



MEETING THE DEMANDS OF TODAY'S FIRE ENGINEERING SYSTEMS



FIRE RESISTANT CABLES

www.xs-technologies.com



When it comes to critical circuit protection - NOT all cables are created equal

FAQs

Q Is a flame retardant cable also fire rated?

A No. A flame retardant cable is not a fire rated cable. A flame retardant cable is designed to only restrict the spread of a fire by inhibiting combustion.

Q Are flame retardant cables intended to maintain critical circuits during a fire?

A NO !

Q Why would you need a fire rated (fire resistive) cable?

When the need to maintain circuit integrity is essential, specify fire rated (fire resistive) cable for those critical circuits that need to work in order to assure life safety or a plant shut down.

A

Q How does the xtreme safety Cables protect conductors during a fire?

Xtreme Safety utilizes electrical grade mica tpc and polyolefin. The mica tape is insulating material into an insulating glass-like structure which protects the conductors against attack by fire and water which may be present during fire fighting efforts.

A

Q How can I use xtreme safety Cables for my critical applications?

A Xtreme Safety Fire Resistant Cables can be designed into the type of cable you need for your application to provide you with the survivability you require.

Q How do I learn more about the Fire Resistant Low Smoke Zero Hologen Cables?

A Visit our website at www.xs-technologies.com, or contact us direct at info@xs-technologies.com

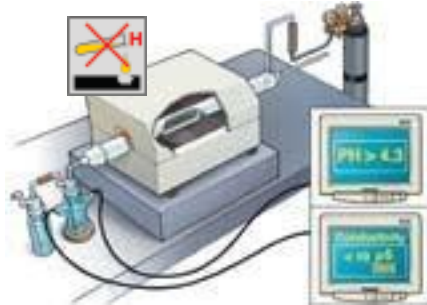
**DURING A FIRE WHEN YOU NEED CRITICAL CIRCUITS TO WORK
FOR LIFE SAFETY AND A SECURE PLANT SHUTDOWN,
FOR SAFETY'S SAKE
CHOOSE LIFELINE TECHNOLOGY**

Flame Retardant vs. Fire Rated/ Fire Resistive – What’s the Difference?

There is a vast difference between cables that are rated flame retardant and those that have earned the rating fire rated or fire resistive. Flame retardant cables resist the spread of fire into a new area, while fire rated cables maintain circuit integrity and continue to work for a specified time under defined conditions. Fire rated cables continue to operate in the presence of a fire and are commonly referred to as circuit integrity cables. The differences between the two ratings are significant for the critical circuits required for life safety or a safe and immediate plant shut down. Additionally, fire rated cables can be used to replace expensive fire rated structures, blankets or wraps and the difficult to install MI cable. Flame retardant cables are not rated to continue to operate in a fire, and in all probability will not maintain circuit integrity during a fire. The differences between flame retardant and fire rated/fire resistive cables can be seen in the test descriptions shown below.

Cable Tests	Fire Rated/Fire Resistive =	Cable Tests	Flame Retardant =
↓	A cable that will continue to operate in the presence of a fire, also identified as Circuit Integrity Cable	↓	A cable that will not convey or propagate a fire as defined by the Flame Retardant or Propagation Tests indicated below
North American Standard UL-2196 or ULC S-139	Large scale flame test, 10 x 10 foot wall, can use either the standard or rapid rise flame profile, cable energized at the utilization voltage, water spray used at conclusion of test to verify the cables can survive fire fighting efforts.	VW1	Vertical wire test to measure flame propagation, small scale, uses Bunsen burner, maximum propagation 12 inches
European Standard IEC 60331	Small scale circuit integrity test, uses 0.6 meter ribbon burner, standard temperature is 750°C for one hour, other optional times and temperatures can be specified, cable energized at rated voltage of cable	FT 1	Similar to VW1
Military Standard MIL-DTL-24643	Small scale circuit integrity test, uses 24 inch ribbon burner, cable energized at normal utilization voltage of cable	FT 2	Horizontal flame spread test, small scale, uses same burner as VW1, maximum propagation 2 inches
Other	Additional circuit integrity tests as defined by the application and end user can be performed and evaluated for compliance	IEC 60332-1	Small scale vertical wire test
		IEC 60332-2	Small Scale vertical cable test
		Vertical Tray Flame Tests	Medium scale tests, measure flame propagation only, does not maintain circuit integrity beyond several minutes
		IEEE-383, IEEE-1202 CSA FT4	All are vertical tray propagation tests, all requirements are basically the same, propagation limited to 1.5 meters
		UL- 1685 UL Method	Similar to above except higher flame propagation is allowed

