

# Holy, whole and holes?

**Holy** shit, this **whole** passive fire protection is more than just **holes** in walls!

This is not Dr Zeus, but Doc PASSIVE at work here.....

- What is the secret to getting the correct FRL for service penetrations?
- Have we overcomplicated things?
- Why is it OK on one project and not the next?
- Am I missing something?

For 30 years, I seem to hear myself saying the same things, over, and over again.

Yes, you do need to provide a fire stop where your services pass through a fire barrier

No, its just not as simple as shoving some fire pillows in the hole around the pipe

The fire sealant is intumescent and that means it swells up in fire conditions to STOP the fire burning through when the cables melt

No fire mortar is not just concrete, if you filled the hole with just concrete it would shrink and fall out very quickly in a fire

No, even a 20mm conduit or plastic pipe does need to be fire stopped!

To be honest, I could have written probably hundreds of little sentences like this here, and these were the first few that just came to mind.

## So, what is this article about?

This article is trying to help those who work in construction gain a better understanding of how to get passive fire protection right the FIRST time.

Whether you are the builder, plumber, electrician, mechanical services contractor or anyone involved with building services, this should be a useful guide to understanding the BASIC questions you need to ask yourself to get a compliant, as installed FRL for a service, or a cluster of services, that need to run through a wall or floor required to have an FRL.

If you do not know what an FRL is, you SHOULD; it's the legal term for a required "fire rating" in our buildings. I am not going to explain it in this article.'

## No foresight and lack of co-ordination of trades

Before I provide a cheat sheet to assist you all hopefully have the tools and knowledge to get it right the first time, I will say that ever since I got into the so called “Passive Fire Protection” industry in 1992, and being a qualified Engineer, I struggled to understand why this industry sector is so guarded, secretive and insular.

Everyone tries to keep things a secret, and put a big BLACK BOX around what can and should be a relatively simple thing; that is providing a “Fire Stopping” SYSTEM, to ensure that all openings in fire barriers are “filled”, “fully-closed” or “protected” so that in a real fire, that the fire will not pass from one-side of the fire barrier to the other-side.

The biggest problem if I can only nominate only one, is that more often than not, **passive fire protection is sadly an after-thought**

Too often, as a leading manufacturer and supplier of products for passive fire protection, our technical team, are asked to provide advice to “fire stop” messy and complicated openings, with a plethora of mixed services, all in close proximity to one another.

This all too common scenario results in expensive and complicated solutions, that if only some foresight had only been there, and if the builder had applied more control as to what trades can run what services where, would have been quick, cheaper and much simpler to do.

# The BASIC building blocks for first time compliance

Let's work through a cheat sheet or check list for you all.

And to think; in 2001, like many others, I got paid handsomely as a consultant to provide this type of advice.....

Today it's FREE, please take the time to read and understand it, but most importantly, IMPLEMENT IT on your projects. PLEASE, PLEASE, & one more PLEASE!

## The questions I ask myself instinctively, and in this particular order, are:

### 1. Have you made the hole yet, and are the service run?

As I said earlier, sadly in most instances, when people reach out to our Trafalgar Technical team, the answer is YES; the holes are already made, in fact there is about 150 of them; and yes, all of the services are there already. We need to complete our works on this building by tomorrow, so we need URGENT technical help. My mate said you guys helped him on his project recently hence why I called.

Sadly, it's not just a matter of shoving the same something in each hole; it will probably require a different fix for each opening!

Can you come over this evening and fix it all for us?

We only manufacture and sell products and we own the fire tested SYSTEMS for our products.

Really? You don't do installation? You only sell products? Can you tell me who can help us? We need them on-site tonight!

.....

If, you involve the manufacturer BEFORE you make the holes and run the services; YES, this means to do some planning, you will be pleasantly surprised how much faster, cheaper and easier the whole exercise can be.

