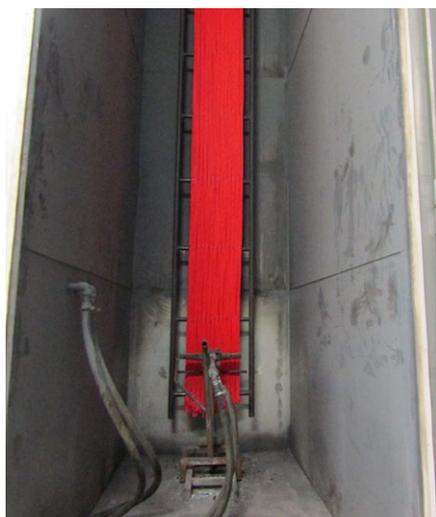
CAVICEL FIRE LABORATORY

**BS EN 60332-3** IEC 60332-3, CEI 20-22/3

## Fire propagation test on bunched cables



Samples of cables 3,5 m long in quantities required by standard are installed on a ladder inside a metallic cabinet. They are subjected to the action of a flame at 750°C for a specific time (20 or 40 minutes). Cables must not burn for more than 2,5 m.



**BS EN 60332-1** IEC 60332-1, CEI 20-35/1

**BS EN 60332-2** IEC 60332-2, CEI 20-35/2 for small diameter cables

## Flame Propagation Test on a Single Cable



A 60 cm long sample of cable is vertically fixed with two clamps inside a small cabin, open on the front. The cable is subjected to the action of a flame produced by a Bunsen burner. The application time of the flame is according to the cable diameter (60-480 seconds). At the end of the test the burnt portion of cable must not be 50 mm close to the higher clamp.



# Gas emission

CAVICEL FIRE LABORATORY

BS EN 60754-1 IEC 60754-1, CEI 20-37/2-1



## HCl Emission

Each non metallic material of the cable (~1.0 g) is burnt into a tube furnace up to 800 °C. A controlled air flow rate absorbs the generated gases in a appropriate solution. The titration of the solution allows to determine the developed hydrochloric acid (HCl) amount.



BS EN 60754-1 IEC 60754-1, CEI 20-37/2-1

## Gas Corrosivity



Each non metallic material of the cable (~1.0 g) is burnt into a tube furnace up to 800 °C. A controlled air flow rate absorbs the generated gases in a appropriate solution. The titration of the solution allows to determine the developed hydrochloric acid (HCl) amount.

This test allows estimation of corrosiveness against metals of gases released when cables burn. Materials composing the cable are burnt into a tubular oven with temperature higher than 935 °C. A controlled air flow rate absorbs the generated gases in a specific distilled water solution. pH and conductivity are finally measured.



STANDARD	REQUIRED VALUES
BS EN 50267-2-2, IEC 60754-2, CEI 20-37/2-2	pH ≥ 4,3 Conductivity ≤ 100 µS.cm-1

# Smoke density

CAVICEL FIRE LABORATORY

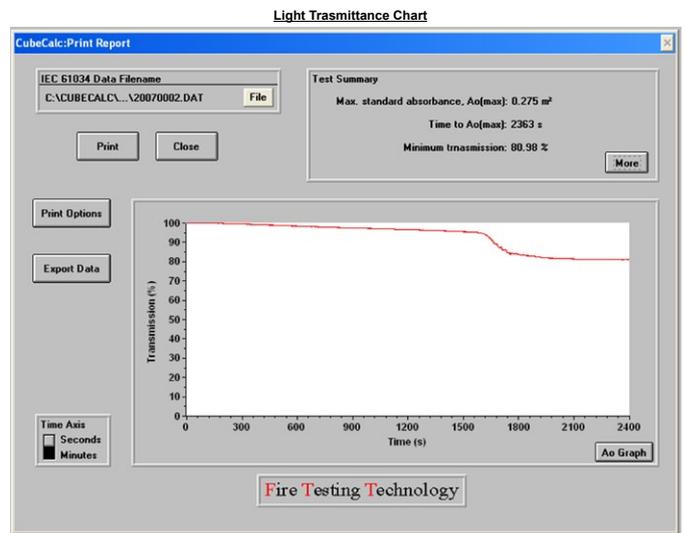
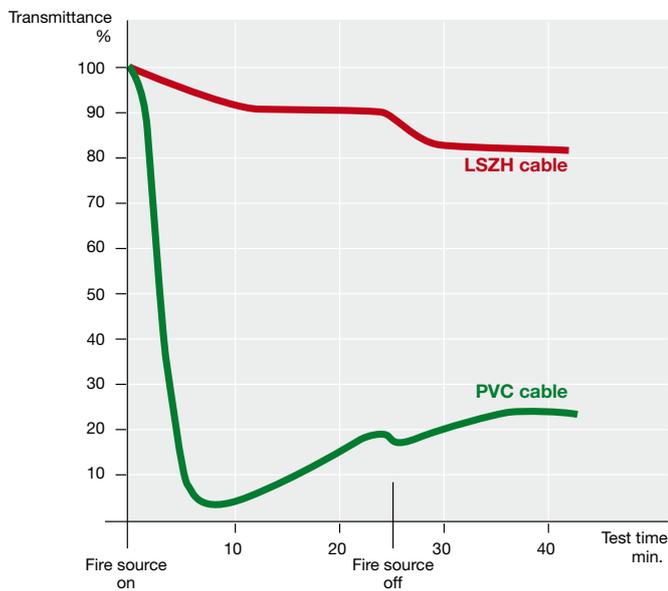
BS EN 61034-2 IEC 61034-2, CEI 20-37/3

## Smoke Density



In a 3 m cube metal cabinet, samples of cables are burned by 100 cm<sup>3</sup> of alcohol contained in a metal tray. A photometric system is based on a light source and a photocell placed horizontally in the mid vertical plane of the cube, at height of 2.15 m. Absorbance or light transmission are measured.

STANDARD	REQUIRED VALUES
BS EN 61034-2, IEC 61034-2, CEI 20-37/3 (Transmittance - LT)	≥ 60% or 80%v



# Construction and General Information

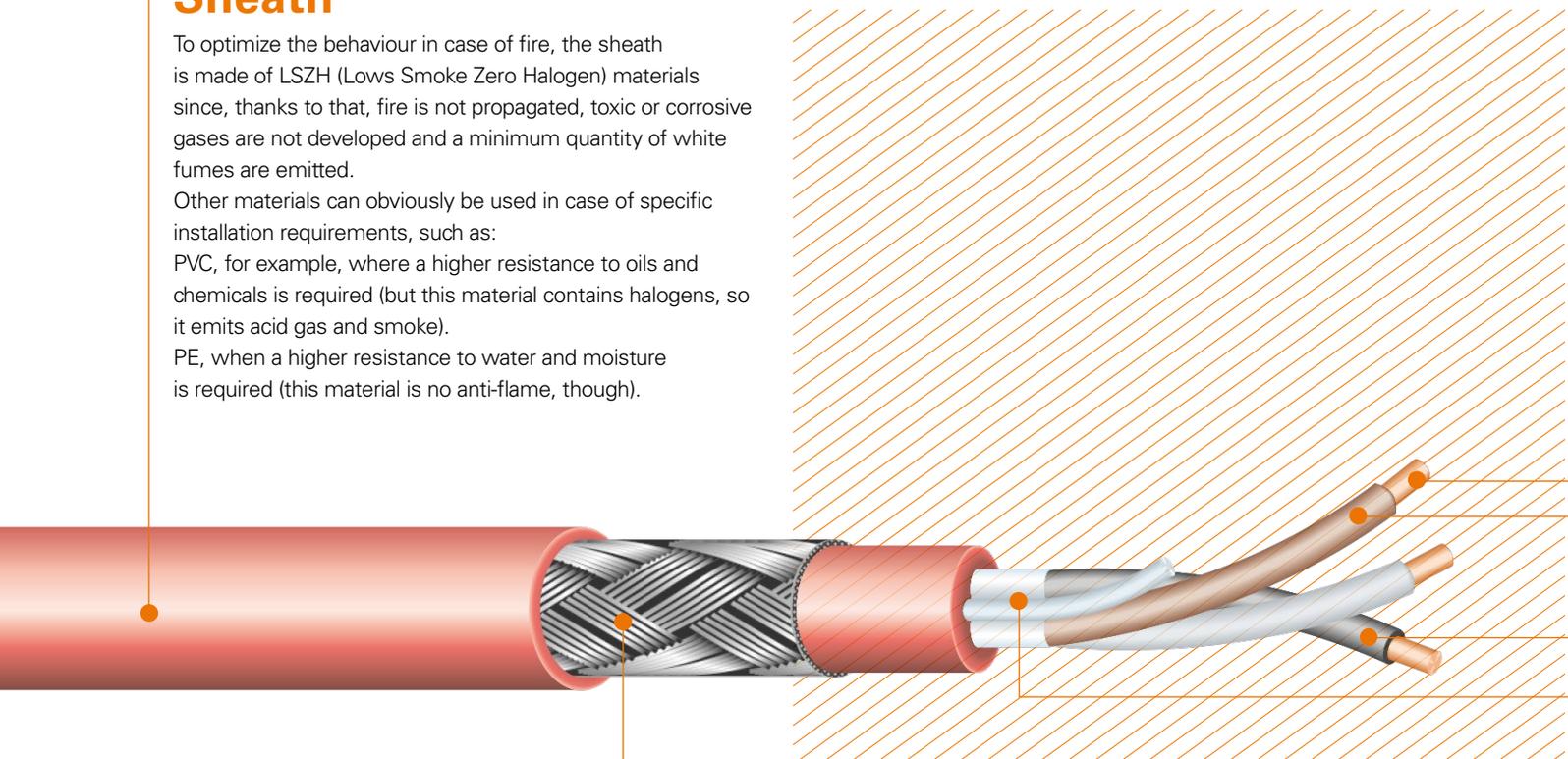
## Sheath

To optimize the behaviour in case of fire, the sheath is made of LSZH (Lows Smoke Zero Halogen) materials since, thanks to that, fire is not propagated, toxic or corrosive gases are not developed and a minimum quantity of white fumes are emitted.