The most important test procedures and their functions



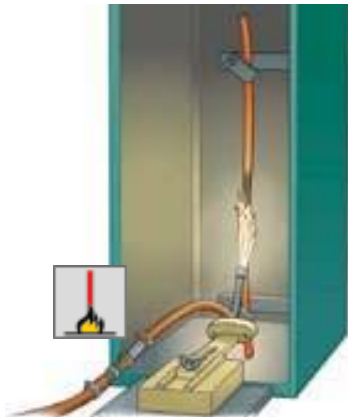
Test on gases evolved during combustion

This test procedure provides information if the insulation material of the cable sheath creates corrosive gases in the event of fire.

Halogen parts or other material in small quantities can be easily identified with this test due to the strong change of pH and conductivity. The conductivity is < 10mS/mm

Standards

- IEC 60754-1 and IEC 60754-2



Test for vertical flame propagation (single insulated wire or cable)

This test method tests a cable sample (length: 60 cm) for burning behaviour.

The flame must extinguish itself, and the burn damage must not reach the upper end of the cable sample.

Standards

- IEC 60332-1-2

- EN 60332-1-2

- VDE 0482-332-1-2

Test for vertical flame spread (bunched wires or cables)

This test method tests a cable bundle (length: 360 cm) with regard to fire propagation.

The flames must extinguish themselves, and burn damage must not exceed a defined height.

Standards

- IEC 60332-3-22 up to 25 Cat A-D

- EN 60332-3-22 up to 25 Cat. A-D

- VDE 0482-332-3-22 up to 25 Cat. A-D



Test for vertical flame spread (bunched wires or cables)

This test checks smoke development when burning the cable or the impairment of the visibility by burning cables.

The reduction in light transparency is measured in a standard chamber.

Standards

- IEC 61034-1 and IEC 61034-2

- EN 61034-1 and EN 61034-2

- VDE 0482-1034 part 1 and 2

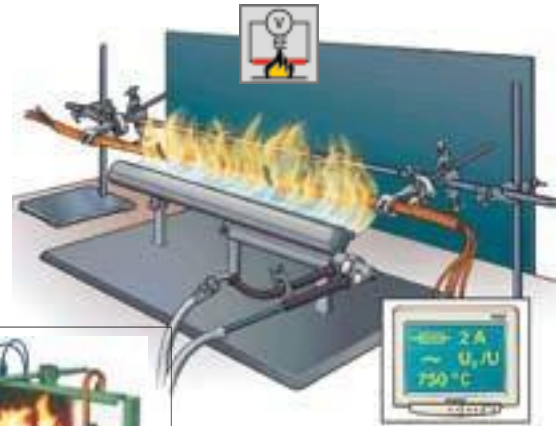
Test of circuit integrity (FE/PH)

This test establishes whether a single cable can maintain circuit integrity during and after exposure to a fire for a time period of at least 180 minutes. Cables which fulfil the requirements of this test are marked with "FE180" after their type designation.

There is no obligation to test the cable for functional integrity beyond the designated period.

