

# A practical guide to the maintenance of passive fire & smoke containment systems



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# Introduction

Fire protection systems are installed in most of our buildings and when operational do save lives and property.

Just like our motor vehicles, however, fire protection systems require some regular maintenance to ensure that they will operate when we need them to.

This document has been prepared to provide some useful and necessary guidance in relation to maintenance of passive fire & smoke containment systems. In many ways these systems are the simplest for of fire protection, consisting in the main of physical barriers, to stop the spread of flames, hot gases & smoke, yet in terms of Australian Standards they suffer from the least amount of useful guidance.

It is hoped that this Guide will assist Building owners and operators, and those involved in maintenance to be able to practically implement a practical maintenance regime using what is currently contained in Section 17 of AS1851 – 2005.

***It is published as Version 1.0 hopefully will provoke some good feedback and improvement suggestions so subsequent updated versions can follow.***

Please send feedback to [maintenance@pfpa.com.au](mailto:maintenance@pfpa.com.au) or call the principal author John Rakic on (02) 9416 0451.

## Disclaimer

This Guide is really just that, Building owners, operators and maintenance providers are ultimately responsible for the well being of their building and the fire protection systems within them and need to take the ultimate responsibility on how they maintain them and what is adequate.



## What is passive fire & smoke containment?

Passive fire and smoke containment relies in the main on physical barriers to stop the spread of flames, hot gases and smoke from passing from one area of a building to another; or from one building to another.

The Building Code of Australia requires fire or smoke compartments for different building classes and types of construction. These consist of physical fire or smoke barriers which manifest themselves as so-called fire walls or smoke walls, and fire resistant ceilings or fire rated floor slabs. These as built barriers are required to be identical to fire tested systems with proven fire ratings or FRL's.

In most of these fire or smoke barriers, we typically require large openings such as door, shutters or curtains for movement of people or goods, and smaller openings for reticulation of building services such as mechanical ventilation, plumbing, electrical and communication cabling. These openings, just like the fire or smoke barriers, require fire stopping systems which are also identical to fire tested systems with proven fire ratings or FRL's.



## What is maintenance?

Maintenance in the context of this Guide and Australian Standard, AS1851 – 2005, consists of inspection, testing (as applicable) and preventative maintenance at specific intervals (including the rectification of defects), which all ensure the continuing reliability of fire protection systems and equipment.

## Do passive systems require maintenance?

Many people argue that passive systems, such as fire walls are maintenance free, predominately because they have no moving parts. This argument has little or no merit, as a fire wall is prone to additional services being passed through it, such as new plumbing pipes, additional mechanical ventilation and most likely in today's buildings changes to network or electrical cable reticulation. These additional services and the associated penetrations made in the fire walls require compliant fire stopping to be installed. The fire wall can also be damaged by movement of goods or building movement itself, and may therefore require some repair work to re-establish the fire rating.

All said, it is imperative, like for all fire protection systems and equipment, that ongoing maintenance is conducted on all passive fire & smoke containment systems.



## What Australian Standards do we have for passive systems?

Prior to 2005, the only passive fire systems which had any Australian Standards for their maintenance were fire resistant door assemblies and fire dampers. Fire doors had their own Australian Standard, AS1851 Part 7, and fire dampers formed part of Australian Standard, AS1851 Part 7 – 1986.

In 2005, after several years of drafting and an extensive public comment process, Australian Standard, AS1851, a combined document, containing most fire protection systems and equipment was published.

This Standard includes a comprehensive Section 17, dealing specifically with passive fire & smoke containment systems. It covers the following passive systems:

- fire and smoke containment barriers encompassing fire walls, smoke walls, fire resistant floors, floor / ceiling system and bulkheads,
- structural fire resistant elements such as beams, columns, girders and trusses for example,
- fire door assemblies,
- smoke door assemblies,
- fire resistant shutter and fire curtain assemblies,
- fire resistant glazing,
- fire resistant access panels and ceiling hatches (man holes),
- fire resistant duct work,
- fire resistant movement or control joints,
- fire stopping of service penetrations encompassing metal & plastic pipes, electrical cable trays, cables, conduits and the like, and communication cables.