Other materials can obviously be used in case of specific installation requirements, such as:

PVC, for example, where a higher resistance to oils and chemicals is required (but this material contains halogens, so it emits acid gas and smoke).

PE, when a higher resistance to water and moisture is required (this material is no anti-flame, though).

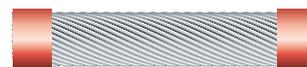


## Armouring

Metallic armour are used when cables have to be installed by direct buried, or if mechanical protection is required. Following points must be considered:

- Required tensile load
- Expected pressure on cable during service
- Protection against rodent
- Protection against accidental damage
- Minimum required bending radius.

**SWA:** single layer of galvanized steel wires, with diameters according to relevant standards, coverage min. 90%. This armour assures a very good mechanical protection and tensile strength. An additional counterspiral tape increases solidity, if required.



**GSWB:** galvanized steel wire braid, diameter of wire: 0.20 - 0.25 - 0.30 - 0.40 mm, with coverage of >80%. It assures a good mechanical resistance, allowing a lower bending radius compared to other armour. It is preferable when there is movement or vibration.



For special application it is possible to use stainless steel, tinned copper or special alloy wires.

## Conductors

Conductors can generally be according to EN 60228:



Type of conductors are chosen according to electrical characteristics, required flexibility, type of connection systems or specific installation conditions, for example:

- in presence of vibration or movement or reduced bending radius it is preferable class 5 flexible conductor,
- class 1 solid conductor is preferable for permanent installation, crimping termination,
- in presence of corrosive atmosphere, high temperature or to facilitate the soldering it is preferable tinned conductor.

## Insulation

The most widespread technologies to guarantee the electric cables connection integrity during a fire is currently the following:

- ceramified silicone-rubber
- mica-glass tape and cross-linked polyolefine

The taping with mica tape is the most typical solution; it allows the use of several insulation materials since the fire resistance is guaranteed by the tape.

The silicone rubber is currently the most frequently used solution because it simplifies and speeds up the installation, thanks to the easy peeling and to the lack of tape.

MICA-GLASS TAPE

SILICONE RUBBER



## Screening

Screens are often used in instrumentation cables to prevent or reduce possible interference in cables that can be caused by the following reasons:

- Cross-talk between adjacent pairs or triples;
- Interference induced by an external source such as electrical equipments, machinery, power line.

The most popular screen is:

**ALUMINIUM/POLYESTER TAPE**  
with a tinned copper drain wire  
or earth conductor



Following screens can also be used, when required:

**COPPER/POLYESTER TAPE**  
with a tinned copper drain wire,  
for a better screen effect



**BARE COPPER BRAID**  
for electromagnetic interference  
or when the cable is subject  
to movements



## Cabling

Fire resistant cables generally can be laid-up in concentric construction and in pairs.

Twisting is important to reduce noise in circuits and also the lay of twist in some constructions must be carefully considered.

# Firecel SR 114H

**SILICONE INSULATION / OVERALL SCREEN  
SOLID & STRANDED CONDUCTOR**



## STANDARD CABLE 300/500 V

**BS 5839-1:2017** Clause 26.2d  
**BS EN 50200:2015 (PH 30 - PH 60 - PH 120)** 830°C  
 fire and mechanical shocks  
**BS EN 50200:2015 + Annex E** 830°C - 30 min.  
 (15 min. fire and mechanical shocks + 15 min. fire mechanical  
 shocks and water spray)  
**BS 6387:2013**  
**Cat. C** fire @ 950°C - 180 min  
**Cat. W** fire 15 min. + fire and water spray 15 min.  
**Cat. Z** fire and mechanical shocks  
 @ 950°C - 15 min.fire



LPCB ref. 217f  
 (cables up to 4 cores)  
 For the scope of the LPCB  
 Approval see  
[www.redbooklive.com](http://www.redbooklive.com)



For the scope  
 of the BASEC Approval  
 see [www.basec.org.uk](http://www.basec.org.uk)

### Applications

**FIRECEL SR 114H** are primarily intended  
 for general application.  
 Typical applications are:  
**BS 5839-1** for **standard** fire resistant  
 cables in fire detection and fire alarm  
 systems for building  
**BS 5839-8** for voice alarm systems  
**BS 5839-9** for emergency voice  
 communication systems.

**BS 5266-1** for emergency lighting of  
 premises (PH60)  
**BS 8519** for fire-resistant control cable  
 systems for life safety and fire-fighting  
 application - Category 1

### Operating temperature

-40°C to +90°C

### Minimum bending radius

6 times the outer diameter.

### Cable construction

#### Conductors

Plain annealed copper wire, solid class  
 1 or stranded class 2 according to EN  
 60228.

#### Insulation

High performance fire resistant silicone  
 rubber type EI2 to BS EN 50363-1.

#### Cabling

Insulated cores are cabled together.

#### Overall screen

Aluminium/polyester tape.

#### Circuit protective conductor or drain wire

Uninsulated tinned copper conductor  
 of the same section and class as the  
 insulated conductors in the 2-, 3- and  
 4-core cables. Drain wire of 0.5 mm<sup>2</sup>  
 tinned copper conductor is provided in  
 cables with more than 4 conductors.

#### Outer sheath

LSZH thermoplastic material type LTS3 to  
 BS 7655-6.1.

Colour red or white (other colours on  
 request).

### Colour code up to 4 cores to HD 308

- 2 cores: ● ●
- 3 cores: ● ● ●
- 4 cores: ● ● ● ●
- 7 cores: centre ●  
 1st layer ● ● ● - 4 cores ○
- 12 cores: centre ● ● ● ● ● ● ● ●  
 1st layer ● ● ● ● ● ● ● - 7 cores ○
- 19 cores: centre ●  
 1st layer ● ● ● ● - 4 cores ○  
 2nd layer ● ● ● ● ● ● ● ● - 10 cores ○

*(on request the cores can be one colour only,  
 identified by printed numbers)*

### Applicable Standards

#### Basic design

BS 7629-1

#### Fire resistant

BS 6387 (cat. C-W-Z)  
 BS EN 50200 (PH30 - PH60 - PH120)  
 BS EN 50200 annex E (fire, mechanical  
 shock and water spray)  
 IEC 60331

#### Flame retardant

BS EN 60332-1-2

#### Fire retardant

BS EN 60332-3-24 (cat. C)

#### Acid gas emission

BS EN 60754-1

#### Smoke density

BS EN 61034-2

N° of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>1 mm<sup>2</sup> solid</b>		
2x1.0	7.1	70
3x1.0*	7.6	85
4x1.0*	8.3	110
7x1.0	10.0	165
12x1.0	12.5	255
19x1.0	15.0	380
<b>1.5 mm<sup>2</sup> solid</b>		
2x1.5	8.0	95
3x1.5	8.5	115
4x1.5	9.4	140
7x1.5	11.3	225
12x1.5	14.5	340
19x1.5	17.0	520
<b>1.5 mm<sup>2</sup> stranded</b>		
2x1.5	8.4	100
3x1.5	8.9	125
4x1.5	9.8	155
<b>2.5 mm<sup>2</sup> solid</b>		
2x2.5	9.4	130
3x2.5	10.0	170
4x2.5	11.0	210
<b>2.5 mm<sup>2</sup> stranded</b>		
2x2.5	9.9	145
3x2.5	10.3	180
4x2.5	11.7	230
<b>4 mm<sup>2</sup> stranded</b>		
2x4	11.5	200
3x4	12.2	260
4x4	13.5	330

Approximate values

\* not included in BS 7629-1:2015 and in LPCB/BASEC  
 approval.

