



FIRE PROTECTION FOR CABLES

Fire resistance & fireproofing; same or different?

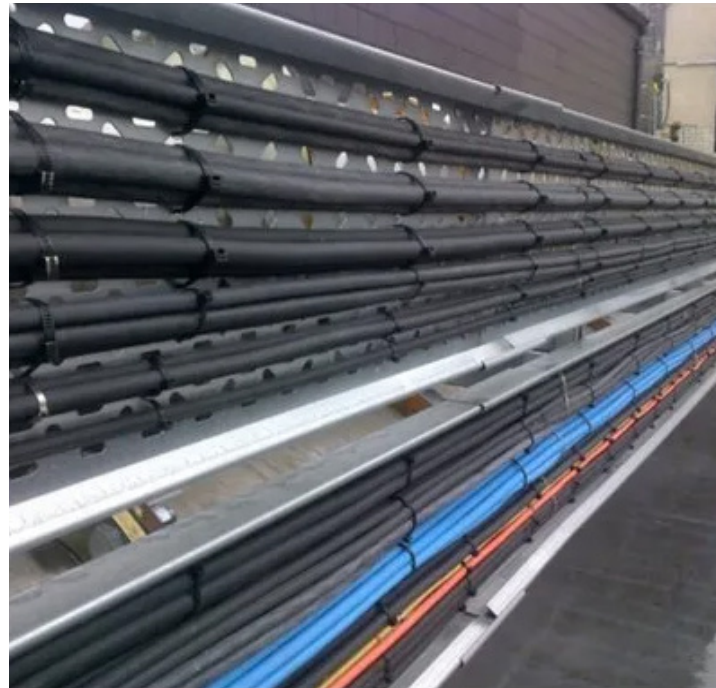
INTRODUCTION

Fires happen sadly, and we all know there are different fire protection strategies to control or suppress fire and limits the damages of the fire.

Cables as we all know have a primary use of providing power to equipment and machinery.

Whether it be in an industrial application in a refinery, steel plant or mining operation, or in a commercial building or residential apartment, we see different requirements for protection of cables.

The article will discuss fire resistance, circuit integrity and rapid flame spread on PVC sheathed power cables and the different fire protection requirements; whether they are mandatory in our NCC/BCA for our buildings recommendations from insurers or wanted for just good asset or business interruption for example.

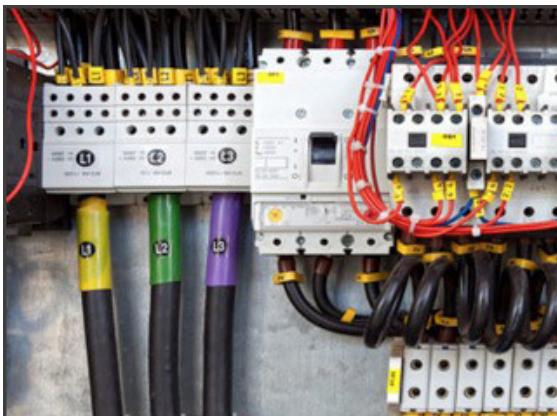


COMMERCIAL AND HIGH-RISE RESIDENTIAL

In Australia, we have the NCC/BCA which outline the technical design provisions for a compliant building.

Some of us know AS3000, the primary design standard used for NCC/BCA compliance; this is our wiring rules for electrical installations. We all respect those electrical contractors who are trained to design and install our cabling and deal with the hazards of live electricity; I would not want to do it!

In layman’s term we have critical equipment which need to operate and do things when we have a fire event, and the building fire alarm and warning system operates. I think the correct term for these is essential services. There are too many to list here, but an example that comes to mind is the wiring to smoke exhaust fans, which are used to control smoke movement in building in the advent of a fire. We do not want the fire to cause the smoke exhaust fans to stop working and allow additional smoke to spread.