One also needs to look at Section 18 of AS1851, which deals with fire & smoke control features of HVAC systems. This section also contains some passive fire & smoke containment systems, namely:

- smoke exhaust or smoke control fans,
- fire dampers,
- smoke dampers,
- automatic or natural smoke & heat (fire) vents,
- automatic smoke curtains,
- fixed smoke barriers, and
- motorised air relief openings such as operable windows



## Why do we need this Guide if we have AS1851?

In theory we do not need this Guide if AS1851 captured all of the necessary guidance for practical implementation of maintenance into the “passive” area.

Unfortunately this is not the case, and it is not the place here to go through the reasons why, suffice to say that the Australian Standards writing process is slow and cumbersome, is a consensus process, and what is published is only the first attempt to Standardise the majority of what makes up passive fire & smoke containment systems. The Committee also adopted a one size fits all approach to the Standard for consistency purposes and this template in hindsight was probably less than ideal for the passive systems.

The most frustrating thing for those in the field, is that changes to AS1851, even editorial issues take several years to materialise themselves in an amendment or revision to the document.

So in short, this Guide is meant to provide some useful and practical interpretation to complement Section 17 of the current version of AS1851, and to provide some necessary additional items to make implementation of AS1851 feasible.

The subsequent sections will deal with the various issues in the current AS1851 and provides some guidance on what to consider doing.



## **Maintenance regimes for the different passive systems**

The current AS1851 does provide in a user friendly and tabular format, an inspection, testing & preventative maintenance regime for most of the different passive fire & smoke containment systems.

In the interest of keeping Section 17 to a reasonable size, the tabulated maintenance regimes are far from comprehensive and are only provided as a starting point for maintenance / service personnel.

It is imperative that the tabulated maintenance regimes are conducted by competent people, who have suitable training and experience both of a general nature and specific to the passive systems in question.

Manufacturer's published maintenance instructions for proprietary systems should also form part of all maintenance regimes.

Competency is determined by the individual State & Territory Legislative requirements and this Guide will not attempt anything more than to stipulate that competent people are necessary.



## Types of maintenance or inspection & testing

Ironically, but not without some resistance by the so-called “passive sub committee”, the old Type 1 & Type 2 inspections for fire doors became obsolete with the introduction of the new AS1851 suite.

For those who are not familiar with the old AS1851 Part 7, there were two levels of inspection & testing for fire doors, (which were called Types), both with different frequencies and requiring different competencies.

Type 1 inspections were very basic inspections of the fire doors and these were conducted monthly by the building owner, whilst Type 2 inspection were conducted by so-called competent fire door service personnel and consisted of comprehensive inspection & testing of the fire doors in question.

The Type 1 inspection regime is no longer documented in AS1851 and for fire doors the old Type 2 inspection is essentially the basis for the new tabulated maintenance regime for fire doors found in AS1851.



## Frequency of maintenance inspections

The frequency of each maintenance regime for each passive fire system was the most controversial and most debated part of Section 17 (along with competencies which were discussed earlier).

The frequencies that are published are not practically workable, and this in the main is a result of the decision to remove a two tiered approach to inspections and testing, akin to the Type 1 & Type 2 inspections discussed above which existed for fire doors and other fire protection systems and equipment prior to the consolidation and publication of the latest AS1851 suite in 2005.

The full maintenance regime as tabulated in AS1851, to allow for a practical implementation of the Standard, could be as follows:

Element	AS1851 frequency	Recommended frequency
Fire compartment barriers (walls, floors, ceiling & bulkheads)	Six monthly	Annually
Hinged and sliding fire doors	Quarterly	Annually
Smoke doors	Quarterly	Annually
Fire shutters and fire curtains	Quarterly	Annually
Fire resistant glazing	Six monthly	Annually

Continued overleaf.....

