THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

**Property Services Design Standards and Guidelines**

Section **10-1**

# 10-1 Passive Fire Guide, General

Version 2.0

# Document Control Information

| | | | |
|---|---|---|---|
| **Team Name:** | Design Standards Steering Group | **Published date:** | 27 June 2022 |
| **Document version:** | Version 2.0 | **Revision date:** | Annually |

### Document Control

| Version | Review Date | Authorised by | Description |
|---|---|---|---|
| 1.0 | 20 January 2020 | Design Standards Steering Group | Initial version of manual. |
| 2.0 | 2 February 2022 | Design Standards Steering Group | Amendments to 10-1.5.5, Table 9. Data management does not require drawing output. Instead, assets to be registered via Excel files. |
| | | | |
| | | | |
| | | | |

### Feedback

If you spot an error in this document, or you have a suggestion on how we can improve the document, please tell us about it by printing, completing and emailing the form in Appendix C to us at PSTechServices@auckland.ac.nz.

# 10-1 Passive Fire Guide, General

## Table of Contents

# List of Tables



# List of Figures

# 10-1.1 Introduction

**Introduction**

This section shall be specifically read in conjunction with *Section 1 About this Document* and *Section 2 Project and Building Works Requirements* of the University of Auckland Property Services Design Standards and Guidelines.

## 10-1.1.1 About this document

University of Auckland's Passive Fire guide outlines the requirements when undertaking fire and smoke stopping within any building at the University. It is made up of 3 parts:

Table 1: Passive fire guide documents

| Name | Description |
|---|---|
| Part 1, General | Focuses on defining the performance requirements for the systems, the fire stopping documentation package and other general requirements. |
| Part 2, Product Selection | Provides, for information only, details on a significant number of fire stopping products from various manufacturers / suppliers / importers which manufacturers attest to achieving compliance with NZ Building Code requirements (AS 4072 Part 1). |
| Part 3, Basic Solutions. | Provides, for information only, several documented solutions for frequently occurring fire stopping situations.<br>This information is intended to minimise the design effort required to ascertain the suitability of the solution and to minimise the risk of installation errors. |

## 10-1.1.2 Using this document

All fire stopping works are undertaken as a contractor 'design and build' element. The contractor is responsible for fully reviewing the fire stopping problem, developing a solution and installing it in a satisfactory way.

It is the responsibility of the fire stopping contractor to confirm that the installation or construction has been carried out in accordance with the Building Code (and any University requirements). In situations of uncertainty, information conflicts or missing information, the contractor must confirm any design and installation details with the product manufacturer (or their local representative).

The responsibility of NZ Building Code compliance of fire stopping products within this guide lies solely with the product manufacturer / supplier / importer. This includes all installation details.

All product information detailed within this guide is provided for information only. Given normal product development cycles, it is possible that products identified within the guide will be superseded, withdrawn or redesigned. Whilst the intent is for the guide to be periodically updated, the fire stopping contractor shall be responsible for checking the product information is current and correct.

"**Passive Fire**" relates to maintaining the fire resistance rating of a fire separation and / or the integrity of a smoke separation. This guide frequently uses 'fire stopping' and 'smoke stopping' to denote this. For simplicity, this guide frequently refers to fire and smoke stopping as 'fire stopping'.

The NZ Building Code requires that all penetrations through fire and / or smoke separations are appropriately stopped to maintain the fire resistance rating of the fire separation and / or the integrity of the smoke separation. This is expected to be achieved by fire stopping solutions which are

- Utilised and installed in strict accordance with the manufacturer's instructions
- Follow the limitations stated in the product datasheet(s) for achieving the fire resistance
- Be in accordance with the product test certificates.

This guide does not remove the requirement for the installer to be competent, both in understanding the fire performance objectives of the fire stopping works and the specific limitations of the fire stopping solution to be used.

Those undertaking passive fire works for the University of Auckland are expected to understand all parts of this guide. Any questions about this information should in the first instance be raised with the Property Services.

### 10-1.1.3 Process

The processes are detailed in the methodology flowcharts provided in Appendix A and Appendix B

Ensuring passive fire protection is correctly and effectively specified, procured, installed and maintained involves a specific process and requires the active involvement of several participants. The project team must ensure participants are coordinated so all potential penetrations of fire separations are identified and minimised at an early stage in design.

Appendix A provides a typical process for a new build 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 the passive fire protection products and systems are submitted to the BCA at the building consent stage. This approach reduces the potential for later conflicts during construction and installation, which in some cases can lead to project delays and/or rework.
- An alternative path, which may be necessary for some building projects, involves the use of performance specifications for passive fire protection systems, where the final selection of products may not be known until after the consent is applied for and the tender process is completed.

Appendix B provides a typical process for an existing building project. The process steps are summarized in the following table.