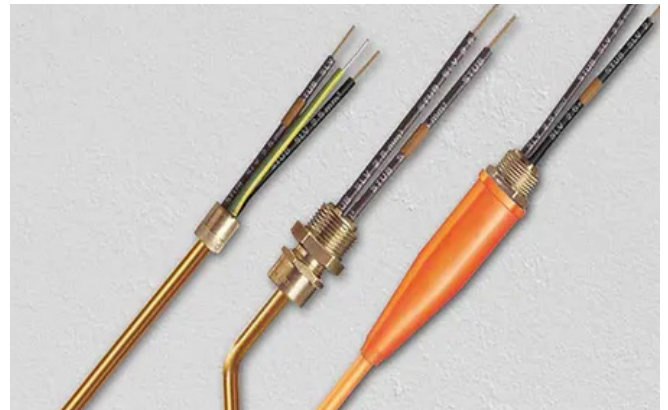
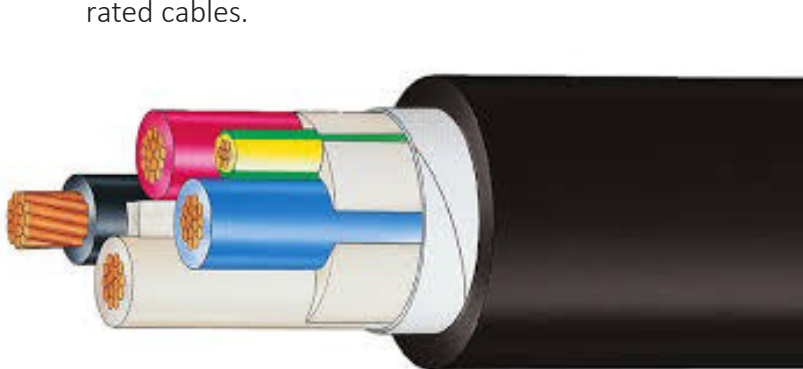
FIRE RATED CABLES AND CIRCUIT INTEGRITY

For these applications we have AS3013 – Wiring for fire resistance.

This outlines fire testing requirements and other important specifications for cabling to essential services.

This requires a fire resistance test using the principals of AS1530 Part – 2014 and ensure that the electrical circuit integrity will not be interrupted for a 2-hour period for example.

I am showing my age here, but I remember Pyrotenax or Metal Insulated Metal Sheathed (MIMS) fire rated cables. In today’s market we have PVC sheathed variants, and I am proud to say I had some peripheral involvement many years ago with the technology behind Pyrolex, a ceramifiable compound used on Olex fire rated cables.



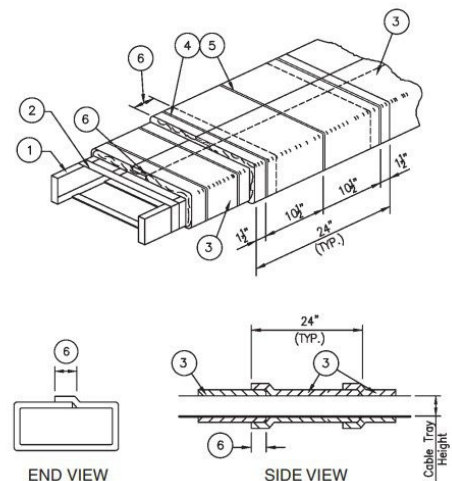
PASSIVE FIRE PROTECTION MEASURES TO PROTECT CABLES FOR FIRE RESISTANCE

Another option or alternative to fire rated cables, is to enclose non-rated cables in a fire rated cable duct, enclosure or to wrap them in a fire tested blanket for example.

Fire testing methods exist for this; we have a relatively new section in AS1530 Part 4 which deals with critical services including electrical wiring.

One important design criteria that can be challenging here is the so called derating of cable current capacity if the passive fire protection increases the temperature adjacent to the cables as they are “buried” or enclosed by thermal fire protection assemblies.

I have seen this come up time and time again; and a standard FRL does not apply. Why? The criteria of temperature rise for a standard enclosure fire tested to AS1530 Part 4 is 180 degrees Celsius; whereas for high voltage cables for example, their operating design caters for temperatures to be kept as low as 80 degrees Celsius to provide the current output they need to. This requires much more expensive and thicker or higher performance materials to withstand 1000 degrees Celsius and maintain almost ambient conditions inside the enclosure adjacent to the cables. Mechanical ventilation or clever intumescent air transfer grilles may be required to meet the design requirements here.



FIRE STOPPING OF OPENING IN FIRE RATED BARRIERS

It would be remiss of me not to talk briefly about fire stopping of openings through fire barriers as this has been a big part of my life. For standard non rated cables, we expect them to burn and spread fire along the jacketing but we hope that correctly installed and fire tested systems to close off the holes around the cables, cable trays and the like will keep the fire in one fire compartment and stop it spreading to another; whether this is via a wall, shafts, ceiling, floor or other fire rated barrier type.

