

# PYROTEC<sup>®</sup>

Engineered for Safety

Certified By:



**Fire Resistant  
Mineral Insulated Cable**

## Buildings Fire Safety

Buildings today are not only designed to be eye catching state-of-the-art architectures, they must be safe and enduring at the same time. It must be able to withstand various unforeseen circumstances prevalent in our aggressive environment today. Whilst steel and concrete structures form the physical backbone of buildings, fire-rated cables act as the main arteries, feeding life by distributing critical power and activating alarm signals during fire emergencies. This convenience of modern lifestyle comes without compromising on fire safety. In the event of a fire, a poor quality fire-rated cable is akin to failing arteries that becomes the main culprit of heat and flame propagation within a building. It is a known fact that the failure of cable integrity is the main source of fire incidence, leading to major catastrophic damage to building structures and even loss of human lives. Inferior materials in such cables can emit excessive smoke, acidic gases and toxic fumes in an event of fire, incapacitating human life.

As such, architects and engineers have the utmost responsibility to ensure every possible safety feature is in place in the event of fires in buildings. Ensuring and protecting occupants' safety is an ultimatum. Hence, selection of fire resistant cables have become even more critical to ensure power connectivity of all essential facilities such as generator systems, fire alarms, smoke and fire shutters, public address (PA) systems, emergency lightings, CCTV, lifts and other electrical/electronic systems.

## Selecting the Right Cable

The fire resistant cable industry has evolved from the most rigid design of Mineral Insulated Copper Cladded Cable (MICC) to the flexible Fire Resistant Mineral Insulated Cable (FRMI). Building designs can be compromised with cheaper cable insulation such as XLPE or PVC. This has undermined and defeated the purpose of fire performance cable, increasing the risk of flame propagation and hazardous gas build-up in the event of a fire. Today, structures are getting taller, with more complex building facilities and more critical space utilization. Hence, the selection criteria of fire resistant cable is most vital in the prevention and full protection in the event of an untoward situation.

### Evolution of FR Cable Design



#### Performance Driven (MICC)

- Mechanically robust
- Watertight
- Corrosion resistant
- Flameproof
- No hazardous gases
- Ability to perform during critical moments
- 105°C Operating Temperature

PYROTEC®



#### Technology Advancement (Flexible FRMI)

- Ensuring MICC's performance
- More cost effective
- Better flexibility
- Easy Installation
- 110°C Operating Temperature



#### Cost Compromising (FR XLPE/PVC)

- Replicate FRMI physically whilst compromising product quality & performance (e.g. flammability & acidic gases emission)
- Designers are usually confused by the few adopted test standards
- 90°C Operating Temperature

The selection of cable insulation and sheath materials determines the performance characteristic of the cable during fire. The window of safety margin is directly corresponding to the degree of operating temperature, flammability index, smoke and toxicity level as well as the halogen gas content. Hence, it is vital to ensure consistency in product quality by evaluating the manufacturer's reputation as well as the product's third party accredited testing & certification bodies.

As one of the key players in the fire resistant cable industry, we are fully aware that cost is always an important factor in all project design consideration. However, we also observed that this factor can be magnified at different decision-making levels and could be confusing to many project owners. Copper, being the key material that constitutes more than 50% of the entire cable construction is a price transparent commodity. What usually determines the cost of the fire resistant cable is the insulation material used and the value of its production processes. In today's price competitive market, the type of insulation material is commonly overlooked and compromised in many installations. We strongly believe that fire safety should never be compromised in any engineering design.

## PYROTEC® Engineered for Safety

**PYROTEC®**, the high-performance Fire Resistant Mineral Insulated Cable (FRMI) is the result of joint venture between EITA Power System Sdn Bhd and Universal Cable (M) Berhad, combining the best fit of marketing distribution with the best reputation in cable production. **PYROTEC®** is developed based on our knowledge of 'Fire Technology', incorporating new developments in material engineering and our consistent innovation whilst achieving the highest cable standards in all three main aspects of fire resistant cable namely in fire performance, prevention and safety requirements. We pride ourselves in our unceasing innovation in product design and in delivering service excellence to meet the ever changing market needs.