Table 2: Passive fire process table for existing building projects

| Step No | Description | Stage |
|---|---|---|
| 1. | Find fire and smoke separations | Design Work |
| 2. | Identify penetrations | |
| 3. | Design and document the fire stopping solution | |
| 4. | Seek approval / review of the solution | |
| 5. | Undertake the onside work | Installation Work |
| 6. | Finalise installation documentation | |

| Step No | Description | Stage |
|---|---|---|
| 7. | Obtain sign-off for the works done | Completion work |
| 8. | Provide information to update the University's asset register | |

### 10-1.1.4 Purpose

The purpose of this section is to:

- Provide a methodology for all fire stopping work undertaken at the University of Auckland, from start-to-finish.
- Provide information to clarify the University's expectations when fire stopping is undertaken
- Provide information relating to the quantum of evidence likely to be required to substantiate the compliance of a fire stopping solution.
- Provide, for information only, a significant number of fire stopping products from various manufacturers / suppliers / importers which are claimed to comply with NZBC requirements (refer to Part 2, Product Selection)
- Provide some solutions for frequently occurring situations (refer to Part 3, Basic Solutions).

### 10-1.1.5 Applicable standards

This table lists the standards that are applicable to Passive Fire Guide, General.

**Note:** The list is not exhaustive and if superseded by other standard(s), the latest version and/or amendment applies.

Table 3: Passive Fire Guide, General Standards

| Standard | No | Title |
|---|---|---|
| AS | 4072 Part 1 | Components for the protection of openings in fire-resistant separating elements.<br>Part 1: Service penetrations and control joints. |
| AS | 1530, Part 4 | Methods for fire tests on building materials, components and structures.<br>Part 4: Fire-resistance test of elements of construction |
| NZS BS | 476 Part 21 | Fire tests on building materials and structures. Methods for determination of the fire resistance of loadbearing elements of construction |
| NZS BS | 476, Part 22 | Fire tests on building materials and structures. Methods for determination of the fire resistance of non-Smoke and loadbearing elements of construction |
| NZS | 4520 (2010) | Fire resisting doorsets |
| BS/EN | 12101, Part 1 | Smoke and heat control systems, Specifications for smoke barriers |
| EN | 1634 Part 3 | Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware, Part 3 – Smoke control test for door and shutter assemblies |
| AC | 1825 | Auckland Council statement for acceptance of firestopping |
| UL | 1479 | Standard for Fire Tests of Penetration Firestops. |
| ETAG | 026 Part1_2012 | Fire Stopping Guide – General and "Hilti" Firestop Systems Ageing Resistance |

# 10-1.2 Abbreviations

### Passive Fire Guide, General abbreviations

Table 4: Passive Fire Guide, General Abbreviations

| Abbreviation | Description |
|---|---|
| AC | Auckland Council |
| BCA | Building Consent Authorities |
| BWoF | Building Warrant of Fitness |
| DIBT | Deutches Institut für Bautechnik |
| EJ | Engineer's Judgement |
| FRR | Fire resistance rating |
| ICT | Information and Communication Technology<br>Includes server and communications rooms |
| ISO | International Organisation for Standardisation |
| NZBC | New Zealand Building Code |
| TA | Territorial Authority |
| UL | Underwriters Laboratories |
| Primary element | A building element providing the basic loadbearing capacity to the structure, and which if affected by fire may initiate instability or premature structural collapse. |
| Secondary element | A building element not providing load bearing capacity to the structure and if affected by fire, instability or collapse of the building structure will not occur. |
| Fire separation | Any building element which separates firecells or firecells and safe paths and provides a specific fire resistance rating (FRR).<br>**Note**: The FRR relates to a standard test which established criteria for structural adequacy, fire integrity and fire insulation. |
| Fire-rated floor infills | • Minimum 1.5 kPa live load capacity to enable maintenance access to the services and/or their respective fire stops.<br>• Maximum 100mm clearance between the service penetrating the fire separation and the load-carrying fire-rated infill. (Clearance to be filled by non-load carrying fire stopping.) |
| Fire resisting closure | A fire rated device or assembly for closing an opening through a fire separation. |
| Sleeping risk spaces | • Includes bedrooms in a hall of residence, dormitories, hospital ward bedrooms, and clinical treatment spaces using sedation.<br>• Does not include bedrooms in a domestic dwelling owned by the University. |
| Smoke separation | Any building element able to prevent the passage of smoke between two spaces |

# 10-1.3 Fire and Smoke Performance Requirements

## 10-1.3.1 Building Warrant of Fitness (BWoF) Requirements

The Building Warrant of Fitness regime does not intend to redesign the fire and smoke separations within the building to meet current NZBC requirements, instead, it seeks to maintain, for the life of a building, the fire or smoke rating performance of these building elements as defined at the time of construction.