Remark:

This test is not equivalent to the test for extended functional integrity (System Circuit Integrity) in accordance with DIN 4102-12



Test of circuit integrity (fire only)

- IEC 60331-11/-21/-23/-25 (>750 °C)
- BS 6387 (cat. C) (950 °C)
- VDE 0472-814 (>750 °C)

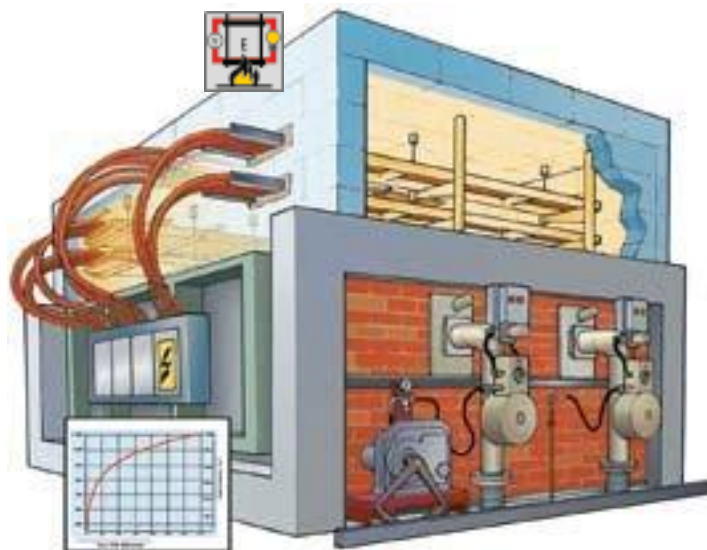
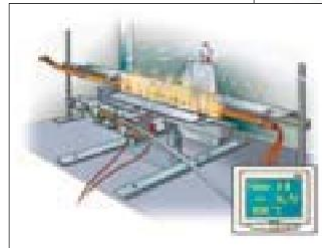


Test of circuit integrity (fire and mechanical shock)

- IEC 60331-1/-2 (>830 °C, 2A)
- EN 50200 (PH) (>830 °C, 2A)
- EN 50362 (> 830 °C, 2A)
- BS 6387 (cat. Z) (950 °C, 3A)

Test of circuit integrity (fire and water)

- BS 6387 (cat. W) (650 °C, 3A)
- VdS 3423 (>830 °C, 3A)
- EN 50200 Annex E (>830 °C, 2A)



Test of System Circuit Integrity of electrical cable installations

This standard describes the requirements and the actions to achieve enhanced circuit integrity of the complete electrical cable installation in the event of fire.

While the circuit integrity test (FE/PH) is only for single cables, in this test cables are tested together and in connection with practical fixing systems.

It is important to note that there is no connection between the two standards, circuit integrity (FE/PH) and enhanced or System Circuit Integrity (E).

Standards

- DIN 4102 part 12 (E30-E90)
- NBN 713-020 (Rf 1, Rf 1 1/2)

Better than any other standard!

This test (E30-E90) is the only worldwide standard for guaranteeing the functional integrity of the complete electrical cable installation, including the fixing components, under normal operating conditions.

TESTING OF FACILITIES



Fire Resistant Cables

Mica/XLPE Insulation / Overall Screen
Solid & Stranded conductor



APPLICATIONS

Fire resistant cables 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

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 mm² 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

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

Standard Cable 300/500 V

BS 5839-1:2013 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 and water @ 650 °C - 15 + 15 min.

Cat. Z fire and mechanical shocks @ 950 °C - 15 min. fire

OPERATING TEMPERATURE

-40 °C to +90 °C

MINIMUM BENDING RADIUS

6 times the outer diameter.

N° of cond. x cross section (mm ²)	Outer diameter (mm)	Weight (kg/km)
1 mm² solid		
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
1.5 mm² solid		
2x1.5	10.1	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
1.5 mm² stranded		
2x1.5	10.5	110
3x1.5	9.7	135
4x1.5	10.5	170
2.5 mm² solid		
2x2.5	10.2	150
3x2.5	10.8	190
4x2.5	12.0	240
2.5 mm² stranded		
2x2.5	10.6	155
3x2.5	11.3	190
4x2.5	12.5	250
4 mm² stranded		
2x4	12.2	220
3x4	13.0	280
4x4	14.4	350

Fire Resistant Cable

BS7629-1



APPLICATION

Hard Skin Enhanced Fire Resistant Cables for use primarily in fire detection, fire alarm, voice alarm, and emergency lighting circuits. These cables are designed to continue to operate for a period of time in a fire situation. 'Enhanced grade' fire resistance is recommended for systems, in particular building types, in which cables might need to operate correctly during a fire for periods in excess of those normally required for single phase evacuation of a building.