Those who, for example, use cast-in situ products, like our Trafalgar FyreCHOKE fire collars (ideal for plastic pipes in floor slabs), , our FyreBOX Cast-in unit for large multi-service opening in floor slabs, and last but not least, our FyreBOX Slab Mount, as another example, whereby you can do the fire stopping BEFORE the wall is even built. These products provide HUGE benefits. They make the correct size opening in the fire barrier for you, and already incorporate the intumescent fire stopping materials.



Trafalgar FyreCHOKE cast-in situ fire collars; either high cast or low cast models are often used to make provision for the proposed plastic pipe penetrations in floor slabs – simply nail them onto formwork in the correct position, pour the concrete and the opening is made for the plastic pipe, complete with fire stopping included



Trafalgar's patent cast-in FyreBOX units getting ready to be covered in concrete and allowing the correct opening size to be made in a floor slab without the need for an opening to be made by the formwork contractor the conventional way.



The patented Trafalgar FyreBOX Slab Mount; this was installed prior to Hebel wall being erected, not only making the hole, but allowing services to be run BEFORE the wall is in place; please note – one trade, electrical was late, so final fire stopping using the graphite impregnated inserts and FyreWRAP will be done when services are complete.

I bet many people reading this, will be pleasantly surprised to see how neat and easy it can be done!!!!

## 2. What is the fire barrier and the FRL required?

Each type of fire barrier requires specific fire testing to establish what FRL can be achieved.

In turn, all openings in each type of fire barrier, also need specific fire testing to verify that the FRL can be maintained.

Openings include fire doors, fire rated access panels, ducts and fire dampers, movement or control joints, and of course openings and holes for services.

It makes good sense then, that one of the first series of questions need to be:

### What is the fire barrier?

- Horizontal floor slab?
- Fire rated ceiling?
- Fire rated services or riser shaft?
- Fire wall?
- Plasterboard, Block work, tilt up concrete, Speedpanel, Hebel, Pronto panel etc etc?

### What is the FRL?

Examples might include:

- -60/60?
- -90/90?
- -120/120?
- 60 minute RISF ceiling where a ceiling cavity is present?

Once we know this information we have the baseline for compliance

### 3. What is the hole size and shape in the fire barrier?

Why is this important?

The opening size and shape will be the first variable needed to select an appropriate fire stopping product

Is the opening small, medium or large?

Is it round, square or has it been bashed through the wall and irregular in shape?

### 4. What service or services passing through the opening?

Together with question 3, above, knowing the opening sizes & shapes, together with the service or services passing through each opening, will allow us to select an as fire tested SYSTEM or configuration which allows the FRL to be maintained.

Let's look at some opening and service configurations to get a better understanding of how this helps us select a product and then verify if there is a fire tested SYSTEM for each example. I will use Trafalgar FyreSTOP product names to provide examples as I most familiar and confident with my own products and fire tested SYSTEMS.

#### A Blank or plain opening

Often forgotten, we see many holes in fire barriers that contain no services for some reason or another. These one could argue are the easiest to understand, but notwithstanding this they still need to have a fire tested SYSTEM.

#### **Blank opening solutions**

Small openings can be filled with Trafalgar FyreFLEX fire rated sealant; the maximum hole size in this case is a 50mm in diameter.

Trafalgar FyrePLUG fire pillows can also be used for blank openings, the larger the whole the more expensive this solution is. They have fire test SYSTEM data for very big openings. I don't typically like them used in floor slabs, even though they have been fire tested, and this is because gravity is not your friend here.

Trafalgar FyreSET mortar is handy for floor slabs as it doesn't need reinforcing to be used but does require mixing and removable formwork to be employed.

Trafalgar Maxilite FyreBOARD is commonly used as it can be cut oversize and fixed over the opening, not requiring exact cutting for a friction fit solution like our Trafalgar FyreBATT's for example.

## Single opening / single service

The simplest example of a service penetration is a single pipe or cable passing through a hole.

Sadly, even these can get somewhat complicated.

### **Pipe types**

There are so many pipes types and of course then there is the added complication of the use insulation, now prevalent with the advent of NCC, Section J.