Fire separations and smoke separations are Specified Systems "SS 15/3" and "SS 15/5" (see *Compliance Schedule Handbook* found on the MBIE website: https://www.building.govt.nz/building-code-compliance/building-code-and-handbooks/compliance-schedule-handbook/) and should be listed on the building's compliance schedule and denoted on fire plans for the building.

Direct any questions about the 'as built' fire and smoke separations within a building to Property Services.

## 10-1.3.2 NZ Building Code (NZBC) Requirements

The fire guidance documents to support the NZBC result in the need to include fire or smoke rated construction (separations) in most buildings. Building features relevant to passive fire are listed in this table.

Table 5: Building features relevant to passive fire

| | |
|---|---|
| Primary element | A building element providing the basic loadbearing capacity to the structure, and which if affected by fire may initiate instability or premature structural collapse. |
| Secondary element | A building element not providing load bearing capacity to the structure and if affected by fire, instability or collapse of the building structure will not occur. |
| Fire separation | Any building element which separates firecells or firecells and safe paths and provides a specific fire resistance rating. |
| Fire resisting closure | A fire rated device or assembly for closing an opening through a fire separation. |

A fire separation is specifically defined as any building element which provides a specific fire resistance rating (FRR), where FRR relates to a performance defined in a standard test for fire resistance. This fire resistance test establishes criteria for structural adequacy, fire integrity and fire insulation.

### Notes on NZBC

- The NZBC prescribes either AS 1530 Part 4 or NZS/BS 476 Parts 21 and 22 as the fire resistance test. The intro to AS 1530 Part 4 states the assessment of smoke production and smoke spread when testing specimens is outside the scope of this Standard. The standard notes that significant smoke spread or smoke production can occur even though an element of construction may have achieved high FRRs – this is support by NZS 4520 (2010) 'Fire Resisting Doorsets' which specifically states that doorset smoke performance issues are excluded from the standard. It also notes that the NZBC currently does not define acceptance criteria for smoke spread through elements of construction.

- The NZBC defines a smoke separation as any building element able to prevent the passage of smoke between two spaces and states that BS/EN12101 Part 1 prescribes a compliant design. While this standard states that all gaps in and around a smoke separation shall be minimized, it does permit gaps around this type of construction (e.g. up to 60mm for smoke curtains which travel more than 6m). In addition to these gaps, the standard permits a maximum leakage rate though the smoke separating construction of 25m³/h/m2 at 25 Pa at ambient temperature or 200°C (tested using the test procedures defined in EN 1634-3).
- The NZBC permits the use fire dampers and fire doorsets which are permitted to be activated (closed) by fusible link operation, typically at an activation temperature of ~70°C. In advance of the activation of the fusible link, these elements provide a path for smoke spread through the smoke separation.

In summary, the NZBC requires construction product to meet a fire resistance for structural adequacy, fire integrity and fire insulation and permits a quantity of smoke to pass through both fire and smoke rated construction.

---

### 10-1.3.3 NZBC Fire Stopping Requirements

The NZBC requires that the continuity and effectiveness of fire separations (the substrate) shall be maintained around penetrations, and in gaps between or within building elements, using fire stops.

As cited in the NZBC, primary and secondary building elements and closures shall be assigned a fire resistance rating (FRR) when tested to either:

- AS 1530 Methods for fire tests on building materials and structures – Part 4: Fire resistance tests of elements of building construction, **or**
- NZS/BS 476 Fire tests on building materials and structures – Parts 21 and 22.

---

#### Testing fire stops

Fire stops shall be tested:

- In circumstances representative of their use in service, paying due regard to the size of expected gaps to be fire stopped, and the nature of the fire separation within which they are to be used
- In accordance with AS 4072: Components for the protection of openings in fire resistant separating elements – Part 1: Service penetrations and control joints.

---

#### Fire stop required performance

**Sprinklered buildings:**

- Integrity rated only (no insulation or structural adequacy requirements).

**Un-sprinklered buildings:**

- Integrity and insulation rated (no structural adequacy requirement)
- No insulation rating is required where it can be shown there will be no combustible materials placed within 300mm of the penetration and fire stop or the fire damper and air duct.

---

**Fire stopping of fire separations**

The fire stopping of fire separations relates to all new gaps and penetrations, and on 'reasonably practicable' grounds, all existing gaps and penetrations either:

- Exposed as part of these works, or
- Local to the new work where they fail to meet the fire performance of the substrate.

It may be necessary for the project fire engineer to provide specific detail as to the extent of remediation work to existing gaps and penetrations (especially when the building has no suspended ceiling).

---

**Fire Rating Nomenclature**

Fire ratings are specified in a form comprising three values, e.g. (60)/60/60, for structural adequacy, fire integrity and fire insulation respectively.

If a number is replaced by a dash (–) no rating for that aspect of the FRR is required.

If the first number (for structural adequacy) is in parentheses, that rating need only be applied to elements which perform a load bearing function.

If the element is not load bearing, no structural adequacy rating is required.