**PYROTEC®** FRMI 110 is developed to meet the rising pressures faced by consultants in selecting the best cost effective yet high performance cable for their designs. The highly cross-linked, mineral-filled insulation compound is engineered to optimize safety requirements, especially in the area of enhanced thermal ageing properties of 110°C operating temperature. This compound is non-flammable, halogen-free, low smoke and toxic emission and is highly self-extinguishing; offering significant cost, weight and space savings while still providing a superior level of fire safety with enhanced cable life span.

## Cable Characteristics



Fire Resistant  
IEC 60331-21  
BS 6387 CWZ



Flame Retardant  
IEC 60332-3  
(22,23,24)



Low Smoke Density  
IEC 61034-2



Operating  
Temperature 110°C  
BS EN 50363-1



Zero Halogen  
IEC 60754-1 & 2  
BS EN 50525-1



Termite & Rodents  
Resistant (Optional)

## Current Ratings

### Correction Factors for Ambient Air Temperature

Ambient Temperature °C	25	30	35	40	45	50	55	60
Correction Factors	1.04	1.00	0.96	0.91	0.87	0.82	0.76	0.71

### Correction Factors for Groupings

Number of circuits		2	3	4	5	6	7	8	9
Single layer direct clipped on a non-metallic surface	Touching	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70
	Spaced*	0.94	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Single layer <b>Multi-core</b> on a perforated metal cable tray vertical or horizontal	Touching	0.86	0.81	0.77	0.75	0.74	0.73	0.73	0.72
	Spaced*	0.91	0.89	0.88	0.87	0.87			
Single layer <b>Single-core</b> on a perforated metal cable tray touching	Horizontal	0.90	0.85						
	Vertical	0.85							

\* Space by a clearance between adjacent surfaces of at least one cable diameter. No correction factor is needed, where horizontal clearance between adjacent cables exceeds 2 cable diameters.

The above are applicable to groups of cables all of one size. If a cable is expected to carry <30% of its grouped ratings, it may be ignored for the purpose of obtaining the correct factor for the rest of the groups.

## Single Insulated

### Cable Construction

Temperature Rating	110 °C
Voltage, U <sub>0</sub> /U	600 / 1000 V.
Conductor	Plain Annealed Copper Wire: IEC 60228 (Class 2)
Fire Proof Layer	Glass Mica Tape
Insulation	Flame Retardant Cross-linked LSOH Mineral Insulation; RED, BLACK

### Cable Characteristic / Performance

- Fire Resistant in compliance to IEC 60331-21, BS 6387 CWZ
- Flame Retardant in compliance to IEC 60332-3 (22, 23, 24)
- Operation temperature at 110 °C in compliance to BS EN 50363-1
- Zero Halogen Content in compliance to IEC 60754-1, IEC 60754-2 and BS EN 50525-1
- Low Smoke Density in compliance to IEC 61034-2.
- Limiting Oxygen Index (LOI) shall be greater than 30% In accordance with ASTM D2863
- Voltage Test 3.5 kV / 5 min.
- Minimum Bending Radius 6 ~ 8 times of overall diameter (OD)



