Position Statement
Passive Fire Fundamentals

PFPS-01 Version 1.0 – Issued: 01/09/20

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Fire Protection Association New Zealand

Position Statement PFPS-01 Passive Fire Fundamentals

Version 1.0 – Issued: 01/09/20

Introduction

- This position statement reflects the views of the Fire Protection Association of New Zealand regarding the design, installation, inspection and maintenance of passive fire protection systems within buildings.
- Definitions relating to passive fire protection are provided at the end of this document.

The fire and life safety design of buildings relies on many features that contribute to the overall fire safety of the building. These features, together with their ongoing inspection and maintenance, collectively play an important role in determining how the building will perform in the event of a fire. This includes whether building can be safely evacuated, can provide sufficient safety for fire fighters to operate within and around the building and can also provide protection to property, contents and the environment.

Passive fire protection systems help to prevent the spread of fire and smoke or maintain the structural adequacy of the building and play a critical role in ensuring that buildings are fire safe. Passive fire protection features can work in isolation or in concert with other building systems (such as sprinklers) to maintain the necessary level of protection expected by the buildings fire design and to meet minimum Building Code requirements.

FPANZ considers passive fire protection to be a specialised trade

FPANZ considers passive fire protection to be a specialised trade, necessitating the need for suitably qualified and experienced persons to be involved at every stage of specification, approval, installation, inspection and maintenance of passive fire protection systems throughout the buildings life.

FPANZ recommends that all passive fire protection work be undertaken by a current **FPANZ member** and highly recommends installer complete NZQA Level 3 Passive fire protection installers qualification.

Passive fire protection has been an unregulated trade with no recognised industry training until the release of NZQA Level 3 Passive Fire Protection training established in 2019. Within the New Zealand building industry, specific disciplines are regulated with occupational licensing in place to ensure that those in the building industry who are responsible for the work are competent and accountable. Passive fire protection is not currently one of these trades and there is much evidence to indicate the need to ensure that passive fire protection in buildings requires well documented controls, specialist installation, well documented evidence and oversight to ensure compliance.

FPANZ is currently establishing a number of training regimes and working with various industry bodies to resolve the problems within the industry and to establish an appropriate regime to oversee passive fire protection. FPANZ members are required to meet the rules and conditions of FPANZ membership which include being bound to the FPANZ Code of Ethical Conduct and the FPANZ Complaints and Disciplinary Procedures.

Recent regimes and initiatives by FPANZ include; Passive Fire Product Register, NZQA Level 3 Passive Fire Protection qualification, Intumescent Coatings Code of Practice, Training Road Shows 'Get it Right' and Position Statements providing advice notes to industry.

BRANZ Guide to Passive Fire Protection in Buildings

- BRANZ[1] have produced a *"Guide to Passive Fire Protection in Buildings"* which is endorsed by FPANZ.
- The purpose of the guide is to enable the effective use of passive fire protection including providing the right product and installing it correctly in the right situation. It proposes best expected practice for specification, approval, installation and verification. The guide also describes the process of verifying on-site installation and post-building consent procedures.
- Figure 4 from this guide (included below) highlights a typical process for a project, from developing the project scope and establishing the requirements to be met, to gaining consent, construction, inspections and sign-off. Two paths are shown for the specification and approval of the passive fire protection design.

The preferred path is that the complete specification and documentation of all passive fire protection products and systems are submitted to the Building Consent Authority (BCA) at the building consent stage. This approach provides full clarity to the BCA and contractor about the work required onsite. An alternative path involves the use of performance specifications for passive fire protection systems, where the final construction details may not be known until after the consent is applied for and the tender process is completed. If a performance specification approach is be used, checks are to occur to clarify how compliance with the Building Code is to be achieved (eg. using passive fire solutions compliant with a NZBC referenced standard.

The BCA should not grant consent unless they are satisfied on reasonable grounds based on the information they have received that the performance requirements of the Building Code would be met.

With either path it is recommended that Passive Fire systems selection and design maintains an element of being a 'live' detail so that any changes throughout the build phase can be documented for compliance. This possible 'construction phase design' element may be the result of discovering building details which were only uncovered once construction started.

The following sections briefly describe the process for each of the main stages of design, construction/installation and inspection.

[1] Guide to Passive Fire Protection in Buildings. BRANZ Ltd. 2017

Figure 4 *Source: BRANZ Guide to Passive Fire Protection in Building*

Typical project process for passive fire protection, showing two paths for specification and approval.