Smoke rated construction is to be denoted -/-/- Sm.

---

## 10-1.3.4 NZBC Smoke Stopping Requirements

The NZBC permits smoke to pass through both fire and smoke rated construction.

The NZBC requirements 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 there is a low probability of injury or illness to persons not near a fire source.

While not specifically stated in documents supporting the NZBC, it could be expected that it requires building elements, defined as a smoke separation, to be constructed to minimise smoke leakage to reasonable levels. This may be by minimising the opening around construction gaps and service penetrations or through the installation of smoke stops in these locations.

It may be necessary for the project fire engineer to provide additional details to clarify these requirements as part of their holistic fire safety assessment of the building.

This issue would apply to all new gaps and penetrations and on 'reasonably practicable' grounds, all existing gaps and penetrations either:

- Exposed as part of these works, or
- Local to the new work where they are considered to fail to meet the smoke performance of the substrate.

---

## 10-1.3.5 Auckland Council Fire Stopping Requirements

Auckland Council has published a policy document related to acceptance of fire stopping and passive fire construction called AC1825 *Auckland Council position statement for acceptance of fire stopping*.

Designers, installers and inspectors should be familiar with these requirements, which can be found at: https://www.aucklandcouncil.govt.nz/building-and-consents/understanding-building-consents-process/ask-for-guidance/Documents/ac1825-position-statement-fire-stopping.pdf

Key requirements include:

- Fire stopping systems specified must be in accordance with AS 4072:Part 1
- It is recommended that all fire stopping systems specified and selected appear on the FPANZ Passive Fire Register
- If fire stopping systems are unable to be sourced to meet the above requirements, or to comply fully with AS 1530, then compliance using an 'engineering judgement' will be considered. This judgement must be supported in writing by the product manufacturer or test sponsor
- Fire stopping systems which end up being selected post consent on the basis of an engineering judgement will require a consent amendment
- Third party independent inspection will be required for 'high risk' buildings
- Fire stopping should be labelled per AS 4072
- Details of the Quality Management System and Project Quality Plan to support the installation of fire stopping systems is required to be submitted at consent.
- A PS4 producer statement from the inspecting fire engineer is one way of satisfying Council that fire stopping has been installed in accordance with consented documents.

### 10-1.3.6 University of Auckland Requirements

In addition to any NZBC fire and smoke performance requirements, the University requires internal building construction enclosing the following spaces to be designed to be practically impermeable to smoke and therefore smoke stopped to the performance details noted:

| Room type | Example of space | Notes |
|---|---|---|
| Sleeping risk spaces (where required by the NZBC to be enclosed in fire separations) | Bedrooms in a hall of residence, dormitories, hospital ward bedrooms, and clinical treatment spaces using sedation | Each sleeping risk space is to be practically impermeable to smoke.<br>This approach is considered to exceed the 'life safety' provided by the NZBC.<br>Fire and smoke rated construction would not be required for bedrooms in a domestic dwelling owned by the University (as per standard NZBC requirements). |
| Designated ICT (Information and Communications Technology) risk spaces | Server and communications rooms. | As a 'property protection' measure exceeding NZBC requirements, the University may require the internal construction enclosing certain ICT spaces to have a fire and smoke performance.<br>The University's Property Services and IT Services are to be consulted about which ICT areas require this treatment, the required fire rating, and the fire and smoke stopping system intended to be used. |

This issue would apply to all new gaps and penetrations and on 'reasonably practicable' grounds, all existing gaps and penetrations either:

- Exposed as part of these works, or
- Local to the new work where they are considered to fail to meet the University's smoke stopping requirements.

Property Services are to be consulted to agree the required remediation work to existing gaps and penetrations.

**Performance Requirements**

The objectives of these requirements are to reduce the life safety or property protection risks as a result of smoke spread through openings in building elements.

**For small openings**, adequate smoke stopping may only require the application of a sealant.

**For larger openings**, applying only a sealant may not be suitable and a rigid or flexible smoke stopping material may be required (see application example below).

Due to the delayed activation (closure) of building elements with fusible links, these features are to be activated using motorised interfaced with the fire alarm system, so the smoke performance is achieved immediately once smoke is detected (e.g. motorised smoke dampers).

The University's performance requirements for smoke stopping are:

- The smoke stopping material(s) is to be practically impermeable to smoke
- The resistance to smoke permeability shall be maintained up to 200°C
- The smoke stopping material(s) is to be applied to fully seal the opening in the building element (substrate). This may require permanent mechanical fixing to the substrate.
- Where a sealant is used, the depth of sealant is to be at least equal to the thickness of the building element (e.g. for glazing) or 10mm, whichever is the smaller amount.

See the *Passive Fire Guide, Part 2 – Product Selection* for options for smoke stopping sealants.

