# Total Fire CABLES Solutions







# Contents: Introduction & How to Use this Guide Codes of Practice Explained AEI Firetec Cables for all Applications Cable Accessories 18-21 Fire Performance Cable Selection Guide 22-23

#### Introduction: Total Fire Solutions

# Power and control cable systems for life safety and fire-fighting applications

Maintaining circuit integrity and limiting hazardous smoke and fume emissions during a fire is vital for life safety and critical to this is cable performance. Making the right cable choice and installing it in accordance with best practice has never been more important. This at-a-glance guide will help you through the selection process, offering a cable for every application and guidance on best installation practice.

#### How to use this guide

1 UNDERSTANDING CODES OF PRACTICE

Codes of practice represent current best installation guidance. Pages 4 to 11 list prominent Codes of Practice complete with applications, conformance information and requirements for installers in each application. This information is further summarised in tables on pages 22-23.

2 SPECIFYING THE RIGHT CABLE EVERY TIME

Make the right cable choice every time with this 'Total Fire Solutions' visual guide to AEI's range of Fire Performance Cables. Individual products are summarised on pages 12-17, so you can be sure you are choosing the best option whatever the location and application, every time.



# Codes of Practice

British Standard Codes of Practice are published to encourage best practice in their area of relevance. They will refer to relevant cable standards and may call up additional performance requirements not included in the generic cable manufacturing standard. Compliance with the code of practice will assure performance of the system.

Trade bodies may also produce codes for their members to abide by, although these may not involve wider consultation with consumer interest groups or other industry stakeholders.

Building Regulations reference a series of approved documents to give more detailed guidance for particular situations. Approved document B of the Building Regulations deals with Fire Safety in Buildings. Volume two section 5.38 covers protected power circuits and requires that a protected circuit should consist of cable meeting at least the requirements for category PH30 of BS EN 50200. Where circuits are required to operate for longer than 30 minutes reference should be made to the following codes of practice;

BS 9999 Power Supplies
BS 7346 Smoke, Heat and Exhaust Ventilation Systems
BS 8519 Power and Control Systems
BS 5839 Fire Alarms Systems
BS 5266 Emergency Lighting





#### **BS** Codes of Practice

# BS 9999

BS 9999 gives guidance and recommends measures to control or mitigate the effect of fire in the design, management and use of buildings. It applies to the design of new buildings and to the alteration, extension and change to use of existing buildings.

It recommends that protected primary and secondary power supplies should be either Mineral Insulated cable or cables meeting the objectives of BS 7346-6 or BS 8491.

#### **BS** Codes of Practice

# BS 7346

BS 7346 specifies the requirements for smoke, heat and exhaust ventilation systems.

BS 7346-6 deals with cable and introduced new tests to assess cable performance under simultaneous conditions of fire, direct mechanical impact and water impact from fire fighting jets i.e. conditions expected in an actual fire situation. These test methods have been reproduced as BS 8491 and BS 7346-6 has been withdrawn. The requirements of BS 7346-6 are now embodied within BS 8519.

AEI's new Firetec Impact Power cable designed and manufactured to BS 7846. (See page 13).





#### **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 incorporates and expands upon the requirements of BS 7346-6, the code of practice for Smoke, Heat and Exhaust Ventilation Systems (now withdrawn), to provide a more comprehensive coverage of fire engineering systems and highlights many of the factors which need to be considered by engineers designing systems and selecting cables to meet life safety and fire fighting objectives.

#### Some of the topics contained in BS 8519 include;

- · Fire survival times
- Power supplies
- Dual circuits/diverse routes
- Fire protective enclosures
- · Automatic change over devices
- Motor control panels
- 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

It should be noted that both Approved Document B of the Building Regulations and BS 9999 the codes of Practice for fire safety in the design, management and use of buildings refer to BS 7346-6 which BS 8519 replaces.

BS 8519 contains six categories of cables, three for power cables and three for control cables each subdivided into escape/survival times of 30, 60 or 120 minutes and each having a specific requirement in respect of fire performance.