Project scope and fire engineering brief
- Legal and consenting requirements
- Client and stakeholder requirements
- Fire safety objectives
- Functional requirements and performance criteria
- Project team
- Prepare fire engineering brief (if required)

Design
- Develop the fire safety design plan
- Locate fire separations and identify fire rating requirements
- Document performance specifications for fire smoke separation and penetration systems
- Fire engineer report

Pathway 1

Detailed passive system design
- Produce a schedule of products and installation requirements for the passive fire protection
- Produce quality drawings linking location of products to the schedule.

Building consent
- Application
- Documentation
- Design review
- Identify requirements for CM
- Issue consent

Pathway 2

Building consent
- Application
- Documentation
- Design review

  Agree QA procedures and requirements
- Identify requirements for CM
- Issue consent

Detailed passive system design
- Produce a schedule of products and installation requirements for the passive fire protection
- Produce quality drawings linking location of products to the schedule

- Sign off on the detailed passive design by BCA or in accordance with any QA processes previously agreed with the BCA

Construct/install passive fire protection systems
- Use specialist contractors when required

  Identify and seek approval for any variations from approved specifications

Inspections
- As agreed with BCA and stakeholders
- Review QA documentation (if applicable)

Completion
- Issue Code Compliance Certificate
- Ensure documentation of fire design including detailed passive specifications is accessible in case of future alterations and inspections
- Review QA documentation (if applicable)

Design Stage

- Undertaking passive fire protection work is never a case of simply using a can of expanding foam to close the construction gap or hole.
- Passive fire protection relies of the correct application of tested and approved systems. These systems often require multiple products to be used.

FPANZ recognises the benefits from early passive fire protection design, prior to consent

Good passive fire protection starts at the design stage and will typically involve numerous parties to understand the fire design requirements of the building, specify all fire requirements such as fire wall and floors and their construction types and coordinate services that may penetrate or impact buildings fire safety features. Leaving the design and coordination of passive fire protection to the end of construction or relying on individual construction trades to install products to reinstate fire compartmentation and other features, may result in an outcome that is inefficient and costly and potentially of poor quality.

Passive fire protection design requires adequate time to research the correct product or combination of products before specifying, designing, sourcing or installing any product. In some situations, time is required to fire test innovative solutions at a registered test laboratory. Adequate resourcing at this stage of the process will ensure the chosen system is fit for purpose and can be constructed to meet the Building Code.

The BCA should be consulted during the design stage to discuss the level of passive fire information which needs to be included in the consent submission. The BCA needs to be provided with sufficient information to identify how (on reasonable grounds) the building work will comply with the Building Code, if the building work were properly completed in accordance with those plans and specifications or that advice. Depending on the BCA and the specific project concerned, this may range from a fully detailed design documentation or alternatively a 'performance based' level of detail.

Where performance specifications only are provided, it should be expected that systems can be installed in accordance with the performance specifications. Such an approach may be subject to a higher level of review and onsite monitoring requirements by the project fire engineer and the BCA.

When issuing the Building Consent, the BCA needs to agree with the applicant how the building works are going to be inspected and what information it would need to rely on in determining whether to issue a Code Compliance Certificate in the future. This should result in the need for detailed as-built documentation, photograph catalogue evidence, fire test report evidence, construction monitoring by a suitable suitably competent person(s) and relevant completion certificates (eg. Producer Statements by approved authors).

Construction Stage

- FPANZ recommends that all passive fire protection work be undertaken by a current **FPANZ member** and highly recommends installer complete NZQA Level 3 Passive fire protection installers qualification.

It is not recommended that individual 'non-passive fire' construction trades install passive fire protection systems, unless the construction work is particularly simple and the contractor is competent and experienced.

It is recommended that the process for confirming a compliant installation and the certification process be agreed with the BCA. This may require inspection from a BCA building inspector and construction monitoring by a suitably competent and experienced person (eg. a Passive Fire Specialist Contractor or 3rd party inspection from an independent person). This could be satisfied by a competent specialist contractor and Fire Engineer.

Inspection Stage

- The contractor has the responsibility to continually monitor the quality of the construction work undertaken.
- Achieving a quality construction outcome requires 'quality' to be embedded throughout the construction phase, from start to finish.
- Beyond having skilled and competent builders, this expectation includes the administrative and procedural activities of the construction company.

Construction inspections by the BCA building inspectors or construction monitoring by a suitably competent person are simply a quality systems audit of what has actually been constructed against the consented design. Construction monitoring (eg. by a designer or BCA) is not intended to check every element onsite. It is a 'spot checking' task where random samples of critical work are checked.

Subject to the prior agreement of the BCA, for simple passive fire protection projects, the BCA will typically undertake the inspections without the need for 3rd party independent inspection. For other projects, the process for installation and certification should follow the process proposed and agreed with the BCA. In some circumstances this may include inspection from a BCA building inspector or construction monitoring by a suitably competent person.