**Examples**

Examples of possible smoke stopping solutions are:

- For Ø30mm metal pipe passing through a Ø45mm hole in a concrete wall. This opening could be smoke stopped using a fire sealant (e.g. Hilti CP606) applied to the annular gap with at least a 10mm depth.
- 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 sealant (e.g. Hilti CP606) applied with at least a 10mm depth.
- For Ø30mm metal pipe passing through a Ø45mm hole in a 6mm glass wall. This opening could be smoke stopped using a fire sealant (e.g. Hilti CP606) applied to the annular gap with at least a 6mm depth.

## 10-1.3.7 Summary of NZBC and University of Auckland Requirements

Table 6 summarises the performance requirements to address the continuity and effectiveness of fire and smoke separations (the substrate) and the fire and smoke stopping used for penetrations and gaps within these building elements.

This applies to all new gaps and penetrations and on 'reasonably practicable' grounds, existing gaps and penetrations.

Table 6: Minimum fire performance requirements

| Relevant Requirements | Situation | |
|---|---|---|
| | Smoke Stopping | Fire Stopping |
| NZ Building Code | Building elements to be constructed to minimise smoke leakage to reasonable levels maintained up to 200°C. | Fire separations (the substrate) tested to AS 1530 Part 4 or NZS/BS 476. |

| Relevant Requirements | Situation | |
|---|---|---|
| | **Smoke Stopping** | **Fire Stopping** |
| | Design to minimise the opening around construction gaps and service penetrations or through the installation of smoke stops.<br>It may be necessary for the project fire engineer to provide additional detail to clarify these requirements as part of their holistic fire safety assessment of the building. | Fire stops tested to AS 4072 Part 1 and in circumstances representative of their use in service.<br>No specific requirement to control smoke leakage.<br>**Fire stops in sprinklered buildings** require this performance:<br>• Integrity rated only (no insulation or structural adequacy requirements)<br>**Fire stops in un-sprinklered buildings** require this performance:<br>• Integrity and insulation rated (no structural adequacy requirement).<br>**Note:** No insulation rating is required where it can be shown that there will be no combustible materials placed within 300mm of the penetration and fire stop or the fire damper and air duct |
| University of Auckland | In addition to NZBC requirements, the University requires internal building construction enclosing these spaces to be designed as smoke separations and smoke stopped:<br>• Sleeping risk spaces, where required by the NZBC to be enclosed in fire separations<br>• Designated ICT risk spaces<br>These measures seek to reduce the life safety or property protection risks as a result of smoke spread through openings in building elements.<br>Performance requirements for this smoke stopping (as detailed earlier include using materials which are practically impermeable to smoke up to 200°C. | |

**Note:** Neither NZBC nor the University have 'water resistance' requirements.

The project fire engineer, as part of their holistic fire safety assessment of the building, may need to provide additional details to clarify the building's design requirements.

### 10-1.3.8 Fire Stopping Engineering Judgements (EJ)

The NZBC requires that the continuity and effectiveness of fire separations be maintained around penetrations, and in gaps between or within building elements, by the use of fire stops.

The NZBC states that fire stop certification shall be based on tests carried out by an independent laboratory in accordance with AS 4072 Part 1. AS 4072 compliance can be achieved by physically testing the fire stopping product within a laboratory furnace test or alternatively by a technical "appraisal" by a person who, on the basis of their experience and qualifications, is competent to do so (e.g. a person associated with a fire testing laboratory).

Fire stops and methods of installation shall be identical to those of the prototype used in tests to establish their FRR – see manufacturer's documentation. The material selected for use as fire stops shall have been tested for the type and size of the gap or penetration, and for the type of material and construction used in the fire separation.

**Note:** Fire stopping products tested to UL, FM, BS, EN, EU, ISO (etc.) test standards are not directly equivalent to AS 4072 and are not cited as the applicable standard for the NZBC.

Should the use of a tested and approved AS 4072 compliance fire stopping solution not be possible (based on a reasonable exploration of the options available from various fire stopping suppliers), a design based on an 'engineering judgement' (EJ) may be acceptable. This is often because of a unique onsite arrangement within an existing building which does not have a compliant solution. Examples can include:

- Compromised accessibility to existing service penetrations to implement an installation to manufacturer's documentation
- Existing service penetrations installed in a tight cluster arrangement or which exceed the 'percentage fill' limits of the tested and approved arrangement
- Wall or floor thickness which are thinner than the tested and approved arrangement
- An 'annular gap' between the service(s) and the substrate which is less than or conversely exceeds the tested and approved arrangement.

The acceptability of an EJ should be based upon interpolation of previously tested fire stopping systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgment is to be given.

To determine the acceptability of the design, written correspondence attesting to the suitability of the proposed fire stopping solution is to be provided to Property Services (or appointed representative, e.g. the project fire engineer) prior to undertaking the installation. This evidence is to be provided from a specialist who is specifically aware of the fire test performance of the relevant fire stopping systems. This specialist should fully understand the failure mechanism(s) of the proposed fire stopping systems.