CONSTRUCTION

Conductor

1.5mm² - 2.5mm²: Class 1 solid conductor according to BS EN 60228

4mm²: Class 2 stranded conductor according to BS EN 60228

Insulation

Mica/Glass fire resistant tape covered by high performance fire resistant silicone rubber

Overall Screen

AL/PET (Aluminium/Polyester Tape)

Circuit Protective Conductor

Tinned copper

Outer Sheath

LSZH (Low Smoke Zero Halogen)

STANDARDS

BS 5839-1:2013 Clause 26.2e, BS EN 50200:2015 (PH 30 - PH 60 - PH 120), BS 6387:2013, BS 7629-1, IEC 60331 BS 6387 (cat. C-W-Z), BS EN 50200 (class PH120), BS EN 50200, BS 8434-2 (120 min), BS EN 60332-1-2, BS EN 60332-3-24 cat. C, BS EN 60754-1, BS EN 60754-2, BS EN 61034-2, BS 5266-1, BS 8519



The electrical and dimensional properties of this product are measured by the Technical and Quality Assurance department at the xtreme safety Cables laboratory. Cable performance in respect of conductor resistance, construction quality (workmanship), dimensional consistency, and other parameters are verified to published standards and approved product drawings.

Conformance to RoHS (Restriction of the use of Hazardous Substances) is determined and confirmed.

CHARACTERISTICS

Voltage Rating

300/500V

Operating Temperature

-40°C to +90°C

Minimum Bending Radius

6 x overall diameter

Core Identification

2 cores ● Blue ● Brown + Bare Earth

3 cores ● Brown ● Black ● Grey + Bare Earth

4 cores ● Blue ● Brown ● Black ● Grey + Bare Earth

Outer Sheath Colour

● Red ○ White

DIMENSIONS

Class 1 Solid Plain Conductor

NO. OF CORES	NOMINAL CROSS SECTIONAL AREA mm ²	EARTH WIRE CONSTRUCTION n' /mm	NOMINAL OUTER DIAMETER mm	NOMINAL WEIGHT kg/km
2	1.5	1/1.18	8.8	105
2	2.5	1/1.75	10.2	150
3	1.5	1/1.38	9.3	130
3	2.5	1/1.75	10.8	190
4	1.5	1/1.38	10.3	165
4	2.5	1/1.38	12	240

Class 2 Stranded Plain Conductor

NO. OF CORES	NOMINAL CROSS SECTIONAL AREA mm ²	EARTH WIRE CONSTRUCTION n' /mm	NOMINAL OUTER DIAMETER mm	NOMINAL WEIGHT kg/km
2	4	7/0.85	12.2	220
3	4	7/0.85	13	280
4	4	7/0.85	14.4	350

ELECTRICAL CHARACTERISTICS

NOMINAL CROSS SECTIONAL AREA mm ²	CONDUCTOR RESISTANCE AT 20°C Ω/km	INSULATION RESISTANCE AT 20°C MΩXkm	NOMINAL CAPACITANCE pF/m	
			Core / Core	Core / Screen
1	18.1	300	95	160
1.5	12.1	300	110	170
2.5	7.41	300	120	200
4	4.61	300	150	250

CURRENT CARRYING CAPACITY

Clipped Direct

NOMINAL CROSS SECTIONAL AREA mm ²	CURRENT RATING	
	2 Core Amps	3 and 4 Core Amps
1	19	17
1.5	24	22
2.5	33	30
4	45	40

In Conduit or in Cable Tray

NOMINAL CROSS SECTIONAL AREA mm ²	CURRENT RATING	
	2 Core Amps	3 and 4 Core Amps
1	17	15
1.5	22	19.5
2.5	30	26
4	40	35