<b>Element</b>	<b>AS1851 frequency</b>	<b>Recommended frequency</b>
Access panels	Six monthly	Annually
Ceiling hatches or man holes	Six monthly	Annually
Fire resistant ducting	Six monthly	Annually
Structural elements (beams, columns, etc)	Six monthly	Annually
Movement or control joints including head of wall / deflection heads	Six monthly	Annually
Fire stopping (electrical, communication, plumbing and miscellaneous)	Six monthly	Annually
Fire stopping (around dampers only )	Six monthly	As per fire dampers in Section 18

## **Concession relating to frequency of inspections for sole occupancy units**

The practical implementation of the as documented maintenance regime for sole occupancy units (home units) is not possible. It is very difficult to coordinate and to get access to all units during a single calendar year.

It is recommended that a similar approach to fire dampers be employed for fire doors, fire compartment walls between adjacent units and common areas, and associated service penetrations; that is to do 20 per cent of the items per year, so that at the end of a five (5) year period, all items have been adequately maintained.

However, if the annual inspection shows the need for repair on many items, it is recommended that all units be inspected annually until the repair is completed and the condition of the passive systems are acceptable to restart the 20 per cent per year maintenance regimes.



## Difficult to inspect elements

One of the main items which makes the implementation of the new AS1851 Section 17 impractical is that does not provide any concession for maintenance of inaccessible or difficult to inspect passive fire & smoke containment elements.

For practical reasons it makes good sense to provide some concessions for elements which are inaccessible or difficult to inspect, but some definitions is required to ensure that these concessions are not taken advantage of unnecessarily.

For the purposes of this guide the following definition applies:

### **Inaccessible passive systems**

Passive fire and smoke containment systems which cannot be readily maintained without demolition of any building elements.

### **Best practice design for passive systems**

Designers should consider suitable access for maintenance of passive systems and fire resistant access panels or ceiling hatches (man holes) should be provided.

Even though the concession for inaccessibility has been provided, in some cases, with the concurrence of the building owner or operator it might be deemed best practice to retrospectively install access panels or ceiling hatches to allow for ongoing maintenance of passive systems. In many cases access is required to get to other services, for example waste traps behind fire resistant ceilings.



## Identification & Labeling of passive systems

Identification of passive systems is an important issue and to date has been very poor across the whole passive fire & smoke containment industry, generally speaking.

There are some obvious exceptions, where labeling or other means of identification are very well implemented and these include fire door tagging and the pink color identifier for fire resistant plasterboard.

We need to break down labeling and identification into a few discrete sub categories and discuss each in turn for the purposes of this Guide, they are:

- Identification of passive products by manufacturer's mark on the fire stopping product itself, (make and model)
- Identification of passive system by generic means (color identification)
- Labeling of as installed passive systems; either for as new installed systems and retrospectively for existing systems
- Labeling for maintenance purposes to confirm passive elements are under ongoing inspection & test.



## **Identification of products by manufacturer's mark**

Where possible, it is recommended that passive elements themselves are marked with the manufacturer's name and the manufacturer's model number. The position of the marking needs to be carefully thought about so as to ideally allow for easy identification after installation by maintenance personnel. This is not practical for all passive product types but where it is, it should be occur.

Some examples include fire door hardware (door locks, closers and the like), and proprietary fire stopping devices (fire collars for pipes or similar products for cables).



*An example of product labeling for identification after installation*



Label on cast-in place fire stop collar which is not seen after installation



Clever identification on underside where product can be identified after installation within the as cast floor slab

## Identification of passive system by generic means

In many cases it is not practical or in some cases impossible for manufacturer's to label their as installed product. Some examples include fire resistant sealant & fire resistant mortar. Other can be labeled, such as fire resistant board, but will inevitably be painted over for aesthetic reason in the as installed and finished building configuration.