Where construction monitoring by a suitably competent person is to be used as part of the quality management system, they should be completely independent of, and divested from, the installer, contractor, manufacturer, or supplier of any material being inspected. The inspector should not be a competitor of the installer, contractor, manufacturer, or supplier of any material being inspected. All potential conflicts of interest should be declared in writing at the first opportunity to the BCA and stakeholders, who will be relying on the findings from this person/company.

It should be recognised that the majority of fire stopping systems are exactly that, systems. Many fire stopping products and systems are also difficult to inspect and confirm compliance once installation has been completed. Destructive testing of a sample of penetrations may be necessary to confirm that the products and systems as installed actually meet with their installation requirements and comply with the approved building consent.

FPANZ Product Register

- The **FPANZ Passive Fire Products Register** contains a substantial list of certified products and systems that have been formally issued with a laboratory report or formal assessment in accordance to AS4072.1 or AS1530.4.

FPANZ recommends the use of the Register of Passive Fire Protection Products

The Register is intended to be used for both new and existing installations, to ensure code compliant products are being specified, consented, installed.

The Register has been produced for reference by:

- Territorial Authorities and Building Consent Authorities
- Fire Engineers
- Architects
- Consultants
- Designers
- Installation, maintenance and inspection contractors
- Building contractors
- Building owners
- Accredited Inspection Bodies

Further Information

For further reading, please refer to the following documents:

1. FPANZ PFPS-02 - Fire and Smoke Stopping Methodology
2. FPANZ PFPS-03 - Fire Stopping: Deemed to Comply and Alterative Solutions
3. FPANZ PFPS-04 - Smoke Stopping
4. FPANZ Passive Fire Products Register, available from **www.fpanz.org**
5. Guide to Passive Fire Protection in Buildings. BRANZ Ltd. 2017 available from **www.branz.co.nz**
6. Ministry of Business, Innovation and Employment, Acceptable Solutions C/AS1 and C/AS2 and Verification Method C/VM2
7. NZBC C1 – C6 & B2
8. AS4072 Part 1: 2005 and 2014: Components for the protection of openings in fire-resistant separating elements - Service penetrations and control joints Amend: 1
9. AS/NZS1668.1: 1998: The use of ventilation and air conditioning in buildings, Part 1: Fire and smoke control in multicompartment buildings Amend: 1
10. NZQA Level 3 Passive Fire Installers Qualification (Competenz) **www.competenz.org.nz**

Definitions

FPA NEW ZEALAND

- Definitions relating to passive fire protection are provided below. Refer also to definitions provided in NZBC reference documents (eg. C/AS2):

Fire resistance rating (FRR)	The term used to describe the minimum fire resistance required of primary and secondary elements as determined in the standard test for fire resistance, or in accordance with a specific calculation method verified by experimental data from standard fire resistance tests. It comprises three numbers giving the time in minutes for which each of the criteria *structural adequacy, integrity* and *insulation* are satisfied, and is presented always in that order (eg. –/60/–). If the first number (for stability) is in parentheses, then that rating need only be applied to elements which perform a load bearing function. If the element is not load bearing, then no stability rating is required. If the last number is '– ', then there is no insulation requirement to the building element. Noting that standard tests for fire resistance do not address smoke spread, should a smoke performance also be required to the building element, "Sm" should be added after the three fire resistance numbers (eg. (60)/60/60 Sm).
Firecell	Any space including a group of contiguous spaces on the same or different levels within a building, which is enclosed by any combination of fire separations, external walls, roofs, and floors. Floors, in this context, include ground floors and those in which the underside is exposed to the external environment (eg. when cantilevered). Note that internal floors between firecells are fire separations.
Fire separation	Any building element which separates firecells or firecells and safe paths, and provides a specific fire resistance rating
Fire rated building element	Any building element which provides a specific fire resistance rating. For example, this describes an 'intermediate floor' as prescribed by C/AS2, noting that this floor does not separate firecells or firecells and safe paths.
Fire door	A doorset, single or multi-leaf, having a specific fire resistance rating, and in certain situations a smoke control capability, and forming part of a fire separation. The door, in the event of fire, if not already closed, will close automatically and be self-latching. Fire doors shall comply with NZS 4520:2010, NZBC Clause F8 and Appendix C, C6.1.2 of Acceptable Solution C/AS2.
Fire resisting closure	A fire rated device or assembly for closing an opening through a fire separation. A fire resisting closure is intended to include fire doors, fire windows or access panels. In this context the opening may be used to permit passage of people or goods, or to transmit light, but does not include an opening to permit the passage of building services.