Categories of cable						
			Applicable fire test	Applicable product*		
Life Safety (LS)	LS 30 mins	Category 1 Power	BS 8491 30 mins	MI Cable Firetec Impact Power		
		Category 1 Control	BS EN 50200 PH30 30 mins annex E	MI Cable Firetec Power Firetec Standard		
	LS 60 mins	Category 2 Power	BS 8491 60 mins	MI Cable Firetec Impact Power		
		Category 2 Control	BS EN 50200 PH60 & 120 mins to BS 8434-2	MI Cable Firetec Power Firetec Enhanced		
Fire Fighting (FF)	FF 120 mins	Category 3 Power	BS 8491 120 mins	MI Cable Firetec Impact Power		
		Category 3 Control	BS EN 50200 PH120 & BS 8519 annex B	MI Cable Firetec Power Firetec Enhanced		

<sup>\*</sup>Choice depends upon level of mechanical protection required.



#### BS Codes of Practice

## BS 5839

BS 5839 provides recommendations for the planning, design, installation, commissioning and maintenance of fire detection and alarm systems in and around buildings.

Section 26 recommends cables conform to one of the following:

BS EN 60702-1 AEI Mineral Insulated Cable

BS 7629 Firetec Standard and Firetec Enhanced

BS 7629 BS 7846

Firetec Power and Firetec Impact Power

It defines two classes of cables, clause 26.2d standard grade and clause 26.2e enhanced grade.

Clause 26.2d standard grade cable calls up fire tests BS EN 50200 PH30 incorporating fire, impact and water testing. It is intended for use as a 30 minute fire rated cable for use in life safety applications where it would be expected a building could be evacuated in under 30 mins (single stage evacuation) or in applications where a risk assessment would suggest a cable would not need to operate for longer than 30 minutes in the event of a fire.

Clause 26.2e enhanced grade cable calls up fire tests BS EN 50200 PH120 and BS 8434-2 incorporating fire, impact and water testing. It is intended for use as a 120 minute fire rated cable for use in life safety applications in complex buildings where there may be multi stage evacuation or in applications where a risk assessment would suggest the cable would not need to operate for longer than 120 minutes in the event of a fire.

#### BS Codes of Practice

## BS 5266

# BS 5266 is the code of practice for the emergency escape lighting of premises.

It does not apply to dwellings, however its provisions apply to common access routes within blocks of flats or maisonettes. Section 8.2 recommends that cables used for connection of an emergency escape lighting luminaire should adequately resist effects of fire and mechanical damage. It specifies the following categories of cables and cable systems to be used.

- a Emergency lighting cables with a duration of survival of 60 minutes when tested to BS EN 50200 and duration of survival of 30 minutes when tested in accordance with BS EN 50200 Annex E. Cables should conform to BS EN 60702-1, BS7629 or BS7846. Suitable cables are MI Cable, Firetec Standard and Firetec Power
- b Enhanced Emergency lighting cables with a duration of survival of 120 minutes when tested in accordance with BS EN 50200 and a duration of survival of 120 minutes when tested in accordance with BS8434-2. Suitable cables are MI Cable, Firetec Enhanced and Firetec Power.
- c Emergency lighting cable systems comprising fire resistant single core or multi core cables enclosed in steel conduit such that the cable has a duration of survival of 60 minutes. The cable system should meet IEC60332-3 for a flame application time of 60 minutes. Suitable cables are Firetec Singlecore, Firetec Standard.
- **d** Enhanced Emergency lighting cable systems comprising fire resistant single core or multi core cables enclosed in steel conduit such that the cable has a duration of survival of 120 minutes. The cable system should meet IEC60332-3 for a flame application time of 120 minutes. Suitable cables are Firetec Singlecore, Firetec Standard, Firetec Enhanced.

The enhanced cables and cable systems are recommended for use in complex buildings where there may be multistage evacuation or in applications where a risk assessment would suggest the cable would need to operate for longer than 120 minutes in the event of a fire.