Conductor			Nominal insulation thickness	Approx. diameter of cable	Approx. cable weight	Current Rating in Air		Current Rating in Enclosed		Voltage Drop			
Size	No. of strands	Nominal diameter				1 phase 2 cables	3 phase Trefoil	1 phase 2 cables	3 phase Trefoil	1 phase 2 cables	3 phase Trefoil	1 phase	3 phase Trefoil
mm <sup>2</sup>	No.	mm	mm	mm	Kg / Km	Amps		Amps		mV / A * m			
1.5	7	1.6	0.7	3.5	25	33	25	28	22	32.8	28.4		
2.5	7	2.0	0.8	4.1	35	44	35	38	30	20.1	17.4		
4	7	2.6	0.8	4.7	50	58	46	50	40	12.5	10.8		
6	7	3.1	0.8	5.2	70	74	60	64	52	8.34	7.22		
10	7	4.1	1.0	6.6	110	104	85	91	75	4.96	4.29		
16	7	4.8	1.0	7.4	170	137	113	120	99	3.12	2.70		
25	7	6.0	1.2	9.1	270	184	155	162	137	1.98	1.71		
35	7	7.2	1.2	10.2	370	227	192	204	172	1.43	1.24		
50	19	8.4	1.4	11.8	490	276	237	228	196	1.06	0.919		
70	19	10.1	1.4	13.5	690	350	302	287	250	0.744	0.645		
95	19	11.8	1.6	15.7	960	434	378	352	307	0.548	0.474		
120	19	13.4	1.6	17.2	1,190	505	442	410	359	0.445	0.385		
150	19	14.8	1.8	19.0	1,480	579	510	458	403	0.372	0.323		
185	37	16.6	2.0	21.2	1,830	670	594	530	470	0.312	0.270		
240	37	19.0	2.2	24.0	2,390	799	713	624	557	0.258	0.223		
300	37	21.3	2.4	27.0	3,010	925	830	713	640	0.227	0.196		
400	61	24.1	2.6	30.1	3,820	1075	970	850	767	0.201	0.174		
500	61	27.1	2.8	33.5	4,790	1241	1124	980	888	0.184	0.159		
630	61	30.8	2.8	37.2	6,090	1428	1298	1142	1038	0.170	0.147		

## Double Insulated

### Cable Construction

Temperature Rating	110 °C
Voltage, U <sub>0</sub> /U	600 / 1000 V.
Conductor	Plain Annealed Copper Wire: IEC 60228 (Class 2)
Fire Proof Layer	Glass Mica Tape
Insulation	Flame Retardant Cross-linked LSOH Mineral Insulation; WHITE
Sheath	Flame Retardant LSOH Compound; ORANGE

### Cable Characteristic / Performance

- Fire Resistant in compliance to IEC 60331-21, BS 6387 CWZ
- Flame Retardant in compliance to IEC 60332-3 (22, 23, 24)
- Operating temperature at 110 °C in compliance to BS EN 50363-1
- Zero Halogen Content in compliance to IEC 60754-1, IEC 60754-2 and BS EN 50525-1
- Low Smoke Density in compliance to IEC 61034-2
- Limiting Oxygen Index (LOI) shall be greater than 30% In accordance with ASTM D2863
- Voltage Test 3.5 kV / 5 min
- Minimum Bending Radius 6 ~ 8 times of overall diameter (OD)



Conductor			Nominal insulation thickness	Nominal sheath thickness	Approx. diameter of cable	Approx. cable weight	Current Rating in Air		Voltage Drop	
Size	No. of strands	Nominal diameter					1 phase	3 phase	1 phase	3 phase
							2 cables	Trefoil		Trefoil
mm <sup>2</sup>	No.	mm	mm	mm	mm	Kg / Km	Amps		mV / A *m	
1.5	7	1.6	0.7	1.4	6.3	55	36	30	32.8	28.4
2.5	7	2.0	0.7	1.4	6.7	70	47	40	20.1	17.4
4	7	2.6	0.7	1.4	7.3	90	62	53	12.5	10.8
6	7	3.1	0.7	1.4	7.8	110	79	67	8.34	7.22
10	7	4.1	0.7	1.4	8.8	160	107	92	4.96	4.29
16	7	4.8	0.7	1.4	9.6	220	141	121	3.12	2.70
25	7	6.0	0.9	1.4	11.3	330	187	163	1.98	1.71
35	7	7.2	0.9	1.4	12.4	430	230	200	1.43	1.24
50	19	8.4	1.0	1.4	13.8	560	278	244	1.06	0.918
70	19	10.1	1.1	1.4	15.7	770	352	310	0.743	0.643
95	19	11.8	1.1	1.5	17.7	433	433	384	0.545	0.472
120	19	13.4	1.2	1.5	19.4	1,290	503	448	0.442	0.383
150	19	14.8	1.4	1.6	21.4	1,610	576	516	0.369	0.320
185	37	16.6	1.6	1.6	23.6	1,970	666	599	0.309	0.268
240	37	19.0	1.7	1.7	26.4	2,550	791	715	0.254	0.220
300	37	21.3	1.8	1.8	29.4	3,190	915	831	0.222	0.192
400	61	24.1	2.0	1.9	32.7	4,030	1061	968	0.197	0.170
500	61	27.1	2.2	2.0	36.3	5,040	1224	1122	0.179	0.155
630	61	30.8	2.4	2.2	40.8	6,440	1409	1297	0.167	0.144

