FPA
NEW ZEALAND

Position Statement
Smoke Stopping

PFPS-04 Version 1.0 – Issued: 07/08/20

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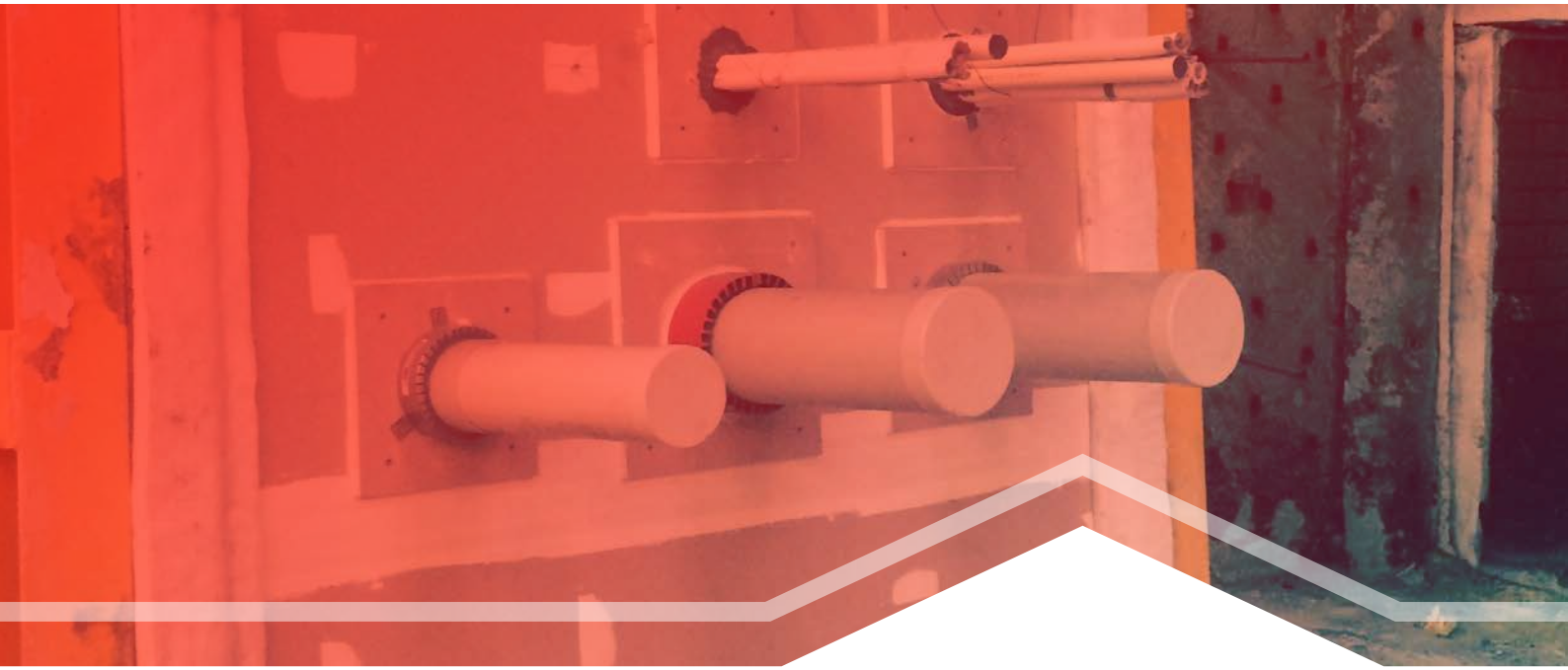
Fire Protection Association New Zealand

Position Statement PFPS-04

Fire and Smoke Stopping Methodology

Version 1.0 – Issued: 07/08/20



INTRODUCTION.....3-4

SUGGESTED APPROACH TO SMOKE STOPPING GAPS AND PENETRATIONS.....5-6

FURTHER INFORMATION.....7

Introduction

- The applicable New Zealand Building Code (NZBC) requirements to smoke stopping are to safeguard people from an unacceptable risk of injury or illness caused by fire, and specifically Clause C3.1 states that buildings must be designed and constructed so that there is a low probability of injury or illness to persons not in close proximity to a fire source. This position statement provides background to the NZBC expectations to minimise smoke leakage/spread and is intended to highlight how smoke stopping construction could be designed and detailed.