VOLTAGE DROP

Clipped Direct

NOMINAL CROSS SECTIONAL AREA mm ²	VOLTAGE DROP	
	2 Core mV/A/m	3 and 4 Core mV/A/m
1	45	39
1.5	30	26
2.5	18	15
4	11	10

In Conduit or in Cable Tray

NOMINAL CROSS SECTIONAL AREA mm ²	VOLTAGE DROP	
	2 Core mV/A/m	3 and 4 Core mV/A/m
1	45	39
1.5	30	26
2.5	18	15
4	11	10

RATING FACTORS

AMBIENT TEMPERATURE °C	25	30	35	40	45	50	55	60	65
RATING FACTOR	1.04	1.00	0.95	0.90	0.85	0.80	0.74	0.67	0.60

By utilisation of high performance materials, xtreme safety has now enhanced the circuit integrity performance of this design of 600/1000V SWA armoured power cable so as to meet the most onerous requirements of BS7346-6 : 2005 - "Components for smoke and heat control systems - Part 6: specification for cable systems". The new standard defines fire performance requirements of various types of fire rated cables in maintaining circuit integrity for life safety, fire fighting and property protection systems.

Fire Safety systems include automatic fire suppression facilities, fire detection and alarms, fire compartmentalisation, smoke

control and ventilation, sprinkler and wet risers, ventilation and shutters, fire fighting lifts etc.

All these systems require secure power supplies in the event of fire and the result of emphasis on the performance of the existing generation of power cables has highlighted the need for enhanced performance.

Firetuf Powerplus meets the specified requirement of the constructional standard BS7846 and in providing enhanced circuit integrity preserves the handling and installation characteristics of a wire armoured design.



The Building Regulations Approved Document B on fire safety was revised on 1st April 2007 and this now specifies fire performance in accordance with BS7346-6.

Fire Resistant Cables can be specified with confidence in meeting the demanding performance required to support modern fire engineering systems in today's buildings.

Construction

Conductors:	Plain annealed stranded copper conductors. For sizes up to and including 35mm ² these are circular. Shaped conductors start at 50mm ² with the exception of 2 core cables where shaped conductors start at 25mm ² .
Insulation:	Mica-glass fire-resistant tapes, covered by an extruded layer of cross-linked polyethylene.
Binder:	Polyester tape.
Bedding:	An extruded layer of Zero Halogen, Low Smoke compound.
Armour:	Single layer of galvanised steel wires.
Sheath:	Thermoplastic Zero Halogen, Low Smoke compound.

Physical Characteristics

Voltage rating(U₀/U):	600/1000V.
Operating temp:	-20°C to +90°C (The cable should not be flexed when either the ambient or cable temperature is below 0°C).
Min. bending radius:	8 x overall diameter of cable.
Note: In the event of a fire, the increase in impedance may require consideration to the installation of larger conductor sizes, to accommodate motor starting loads and the performance of protective conductors.	

Standards Achieved

Circuit integrity:	BS6387 180 mins.
Acid gas emission:	IEC 60754, BS EN 50267.
Flame propagation:	IEC 60332-3, BS EN 50265, BS EN 50266.
Smoke emission:	IEC 61034, BS EN 50268.



Fire Resistant Cable Technical Data

2 Core

Nominal area of conductor mm ²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance		Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Star capacitance μF/km	Max. arm. resistance at 20°C Ω/km
						DC@20°C Ω/km	AC@90°C Ω/km				
10*	0.7	1.25	15.0	20.8	830	1.830	2.333	0.093	2.335	0.32	6.0
16*	0.7	1.25	16.7	23.2	1000	1.150	1.466	0.088	1.469	0.35	3.8
25	0.9	1.25	16.5	23.2	1100	0.727	0.927	0.082	0.930	0.38	3.7
35	0.9	1.6	18.5	26.1	1550	0.524	0.668	0.077	0.673	0.42	2.5
50	1.0	1.6	20.8	28.6	1850	0.387	0.494	0.076	0.500	0.45	2.3
70	1.1	1.6	23.8	31.8	2450	0.268	0.342	0.075	0.349	0.49	2.0
95	1.1	2.0	26.9	35.9	3350	0.193	0.247	0.074	0.258	0.55	1.4
120	1.2	2.0	29.7	38.9	3900	0.153	0.196	0.072	0.209	0.57	1.3