This Guide recommends the use of the means of colors for identification purposes, and the fire resistant plasterboard manufacturers have set a good precedent with the pink color used for all fire resistant plasterboard supplied into the Australian market. This can be applied to fire resistant sealant and fire resistant mortar which can be supplied and installed in a different colour to the normal grey; possibly in red. Of course in some cases for aesthetic reasons, for exposes passive systems, it may require that standard grey or white, colors typically used be used. However, having said that, there will be thousands of instances where this is not the case, and color identified products should be used.



Red fire resistant mortar installed for ease of identification – compare and contrast this to the penetration next to the red one and it is obvious that using red products has some merit.

## **Labeling of as installed and new passive systems**

Fire doors, as required by AS1905 Part 1, require mandatory tagging to allow identification of the as installed assembly. Maintenance personnel can identify the manufacturer, installer and fire rating of the assembly which assists in ongoing maintenance activities for the life of the installation.

Other passive fire systems do not have mandatory labeling requirements. For example, AS4072 Part 1 provides requirements for labeling of service penetrations or as installed fire stopping systems, but unfortunately these requirements are not mandatory.

For the purposes of this Guide, it is recommended that all new installations of fire stopping systems for protection of service penetrations are labeled using the requirements provided in AS4072 Part 1. For practical purposes the label can be simplified and an example is provided below:

<b>FIRESTOP SERVICE PENETRATION DO NOT DISTURB</b>		
<b>This penetration is compliant with the requirements of AS1530.4 &amp; AS4072.1 as applicable</b>		
Fire rating (FRL): _____		
Installed by: <u>Fire stop installations Pty Ltd</u> <small>(company name)</small>		
Installation date: _____	Penetration Number: <u>B201</u>	
<b>Contact us in the event of damage or if reinstatement is required</b>		
 <small>Firestop Installations Pty Ltd</small>	<b>Firestop Installations Pty Ltd</b>	<b>Phone: 1800 727 743</b>

### **Example of label for as installed passive fire stopping system**

In some cases, common sense needs to prevail and concessions should apply where labeling will be unsightly for aesthetic purposes in as seen common areas for example. However there will be thousands of instances where this is not the case and effective labeling should be employed in all these instances.

## Unlabelled passive systems and the use of retrospective labelling

It will be inevitable, at least for some years, until AS1851 and Section 17 have been implemented, (hopefully with the assistance of this Guide and future amendments to Section 17), that there will be tens of thousands of unlabelled passive fire stopping systems for service penetrations.

So what do we do?

We need to **retrospectively label** the penetrations and this would form part of an initial passive fire safety systems baseline audit. These audits are discussed in the subsequent section.

The auditor in most cases will not be in a position to identify the manufacturer's product as installed and the manufacturer and original installation contractor will not typically be involved again to apply the labels which should have originally been installed on the passive systems.

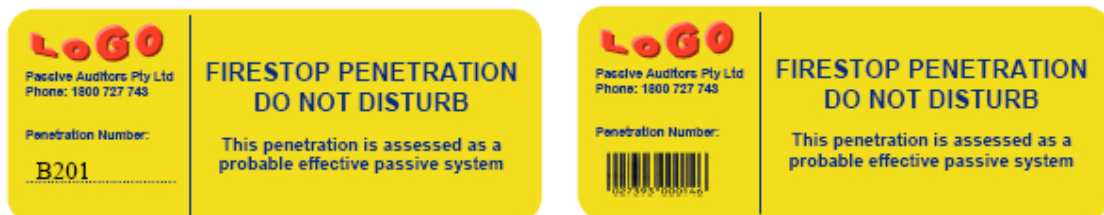
By using experience the auditor as a practical means of moving forward can **retrospectively label** the fire stopping system as sound, assuming for unlabeled proprietary items such as mortar or sealants for example, that the mortar or sealant is in fact fire resistant and has been installed correctly to provide a fire rating.