#### MINERAL INSULATED

Manufactured and designed to BS EN 60702-1

#### FIRETEC IMPACT POWER

Manufactured and designed to BS 7846









Voltage Ratin

Description

Construction

Operating
Temperature
Minimum
Bending Radiu

Cor Identificatio

Length

Fire Test

Emission and Flam Propagation

Sheath Colou

Manufacturing
Standard
Code of Practic

CX Too are		8
Voltage Rating	500 volts Light Duty. 750 volts Heavy Duty	
Description	Mineral Insulated cable delivers ultimate fire performance. It guarantees data transmission and security of power and control circuits by exceeding the requirements of BS 8519-1 providing circuit integrity to 950°C. It also exceeds enhanced grade requirements defined by BS 5839-1 26.2e - the universal cable that satisfies all Cat. 1, 2 & 3 Power, and all Cat 1, 2 & 3 Control requirements defined by BS 8519.	
Construction	Solid copper conductor. Compressed magnesium oxide powder insulation. Solid copper sheath and optional thermoplastic LSZH sheath.	
Operating Temperature	-10°C to +250°C	
Minimum Bending Radius	6 x overall diameter	
Core Identification	Coloured sleeving available	
Lengths	LD - 100/500 mtrs. Special lengths available on request HD - Cables available in nominal lengths	
Sheath Colour	Red, White or Orange. Other colours available	
Manufacturing Standard	BS EN 60702-1 and BS EN 60702-2 Accessories (BS EN 60079)	
Code of Practice	BS 5839-1 Clause BS 8519 Category 1 & 2 26.2e Enhanced Control For Category 3 and Power applications Emergency Lighting cable Energency Lighting cable	
Fire Tests	BS 8434-2 BS EN 50200 PH30, PH60, PH120 BS 6387 C W & Z BS 8491	
Emissions and Flame Propagation	BS EN 50267 (IEC 60754) Acid Gas Emission BS EN 50268 (IEC 61034) Smoke Emission BS EN 50265, 50266 (IEC 60332) Flame Propagation	

g	600/1000 volts
n	Firetec Impact Power cables are similar in construction to armoured cables, but provide additional protection to smaller cable sizes to ensure the best possible mechanical protection from a polymeric cable. Designed to meet the application of fire, direct impact and water jet as specified in BS 8491, making them suitable for use as 120 minute rated category 3 power cables under BS 8519.
n	Stranded plain annealed copper conductors. Mica/glass fire barrier tape. Cross linked polyethylene insulation (XLPE). LSZH bedding, steel wire armouring and LSZH outer sheath.
g e	-10°C to +90°C
n s	6 x overall diameter (8 times for cables 25mm² and above)
e n	2c - Bn & Be. 3c - Bn, Blk & Gy. 4c - Bn, Blk, Gy & Be.*
s	Cut lengths on request
ır	Black
g d e	BS 7846  BS 5839-1 Clause 26.2e Enhanced Category 1, 2, 3 Control and Category 1, 2, 3 Power BS 9999
5	BS 8434-2 BS EN 50200 PH30, PH60, PH120 BS 6387 C W & Z, BS 8491
s e n	BS EN 50267 (IEC 60754) Acid Gas Emission BS EN 50268 (IEC 61034) Smoke Emission BS EN 50265, 50266 (IEC 60332) Flame Propagation
	1. *Old core colours available. 2c Rd, Blk. 3c Rd, Yw, Be. 4c Rd, Yw. Be. Blk.

Special Notes

(In its bare copper form there are no emissions)

Testing at AEI confirms compliance with BS 8519 Cat.3 Control and Cat.1, 2 & 3 Power (Clause II, note 2. for cables <20mm OD).</li>

<sup>2.</sup> Methods of cable support should withstand a similar temperature and duration to that of the cable.

<sup>4</sup>c Rd, Yw, Be, Blk.

Special Notes

Methods of cable support should withstand a similar temperature and duration to that of the cable.