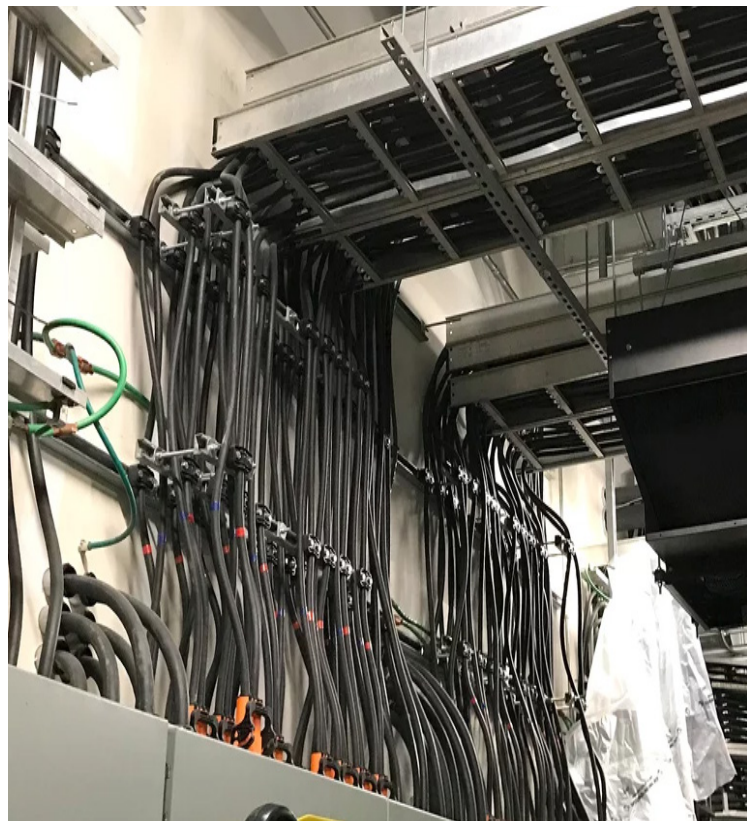


INDUSTRIAL AND MANUFACTURING OR POWER GENERATING FACILITIES

We see a very different fire protection challenge for cable in manufacturing plants, refineries, sub stations, telephone exchanges, nuclear power plants or the new challenge of Batteries Energy Storage Systems (BESS).

Here we typically see a plethora of cable trays, running around equipment. A spider web of cable trays and a high density of PVC sheathed cables are typical.

Real fire and history have shown us that a fire starting on one cable tray will spread quickly along either a horizontal or vertical cable tray. The molten droplets of PVC will drip like candle wax and fire will start on other cable trays. Ignoring the acrid and acidic smoke which quickly causes issue with electronics, the fire spread can destroy a factory or industrial facility.



ENTER THE INSURERS:

There is no bigger underwriter in the world than **Factory Mutual; aka FM Global.**

It is not the NCC or BCA which governs the fire protection requirements; it is the insurance.

An Underwriter, like FM Global for example will quantify the risk to property and more importantly business interruption, and the insurance premium will be set accordingly.

FM Global have their own approval standards and fire test methods and facilitate fire testing of materials and issue FM product or system approvals against these fire test methods.

FM3971 is one pertinent example for single and grouped cables.

It deals with mitigating fire spread for Grouped Cables.



Examination Standard for Fire Protective Coatings and Wraps for Grouped Cables

Class Number 3971

October 2023

Category	Coatings and Wraps For Grouped Electrical Cables (Class Number 3971, 2019)
Approval Standard	FM 3971 - Fire Protective Coatings and Wraps for Grouped Cables
Certification Type	FM Approved

There is a range of test that form part of the FM3971, including fire spread, de-rating or non de-rating of the cables, longevity, fitness for purpose and more.

There are many fire test method globally which deal with just fire spread such as IEC 60332-3 for example, but for mine the **FM Approval Standard FM 3971 is the most stringent, most thorough and the hardest to obtain and therefore the insurance industry standard.**

IEC 60332-3-22:2018

Tests on electric and optical fibre cables under fire conditions
- Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category A



PASSIVE FIRE PROTECTION MATERIALS

Spray applied fireproofing cable coating materials

The only product or systems, until recently that have been allowed to be used and have had FM Approval to FM3971 have been spray applied, so called fireproofing cable spray materials.