- Note that the information provided herein is a guide only, and is intended to assist the designer, consenting authoring and the installer to determine what smoke stopping may be appropriate (if any) for their building project.

Definitions relating to smoke separations and smoke stopping are provided in FPANZ position statement, *PFP01 Introduction*.

The effectiveness of a firecell or smokecell shall be maintained by ensuring the continuity of fire and smoke separations at separation junctions and around joints where closures, protected shafts and penetrations occur. Furthermore, the Acceptable Solutions (eg. C/AS2) state that gaps shall be sealed with fire resistant materials complying with AS 1530.4 to avoid the passage of smoke through fire and smoke separations.

Compliance with the two statements above does not inherently require all gaps to be smoke stopped.

Firstly, the NZBC defines what a smoke separation is and references BS EN 12101 Part 1 as a means of compliance. This standard defines both allowable gaps around the edges of the smoke separation and the permitted permeability of the smoke separation. Depending on the shape of the smoke separation, BS EN 12101 Part 1 compliance can allow leakage areas equating to a few percent of the smoke separation.

Secondly, the reference to AS1530.4 relates to a fire test standard. As mentioned in the introduction to the standard, AS1530.4 does not provide any controls on smoke leakage except for fire and smoke dampers. 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). This increases to $360m^3/(h/m^2)$ for fire dampers.

As noted in BRANZ Study Report No148 (2006), which examined the tenability in *exitways*, noted that the NZBC does not have a quantified smoke leakage criteria. Conclusions from the BRANZ study suggested a maximum measured air leakage rate through doors, at ambient or medium temperature conditions, of 25 and 40 m^3/hr for single and two leaf doorsets respectively. They also recommended that New Zealand regulators define acceptance criteria in future Building Code guidance. This has not happened.

In summary, whilst the NZBC requires fire separations to be constructed to meet a fire resistance for structural adequacy, fire integrity

Introduction *cont.*

and fire insulation, the NZBC permits a quantity of smoke to pass through both fire and smoke rated construction.

Whilst not specifically stated in documents supporting the NZBC, it could be expected that it requires building elements to be constructed to minimise smoke leakage to reasonable levels so to enable people to escape from the building if it is on fire. This may be by minimising the opening around construction gaps and service penetrations or through the installation of smoke stops in these locations. It is expected that the project fire engineer is best placed to provide additional details to clarify these requirements as part of their holistic fire safety assessment of the building.

Following a risk-based approach, it is possible that the quantitative or qualitative evidence from the fire engineer would highlight that smoke separations and smoke stopping is not required in certain buildings – for instance non-sleeping, low-rise buildings utilising a single stage evacuation approach (eg. retail and offices). The converse is possible in buildings where sleeping occurs or where the evacuation would be delayed (eg. hospital wards).

Should a qualitative justification be insufficient, a quantitative analysis of the movement of fire, smoke and people could be undertaken by the fire engineer to determine the importance of smoke spread (and therefore the design to restrict this spread) to the life safety of the building occupants.

Fire engineers should discuss their design approach for smoke separations and smoke stopping with the Building Consent Authority (BCA) early in the design process (pre-consent) to clarify expectations so the BCA is satisfied “on reasonable grounds” that the proposed work will meet the requirements of the Building Code.

Suggested Approach
to Smoke Stopping Gaps and Penetrations

Given the absence of specific deemed to comply Building Code details on how smoke stopping could be designed to minimise smoke leakage to reasonable levels, FPANZ recommends the following approach:

The design requirements for smoke stopping are:

1. Material(s) used for smoke stopping are to be practically impermeable to smoke.
2. The resistance to smoke permeability shall be maintained up to 200°C. Fire rated products (eg. fire rated sealants/mastics) meeting standard NZBC tests for fire resistance will achieve this requirement.
3. For small openings, adequate smoke stopping may only require the application of a sealant. For larger openings, applying only a sealant alone may not be suitable and a rigid or flexible smoke stopping material (e.g. a plasterboard patch) may also be required and screw fixed to the substrate.
4. Where a sealant/mastic is to be used, the depth of product applied is to be at least 10mm or equal to the thickness of the building element (eg. for glazing), whichever is the smaller amount. This criterion is not required where manufacturer approved intumescent sealants/wraps are used to fully encapsulate the gap/penetration (eg. electrical flush box putty wrap),
5. [For penetrations made using materials unable to withstand 200°C]. Due to the failure risk of the material, such penetrations are to be both fire stopped and smoke stopped.