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#### FIRETEC POWER

Manufactured and designed to BS 7846

#### FIRETEC ENHANCED

Manufactured and designed to BS 7629















PASEC		BASEC	
Voltage Rating	600/1000 volts	Voltage Rating	300/500 volts
Description	Firetec Power is a fire resistant armoured cable suitable for use in fixed installations for power circuits, fire alarm systems and emergency lighting systems. It is robust, flexible and suitable for use inside and outside buildings, meeting the enhanced grade of BS 5839 26.2e.	Description	Firetec Enhanced ca alarm systems, emer Category 1, 2 & 3 Cor BS 8519. The mica gla over the conductor to
Construction	Stranded plain annealed copper conductors. Mica/glass fire barrier tape. Cross linked polyethylene insulation (XLPE). LSZH bedding, steel wire armouring and LSZH outer sheath.		enhanced fire perfor enhanced grade of B Solid or stranded plair
Operating Temperature	-10°C to +90°C	Construction	Tinned annealed copp fire barrier tape. Alur tape screen. LSZH ins
Minimum Bending Radius	6 x overall diameter (8 times for cables 25mm² and above)	Operating Temperature	-10°C to +90°C
Core Identification	2c - Bn & Be. 3c - Bn, Blk & Gy. 4c - Bn, Blk, Gy & Be.* Multicore - white cores with black printed numbers	Minimum Bending Radius	6 x overall diameter
Lengths	Cut lengths on request	Core Identification	2c - Bn & Be. 3c - Bn 4c - Bn, Blk, Gy & Be
Sheath Colour	BS 7846	Lengths	100/500 mtrs. Special
Manufacturing Standard		Sheath Colour	Red or White. Other o
Code of Practice	BS 5266. Enhanced Emergency Lighting cable.		ned of write. Other c
Fire Tests	BS 8434-2 BS EN 50200 PH30, PH60, PH120 BS 7846 F2	Manufacturing Standard	BS 7629-1
Emissions and Flame Propagation	BS EN 50267 (IEC 60754) Acid Gas Emission BS EN 50268 (IEC 61034) Smoke Emission BS EN 50265, 50266 (IEC 60332) Flame Propagation	Code of Practice	BS 5839-1 Clause 26.2e Enhanced BS 5266 Enhanced Emergency Lighting c
	*Old core colours available. 2c Rd, Blk. 3c Rd, Yw, Be. 4c Rd, Yw, Be, Blk.     This cable can be supplied without steel wire armour for situations where sufficient mechanical protection already exists and where a smaller, lighter, more flexible cable would be preferred.	Fire Tests	BS 8434-2 BS EN 50200 PH30, P BS 6387 C W & Z
Special Notes	Simply request details of our Firetec unarmoured range of cables. Fire resistant to BS 6387 C W & Z, LSZH material used throughout, LPCB approved.	Emissions and Flame	BS EN 50267 BS EN 50268

3. Methods of cable support should withstand a similar temperature

4. Testing at AEI confirms compliance with BS 8519 Category 1, 2 & 3 Control and meets the requirements for an enhanced

and duration to that of the cable.

grade of cable to BS 5839 26.2e.

c Enhanced cable is suitable for fire systems, emergency lighting circuits and ory 1, 2 & 3 Control circuits as defined in 19. The mica glass tape is applied directly he conductor to ensure the best possible iced fire performance. It meets the iced grade of BS 5839 26.2e.

or stranded plain annealed copper conductors. d annealed copper full size CPC. Mica/glass arrier tape. Aluminium/polyester laminated creen. LSZH insulation and outer sheath.

n & Be. 3c - Bn, Blk & Gy n, Blk, Gy & Be

00 mtrs. Special lengths available on request

r White Other colours available

39-1 Clause Enhanced 66 Enhanced ency Lighting cable

BS 8519 Category 1 & 2 Control For Category 3 Control see Special Notes.

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50200 PH30, PH60, PH120

#### 87 C W & Z

# **Propagation**

(IEC 60754) Acid Gas Emission (IEC 61034) Smoke Emission

#### BS EN 50265, 50266 (IEC 60332) Flame Propagation

#### **Special Notes**

- 1. Testing at AEI confirms compliance with BS 8519 Category 3 Control
- 2. Methods of cable support should withstand a similar temperature and duration to that of the cable.

#### FIRETEC STANDARD

Manufactured and designed to BS 7629

#### FIRETEC SINGLECORE

A fire resistant LSZH conduit wire









Methods of cable support should withstand a similar

temperature and duration to that of the cable.