Definitions cont.

Fire damper	A device with a specified FRR complete with fixings and operating mechanism for automatically closing off an airway where it passes through a fire separation. An airway may be a duct, plenum, ceiling space, roof space or similar construction used for the passage of ventilating air. The operation of the fire damper may be by 'fusible link only' or 'motorised with fusible link'. C/AS2 requires fire dampers and damper blades to: - Comply with AS 1682.1 and AS 1682.2, and - Have a fire integrity and insulation rating no less than that of the fire separation, except that the damper blade is not required to have an insulation rating if the building is sprinkler protected or means are provided to prevent combustible materials being placed closer than 300mm to the fire damper and air duct, and - Be readily accessible for servicing. AS1530.4-2005 (section 11.6) permits a maximum damper leakage rate of 360m3/(h/m^2), at 300Pa during the first five minutes of the fire test (corrected to standard temperature and pressure). This leakage rate consideration relates to the potential for fire spread under the criterion for fire integrity only. AS/NZS1668.1-1998 requires motorized fire dampers to be designed so that they close to their required position within a time period not exceeding 60 s from receipt of a fire alarm signal.
Fire stop	A material or method of construction used to restrict the spread of fire within or through fire separations, and having a FRR no less than that of the fire separation. Fire stops are mainly used to seal around penetrations but can also be used to seal narrow gaps between building elements. Commonly known as linear construction joints and blank openings.
Fire stop system through penetration	Fire stop assembly for through penetrations is a combination of firestop compatible for use with the penetrant. Penetration items such as cables, cable tray, conduits, ducts, pipes, etc., and their means of support through the wall or opening. Together they restores the fire resistance rating of the fire separating elements in terms of its integrity and/or insulation properties.
Fire stop system for joints	Fire stop assembly for joints is where fire stop with movement capability is used to seal the linear joints between two adjacent fire separating elements, to maintain the fire resistance of the separating elements. Fire stop system should be installed within its tested design limits with regard to size of the joint, type of assembly, and anticipated compression and extension of the joint to maintain the required integrity and/or insulation values.

Definitions cont.

Smoke separation	Any building element used to restrict the passage of smoke between two spaces. Smoke separations shall: a) Be a smoke barrier complying with BS EN 12101 Part 1, or b) Consist of rigid building elements capable of resisting without collapse: i) a pressure of 0.1 kPa applied from either side, and ii) self-weight plus the intended vertically applied live loads, and c) Form an imperforate barrier to the spread of smoke, and d) Be of non-combustible construction, or achieve a FRR of 10/10/-, except that non-fire resisting glazing may be used if it is toughened or laminated safety glass. Additionally, AS1530.4-2005 gives a 200°C maximum temperature provision for smoke barriers.
Fire and smoke separation	Any building element designed as both a fire separation and a smoke separation.
Smokecell	A space within a building which is enclosed by an envelope of smoke separations, or external walls, roofs, and floors.
Smoke control door	A doorset that complies with Appendix C, C6.1.2 of Acceptable Solution C/AS2. A smoke control door will be self-closing, self-latching and fitted with smoke seals. It is required to have marking and labels complying with the relevant parts of NZS 4520:2010 Fire-resistant doorsets and NZBC Clause F8.
Smoke damper	A closure designed to restrict the passage of smoke through a duct. C/AS2 requires smoke dampers to: - Comply with AS 1682.1 and AS 1682.2, and - Where evacuation is delayed, be provided in ventilation ducts that pass through a *fire separation* to a *place of safety* within the building. AS1530.4-2005 (section 11.6) permits a maximum smoke damper leakage rate of 200m^3/(h/m^2), at 300Pa during the first five minutes of the fire test (corrected to standard temperature and pressure). AS/NZS1668.1-1998 requires - Smoke damper tip seals are to be used. - The smoke damper shall have an automatic means of closure from a fire alarm signal. The thermally activated device may be omitted. - Where the smoke damper is motorised, the damper closure retaining clip shall be omitted to allow automatic resetting to the open position upon resetting of the smoke control system.
Smoke stop	A material or method of construction used to restrict the spread of smoke within or through fire separations or smoke separations. Smoke stops are mainly used to seal around penetrations but can also be used to seal narrow gaps between building elements.

Definitions cont.

Combined fire and smoke damper	A closure designed as both a fire damper and a smoke damper.
Hold-open device	A device which holds a smoke control door or fire door open during normal use but is released by deactivating the device by an automatic fire detection system, allowing the door to close automatically under the action of a self-closing device.