## Double Insulated

### Cable Construction

Temperature Rating	110 °C
Voltage, U <sub>0</sub> /U	600 / 1000 V.
Conductor	Plain Annealed Copper Wire: IEC 60228 (Class 2)
Fire Proof Layer	Glass Mica Tape
Insulation	Flame Retardant Cross-linked LSOH Mineral Insulation Red, Black [2 core] Red, Yellow, Blue [3 core] Red, Yellow, Blue, Black [4 core] (others colour available upon request)
Filler (if any)	Non-hygroscopic fillers
Binder (if any)	Binder tape
Sheath	Flame Retardant LSOH Compound; ORANGE

### Cable Characteristic / Performance

Fire Resistant in compliance to IEC 60331, BS 6387 CWZ	
Flame Retardant in compliance to IEC 60332-3 (22, 23, 24)	
Operating temperature at 110 °C in compliance to BS EN 50363-1	
Zero Halogen Content in compliance to IEC 60754-1, IEC 60754-2 and BS EN 50525-1	
Low Smoke density in compliance to IEC 61034-2	
Limiting Oxygen Index (LOI) shall be greater than 30% In accordance with ASTM D2863	
Voltage Test	3.5 kV / 5 min
Minimum Bending Radius	6 ~ 8 times of overall diameter (OD)



Conductor			Nominal insulation thickness	Nominal sheath thickness	Approx. diameter of cable	Approx. cable weight	Current Rating in air	
Size	No. of strands	Nominal diameter					Free Air	Voltage Drop
mm <sup>2</sup>	No.	mm	mm	mm	mm	Kg / Km	Amps	Refer to NOTE #1 mV / A *m
2C x 1.5	7	1.6	0.7	1.8	11.1	140	34	32.8
2C x 2.5	7	2.0	0.7	1.8	12.0	180	45	20.1
2C x 4	7	2.6	0.7	1.8	13.0	220	59	12.5
2C x 6	7	3.1	0.7	1.8	14.2	280	75	8.34
2C x 10	7	4.1	0.7	1.8	16.0	390	103	4.96
2C x 16	7	4.8	0.7	1.8	17.7	530	136	3.12
3C x 1.5	7	1.6	0.7	1.8	11.7	170	29	28.4
3C x 2.5	7	2.0	0.7	1.8	12.6	210	38	17.4
3C x 4	7	2.6	0.7	1.8	13.7	280	50	10.8
3C x 6	7	3.1	0.7	1.8	15.0	350	64	7.22
3C x 10	7	4.1	0.7	1.8	17.0	500	88	4.29
3C x 16	7	4.8	0.7	1.8	18.8	700	116	2.70
3C x 25	7	6.0	0.9	1.8	22.3	1,040	155	1.71
3C x 35	7	7.2	0.9	1.8	24.8	1,360	191	1.24
3C x 50	19	8.4	1.0	1.8	27.8	1,780	231	0.918
3C x 70	19	10.1	1.1	1.9	32.1	2,470	294	0.643
3C x 95	19	11.8	1.1	2.0	36.1	3,300	365	0.471
3C x 120	19	13.4	1.2	2.1	40.0	4,120	424	0.382
3C x 150	19	14.8	1.4	2.3	44.4	5,130	486	0.318
4C x 1.5	7	1.6	0.7	1.8	12.6	210	29	28.4
4C x 2.5	7	2.0	0.7	1.8	13.6	260	38	17.4
4C x 4	7	2.6	0.7	1.8	14.9	340	50	10.8
4C x 6	7	3.1	0.7	1.8	16.3	440	64	7.22
4C x 10	7	4.1	0.7	1.8	18.5	630	88	4.29
4C x 16	7	4.8	0.7	1.8	20.5	890	116	2.70
4C x 25	7	6.0	0.9	1.8	24.5	1,340	155	1.71
4C x 35	7	7.2	0.9	1.8	27.3	1,750	191	1.24
4C x 50	19	8.4	1.0	1.8	30.6	2,300	231	0.918
4C x 70	19	10.1	1.1	2.0	35.6	3,230	294	0.643
4C x 95	19	11.8	1.1	2.1	40.1	4,330	365	0.471
4C x 120	19	13.4	1.2	2.3	44.6	5,420	424	0.382
4C x 150	19	14.8	1.4	2.4	49.3	6,720	486	0.318