# Firecel SR 114E

**MICA/SILICONE INSULATION / OVERALL SCREEN  
SOLID & STRANDED CONDUCTOR**



## ENHANCED CABLE 300/500 V

**BS 5839-1:2017** Clause 26.2e  
**BS EN 50200:2015 (PH 120)**  
 830°C fire and mechanical shocks  
**BS 8434-2:2003 +A2:2009** 930°C - 120 min. (60 min. fire and mechanical shocks + 60 min. fire mechanical shocks and water spray)  
**BS 6387:2013**  
**Cat. C** fire @ 950°C - 180 min  
**Cat. W** fire 15 min. + fire and water spray 15 min.  
**Cat. Z** fire and mechanical shocks @ 950°C - 15 min.fire



LPCB ref. 217f  
 (cables up to 4 cores)  
 For the scope of the LPCB Approval see [www.redbooklive.com](http://www.redbooklive.com)



For the scope of the BASEC Approval see [www.basec.org.uk](http://www.basec.org.uk)

PRODUCT MARKING LICENCE N°: 211/001

### Applications

**FIRECEL SR 114E** are primarily intended for use in fire detection and fire alarm systems, emergency lighting circuits or if cables need to properly operate when **fire resistance improvement is required**. Typical applications are:  
**BS 5839-1** for **enhanced** fire resistant cables in fire detection and fire alarm systems for building

**BS 5839-8** for voice alarm systems  
**BS 5839-9** for emergency voice communication systems.  
**BS 5266-1** for emergency lighting of premises  
**BS 8519** for fire-resistant control cable systems for life safety and fire-fighting application - Category 2 and 3

### Operating temperature

-40°C to +90°C

### Minimum bending radius

6 times the outer diameter.

### Cable construction

#### Conductors

Plain annealed copper wire, solid class 1 or stranded class 2 according to EN 60228.

#### Insulation

Mica/Glass fire resistant tape covered by high performance fire resistant silicone rubber type EI2 to BS EN 50363-1.

#### Cabling

Insulated cores are cabled together.

#### Overall screen

Aluminium/polyester tape.

#### Circuit protective conductor or drain wire

Uninsulated tinned copper conductor of the same section and class as the insulated conductors in the 2-, 3- and 4-core cables. Drain wire of 0.5 mm<sup>2</sup> tinned copper conductor is provided in cables with more than 4 conductors.

#### Outer sheath

LSZH thermoplastic material type LTS3 to BS 7655-6.1.

Colour red or white (other colours on request).

### Colour code up to 4 cores to HD 308

- 2 cores: ● ●
- 3 cores: ● ● ●
- 4 cores: ● ● ● ●
- 7 cores: centre ●  
1st layer ● ● - 4 cores ○
- 12 cores: centre ● ● ● ●  
1st layer ● ● ● ● - 7 cores ○
- 19 cores: centre ●  
1st layer ● ● ● ● - 4 cores ○  
2nd layer ● ● ● ● - 10 cores ○

(on request the cores can be one colour only, identified by printed numbers)

### Applicable Standards

#### Basic design

BS 7629-1

#### Fire resistant

BS 6387 (cat. C-W-Z)  
 BS EN 50200 (PH120)  
 BS EN 50200 annex E (fire, mechanical shock and water spray)  
 BS 8434-2 (120 min)  
 IEC 60331  
 BS 8519 clause 11 cat.3

#### Flame retardant

BS EN 60332-1-2

#### Fire retardant

BS EN 60332-3-24 (cat. C)

#### Acid gas emission

BS EN 60754-1

#### Smoke density

BS EN 61034-2

N° of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>1 mm<sup>2</sup> solid</b>		
2x1.0	7.9	85
3x1.0*	8.4	105
4x1.0*	9.3	125
7x1.0	10.9	175
12x1.0	14.5	300
19x1.0	17.0	470
<b>1.5 mm<sup>2</sup> solid</b>		
2x1.5	8.8	105
3x1.5	9.3	130
4x1.5	10.3	165
7x1.5	12.1	230
12x1.5	16.0	380
19x1.5	19.0	590
<b>1.5 mm<sup>2</sup> stranded</b>		
2x1.5	9.2	110
3x1.5	9.7	135
4x1.5	10.5	170
<b>2.5 mm<sup>2</sup> solid</b>		
2x2.5	10.2	150
3x2.5	10.8	190
4x2.5	12.0	240
<b>2.5 mm<sup>2</sup> stranded</b>		
2x2.5	10.6	155
3x2.5	11.3	190
4x2.5	12.5	250
<b>4 mm<sup>2</sup> stranded</b>		
2x4	12.2	220
3x4	13.0	280
4x4	14.4	350

Approximate values

\* not included in BS 7629-1:2015 and in LPCB/BASEC approval.

# Firecel SR 104

**SILICONE INSULATION / OVERALL SCREEN  
SOLID & STRANDED CONDUCTOR**



## SR/OS/LSZH 300/500 V



LPCB ref. 217n (cables up to 4 cores)  
For the scope of the LPCB Approval  
see [www.redbooklive.com](http://www.redbooklive.com)

### Applications

**FIRECEL SR 104** are primarily intended for general application.  
Typical applications are:  
Fire detection and fire alarm systems for building, voice alarm, emergency voice communication, emergency lighting and central battery systems.

### Operating temperature

-40°C to +90°C

### Minimum Bending radius

6 times the outer diameter

### Cable construction

#### Conductors

Plain copper conductor according to EN 60228 class 1 solid or class 2 stranded.

#### Insulation

High performance fire resistant silicone rubber.

#### Cabling

Insulated cores are cabled together.

#### Overall screen

Aluminium/polyester tape with tinned copper drain wire 0,5 mm<sup>2</sup>.

#### Outer sheath

LSZH thermoplastic compound type LTS3 according BS 7655.  
Colour red or white (other colours on request).

### Colour code up to 4 cores to HD 308

- 2 cores: ● ●
- 3 cores: ● ● ●
- 4 cores: ● ● ● ●

### Applicable Standards

#### Basic design

EN 50288-7

#### Fire resistant

BS 6387 (cat. C-W-Z)  
BS EN 50200 - BS EN 50200 PH120  
BS EN 50200 Annex E

#### Flame retardant

BS EN 60332-1-2  
IEC 60332-3-22 cat. A

#### Acid gas emission

BS EN 60754-1  
BS EN 60754-2

#### Smoke density

BS EN 61034-2

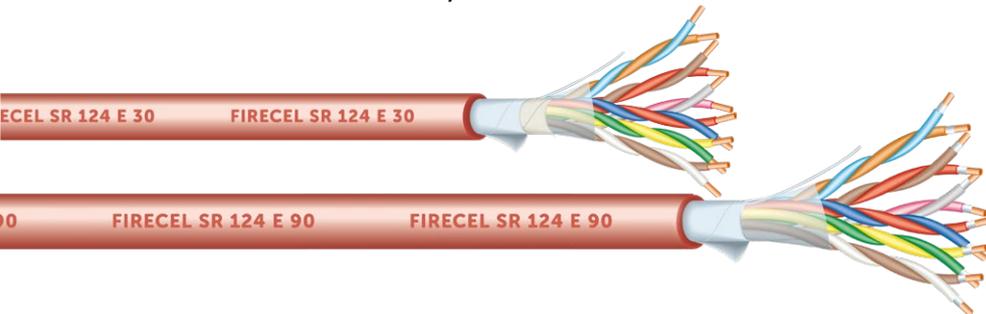
N° of cores x size (mm <sup>2</sup> )	Size of conductors (n°/mm)	Outer diameter (mm)	Weight (kg/km)
<b>1,5 mm<sup>2</sup> solid</b>			
2x1.5	1/1.38	7.8	90
3x1.5	1/1.38	8.4	110
4x1.5	1/1.38	9.3	140
<b>2.5 mm<sup>2</sup> solid</b>			
2x2.5	1/1.75	9.0	120
3x2.5	1/1.75	9.5	150
4x2.5	1/1.75	10.6	190
<b>1.5 mm<sup>2</sup> stranded</b>			
2x1.5	7/0.53	8.5	100
3x1.5	7/0.53	8.8	120
4x1.5	7/0.53	9.8	150
<b>2.5 mm<sup>2</sup> stranded</b>			
2x2.5	7/0.67	9.6	140
3x2.5	7/0.67	10.3	170
4x2.5	7/0.67	11.2	210
<b>4.0 mm<sup>2</sup> stranded</b>			
2x4	7/0.85	11.2	190
3x4	7/0.85	11.9	240
4x4	7/0.85	12.8	290

Approximate values

Cables with cross section 0.5, 0.75, 1.0 sqmm can be supplied on request. Please contact our Technical Dpt. for further information on characteristics.

# Firecel SR 124 E 30 / E 90

**MULTIPAIR OVERALL SCREEN / SILICONE INSULATION**



**JE-H(ST)H...BD - FE180/E30**  
**JE-H(ST)H...BD - FE180/E90**



### Applications

Fire resistant communication cables suitable for indoor and outdoor installation, in dry and humid areas. These cables assure circuit integrity E30-E90 according to DIN 4102-12. Operating voltage peak value: 225V.

### Operating temperature

Operating: -30/+70 °C  
 Installation: -5/+50 °C

### Minimum bending radius

7,5 times the outer diameter.