3 Core

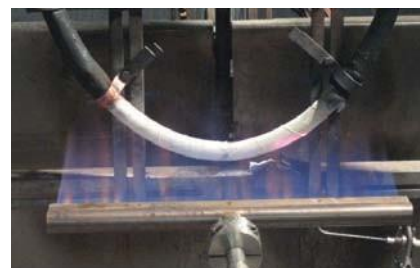
Nominal area of conductor mm ²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance		Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Star capacitance μF/km	Max. arm. resistance at 20°C Ω/km
						DC@20°C Ω/km	AC@90°C Ω/km				
10*	0.7	1.25	16.1	20.4	1080	1.830	2.333	0.093	2.335	0.32	4.0
16*	0.7	1.25	18.0	24.5	1310	1.150	1.466	0.088	1.469	0.35	3.6
25	0.9	1.6	21.0	28.4	1800	0.727	0.927	0.082	0.930	0.38	2.5
35	0.9	1.6	23.3	30.9	2200	0.524	0.668	0.077	0.673	0.42	2.3
50	1.0	1.6	23.8	31.4	2450	0.387	0.494	0.076	0.500	0.45	2.0
70	1.1	1.6	27.3	35.1	3200	0.268	0.342	0.075	0.349	0.49	1.8
95	1.1	2.0	29.9	37.9	4450	0.193	0.247	0.074	0.258	0.55	1.3
120	1.2	2.0	34.1	43.3	5300	0.153	0.196	0.072	0.209	0.57	1.2

4 Core

Nominal area of conductor mm ²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance		Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Star capacitance μF/km	Max. arm. resistance at 20°C Ω/km
						DC@20°C Ω/km	AC@90°C Ω/km				
10*	0.7	1.25	17.8	24.1	1260	1.830	2.333	0.093	2.335	0.32	3.7
16*	0.7	1.25	19.9	26.4	1640	1.150	1.466	0.088	1.469	0.35	3.2
25	0.9	1.6	23.2	30.6	2150	0.727	0.927	0.082	0.930	0.37	2.3
35	0.9	1.6	25.8	33.4	2650	0.524	0.668	0.077	0.673	0.42	2.0
50	1.0	1.6	27.2	35.0	3100	0.387	0.494	0.076	0.500	0.45	1.8
70	1.1	2.0	31.7	40.7	4400	0.268	0.342	0.075	0.349	0.48	1.2
95	1.1	2.0	35.5	44.7	5650	0.193	0.247	0.074	0.258	0.55	1.1
120	1.2	2.5	34.7	50.1	7250	0.153	0.196	0.072	0.209	0.55	0.76

Shaped conductors unless otherwise stated.

* Circular conductors



Fire Resistant designs achieve the highest rating of upto 180 minutes when subjected to integrated testing involving direct impact and high pressure water spray. The details of this test are currently documented in Annex B of BS6387, but will soon be published as a stand alone standard BS8491.



Authoritative, dynamic and forward thinking, Xtreme Safety Cables in the Pakistan has the expertise, experience and innovation to develop market-leading products and a customer driven commitment to deliver excellent service to the market.

Xtreme Safety extensive range of cabling products are readily available through an efficient network of wholesalers, distributors and sales offices serving a diverse range of industries and applications. We are founded on strong values and across our business

we never lose sight of the fact that our products are ultimately delivering power for people to live their lives comfortably, efficiently and risk free.

Never before has specifying the right product for the right application been so important and in specifying Xtreme Safety you can be safe in the knowledge that you are choosing the world's most trusted cable brand.