NOTE # 1: 2C - 1 Phase System, 3C or 4C - 3 Phase System

## Double Insulated

### Cable Construction

Temperature Rating	110 °C
Voltage, U <sub>0</sub> /U	300 / 500 V.
Conductor	Plain Annealed Copper Wire: IEC 60228 (Class 2)
Fire Proof Layer	Glass Mica Tape
Insulation	Flame Retardant Cross-linked LSOH Mineral Insulation Black & White (Insulated core with numbering)
Filler	No
Drain Wire	Tinned Annealed Copper Wire
Overall Screen	Aluminium Foil
Binder (if any)	Binder Tape
Sheath	Flame Retardant LSOH Compound ; RED

### Cable Characteristic / Performance

- Fire Resistant in compliance to IEC 60331-21, BS 6387 CWZ
- Flame Retardant in compliance to IEC 60332-3 (22, 23, 24)
- Operating temperature at 110 °C in compliance to BS EN 50363-1
- Zero Halogen Content in compliance to IEC 60754-1, IEC 60754-2 and BS EN 50525-1
- Low Smoke density in compliance to IEC 61034-2
- Limiting Oxygen Index (LOI) shall be greater than 30% In accordance with ASTM D2863
- Voltage Test 2 kV / 1 min
- Minimum Bending Radius 6 ~ 8 times of overall diameter (OD)



Size	Conductor		Nominal insulation thickness	Nominal sheath thickness	Approx. diameter of cable	Approx. cable weight
	No. of strands	Nominal diameter				
No x mm <sup>2</sup>	No.	mm	mm	mm	mm	Kg / Km
1 Pr x 1.0	7	1.3	0.6	0.9	8.6	80
2 Pr x 1.0	7	1.3	0.6	1.1	10.3	130
3 Pr x 1.0	7	1.3	0.6	1.2	13.7	190
4 Pr x 1.0	7	1.3	0.6	1.2	15.1	240
5 Pr x 1.0	7	1.3	0.6	1.2	16.7	290
7 Pr x 1.0	7	1.3	0.6	1.2	18.3	370
10 Pr x 1.0	7	1.3	0.6	1.4	23.8	540
1 Pr x 1.5	7	1.6	0.7	0.9	9.6	100
2 Pr x 1.5	7	1.6	0.7	1.2	11.7	170
3 Pr x 1.5	7	1.6	0.7	1.2	15.6	250
4 Pr x 1.5	7	1.6	0.7	1.2	17.3	320
5 Pr x 1.5	7	1.6	0.7	1.3	19.2	390
7 Pr x 1.5	7	1.6	0.7	1.3	21.0	510
10 Pr x 1.5	7	1.6	0.7	1.5	27.4	730
1 Pr x 2.5	7	2.0	0.8	1.0	11.1	130
2 Pr x 2.5	7	2.0	0.8	1.3	13.4	230
3 Pr x 2.5	7	2.0	0.8	1.3	18.0	340
4 Pr x 2.5	7	2.0	0.8	1.3	20.0	440
5 Pr x 2.5	7	2.0	0.8	1.4	23.3	540
7 Pr x 2.5	7	2.0	0.8	1.4	24.4	710
10 Pr x 2.5	7	2.0	0.8	1.7	32.1	1040

Marketed by:

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