### Cable construction

#### Conductors

Solid plain annealed copper. 0.8 mm

#### Insulation

Silicone rubber (E30 cables)

Silicone rubber + Mica tape (E90 cables)

#### Overall screen

Aluminium/polyester tape with solid tinned copper drain wire 0,8 mm + glass tape (E30)

Aluminium/polyester tape with solid tinned copper drain wire 0,8 mm (E90)

#### Outer sheath

LSZH thermoplastic compound

### Applicable Standards

#### Functional resistance in fire

DIN 4102-12

STN 92 0205

CSN 73 0895

#### Fire resistance

IEC 60331-23

#### Flame retardant

EN 60332-1-2 / IEC 60332-1-2

#### Fire retardant

DIN EN IEC 60332-3-24

VDE 0482-332-3-24

#### Halogen free properties

DIN EN 60754-2

VDE 0482-754-2

#### Low smoke emission

DIN EN 61034-2

VDE 0482-1034-2

#### Design

DIN VDE 0815

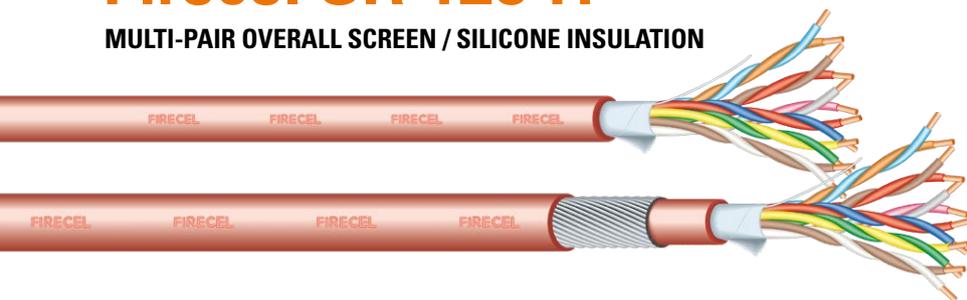
FE180 / E 30		
N° of pairs x size (mm <sup>2</sup> )	Outer diameter mm	Weight kg/km
1 x 2 x 0.8	6.2	50
2 x 2 x 0.8	9.9	70
4 x 2 x 0.8	10.9	130
8 x 2 x 0.8	16.2	330
12 x 2 x 0.8	17.2	340

FE180 / E 90		
N° of pairs x size (mm <sup>2</sup> )	Outer diameter mm	Weight kg/km
1 x 2 x 0.8	7.1	60
2 x 2 x 0.8	8.1	90
4 x 2 x 0.8	14.1	190
8 x 2 x 0.8	17.0	510
12 x 2 x 0.8	21.9	470

Approximate values

# Firecel SR 125 H

**MULTI-PAIR OVERALL SCREEN / SILICONE INSULATION**



**SR/OS/LSZH 300/500 V**  
Not Armoured

**SR/OS/LSZH/SWA/LSZH 300/500 V**  
Armoured

## Applications

Firecel SR 125H are designed, manufactured and tested as data transmission cables for emergency services. These are used for data and voice transmission when high frequency signal has to be assured also in the event of a fire.

## Operating temperature

-40°C to +90°C

## Minimum bending radius

**Not armoured type**  
12 times the outer diameter.

**Armoured type**  
15 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor according to EN 60228 class 1 solid or class 2 stranded.

### Insulation

High performance fire resistant silicone rubber.

### Twisting

The insulated cores shall be twisted in pairs for a good reduction of the electromagnetic noise.

### Cabling

The pairs are cabled with suitable non hygroscopic fillers (when necessary) and wrapped with polyester tape if required.

### Overall screen

Aluminium/polyester tape with tinned copper drain wire 0,5 mm<sup>2</sup>.

### Armoured design

*Inner sheath:* LSZH thermoplastic compound.

*Armour:* Single layer of galvanized steel wires (SWA).

### Outer sheath

LSZH thermoplastic compound.

## Applicable Standards

**Basic design** BS 7629

**Fire resistant** IEC 60331-23

**Flame retardant** IEC 60332-1-2

**Fire retardant** IEC 60332-3-24 (cat. C)

**Halogen free properties** IEC 60754-1

**Low smoke emission** IEC 61034-2

UNARMoured			ARMoured		
N° of pairs x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)	Diameter under armour (mm)	Outer diameter (mm)	Weight (kg/km)
<b>0,5 mm<sup>2</sup> solid</b>			<b>U-SR/OS/LSZH/SWA/LSZH</b>		
1x2x0,5	6,5	56	6,5	10,7	235
2x2x0,5	9,5	94	9,5	14,5	381
3x2x0,5	10,5	118	10,5	15,2	472
5x2x0,5	12,0	167	12,0	18,4	550
6x2x0,5	13,0	197	13,0	18,5	574
10x2x0,5	16,5	273	16,5	22,3	760
15x2x0,5	20,5	410	20,5	24,2	941
20x2x0,5	22,6	520	22,6	27,1	1146
<b>1 mm<sup>2</sup> stranded</b>			<b>R-SR/OS/LSZH/SWA/LSZH</b>		
1x2x1	7,4	77	7,4	11,3	265
2x2x1	10,6	130	10,6	15,9	452
3x2x1	11,2	196	11,2	16,2	528
5x2x1	13,7	245	13,7	20,1	665
6x2x1	14,8	300	14,8	20,3	695
10x2x1	18,9	378	18,9	23,8	937
15x2x1	23,2	567	23,2	27,8	1368
20x2x1	26,2	831	26,2	30,9	1650
<b>1,5 mm<sup>2</sup> stranded</b>			<b>R-SR/OS/LSZH/SWA/LSZH</b>		
1x2x1,5	8,7	100	8,7	12,1	305
2x2x1,5	10,2	188	10,2	17,2	525
3x2x1,5	12,9	223	12,9	16,2	614
5x2x1,5	16,7	346	16,7	22,1	794
6x2x1,5	17,5	426	17,5	22,3	845
10x2x1,5	23,4	541	23,4	27,0	1315
15x2x1,5	28,9	892	28,9	30,7	1691
20x2x1,5	32,5	1182	32,5	34,4	2075

## ELECTRICAL CHARACTERISTICS

Cross section (mm <sup>2</sup> )	0,5	1,0	1,5
Capacitance (pF/m)	90	100	110
L/R (µH/Ohm)	25	25	40

Approximate values

# Firecel SR 225 H

**MULTI-PAIR OVERALL SCREEN / MICA+XLPE INSULATION**



**R-MXLPE/OS/LSZH  
300/500 V**

Not Armoured

**R-MXLPE/OS/LSZH/  
SWA/LSZH 300/500 V**

Armoured

## Applications

Firecel SR 225H are designed, manufactured and tested as data transmission cables for emergency services. These are used for data, voice and signal transmission when high frequency signal has to be assured also in the event of a fire.

## Operating temperature

-40°C to +90°C.

## Minimum bending radius

### Not armoured type

12 times the outer diameter.

### Armoured type

15 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor according to EN 60228 class 1 solid or class 2 stranded.

### Insulation

Mica/Glass tape plus X-LSZH compound.

### Twisting

The insulated cores shall be twisted in pairs for a good reduction of the electromagnetic noise.

### Cabling

The pairs are cabled with suitable non hygroscopic fillers (when necessary) and wrapped with polyester tape if required.

### Overall screen

Aluminium/polyester tape with tinned copper drain wire 0,5 mm<sup>2</sup>.

### Armoured design

*Inner sheath:* LSZH thermoplastic compound.

*Armour:* Single layer of galvanized steel wires (SWA).

### Outer sheath

LSZH thermoplastic compound.

## Applicable Standards

**Basic design** EN 50288-7

**Fire resistant** IEC 60331-23

**Flame retardant** IEC 60332-1-2

**Fire retardant** IEC 60332-3-24 (cat. C)

**Halogen free properties** IEC 60754-1

**Low smoke emission** IEC 61034-2

UNARMOURED			ARMOURED		
N° of pairs x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)	Diameter under armour (mm)	Outer diameter (mm)	Weight (kg/km)
<b>0,75 mm<sup>2</sup> stranded</b>	<b>R-mXLPE/OS/LSZH</b>		<b>R-mXLPE/OS/LSZH/SWA/LSZH</b>		
1x2x0,75	7,8	64	7,8	12,3	292
2x2x0,75	10,7	118	10,7	15,5	504
5x2x0,75	14,8	218	14,8	22,2	703
10x2x0,75	20,1	380	20,1	25,8	1005
15x2x0,75	24,9	535	24,9	31,0	1434
20x2x0,75	28,2	680	28,2	34,6	1715
<b>1 mm<sup>2</sup> stranded</b>	<b>R-mXLPE/OS/LSZH</b>		<b>R-mXLPE/OS/LSZH/SWA/LSZH</b>		
1x2x1	8,4	73	8,4	12,7	316
2x2x1	11,5	136	11,5	18,3	549
5x2x1	15,7	266	15,7	23,7	798
10x2x1	21,3	455	21,3	28,8	1279
15x2x1	26,5	646	26,5	32,9	1622
20x2x1	30,2	839	30,2	36,9	1971
<b>1,5 mm<sup>2</sup> stranded</b>	<b>R-mXLPE/OS/LSZH</b>		<b>R-mXLPE/OS/LSZH/SWA/LSZH</b>		
1x2x1,5	9,3	87	9,3	13,7	346
2x2x1,5	13,0	165	13,0	19,6	622
5x2x1,5	18,1	342	18,1	25,5	927
10x2x1,5	24,8	606	24,8	31,3	1535
15x2x1,5	30,8	862	30,8	35,8	1954
20x2x1,5	34,9	1121	34,9	40,8	2631