The very first material approved under FM3971 over 30 years ago was a German product from **SVT Brandschutz** which was an intumescent cable coating. Today most of the materials are [Ablative, including SVT Flammotect A](#).



Application of spray applied fireproofing cable coating materials

Applying cable coating is not easy. The ablative coating is not a paint, it is a thick mastic, and requires high pressure, specialist machine and experienced operators. The cables need to be clean of dust, grease and grit to allow cohesion of the material.

A good example of the strength and experience of FM Global can be seen in the fact that even though 0.6mm of fireproofing cable coating can resist the harsh vertical flame spread test; FM global insist on a minimum of 1.6mm of fireproofing cable coating.

So back to the application of the fireproofing cable coating.

What needs to happen to get it applied?

A good spray applicator will need to:

- **Clean the cables** – this can be more expensive and time consuming than the application itself
- **Masking of adjacent areas** – Cover up adjacent areas to avoid everything getting coated when the spray
- **Specialist Equipment** – Procurement of Compressor, Spray machinery, spray tips
- **Transport to site** - Transport their specialised spray guns and large bulky pallets of materials to site
- **Stop production in the area to spray all cables;** taking wet film measurements to ensure the require dry film **thickness of 1.6mm for FM3971 compliance** is achieved; this may require several concurrent shut downs to achieve
- **Remove masking**
- **Dispose** of pallet, empty drum and spray soaked masking
- **Transport** waste and spray guns back to their depots



Phew, done; very expensive exercise, requiring specialist application equipment, and skilled and approved applicators.

Adds, move and changes of cables

Now what happens?

The facility wants or need to add or move cables.

You can add them easily and run them on top of the sprayed cables in the tray, but now you have to do more coating. **Eat, sleep, spray repeat.** Removing cables is near impossible. Excuse me if I say the spray applied cable fireproofing materials “stick like shit to a blanket”.

Cables inside the spray stay there. They cannot be re-used elsewhere and we all know how expensive cables are. Why buy new ones; I think it would be utopia if we could re-use the old ones, I hear the facility owner say repeatedly.



Spray applied fireproofing cable coating materials

They say the German's are the best engineers; another proof in point!

Trafalgar, my company has represented SVT Brandschutz in Australia & New Zealand as it partners for spray applied cable coating for about 15 years now.

About 10 years ago, whilst I was having a nice German beer with the owner and technical director of SVT Brandschutz in a beer garden in Germany I asked them if they had thought of wrapping cables instead of spraying them.

“Oh John, we have always made and sold cable coating. You know we were the first company to comply with FM3971”

Fast forward a very long and arduous 10 years and another world first from SVT Brandschutz. A patented, very thin, cable wrap; or translating from German to English, a cable bandage; **Pyrosafe DG.**

Why 10 years, you might ask.

Both SVT Brandschutz & Trafalgar had to get FM Global to rewrite FM3971 to cater for a new way to wrap a cable tray with a bandage and to ensure fire spread inside and outside of the bandage will not happen. This does not happen quick.

FM3971 was rewritten and published to allow for both spray applied coatings and wraps.

SVT Brandschutz is the first wrap material to be fire tested and go through all the other required testing and gain an FM 3971 Approval.

Trafalgar and yours truly are proud to be involved in this game changer, which is now available in both Australia and New Zealand.

Application of PyroSAFE cable fireproofing wrap material

Cut wrap to width of cable tray and required overlap, wrap around and secure with strap and belt buckle like clip. Yes, that easy.