- Plastic
  - PVC, HDPE, PP, PEX, PEX-AL-PEX
- Metallic
  - Cast iron, steel or copper
- Insulation types
  - None, Armaflex or similar, FR Armaflex or similar, Thermotec, EPS, Rockwool, Foiled or not foiled?
- **Is there a fitting or elbow on the pipe and is it in the opening?**

For plastic pipes, I think most people know they can use an intumescent fire collar such as our Trafalgar FyreCHOKE range?

For smaller plastic pipes and conduits, Trafalgar's FyrePEX HP (high performance) graphite sealant or mastic is proving very popular.



*Trafalgar FyrePEX HP graphite sealant – ideal for use of conduits and PEX and PEX-AL-PEX pipes*



With the use of the Trafalgar FyrePEX HP sealant as shown in the picture above, we got many complaints from certifiers saying it was too difficult for them to check the annular gap between the edge of the pipe and the hole in the opening, and more importantly it is impossible to check the depth of the sealant that was installed without doing a destructive test on some random samples to check this on site.

The clever use of an external Trafalgar FyreSHEATH, another innovative and responsive solution we developed to solve these problems. It takes away the pain for the installer of trying to make the perfect size hole, creating the necessary annular gap required for correct fire stopping around these service types. The use of a FyreSHEATH also allows for easy visual compliance by the certifier and helps to ensure the correct depth of Trafalgar FyrePEX HP is used and can easily be verified.



*A Trafalgar little orange FyreSHEATH being employed on the surface allowing Trafalgar FyrePEX HP graphite sealant to be applied to the correct depth, allowing easy identification for certifiers and reducing complexity of install for the contractors.*

For plain metallic pipes (or non-insulated or non-lagged pipes), there are many fire stopping products that can be used, but as part of the fire tested SYSTEM you will typically need Trafalgar FyreWRAP or its thinner cousin Trafalgar TWRAP to achieve the full FRL. The reason for this is the high thermal conductivity of metal pipes, results in heat flow through the wall and the fire stopping. The use of the wraps keeps the temperatures below the required limits during fire testing providing the important insulation component of an FRL.



Copper pipes undergoing fire testing incorporating Trafalgar FyreFLEX fire rated sealant in the opening at the wall, and FyreWRAP and/or TWRAP insulation materials to reduce the impact of heat conduction through the wall by the highly thermal conductive nature of the metallic based services.

For insulated metallic pipes (typically insulated copper), an intumescent material is required to fill the void left by the foam when it will melt early in a fire.

We have found that our FyreBOX Mini's are very popular here, and are available as small as 50mm diameter and right up to 150mm diameter, as well as a small 65mm square unit and the bigger 100mm square unit. These now come with our FyreFLANGES which allow for some oversized openings to be catered for.



*A FyreBOX Mini being fire tested with Therмотec insulation and passing through a plasterboard fire wall. You will notice the small flange on this fire tested unit; Trafalgar have recently fire tested a much more forgiving FYREflange to allow for less rigour in creating the "perfect" hole size for use with these intumescent fire stopping SYSTEMS.*

## Cable types

Again, there are lots of cable types and sizes

- Power
- Earth
- Data or network
- TPS, etc, etc. etc.....

The size of the cable, and most importantly its copper core diameter is very important to know as this has a big bearing of fire performance especially in terms of thermal conductivity under heat.

All of Trafalgar's products have been fire tested with cables.



*A small bundle of larger core power cables being fire tested without a cable tray; note the Trafalgar TWRAP insulation*



*A cable tray with a large assortment of cables being fire tested; please note AS4072 Part 1 provides some acceptable and typical installations that require fire testing; again, please note the fully encapsulated Trafalgar TWRAP. It allows relatively short lengths to be provided and is thin and easy to wrap around services.*

## Single opening / with multiple services - same service type

The next configuration is a single opening or hole with multiple services which are the same.

### Cables

Multiple cables will often be passed through the same opening.

Depending on the quantity and types of cables, the fire stopping will be different.