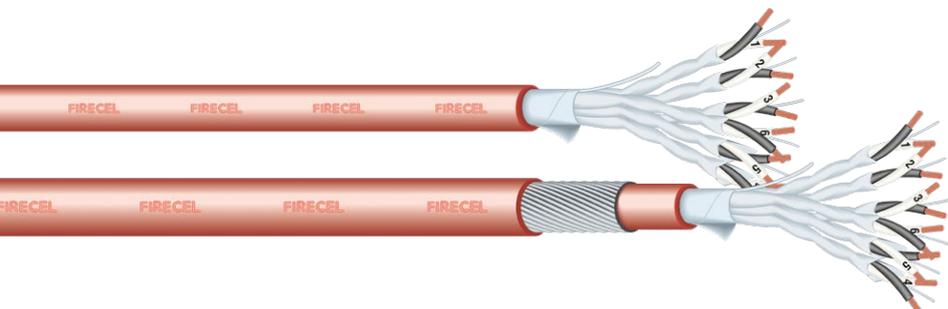
## ELECTRICAL CHARACTERISTICS

	0,75	1	1,5
Cross section (mm <sup>2</sup> )	0,75	1	1,5
Capacitance (pF/m)	150	150	150
L/R (µH/Ohm)	25	25	40

Approximate values

# Firecel SR 228 – PA/GA

**MULTI-PAIR INDIVIDUAL AND OVERALL SCREEN/MICA+XLPE INSULATION**



**F-MXLPE/IS/OS/LSZH  
300/500 V**

Not Armoured

**F-MXLPE/IS/OS/LSZH/  
SWA/LSZH 300/500 V**

Armoured

## Applications

Firecel SR 228 are designed, manufactured and tested for Public Address/General Alarm (PA/GA) system to significantly improve system integrity and functionality

## Operating temperature

-40°C to +90°C.

## Minimum bending radius

### Not armoured type

12 times the outer diameter.

### Armoured type

15 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor according to EN 60228 class 1 solid or class 2 stranded.

### Insulation

Mica/Glass tape plus X-LSZH compound.

### Twisting

The insulated cores shall be twisted in pairs for a good reduction of the electromagnetic noise.

### Individual screen

Aluminium/polyester tape, coverage >100%, aluminium in contact with tinned copper drain wire 0,5 mm<sup>2</sup>.

### Cabling

The screened pairs are cabled with suitable non hygroscopic fillers (when necessary) and wrapped with polyester tape if required.

### Overall screen

Aluminium/polyester tape with tinned copper drain wire 0,5 mm<sup>2</sup>.

### Armoured design

*Inner sheath:* LSZH thermoplastic compound.

*Armour:* Single layer of galvanized steel wires (SWA).

### Outer sheath

LSZH thermoplastic compound.

## Applicable Standards

**Basic design** EN 50288-7

**Fire resistant** EN 50200 PH 120

**Flame retardant** IEC 60332-1-2

**Fire retardant** IEC 60332-3-24 (cat. C)

**Halogen free properties** IEC 60754-1

**Low smoke emission** IEC 61034-2

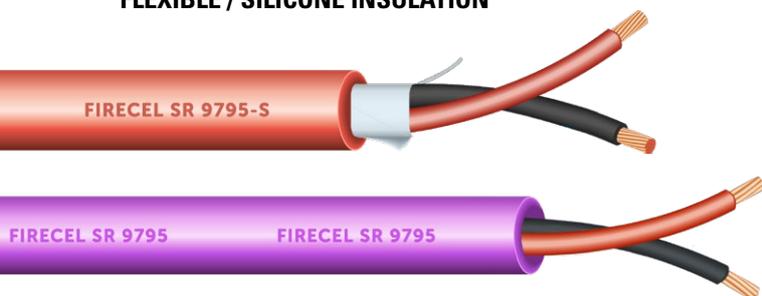
UNARMoured			ARMoured		
N° of pairs x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)	Diameter under armour(mm)	Outer diameter (mm)	Weight (kg/km)
<b>2.5 mm<sup>2</sup></b>	<b>F-mXLPE/IS/OS/LSZH</b>		<b>F-mXLPE/IS/OS/LSZH/SWA/LSZH</b>		
1x2x2,5	9,3	120	9,3	14,1	370
2x2x2,5	14,7	270	14,7	20,0	670
<b>4 mm<sup>2</sup></b>	<b>F-mXLPE/IS/OS/LSZH</b>		<b>F-mXLPE/IS/OS/LSZH/SWA/LSZH</b>		
2x2x4,0	16,7	370	16,7	22,0	820
4x2x4,0	19,8	600	19,8	25,2	1120
6x2x4,0	24,1	920	24,1	29,7	1570
<b>6 mm<sup>2</sup></b>	<b>F-mXLPE/IS/OS/LSZH</b>		<b>F-mXLPE/IS/OS/LSZH/SWA/LSZH</b>		
2x2x6,0	18,7	500	18,7	24,1	990

Approximate values

Others cross sections and formations are available on request

# Firecel SR 9795-S / 9795 - PH 30 / PH 120

**FLEXIBLE / SILICONE INSULATION**



**FG29OHM16 (Firefighting cable)**  
**FG29OM16 (EVAC cable)**



Cca-s1b,d1,a1

Version also available ULTRASAFE

B2ca-s1a,d0,a1

## Applications

### FIRECEL SR 9795-S / 9795

**Fire-fighting cables:** cables used for in safety systems installation, such as extinguishing and active/passive protection systems in public and private buildings, as per UNI 9795 and UNI 11224 standards. Used in fixed automatic systems and fire alarm detection/signaling.

**EVAC cables:** cables used for the construction of safety systems in public and private buildings, in voice alarm systems, as prescribed by UNI 9795 and by UNI 11224 standard.

## Operating temperature

-5°C / +65°C (installation)  
 -20°C / +90°C (operating)

## Minimum bending radius

6 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor flexible according to EN 60228 class 5.

### Insulation

High performance fire resistant silicone rubber, type G29.

### Cabling

Insulated cores are cabled together.

### Overall screen

#### (Only for FIRECEL SR 9795-S)

Aluminium/polyester tape with tinned copper drain wire 0,5 mm<sup>2</sup>.

### Outer sheath

LSZH thermoplastic compound, Type M16.

## Applicable Standards

### Fire resistant

EN 50200 (PH30 o PH120)  
 IEC 60331-21

### Flame retardant

EN 60332-1-2 / IEC 60332-1-2

### Fire retardant

EN 60332-3-25  
 IEC 60332-3-25

### Acid gas emission

EN 60754-1 / IEC 60754-1  
 EN 60754-2 / IEC 60754-2

### Smoke density

EN 61034-2 / IEC 61034-2

### Basic design

CEI 20-105

### CPR

Cca-s1b,d1,a1

Version also available ULTRASAFE

B2ca-s1a,d0,a1

N* of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>UNI 9795-S (Firefighting cable)</b>		
2x0.75	6.7	60
2x1.0	6.9	70
2x1.5	8.0	90
2x2.5	9.5	130
<b>UNI 9795 (EVAC cables)</b>		
2x0.75	6.4	50
2x1.0	6.6	60
2x1.5	7.7	80
2x2.5	9.2	120

Approximate values

# Firecel SR 118

SILICONE INSULATION

SR/LSZH 300/500 V



## Applications

**FIRECEL SR 118** are designed, manufactured and tested as control cable for emergency services and fire circuit control.

## Operating temperature

- 40 °C / +90 °C

## Cable construction

### Conductors

Plain copper conductor according to EN 60228 class 1 solid or class 2 stranded.

### Insulation

High performance fire resistant silicone rubber.

### Cabling

Insulated cores are cabled together.

### Outer sheath

LSZH thermoplastic compound.  
Colour red (other colours on request).

## Colour code up to 4 cores to HD 308

2 cores: ● ●

3 cores: ● ● ●

4 cores: ● ● ● ●

## Applicable Standards

### Basic design

EN 50288-7

### Fire resistant

BS 6387 (cat. C-W-Z)  
BS EN 50200 (class 50200 - PH 60)  
IEC 60331-21

### Flame retardant

BS EN 60332-1-2  
IEC 60332-3-22 cat. A

### Acid gas emission

BS EN 60754-1  
BS EN 60754-2

### Smoke density

BS EN 61034-2

N° of cores x size (mm <sup>2</sup> )	Size of conductors (n°/mm)	Outer diameter (mm)	Weight (kg/km)
<b>1.5 mm<sup>2</sup> solid</b>			
2x1.5	1/1.38	7.4	80
3x1.5	1/1.38	7.8	100
4x1.5	1/1.38	8.5	130
<b>1.5 mm<sup>2</sup> stranded</b>			
2x1.5	7/0.53	7.8	90
3x1.5	7/0.53	8.3	110
4x1.5	7/0.53	9.0	140
<b>2.5 mm<sup>2</sup> solid</b>			
2x2.5	1/1.75	8.7	110
3x2.5	1/1.75	9.2	150
4x2.5	1/1.75	10.1	190
<b>2.5 mm<sup>2</sup> stranded</b>			
2x2.5	7/0.67	9.2	120
3x2.5	7/0.67	9.8	160
4x2.5	7/0.67	10.7	200
<b>4.0 mm<sup>2</sup> stranded</b>			
2x4	7/0.85	10.3	160
3x4	7/0.85	11.0	220
4x4	7/0.85	12.0	280

Approximate values

Cables with cross section 0.5, 0.75, 1.0 sqmm can be supplied on request. Please contact our Technical Dpt. for further information on characteristics.