Examples of suitable specialists include the proposed fire stopping systems' manufacturer or an independent fire testing laboratory.

The correspondence should highlight specific information including compliance limitations and installation instructions in order to define how the design is to be correctly installed.

The EJ fire stopping system shall be supported by a signed statement from the specialist (on company letterhead) stating (or similar wording):

*"In our opinion and based on the information provided by …… for the project ……, we believe the passive fire stopping solution (design and installation details attached) will achieve at least a fire/smoke performance of …… when tested to AS 4072.1:2005 or AS 1530.1:2005."*

An EJ is to be accepted only for a single, specific job and project location and should not be transferred to any other job or project location without thorough and appropriate review of all aspects of the next job or location's circumstances.

This approach would be deemed by the NZBC as an 'alternative solution'. For existing fire stopping situation, the justification of this approach may also involve statements relating to 'as near as is reasonably practicable'.

This approach is like other countries including USA. (Refer to http://www.firestop.org/engineering-judgment-guidelines.html and http://www.firestop.org/uploads/2/4/5/4/24544763/ifc_guidelines_for_evaluating_firestop_systems_in_engineering_judgments.pdf.

### 10-1.3.9 No Building Consent to Undertake Fire Stopping Works

Section 40 of the Building Act states that a person commits an offence if a building is constructed, altered, demolished, or removed without a building consent.

Despite Section 40, Schedule 1 of the Building Act details the type of work that does not require a building consent and who can carry out this work.

The Ministry of Business, Innovation and Employment (MBIE) has published guidance (available at http://www.dbh.govt.nz/bc-no-consent) relating to Schedule 1 Building Consent 'exemption'. This guide highlights that penetrations of a limited size (with a maximum diameter of 300 mm) through both internal and external building components may be permitted without needing a building consent. It also covers any building work associated with penetrations such as weatherproofing, fireproofing, or sealing.

While no consent may be required for undertaking some fire and smoke stopping works, there still may be a requirement to apply for a building consent exemption to the TA / BCA.

Use this link to request an exemption of building work that would normally require a building consent:
https://onlineservices.aucklandcouncil.govt.nz/councilonline/splashPage?consentType=BUILDING&productType=B_EXEMPTION_BUILDING#)

All exempt work must still comply with the NZ Building Code.

Property Services must be consulted in advance of undertaking any modification to fire or smoke separations to determine the project requirements.

# 10-1.4 General Requirements

## 10-1.4.1 Durability and Serviceability (Life Expectancy)

It is the effectiveness of a fire stopping system on exposure to fire that is of greatest importance rather than 'just-installed' arrangement.

It is a requirement of the NZBC (Clause B2.2 plus Acceptable Solution B2/AS1 'Durability' (2011)) that all building materials, components and construction methods shall be sufficiently durable to ensure the building, without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the building.

It is noted that 'durability' is about people's reasonable expectations that, subject to normal maintenance, a product will last for a specified number of years. This differs from a 'product warranty' which is usually a written promise to replace or repair a product or work, if necessary, during a specified period. Usually, the company manufacturing or selling the product provides the warranty to the buyer.

The NZBC defines fire stopping as a building element which is 'moderately difficult to access or replace', therefore requiring fire (and smoke) stopping products to have at least 15-year durability.

AS 4072 Part 1 states:

> *"the design of the sealing system should take into account all the conditions to which it can reasonably be expected to be exposed. The sealing system should be capable of meeting these conditions for its anticipated life".*

From information obtained from manufacturers / suppliers, it appears some attest to service life between 20-50 years for their fire stopping products. In some instances, this appears to be supported by test evidence from laboratory simulations (e.g. using these standards; DIBT in Germany and UL1479 in USA). The suppliers do not appear to specifically attest to the actual (in-use onsite) duration of resistance to ageing.

When assessing the suitability of possible fire (or smoke) stopping solutions, for comparable products which effectively only differ on their life expectancy performance, the product / solution with an increased life expectancy should be used to meet the University's expectations. Any queries relating to this matter should be directed to Property Services.

As noted in Table 7, almost all fire stopping products are damaged to some extent by environmental factors.

Table 7: Likely impact of environmental factors on performance

| Possible failure modes | Failure caused by... |
|---|---|
| Heat (in buildings: 30°C - 60°C) | Softening, chemical decomposition |
| Cold | Embrittlement and fracture |
| High-energy radiation | UV radiation, radioactive radiation |
| Chemical influences | e.g. cleaning agents, oil, ozone, chlorine, Salt spray mist |
| Water and moisture | Leaching or washing out of components |
| Mechanical loads | Embrittlement and fracture due to movement |
| Migration of components | Loss of flexibility |
| Mould and mildew | Decomposition of polymer chains due to fungus or bacteria |

*Source: "ETAG026 Part 1_2012 - Fire Stopping Guide – General" and "Hilti Firestop Systems Ageing resistance", (from www.hilti.co.uk)*

Of the factors mentioned above, UV, moisture and temperature variations may have the greatest effect on the future performance of a fire stopping system.