Refer example figures on adjacent page.
Examples of possible smoke stopping solutions are:

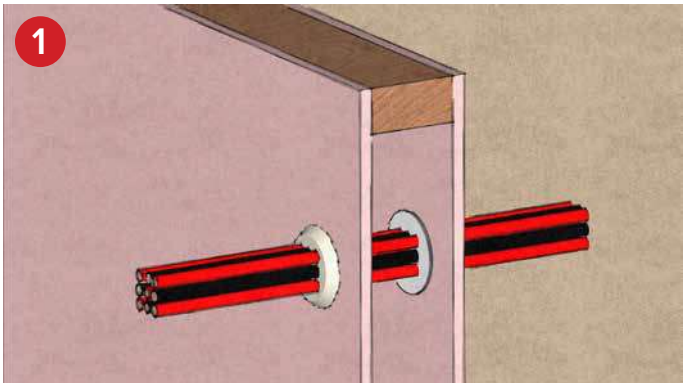
- for Ø30mm non-combustible pipe passing through a Ø45mm hole in a plasterboard wall. This opening could be smoke stopped using a fire rated sealant applied to the annular gap with a 10mm depth (minimum) on both wall linings.
- for Ø30mm metal pipe passing through a Ø100mm hole in a concrete wall. This opening could be patched using a plasterboard sheet and any annular gap would be smoke stopped using a fire rated sealant applied with a 10mm depth (minimum).
- for Ø30mm metal pipe passing through a Ø45mm hole in a 6mm glass wall. This opening could be smoke stopped using a fire rated sealant applied to the annular gap with at least a 6mm depth.

It is important that the addition of smoke sealant materials does not detrimentally impact on the performance of a fire stopping system. Any questions regarding product compatibility should be raised with the product suppliers and ensure products used are the same brand manufacturer (i.e mastic & Collar are the same manufacturer).

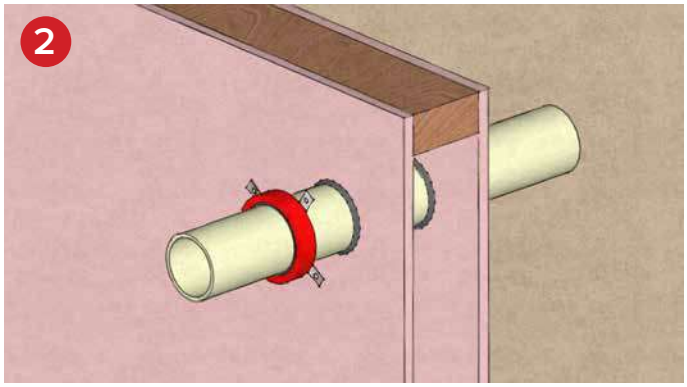
Refer to Manufacturer for specific Solutions and Installation instructions

Suggested Approach to Smoke Stopping Gaps and Penetrations *cont.*

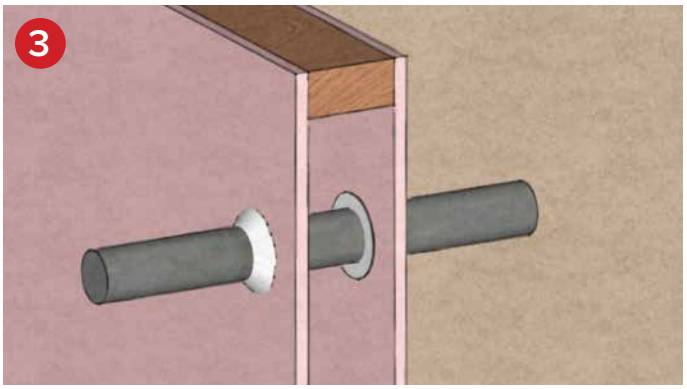
THESE ARE INDICATIVE SKETCHES ONLY AND NOT INTENDED TO BE USED AS SPECIFICATION OR INSTALLATION INSTRUCTIONS. REFER TO MANUFACTURERS FOR SPECIFIC DETAILS & INSTALLATION INSTRUCTIONS