They will not be able to determine the extent of the fire rating of the as installed system or take full responsibility for this.

**WARNING – This cannot practically be done for fire resistant door assemblies.**

### Retrospective label for existing service penetrations

The retrospective label can look something like this:



### Examples of retrospective labels using either alpha-numeric or bar coding for penetration identification

The retrospective labeling should be using fluorescent yellow in all cases for ease of segregation against the as installed new labels and ongoing maintenance / inspection labels.



## **Initial fire safety systems baseline audit**

For passive systems, it would be common that most building would not have well documented fire or smoke compartment drawings, would not have detailed schedules of as installed systems, and very few penetration would be labeled.

**In this case, that is where there is poor documentation and no labeling, an initial passive fire safety system baseline audit is required and the compartment drawings and retrospective labeling of passive system is necessary.**

The preparation of this documentation and the retrospective labeling will allow subsequent maintenance to be conducted effectively. It might be necessary to do this in stages for large building. For example the common areas initially, followed by floor-by-floor in a high rise building.

Experienced and competent passive fire protection personnel should be engaged to do these initial passive fire safety systems baseline audits.



## **Label for maintenance purposes to confirm passive elements are under ongoing inspection & test.**

This Guide recommends the use of a small label in the form of a sticker which is applied onto or adjacent to each passive fire system under an ongoing maintenance regime, to identify it as being under ongoing inspection.

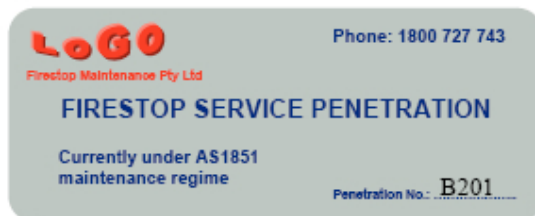
The label should have the maintenance company's name on it and the penetration number (or bar code identifier).

By doing this, it allows the building owner or operator to clearly identify any passive fire stopping systems which are new or not under ongoing inspection, as these will not have labels.

These labels can complement the as installed labels which of course contain more information on the as installed systems.

These dual labeling systems, that is the as installed passive system label and the maintenance label, work well for the fire door industry where both tags and maintenance labels are used together.

An example of a label used to identify that a passive system is under a current maintenance regime is as follows:



**An example of a label used to identify that a passive system is under a current maintenance regime**

## Commissioning & maintenance - an important distinction

One of the impediments to the successful implementation of the new AS1851 for most fire protection systems is the distinction between fixing what should have already been in place had adequate commissioning taken place after initial installation, and ongoing maintenance.

The fact is that many building have not been correctly commissioned, and it is ironic and quite sad that maintenance personnel have to be the bearers of the bad news for the building owner or operator.

In the case where maintenance inspections require some major repairs, which may be a result of poor commissioning, these inevitably require action and these need to be treated separately to the maintenance contract. In some cases, where practical, the original builder needs to be contacted to commission the building as they should have originally.

For passive systems, it would be common that most buildings would not have well documented fire or smoke compartment drawings, would not have detailed schedules of as installed systems, and very few penetration would be labeled.

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Experienced and competent passive fire protection personnel should be engaged to do these initial passive fire safety systems baseline audits.



## Evidence of compliance documentation

Building owners must be in possession of suitable documentation regarding the as installed passive fire & smoke containment systems in their buildings.

This should take the form of fire or smoke compartment drawings and schedule of as installed systems correlating with corresponding labeled elements, or where labeling is deemed inappropriate, corresponding with a suitable means for the maintenance personnel to find each passive element.

If this information is not available for a maintenance company engaged to maintain the passive system at a given building, the maintenance company must request that the building owner employ a suitably qualified organization to conduct and document an initial passive fire safety systems baseline audit. (These have been discussed earlier in the Guide).



# Labelling of passive systems

**Appendix: 1**  
A flowchart showing different labelling options for passive systems