As many fire stopping systems are designed for applications in the interior of buildings, special care is to be taken when selecting the system so that it remains effective throughout its life expectancy.

The fire stopping documentation for the project shall specify for each product / system utilised:

- The life expectancy
- Any special / unusual inspection and maintenance requirements
- Maximum 'cycling' operations permitted.

Possible performance deterioration of a fire stopping system due to environmental factors should be checked on 'reasonably practicable' grounds during regular building inspections and when building work occurs. For installations in accessible spaces, such inspections may occur at least on an annual basis (as part of the BWoF regime). Existing penetrations are to be checked for possible deterioration when exposed as part of new building work. Property Services must be consulted to agree the required remediation work to existing gaps and penetrations where they are considered to fail to meet fire or smoke stopping requirements.

### 10-1.4.2 Packaging, Transport and Storage

Fire stopping solutions must be used in strict accordance with the manufacturer's instructions, this includes the required for all products to be handled and stored appropriately. Any queries regarding this should be directed to the product manufacturer or their local representative.

Many products have requirements regarding storage temperature ranges and maximum storage durations.

Do not use any product which are damaged or beyond its expiry date unless supported by written approval from the product manufacturer or their local representative.

### 10-1.4.3 Construction to Support Fire Stopping Systems

Fire stopping systems must be installed together with any service-supporting construction in-line with the manufacturer's recommendations. These supports include clips, ties, hangers, ladder racks or trays, or any device designed to carry the load of the penetrating service(s).

The supports should be appropriately designed to accommodate any expected movement (e.g. due to thermal expansion or contraction, seismic action, rotation). These supports are likely to be no more than 500mm from the penetration.

### 10-1.4.4 Quality Assurance

For the fire stopping project to be completed successfully, all aspects of work should be checked frequently.

Quality assurance is a team obligation that needs to be built into every aspect of the project. Quality will be obtained through appropriate planning and control of work operations and by specific quality control activities such as reviewing, inspecting and quality surveillance / audit.

Workmanship shall be to a high standard and completed by a competent installer. The installer shall gain all necessary training in the design and installation of the fire stopping solution.

**Note:** Property Services (or the project fire engineer) may require the replacement of any installation deemed to be of a poor standard at no additional cost.

The fire stopping contractor's QA process is to check (on reasonable grounds) the design solution against all relevant information relating to each fire and smoke stopping systems used, e.g. manufacturer's datasheets, fire test reports, installation instructions, and Engineering Judgement documentation.

To verify the quality of the installation works, Property Services (or the project fire engineer or 3rd party fire stopping inspector) is likely to undertake destructive testing of a sample of the installations based on a 'risk based' approach:

- **If the fire stopping solution is simple**, and therefore it would be very difficult to install it incorrectly, the inspector may determine that no destructive test is required (e.g. this may be appropriate for a fire collar around a uPVC pipe).
- **For more complex fire stopping solutions** where the skill / knowledge of the contractor is important for construction quality, destructively testing at least one sample of the specific solution would likely be appropriate. A solution requiring a specified minimum depth of sealant / putty / filler is expected to be considered as a 'more complex fire stopping solution'. Additional testing should occur until the inspector is satisfied that a quality solution is being achieved.

In advance of the installation work, the inspector and contractor shall agree the details of the destructive testing (e.g. quantity/percentage of penetrations) and obtain client signoff for this work (and associated cost). The fire engineer is expected to be involved in these discussions.

The inspector is to be accompanied by the installer during site inspection so that installation queries can be addressed quickly.

The inspector is to undertake all destructive testing and is to instruct the installer when the fire stopping can be re-instated and if additional testing is required.

All costs associated with the fire stopping re-instatement works shall be met by the fire stopping contractor.

### 10-1.4.5 University of Auckland Approved Contractor Status and Site Induction

The University maintains an Approved Contractor Register to check contractors met minimum health and safety standards and are therefore permitted to work on a University campus. Any queries relating to this matter should be directed to Property Services.

In accordance with this scheme, fire stopping works are to be undertaken by companies and persons who have specific training and competence in relation to the work to be undertaken. Reasonable steps should be taken to maintain competency, which is likely to include participation in product training events and possibility certified training schemes. Upon request, evidence of specific training and competence is to be provided to the University. It is expected that the level of competency will dictate the level of supervision is required.

The scheme also requires that reasonable steps are taken to manage health and safety requirements while carrying out work, on site, for the University.

A site and building induction are typically required prior to undertaking work at the University. Any queries relating to this matter should be directed to Property Services.