- Clean the cables – **NO NEED TO CLEAN CABLES**
- Masking of adjacent areas – **NO MASKING REQUIRED**
- Transport to site- Transport their specialised spray guns and large bulky pallets of materials to site – **ONLY CARTONS OF WRAP AND STRAP AND BELT BUCKLES TO TRASPOT**
- Wrap all cables and secure with straps; **NO NEED TO MEASURE AS WRAP THICKNESS IS PREDEFINED.** – **FAST, CLEAN & EASY**
- Remove masking- **NO MASKING REQUIRED**
- Dispose of pallet, empty drum and spray soaked masking – **CARDBOARD CARTONS CRUSHED & PUT IN RECYCLING BIN AT FACILITY**
- Transport waste and spray guns back to their depots – **NOT APPLICABLE**



1. MEASURE



2. CUT



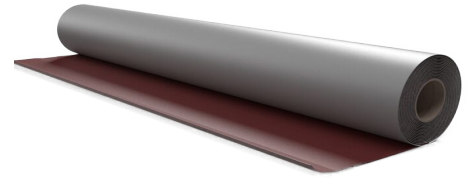
3. WRAP



4. SECURE WITH PROVIDED STRAPS

Adds, move and changes of cables

Open belt buckles, partially open the wrap, add new or remove old cable and then close up wrap and close belt buckles.



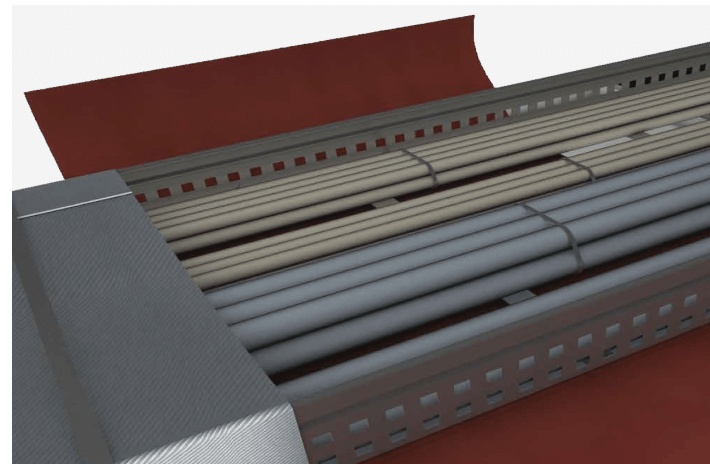
Costing of PyroSAFE cable fireproofing wrap material

Sounds to good to be true, so what the catch; I can hear you saying to yourself and you read this. The landed material costs and sell price for materials, when we compare our SVT Flammotect A cable coating and the SVT PyroSAFE wrap are almost on par.

As Trafalgar we do not have to deal with shelf-life concerns of our stocks of cable coating, logistical nightmare trying to help ship drums to remote locations for our client when we sell the wrap.

For me I can see the world and for us Australia & New Zealand going exclusively to [SVT PyroSAFE wrap](#); we will continue to stock and offer spray applied cable coating as long as there is a demand, but common sense and economics, coupled with compelling simplicity suggest that cable coating might be retired like the horse and cart and we will now see cable bandage be the vehicle we drive today.

Don't Let This Happen to You




PyroSAFE Wrap opened up after a fire test-

Watch the Full Video- [Click Here](#)



FIRE PROTECTION FOR CABLES By John Rakic

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CABLE FIREPROOFING APPLICATION COSTS			Wrap Savings
Process Step	Cable Coating Spray Applied	Pyro Safe- Cable Wrap	\$
Preperation, Pre - Install and Logistics	Material Cost	\$50 per sqm	\$↑
	Overspray (material waste)	Cost of overspray of cable coating- \$15-20 per sqm (average estimate)	✓ NIL
	Plastic Masking	Mask area to avoid overspray 	✓ NIL
	Pre- Cleaning of Cables	Clean cables to allow coating to adhere- This can be VERY expensive and cause damage to cables 	✓ NIL
	Specialist Equipment	Compressor, Spray machinery, spray tips 	✓ NIL
	Transport to Site	Transport Bulk material and specialist equipment to site 	✓ Light textile material 
Installation and Waste Disposal	Installation Complexity	Spray coating to achieve 1.6mm DFT  Hard to coat evenly, Carefully check thicknesses to ensure compliance 	✓ Simple: • Wrap thickness is pre-defined. • Guaranteed performance
	Waste Disposal	<ul style="list-style-type: none"> Remove masking Transport empty drums and masking material from site Dispose of empty drums and soiled masking material 	✓ Cardboard in site recycling bin 
	Plant Upgrades: Changes to cable distribution	New cables	Will require additional cable coating
	Old cable removal and redeployment	Cannot remove from coated bundle	✓ Open wrap,remove cable, re-close wrap
Overall Costs		\$↑	\$↓