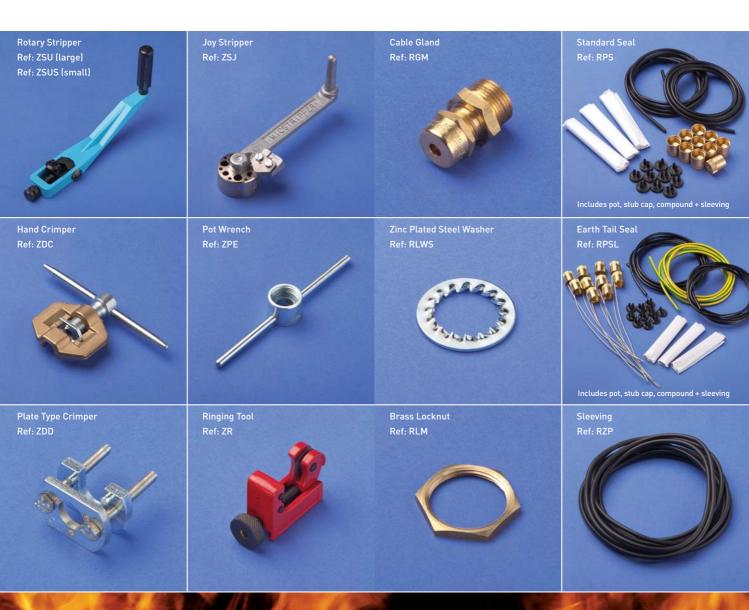
Voltage Rating	300/500 volts	Voltage Rating	600/1000 volts				
Description  Firetec Standard cable is suitable for fire alarm systems and emergency lighting circuits.  It meets the standard grade of BS 5839 26.2d and Category 1 Control as defined by BS 8519.		Description	Firetec Singlecore is designed to be installed in metal conduit. For use in fire alarm and emergency lighting circuits for new installations or upgrading existing conduit systems to fire performance standards. Elastomeric insulation gives high mechanical strength, excellent flexibility and resistance to abrasion.				
Construction	Solid or stranded plain annealed copper conductors. Tinned annealed copper full size CPC.	Construction	Stranded plain annealed copper conductors. Mica/glass fire barrier tape. Elastomeric LSZH outer sheath.				
Construction	Aluminium/polyester laminated tape screen. LSZH insulation and outer sheath.	Operating Temperature	-10°C to +90°C				
Operating Temperature	-10°C to +90°C	Minimum Bending Radius	6 x overall diameter				
Minimum Bending Radius	6 x overall diameter	Core Identification	Bn, Blk, Gy, Be, Rd, Oe, Yw & Gn/Yw. Other colours available on request				
Core Identification	2c - Bn & Be. 3c - Bn, Blk & Gy 4c - Bn, Blk, Gy & Be	Lengths	100/500 mtrs. Special lengths available on request				
Lengths	100/500 mtrs. Special lengths available on request	Fire Tests	BS 6387 C, W, Z and IEC 60331-21 when tested in a steel conduit at a temperature of 950°C and an increased voltage of 600/1000volts.				
Sheath Colour	Red or White. Other colours available	Sheath Colour	N/A				
Manufacturing Standard	BS 7629-1	Manufacturing Standard	BS 7211 (generally to, fire resistant)				
Code of Practice	BS 5839-1 Clause 26.2d Standard BS 5266 Emergency Lighting cable BS 8519 Category 1 Control	Code of Practice	BS 5266 Enhanced Emergency Lighting cable system				
Fire Tests	BS EN 50200 PH30, PH60, PH120 BS 6387 C W & Z	Emissions and Flame	BS EN 50267 (IEC 60754) Acid Gas Emission BS EN 50268 (IEC 61034) Smoke Emission				
Emissions and Flame	BS EN 50267 (IEC 60754) Acid Gas Emission BS EN 50268 (IEC 61034) Smoke Emission	Propagation	BS EN 50265, 50266 (IEC 60332) Flame Propagation				
Propagation	BS EN 50265, 50266 (IEC 60332) Flame Propagation	Special Notes	Methods of cable support should withstand a similar				

**Special Notes** 

temperature and duration to that of the cable.



#### Mineral Accessories





#### Mineral Accessories (continued)



#### Maximum Spacing of Fixings

	Overall Firetec S Diameter of Firetec E					Mineral Insulated Cable		
	Cable (mm)	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	
	Up to 9	250	400	-	-	600	800	
	>9 to 15	300	400	350	450	900	1200	
ĺ	>15 to 20	-	-	400	550	1500	2000	
	>20 to 40	-	-	450	600	2000	3000	
	>40 to 60	-	-	800	900	-	-	
	>60	-	-	1200	1600	-	-	

#### Notes

- 1 Methods of cable support should withstand a similar temperature and duration to that of the cable. Cables manufactured by AEI are supported by AEI clips during fire tests to ensure this criteria is met.
- 2 The spacings stated for horizontal runs may be applied also to runs at an angle of more than 30 degrees from the vertical. For runs at an angle of 30 degrees or less from the vertical, the vertical spacings are applicable.

#### Firetec Accessories







A range of nylon glands and fixings are available for Firetec Standard and Enhanced cables. Details available on request.