# Firecel SR 220

MICA+ XLPE INSULATION



**R-MXLPE/LSZH 300/500 V**

### Applications

**FIRECEL SR 220** are designed, manufactured and tested for general application.

### Operating temperature

-40°C to +90°C

### Minimum bending radius

10 times the outer diameter.

### Cable construction

#### Conductors

Plain copper conductor stranded according to EN 60228 class 2.

#### Insulation

Mica/Glass tape plus X-LSZH compound.

#### Cabling

Insulated cores are cabled together.

#### Outer sheath

LSZH thermoplastic compound.

Colour orange or white (other colours on request).

### Colour code to HD 308

*Without earth conductor*

2 cores: ● ●

3 cores: ● ● ●

4 cores: ● ● ● ●

5 cores: ● ● ● ● ●

Above 5 cores: ● numbered

*With earth conductor*

3 cores: ● ● ●

4 cores: ● ● ● ●

5 cores: ● ● ● ● ●

Above 5 cores: ● numbered ●/●

### Applicable Standards

#### Basic design

EN 50288-7

#### Fire resistant

IEC 60331-21

#### Flame retardant

EN 60332-1-2 / IEC 60332-1-2

#### Fire retardant

EN 60332-3-24 (cat. C)

IEC 60332-3-24 (cat. C)

#### Acid gas emission

EN 60754-1 / IEC 60754-1

EN 60754-2 / IEC 60754-2

#### Smoke density

EN 61034-2 / IEC 61034-2

N° of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>0.75 mm<sup>2</sup> stranded</b>		
R-mXLPE/LSZH		
2x0.75	7.3	68
3x0.75	8.0	83
4x0.75	8.7	100
<b>1 mm<sup>2</sup> stranded</b>		
R-mXLPE/LSZH		
2x1	7.9	82
3x1	8.4	96
4x1	9.4	121
7x1	11.3	174
12x1	15.1	282
19x1	18.0	424
<b>1.5 mm<sup>2</sup> stranded</b>		
R-mXLPE/LSZH		
2x1.5	8.5	100
3x1.5	9.3	126
4x1.5	10.1	150
7x1.5	12.2	220
12x1.5	16.5	365
19x1.5	19.5	544
<b>2.5 mm<sup>2</sup> stranded</b>		
R-mXLPE/LSZH		
2x2.5	9.7	139
3x2.5	10.4	168
4x2.5	11.5	206
7x2.5	14.0	310
12x2.5	18.8	514
19x2.5	22.4	782

Approximate values

# Firecel SR 109

**FLEXIBLE/SILICONE INSULATION  
OVERALL SCREEN**



**F-SR/OS/LSZH 450/750 V**

## Applications

**FIRECEL SR 109** are designed, manufactured and tested for general application in power and signal wiring, for emergency circuit and fire circuit control where high rejection of electrostatic noise is needed.

## Operating temperature

40°C to +90°C

## Minimum bending radius

8 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor flexible according to EN 60228 class 5.

### Insulation

High performance fire resistant silicone rubber.

### Cabling

Insulated cores are cabled together.

### Overall screen

Aluminium/polyester tape with tinned copper drain wire 0,5 mm<sup>2</sup>.

### Outer sheath

LSZH thermoplastic compound.  
Colour red (other colours on request).

## Colour code

*Without earth conductor*

**2** cores: ● ●

**3** cores: ● ● ●

**4** cores: ● ● ● ●

**7** cores and **above**: ● numbered

*With earth conductor*

**3** cores: ● ● ●/●

**4** cores: ● ● ● ●/●

**5** cores: ● ● ● ● ●/●

**7** cores and **above**: ● numbered ●/●

## Applicable Standards

### Fire resistant

CEI 20-36/2-1  
EN 50200 PH60  
IEC 60331-21

### Flame retardant

EN 60332-1-2 / IEC 60332-1-2

### Fire retardant

EN 60332-3-24 (cat.C)  
IEC 60332-3-24 (cat.C)

### Acid gas emission

EN 60754-1 / IEC 60754-1  
EN 60754-2 / IEC 60754-2

### Smoke density

EN 61034-2 / IEC 61034-2

N° of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>0.75 mm<sup>2</sup> flexible</b>		
<b>F-SR/OS/LSZH</b>		
2x0.75	7.6	69
3x0.75	8.0	84
4x0.75	8.7	103
<b>1 mm<sup>2</sup> flexible</b>		
<b>F-SR/OS/LSZH</b>		
2x1	8.0	78
3x1	8.2	86
4x1	8.9	110
7x1	10.8	176
12x1	13.9	275
19x1	16.4	408
<b>1,5 mm<sup>2</sup> flexible</b>		
<b>F-SR/OS/LSZH</b>		
2x1.5	8.3	88
3x1.5	8.8	112
4x1.5	9.8	141
7x1.5	11.7	W218
12x1.5	15.3	352
19x1.5	18.2	535
<b>2.5 mm<sup>2</sup> flexible</b>		
<b>F-SR/OS/LSZH</b>		
2x2.5	9.8	123
3x2.5	10.4	159
4x2.5	11.4	196
7x2.5	13.4	305
12x2.5	17.9	505
19x2.5	21.1	760

Approximate values

# Firecel SR 116H

SILICONE INSULATION



**R-SR/LSZH 450/750 V**

## Applications

**FIRECEL SR 116H** are designed, manufactured and tested for general application in power supply and signal wiring, for emergency circuit and fire circuit control.

## Operating temperature

-40°C to +90°C  
(for insulated conductors only: max 200°C).

## Minimum bending radius

10 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor stranded according to EN 60228 class 2.

### Insulation

High performance fire resistant silicone rubber.

### Cabling

Insulated cores are cabled together.

### Outer sheath

LSZH thermoplastic compound.  
Colour red (other colours on request).

## Colour code to HD 308

*Without earth conductor*

2 cores: ● ●

3 cores: ● ● ●

4 cores: ● ● ● ●

5 cores: ● ● ● ● ●

**Above 5** cores: ● numbered

*With earth conductor*

3 cores: ● ● ●/●

4 cores: ● ● ● ●/●

5 cores: ● ● ● ● ●/●

## Applicable Standards

### Fire resistant

CEI 20-36/2-1  
EN 50200 (PH90)  
IEC 60331-21

### Flame retardant

EN 60332-1-2 / IEC 60332-1-2

### Fire retardant

EN 60332-3-24 (cat. C)  
IEC 60332-3-24 (cat. C)

### Acid gas emission

EN 60754-1 / IEC 60754-1  
EN 60754-2 / IEC 60754-2

### Smoke density

EN 61034-2 / IEC 61034-2

N° of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>1.5 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x1.5	7.8	96
3x1.5	8.3	116
4x1.5	9.3	147
5x1.5	10.5	180
<b>2.5 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x2.5	9.2	138
3x2.5	9.8	169
4x2.5	11.3	222
5x2.5	12.3	259
<b>4 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x4	10.5	189
3x4	11.6	246
4x4	12.5	299
5x4	14.0	359

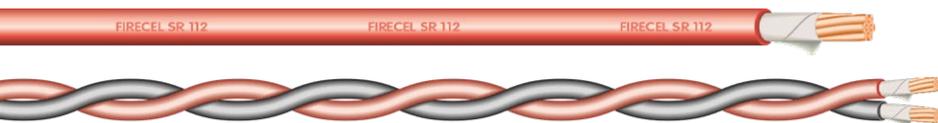
Approximate values

# Firecel SR 112

**SINGLE CORE  
MICA+XLSZH INSULATION**

# Firecel SR 112X

**TWIN CORE  
MICA+XLSZH INSULATION**



## R-MXLSZH - 450/750V



LPCB ref. 217d (only SR 112)  
For the scope of the LPCB Approval  
see [www.redbooklive.com](http://www.redbooklive.com)

### Applications

**FIRECEL SR 112** are designed, manufactured and tested as cable fixed or protected installation for emergency power supply, lighting and control gear.

### Operating temperature

-20°C to +90°C

### Minimum bending radius

8 times the outer diameter.

### Cable construction

#### Conductors

Plain copper conductor stranded according to EN 60228 class 2.

#### Insulation

Mica/Glass tape plus X-LSZH.

#### Twisting

Only for FIRECEL SR 112X two conductors are twisted.