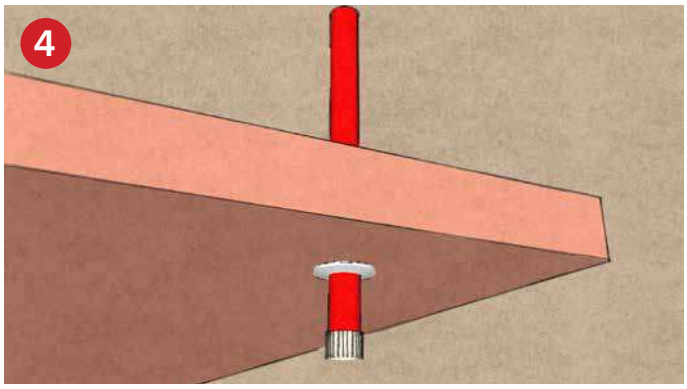
Cables with Fire rated Mastic applied



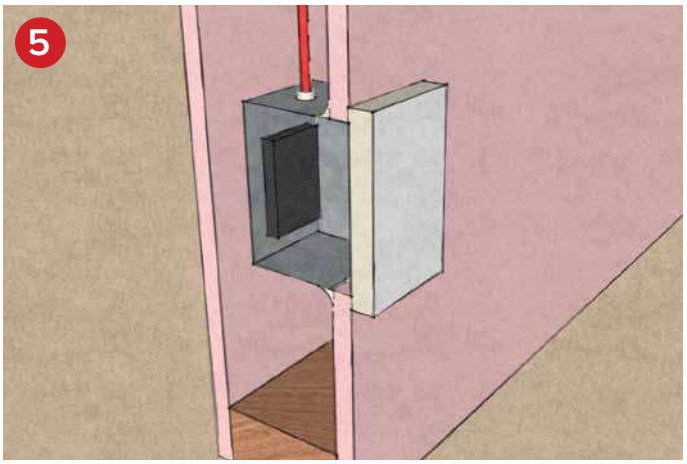
Fire collar with Mastic applied at wall prior to install of collar



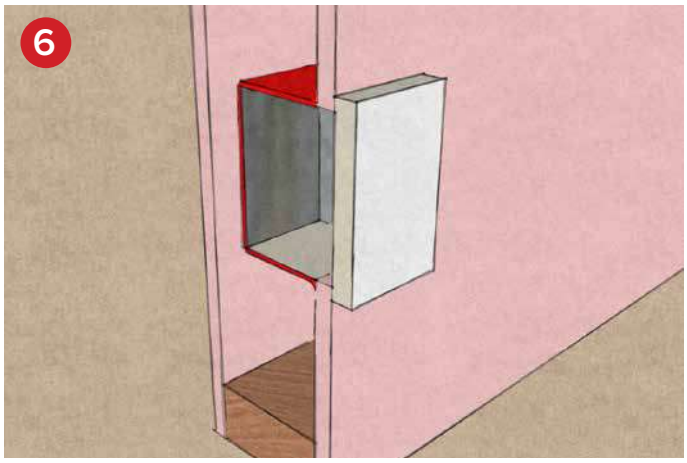
Metal pipe with Fire rated Mastic applied



Cable through a Plasterboard ceiling with Fire rated Mastic applied



Metal Flush box with Intumescent pad & Fire rated mastic applied to gaps



Metal Flush box with Fire rated Putty surround

Further Information

For further reading, please refer to the following documents:

1. FPANZ PFPS-01 - Introduction to Passive Fire Protection
2. FPANZ PFPS-02 - Fire and Smoke Stopping Methodology
3. FPANZ PFPS-03 - Fire Stopping: Deemed to Comply and Alternative Solutions
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. AS1530 Part 4: 2005: Methods for fire tests on building materials, components and structures - Fire-resistance tests of elements of building construction
9. AS4072 Part 1: 2005: Components for the protection of openings in fire-resistant separating elements - Service penetrations and control joints Amend: 1
10. AS/NZS1668.1: 1998: The use of ventilation and air conditioning in buildings, Part 1: Fire and smoke control in multicompartment buildings Amend: 1
11. NZQA Level 3 Passive Fire Installers Qualification (Competenz) **www.competenz.org.nz**