# Fire Performance Cable Selection Guide

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Mineral Cable	Firetec Enhanced	Firetec Standard	Firetec Singlecore	Firetec Power	Firetec Impact Power
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		Σ	ΙĒ	证	iΞ	iĒ	证
Codes of Practice							
Emergency Lighting	BS 5266 Emergency Lighting cable	•	•	•		•	•
	BS 5266 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 Systems (SHEVS)	BS 7346-6						•
Power and Control	BS 8519 Category 1 Control	•	•	•		•	•
	BS 8519 Category 2 Control	•	•			•	•
	BS 8519 Category 3 Control	•	•			•	•
	BS 8519 Category 1 Power	•					•
	BS 8519 Category 2 Power	•					•
	BS 8519 Category 3 Power	•					•
General	BS 9999	•					•
Manufacturing Stan	dards						
	BS EN 60702-1	•					
	BS 7629		•	•			
	Gen BS 7211				•		
	BS 7846				•		
Fire Resistance Test	ts						
	BS 6387 C W & Z	•	•	•	•	•	•
	BS EN 50200 PH30	•	•	•		•	•
	BS EN 50200 PH60	•	•	•		•	•
	BS EN 50200 PH120	•	•	•		•	•
	BS 8434-2	•	•			•	•
	BS 8519 Annex B	•	•			•	•
	BS 7846 F2	•				•	•
	BS 7846 F30, F60, F120	•					•
	BS 8491	•					•
	IEC 60331-3	•	•	•	•	•	•
Fire Reaction Tests							
Low smoke zero halogen	alogen BS EN 50267, (IEC 60754) BS EN 50268, (IEC 61034)		•	•	•	•	•
Flame propagation	BS EN 50265, BS EN 50266 (IEC 60332)		•	•	•	•	•

# Mechanical Protection Cable Selection Guide

System	Code of	Application	Cable	Choice considerations
0,5.0	Practice	- гррания	oubic .	onoice constant anons
Conduit Wiring		Conduit wiring	Firetec Singlecore	To be installed in conduit
Fire Alarm	BS 5839	26.2d Standard grade cable	Firetec Standard	Protection may be required
		26.2e Enhanced grade cable	Firetec Enhanced Firetec Power MI Cable	Protection may be required Inherently protected Small, lightweight, protected
Emergency Lighting	BS 5266	Emergency lighting cable	Firetec Standard Firetec Power MI Cable	Protection may be required Inherently protected Inherently protected
		Enhanced Emergency lighting cable	Firetec Enhanced Firetec Power MI Cable	Protection may be required Inherently protected Inherently protected
		Emergency Lighting cable system	Firetec Singlecore Firetec Standard	To be installed in conduit To be installed in conduit
		Enhanced Emergency Lighting cable system	Firetec Singlecore Firetec Enhanced	To be installed in conduit To be installed in conduit
Power and Control	BS 8519	Category 1 Control	MI Cable Firetec Power Firetec Enhanced Firetec Standard	Small, lightweight, protected Inherently protected Protection may be required Protection may be required
		Category 2 Control	MI Cable Firetec Power Firetec Enhanced	Small, lightweight, protected Inherently protected Protection may be required
		Category 3 Control	MI Cable Firetec Power Firetec Enhanced	Small, lightweight, protected Inherently protected Protection may be required
		Category 1 Power	MI Cable Firetec Impact Power	Small, lightweight, protected Inherently protected
		Category 2 Power	MI Cable Firetec Impact Power	Small, lightweight, protected Inherently protected
		Category 3 Power	MI Cable Firetec Impact Power	Small, lightweight, protected Inherently protected

#### About us

AEI Cables has been making cable for over 170 years, satisfying many diverse markets and applications around the world.

With a reputation for product excellence and our capability to deliver the goods to global projects, AEI Cables has an enviable position as a world class manufacturer.

#### **Online**

Visit us online and find out more about AEI Cables:

- View all of our products and technical data
- Use our popular 'Cable Wizards'
- Get useful information from our 'Click & Learn' section or test your cable knowledge and play 'AEI Cable Trumps'
- Register to receive all the latest company and industry news via E-Bulletin

#### **Product Range**

- Fire Protection Cables
- Industrial Cables
- Mining Cables
- Oil and Gas Cables
- Defence Cables
- Power Cables
- Rail Cables
- Bespoke Customer Cables



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