For cables not on cable trays, and for relatively small cables, some Trafalgar fire tested SYSTEMS are quite painless and cost effective. Trafalgar FyreFLEX fire rated sealant applied to small opening with multiple cables, can provide as high as a FRL of -120/120 but require coning or a fillet of sealant around the cables outside the opening (as well as inside the opening of course).



Penetrations tested in Hebel, SPEEDPANEL, FyreBOARD  
Maxilite, Plasterboard and concrete fire barriers

Just like for single insulated copper pipes, the Trafalgar FyreBOX mini range is ideal for cables, especially data cables, as it allows for easy adds, moves and changes of cable over the life of the building.



*FyreBOX Mini's are ideal for data and network cables and here is one example of some on site installations through a floor slab shown from below*

Things get more difficult when it comes to larger quantities of cables and the use of cable trays or cable ladders.

Trafalgar have worked hard to allow the cable trays to pass through the opening (not having to be terminated either side of the opening) and has many fire tested SYSTEMS to cater for this scenario.

Some examples include Trafalgar FyrePLUG fire pillows, Trafalgar FyreSET fire mortar, Trafalgar FyreBATT's, Trafalgar Maxiite Fyreboard and the most tested SYSTEMS are for our larger FyreBOX Maxi's which can cater for double cable trays, side by side, or even on top of each other.

Why so many choices? They have just evolved over time and each has its own merits and people just like to do the same thing different our experience has shown.



*Trafalgar FyreBOX Maxi's being installed to protect large banks of the same service type (insulated copper services) passing through a fire rated floor slab*

All of these systems, due to the high thermal conductivity of the metallic cable trays require the addition of Trafalgar FyreWRAP or Trafalgar TWRAP for 300 to 450mm either side of a wall, and for floor slabs, 300mm to 600mm in length depending on the fire barrier type and thickness, the size of cable trays, and type and quantity of cables employed.

## Single opening / with multiple & mixed service types

This is where things would previously been extremely messy.

Builders would need to re-route services into same types and pass them through individual openings with 200mm of separation in between respective openings.

Trafalgar, saw so many of these configurations and decided to develop SYSTEMS that have been fire tested and allow mixed service types all through one single opening.

Enter the Trafalgar FyreBOX. Some of which are patented and very innovative systems

Extensive fire testing has been conducted and we have conducted so many fire tests, we now have a database which allows us to provide fire test approvals for all sorts of configurations of cable trays, cables, metallic pipes, plastic pipes, insulated metallic and plastic pipes, even with PEX and PEX-AL-PEX pipes.



*A Trafalgar FyreBOX Maxi solving a real world and typical commercial construction installation – please note this photo is taken before the FyreWRAP or TWRAP has been installed*





*A final cable tray installation with a cable trays, multiple cables all nicely finished with EyreWRAP to provide a full FRL of -120/120 in this case*



*Another real life and typical application for the Trafalgar FyreBox range – again before application of FyreWRAP or TWRAP*

# So how do you know what fire barriers, products and service types will work?

Again, I can only speak for Trafalgar.

Our technical team have painstakingly developed technical manuals for each of our FyreSTOP products, which break down our fire tested system approvals, by fire barrier types and service types, CLEARLY allowing you to look the achievable FRL or fire rating for each scenario you might have.



## APPROVED SERVICES:

<b>Floor Slabs</b> (Minimum 120mm thick concrete slab)				
Service	Installation	Slab Opening (diam)	Fill depth	FRL
16mm PEX-A PEX-B PEX-AI-PEX	<b>Slab Fill</b> (from one side only)	40mm	60mm	-/120/120
1x Air Conditioning pair coil* FR insulated	<b>Slab Fill</b> (from one side only)	100mm	60mm	-/120/120
Up to 3x Air Conditioning pair coil* side by side	<b>Slab Fill</b> (from one side only)	120mm	60mm	-/120/120
1x Air Conditioning pair coil* PE insulated	<b>Slab Fill with TWRAP</b> (Sealant from one side only with TWRAP applied for 300mm top side only)	100mm	60mm	-/120/120

\*A/C bundle to consist of two pairs of insulated copper pipes (pair coil) with insulation up to 20mm thick with or without: power cables up to 12mm OD, data cables up to 6mm OD and one flexible or rigid PVC drain up to 20mm OD.