### Colour code

**Single core:** ● ● ● ● (other colours on request)

**Twin core:** ● ● (other colours on request)

### Applicable Standards

#### Basic design

BS 8592

#### Fire resistant

IEC 60331-21

BS EN 50200 PH 120

BS EN 50200 + Annex E

BS 6387 Cat. C-W-Z

BS 8434-2 (tested in steel conduit)

#### Acid gas emission

EN 60754-1 / IEC 60754-1

EN 60754-2 / IEC 60754-2

#### Smoke density

EN 61034-2 / IEC 61034-2

Size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>SR 112</b>		
<b>single core</b>		
<b>R-mXLSZH</b>		
1.5	4.1	30
2.5	4.7	45
4	5.2	60
6	5.8	90
10	7.1	140
16	7.7	200
25	9.4	300

<b>SR 112X</b>		
<b>twin core</b>		
<b>R-mXLSZH</b>		
2x1.5	8.2	60
2x2.5	9.4	90
2x4	10.4	120
2x6	11.6	180
2x10	14.2	280
2x16	15.4	400
2x25	18.8	600

Approximate values

# Firecel SR 206

MICA+XLPE INSULATION



**R-MXLPE/LSZH 0.6/1 KV**

## Applications

Power supply and signal transmission, indoors or outdoors even wet environment.

For fixed laying in free air, in pipe or conduit, on masonry and metal structures or suspended. In places where in case of fire people are exposed to serious risks

due to the emission of smoke, toxic and corrosive gases and where you want to avoid damage to facilities, equipment, goods. Suitable for feeding of: emergency exits, alarm signals, warning of smoke or gas, escalators. Suitable for laying underground direct or indirect.

## Operating temperature

-40°C to +90°C

## Minimum bending radius

10 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor stranded according to EN 60228 class 2.

### Insulation

Mica/Glass tape plus X-LSZH compound.

### Cabling

Insulated cores are cabled together.

### Outer sheath

LSZH thermoplastic compound.

Colour red (other colours on request).

## Colour code To HD 308

*Without earth conductor*

2 cores: ● ●

3 cores: ● ● ●

4 cores: ● ● ● ●

5 cores: ● ● ● ● ●

*With earth conductor*

3 cores: ● ● ●/●

4 cores: ● ● ● ●/●

5 cores: ● ● ● ● ●/●

## Applicable Standards

**Basic design** IEC 60502-1

**Fire resistant** IEC 60331-21

**Flame retardant** IEC 60332-1-2

**Fire retardant** IEC 60332-3-24 (cat. C)

**Acid gas emission** IEC 60754-1

**Smoke density** IEC 61034-2

N° of cores x size (mm²)	Outer diameter (mm)	Weight (kg/km)
<b>1.5 mm² stranded</b>		
2x1.5	10.4	145
3x1.5	10.9	167
4x1.5	11.8	196
5x1.5	12.9	226
<b>2.5 mm² stranded</b>		
2x2.5	11.2	180
3x2.5	11.8	209
4x2.5	12.8	250
5x2.5	14.0	289
<b>4 mm² stranded</b>		
2x4	12.3	230
3x4	13.0	275
4x4	14.1	331
5x4	15.5	387
<b>6 mm² stranded</b>		
2x6	14.6	329
3x6	15.5	397
4x6	16.9	482
5x6	18.6	565
<b>10 mm² stranded</b>		
2x10	16.4	450
3x10	17.4	554
4x10	19.1	682
5x10	21.0	805
<b>16 mm² stranded</b>		
2x16	18.5	619
3x16	19.7	777
4x16	20.3	1050
5x16	23.9	1208
<b>25 mm² stranded</b>		
2x25	22.0	914
3x25	23.5	1161
4x25	26.0	1500
5x25	28.7	1700

Approximate values

# Firecel SR 106H

SILICONE INSULATION



**SR/LSZH 0.6/1 KV**

## Applications

Power supply and signal transmission, indoor or outdoor even wet environment. For fixed laying in free air, in pipe or conduit, on masonry and metal structures or suspended. In places where in case of fire people are exposed to serious risks due to the

emission of smoke, toxic and corrosive gases and where you want to avoid damage to facilities, equipment, goods. Suitable for feeding of: emergency exits, alarm signals, warning of smoke or gas, escalators. Suitable for laying underground direct or indirect.

## Operating temperature

-40°C to +90°C  
(for insulated conductors only: max 200°C).

## Minimum bending radius

15 times the outer diameter

## Cable construction

### Conductors

Plain copper conductor stranded class 2 for section up to 10 mm<sup>2</sup> or flexible class 5 for section above 10 mm<sup>2</sup>, according to EN 60228.

### Insulation

High performance fire resistant silicone rubber.

### Cablings

Insulated cores are cabled together.

### Outer sheath

LSZH thermoplastic compound.  
Colour red (other colours on request).

## Colour code To HD 308

*Without earth conductor*

- 2 cores: ● ●
- 3 cores: ● ● ●
- 4 cores: ● ● ● ●
- 5 cores: ● ● ● ● ●

*With earth conductor*

- 3 cores: ● ● ● / ●
- 4 cores: ● ● ● / ● / ●
- 5 cores: ● ● ● ● / ●

## Applicable Standards

### Fire resistant

EN 50200 (PH90) / IEC 60331-21 / BS 6387 (cat. C-W-Z) / SS 299 part 1

### Flame retardant

EN 60332-1-2 / IEC 60332-1-2

### Fire retardant

EN 60332-3-24 (cat. C) / IEC 60332-3-24 (cat. C)

### Acid gas emission

EN 60754-1 / IEC 60754-1  
EN 60754-2 / IEC 60754-2

### Smoke density

EN 61034-2 / IEC 61034-2

N° of cores x size (mm <sup>2</sup> )	Outer diameter (mm)	Weight (kg/km)
<b>1.5 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x1.5	9.2	124
3x1.5	9.8	148
4x1.5	10.6	176
5x1.5	11.5	214
<b>2.5 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x2.5	10.0	155
3x2.5	10.6	188
4x2.5	11.5	228
5x2.5	12.6	266
<b>4 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x4	11.2	207
3x4	12.1	263
4x4	13.6	332
5x4	14.5	399
<b>6 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x6	13.1	298
3x6	14.4	372
4x6	15.8	463
5x6	17.6	576
<b>10 mm<sup>2</sup> stranded</b>		
R-SR/LSZH		
2x10	15.9	441
3x10	16.8	541
4x10	18.5	680
5x10	20.5	850
<b>16 mm<sup>2</sup> flexible</b>		
F-SR/LSZH		
2x16	17.4	602
3x16	19.4	777
4x16	21.2	973
5x16	23.3	1202

Approximate values

# Firecel SR 140

**MICA+XLPE INSULATION ARMoured**



**R-MXLPE/LSZH/SWA/LSZH  
0.6/1 KV**

## Applications

Power supply and signal transmission, indoors or outdoors even wet environment.

For fixed laying in free air, in pipe or conduit, on masonry and metal structures or suspended. In places where in case of fire people are exposed to serious risks

due to the emission of smoke, toxic and corrosive gases and where you want to avoid damage to facilities, equipment, goods. Suitable for feeding of: emergency exits, alarm signals, warning of smoke or gas, escalators. Suitable for laying underground direct or indirect.

## Operating temperature

-40°C to +90°C

## Minimum bending radius

12 times the outer diameter.

## Cable construction

### Conductors

Plain copper conductor stranded according to EN 60228 class 2.

### Insulation

Mica/Glass tape plus X-LSZH compound.

### Cabling

Insulated cores are cabled together.

### Bedding

LSZH thermoplastic material.

### Armour

Single layer of galvanized steel wires (SWA).

### Outer sheath

LSZH thermoplastic compound.

Colour black (other colours on request).

## Colour code To HD 308

2 cores: ● ●

3 cores: ● ● ●

4 cores: ● ● ● ●

7 cores: ○ numbered

## Applicable Standards

**Basic design** BS 7846

**Fire resistant**

BS 7846 (cat. F2) / BS 6387 (cat. C-W-Z) /

BS EN 50200 (PH60)

BS 8491

**Flame retardant** EN 60332-1-2

**Fire retardant** EN 60332-3-24 (cat. C)

**Acid gas emission** EN 60754-1

**Smoke density** EN 61034-2

N° of cores x size (mm <sup>2</sup> )	Diameter under armour (mm)	Outer diameter (mm)	Weight (kg/km)
<b>1.5 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x1.5	8.8	13.8	364
3x1.5	9.8	14.8	418
4x1.5	10.6	15.6	460
7x1.5	12.8	18.2	607
12x1.5	16.8	23.1	988
19x1.5	19.4	26.4	1390
27x1.5	23.3	30.5	1760
37x1.5	26.4	34.0	2175
<b>2.5 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x2.5	9.6	14.6	416
3x2.5	10.7	15.7	480
4x2.5	11.2	16.2	514
7x2.5	13.8	19.9	818
12x2.5	18.2	25.4	1312
19x2.5	21.4	28.8	1705
27x2.5	25.8	33.4	2180
37x2.5	29.2	37.8	2950
<b>4 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x4	11.1	16.1	510
3x4	11.8	16.8	570
4x4	12.9	17.9	649
7x4	15.6	21.7	1004
12x4	20.9	28.1	1642
<b>6 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x6	12.3	17.3	600
3x6	13.1	18.1	680
4x6	14.4	20.5	927
<b>10 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x10	14.9	19.9	800
3x10	16.1	22.2	1078
4x10	17.7	23.8	1256
<b>16 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x16	17.1	22.5	1034
3x16	18.3	24.4	1354
4x16	20.2	26.5	1625
<b>25 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x25	20.3	26.6	1530
3x25	21.8	28.8	1972
4x25	24.1	31.3	2355
<b>35 mm<sup>2</sup> stranded</b>			
R-mXLPE/LSZH/SWA/LSZH			
2x35	22.7	29.9	2055
3x35	24.3	31.7	2450
4x35	27.0	34.4	2943

Approximate values

# Firecel LAN 6

**SF/UTP FRNC-LSZH FIRE RESISTANT 4X2XAWG22/1  
CAT.6 (UP TO 250 MHZ)**



## SR/LSZH 0.6/1 KV



LPCB ref. 217m  
For the scope of the LPCB Approval  
see [www.redbooklive.com](http://www.redbooklive.com)

### Applications

Signal transmission, indoor installation in places where in case of fire people are exposed to serious risks for emission of smoke, toxic and corrosive gases and where you want to avoid damage to facilities, equipment, goods. This type of cable is used in structured cabling for computer networks such as Ethernet.