*An abstract from the Trafalgar FyrePEX HP graphite sealant technical manual*

Pre-Installation: Approved services and fire barriers

### SpeedPanel walls – 78mm thickness

FyreBOX™ Maxi and Mini installed in double-layer plasterboard walls (64mm stud depth)			
Service type	Service specification	FRL (no wrap required)	FRL with Twrap/FyreWrap
Plastic pipes	Rigid or flexible uPVC conduits up to 32mm OD (with or without cables)	-/120/-	-/120/120
	PEX pipes up to 25mm OD	-/120/-	-/120/120
	PEX pipes 32mm OD	-/120/-	-/90/90
	PEX-al-PEX pipes up to 25mm OD	-/120/-	-/120/120
	PEX-al-PEX pipes 32mm OD	-/120/-	-/90/90
	cPVC sprinkler pipes up to 40mm OD	-/120/-	-/120/120
	cPVC sprinkler pipes 40-60mm OD	-/120/-	-/120/120
Bare metal pipes	Copper pipes up to 50mm OD	-/120/-	-/120/120
	Steel pipes up to 60mm OD	-/120/-	-/120/120
Insulated metal pipes	Copper pipes up to 50mm OD with PE insulation up to 20mm thickness	-/120/-	-/120/120
	Copper pipes up to 50mm OD with FR insulation	-/120/-	-/120/120
	Copper pipes up to 20mm OD with rockwool-type insulation	-/120/-	-/120/120
	Paicol pipes up to 9.5 and 19mm OD with PE insulation up to 13mm thickness	-/120/-	-/120/120
	Paicol pipes up to 9.5 and 19mm OD with FR insulation up to 20mm thickness	-/120/-	-/120/120
Power cables	Bundles of up to 12x TPS	-/120/-	-/120/120
	All other power cables	-/120/-	-/120/120*
Comms cables	All comms cables	-/120/-	-/120/120

Note: All systems to use minimum 300mm TWrap / FyreWrap to both sides of the wall as indicated

\* Large single-core cables require 450mm of TWrap / FyreWrap, all other power cables require 300mm

Options available for 51 and 64mm Speedpanel, contact our technical team for further information

Another example of FRL's achievable and well documented, this time for Trafalgar FyreBOX Maxi's in Speedpanel wall types

## Do you want more information from Trafalgar?

Visit [www.tfire.com.au](http://www.tfire.com.au) and you can easily find all of products and for each one, you will find a product datasheet, detailed technical manual and an MSDS where applicable for easy review or download for your records.



Request a Quote

Download Technical Manual

Download MSDS

Download VOC Certificate

Trafalgar Install Videos

*For each product, [www.tfire.com.au](http://www.tfire.com.au) web site provides useful and easy to find info*

## Summary

Ask yourself the following questions and gather the relevant information to help you determine what SYSTEM will work for your problem(s)

Have you made the hole yet, and are the service run?

What is the fire barrier and the FRL required?

What is the hole size and shape in the fire barrier?

What service or services passing through the opening?

- **A little bit of planning goes along way and saves time & money**
- FRL's are determined from one and typically multiple fire tests
- FRL's are fire barrier dependent
- The hole size and shape of the opening in the fire barrier is important
- The type and quantity of services often determine the products and SYSTEMS that will provide the requisite FRL
- Metallic pipes, larger cables, and cable trays will require the addition of FyreWRAP or TWRAP
- Where plastic pipes and insulation materials are used for / on pipes intumescent solutions will always be required
- The Trafalgar FyreBOX range caters for small, large and mixed service types
- Trafalgar's product specific system manuals make it easy to check for fire barrier types, services and achievable FRL's
- If you are not sure ask; call 1800 888 714 or email [technical@tgroup.com.au](mailto:technical@tgroup.com.au)