### Operating temperature

-20°C to 70°C

### Minimum bending radius

15 times the outer diameter

### Cable construction

#### Conductors

Plain annealed copper wire, solid AWG22/1

#### Insulation

Polyolefin

#### Fire barrier

Special mineral glass tape, wrapped on each insulated conductor

#### Twisting

The insulated cores shall be twisted in pairs and wrapped with glass fibre tape.

#### Cabling

The pairs are cabled together around a central cross separator filler

#### Overall screen

Copper/polyester tape, outside in contact with a bare copper braid.

#### Outer sheath

LSZH thermoplastic material, red colour

#### Nom. Outer diameter

10.6 mm

### Colour code To HD 308

1st pair: ● ○ / ● ○

2nd pair: ● ○ / ● ○

3rd pair: ● ○ / ● ○

4th pair: ● ○ / ● ○

### Applicable Standards

#### Standard reference

IEC 61156-5; EN 50288-5-1; EN 50289-4-16; ISO/IEC 11801; EN 50173; EN 50200

#### Flame retardant

IEC 60332-1-2

#### Fire retardant

IEC 60332-3-24 (cat. C)

#### Fire resistant

BS EN 50200 (class PH120)

#### Acid gas emission

BS EN 60754-1; BS EN 60754-2

#### Smoke density

BS EN 61034-2

### Electrical characteristics

#### Max DC conductor resistance

59,4 Ω/km

#### Max operating voltage

125 Vac

#### Min insulation resistance

2,0 GΩ x km

#### Capacitance

@800 Hz 65 pF/m

#### Characteristic Impedance

100 Ω (± 15%)

#### Velocity of propagation

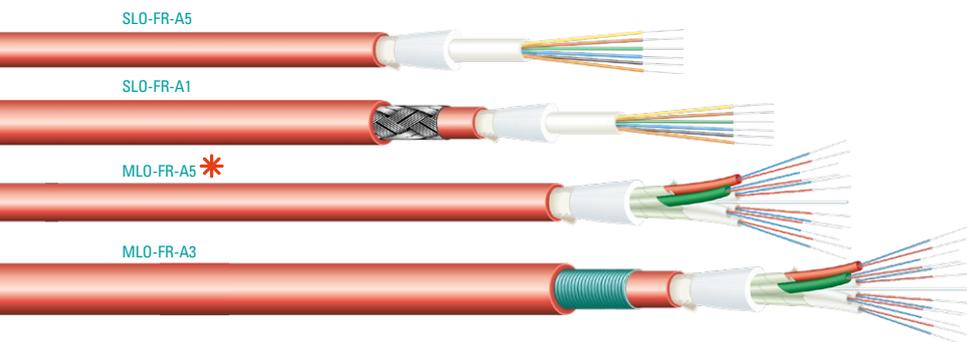
66%

#### Delay skew

20 nsec/100 m

# SLO/MLO

## LOOSE BUFFERED CABLES



# OPTICEL

## FIBRE OPTIC CABLE

### SINGLETUBE

SLO-000-\*\*-M1-A5-FR  
SLO-000-\*\*-M1-A1-FR

### MULTITUBE

MLO-000-\*\*-M1-A5-FR \*  
MLO-000-\*\*-M1-A3-FR



### Applications

These cables are used inside buildings, tunnels or closed areas in general, also for outdoor application for instrumentation and Oil & Gas applications.

### Operating temperature

-40°C to +90°C

### Minimum bending radius

10 times the outer diameter.

### Cable construction

#### Fibres

Singlemode and multimode fibres, with loose technology coating.

#### Structure

- For type SLO-FR the jelly filled tube containing the fibres is reinforced with glass yarns and is wound with a flame resistant tape.
- For type MLO-FR the jelly filled tubes containing the fibres are individually wound with a mica tape and are cabled around a central steel or FRP (fibreglass reinforced plastic) element. When necessary glass yarn is the traction element. A flame resistant tape improves fire resistance.

#### Inner sheath

(only for A1 and A3 armoured cables)  
LSZH thermoplastic compound.

#### Armouring

- A1 Galvanized steel wire braid
- A3 Corrugated steel tape
- A5 Anti-rodent glass yarns

#### Outer sheath

LSZH thermoplastic compound.  
Colour red (other colours on request).

### Applicable Standards

**Basic design** BS 7629

**Fire resistant** BS 6387 – CWZ

**Fire resistant** IEC 60331-25

**Flame retardant** IEC 60332-1-2

**Fire retardant** IEC 60332-3-24 (cat. C)

**Acid gas emission** BS EN 60754-1;

BS EN 60754-2

**Smoke density** IEC 61034-2

### Available upon request

#### Armouring

A7 - Steel wire armour

	Tube diameter (mm)	Outer diameter (mm)	Weight (kg/km)
<b>** - number of fibres</b>	<b>SLO-000-**-M1-A5-FR</b>		
2 ÷ 12	2.7	8.0	70
16 ÷ 24	3.5	9.0	80
<b>** - number of fibres</b>	<b>SLO-000-**-M1-A1-FR</b>		
2 ÷ 12	2.7	11.5	160
16 ÷ 24	3.5	12.0	180
<b>** - max number of fibres</b>	<b>MLO-000-**(n)-M1-A5-FR *</b>		
72	2.0	15.0	230
96	2.0	16.5	250
144	2.0	20.5	280
<b>** - max number of fibres</b>	<b>MLO-000-**(n)-M1-A3-FR</b>		
72	2.0	15.0	280
96	2.0	17.5	310
144	2.0	21.5	350

Approximate values

\* Cables MLO-FR-\*\*-M1-A5-FR up to 72 fibres are LPCB approved, ref. 217.i  
For the scope of the LPCB Approval see [www.redbooklive.com](http://www.redbooklive.com)

# QFCI/QFCU

MULTILOOSE



## MLO-000-\*\*-M1-A1-FR-QFCI/QFCU

Approved by:



### Applications

- Safety Systems, Critical Connections and Fire Fighting Systems
- Outdoor installation in Off-shore, Oil & Gas and Marine applications
- Data transmission and telecommunication systems

### Operating temperature

- 40 °C / + 70 °C (operating)
- 40 °C / + 70 °C (storage)
- 10 °C / + 70 °C (installation)

### Minimum bending radius

- 20 times overall diameter (dynamic)
- 10 times overall diameter (static)

### Cable construction

#### Fibres

Singlemode and multimode fibres, with loose technology coating.

#### Structure

The jelly filled tubes containing the fibres are individually wound with a mica tape and are cabled around a central steel or FRP (fibreglass reinforced plastic) element. A flame resistant tape improves fire resistance.

#### Inner sheath

LSZH (M1) compound.

#### Armouring

A1 Galvanized steel wire braid

#### Outer sheath

**QFCI** type: LSZH - SHF1 (M1) compound

**QFCU** type: oil and mud resistant LSZH - SHF2 (M1) compound

### Applicable Standards

#### Optical fibre characteristics

IEC 60793-1

#### Optical fibre cable characteristics

IEC 60793-1

#### Fire Resistant

IEC 60331-25 EN 50200 PH30/PH120

#### Fire retardant

IEC 60332-3 EN 60332-3

#### Flame retardant

IEC 60332-1-2 EN 60332-1-2

#### Acid gas emission

EN 60754-1 / IEC 60754-1  
EN 60754-2 / IEC 60754-12

#### Smoke density

IEC 61034-2 EN 50268-2

#### Cables for offshore installation

NEK 606

Type	Fibre (n° max)	Tube Diameter (mm)	Diameter (mm)	Weight (kg/km)	Tension load (N)	Crush (N/100mm)
MLO-000-**(n)-M1-A1-FR-QFCI/QFCU	4	2.0	13.5	230	1500	3000
MLO-000-**(n)-M1-A1-FR-QFCI/QFCU	8	2.0	13.5	230	1500	3000
MLO-000-**(n)-M1-A1-FR-QFCI/QFCU	12	2.0	13.5	230	1500	3000
MLO-000-**(n)-M1-A1-FR-QFCI/QFCU	24	2.0	13.5	230	1500	3000
MLO-000-**(n)-M1-A1-FR-QFCI/QFCU	48	2.0	13.5	230	1500	3000

Approximate values





Conducting Value

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