## 10-1.4.6 Wall Stenciling

On walls within plant rooms, service risers and above ceilings concealed from general view, the fire or smoke rating shall be stenciled, by the main contractor, on the both sides of the fire separations or smoke separations.

The design of the stencils (if not provided by Property Services directly) is to be reviewed and agreed by Property Services (and possibly the architect and fire engineer). The stencil is to be located every 3 metres and at every change in direction. The colour used for the stencil is to be contrasting to that of the wall it is placed on. The size of the stenciling is to be suitable so all words can be viewed from floor level.

An example of stenciling text is (where xx is the rating of the separation):

| | | |
|---|---|---|
| FIRE RATED WALL<br>xx/xx/xx<br>FIRE STOP<br>ALL PENETRATIONS | FIRE AND SMOKE RATED WALL<br>xx/xx/xx Sm<br>FIRE AND SMOKE STOP<br>ALL PENETRATIONS | SMOKE RATED WALL<br>-/-/- Sm<br>SMOKE STOP<br>ALL PENETRATIONS |

All fire or smoke performance requirements are identified on "fire separation" plans and sections. Consult Property Services (or the project fire engineer) if there be any queries about this issue.

## 10-1.4.7 Fire-rated Floor Infills

### Trafficable Situations

Trafficable fire rated floor infills shall be designed as described below:

- Minimum 1.5 kPa live load capacity to enable maintenance access to the services and/or their respective fire stops. Seek confirmation of loading requirements by the structural engineer and Property Services.
- Maximum 100mm clearance between the service penetrating the fire separation and the load-carrying fire-rated infill. (Clearance to be filled by non-load carrying fire stopping.)
- Identified by painted markings/signage or suitably permanent labels clearly showing the extent and design loading of the load-carrying fire-rated infill system

The performance of the fire stopping is not to be impaired by the thermal expansion or contraction of the service penetrating the infill (e.g. provide an appropriate annular gap and fire stop).

**Non-Trafficable Situations**

As shown in Figure 1, non-trafficable fire rated floor infills are to be clearly stenciled "DO NOT STEP". Such situations are also likely to require a safety barrier.


Figure 1: Example of a floor stencil to non-trafficable floor

## 10-1.4.8 Fire Stopping Re-entry

The choice of fire stopping system needs to consider the likelihood of future alteration to the fire stopping installation. This is more likely to occur for electrical or communications cables.

Where fire stopping re-entry is important, the chosen system should facilitate quick, easy alteration of the service with minimum required repair.

Examples of these products include specialty firestop sleeve and block systems.

The University's Property Services and ITS are to be consulted about which installation may require this future re-entry which may influence the choice of fire stopping product(s).

## 10-1.4.9 Coordination with other trades

Poor co-ordination between the fire stopping installer and other trades onsite is likely to cause difficulties in meeting the limitations stated in the product datasheet(s) for achieving the fire resistance and be in accordance with the product test certificates. This may lead to the need for fire stopping re-work or an Engineering Judgement application.

The fire stopping contractor is responsible for the co-ordination of fire stopping systems with other trades.

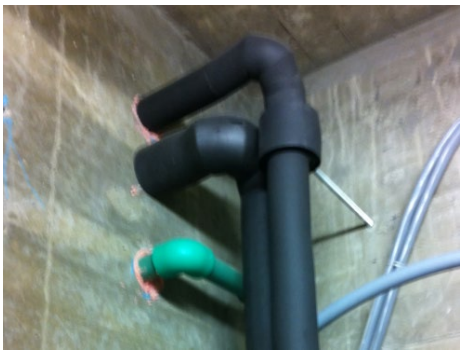
Co-ordination activities are likely to include (but are not limited to) providing a briefing to other trades about the correct installation of services to meet the limitations of the fire stopping system, e.g.:

- The service (e.g. pipes) are installed perpendicular to the substrate (wall or floor).

- Any bends placed in a service (e.g. pipes) should be enough distance from the substrate (e.g. 75mm) so there is sufficient room for installation of the fire stopping product.
- The number of services (e.g. cables) within a single substrate hole should not exceed 'percentage fill' limits of the fire stopping product (e.g. 55%)
- The hole cut in the substrate for the service is to be the correct size and shape to stay within the upper and lower limits of the fire stopping product. This relates to the 'annular gap' requirements prescribed for many products.
- Sufficient space is to be provided between adjacent services ('service clusters').
- Care is required when 'mixed service' penetrations are considered (e.g. a combustible pipe beside a non-combustible pipe in the same substrate hole) as this approach can result an installation which cannot be adequately fire stopped (thus requiring re-installation of the services).
- Any remedial work required to the substrate prior to the installation of the service to meet the limits of the fire stopping product. This often occurs for single layer plasterboard linings and for 'thin' solid core construction (e.g. concrete floors <100mm thick). Single layer plasterboard linings may require a local plasterboard patch to increase the wall thickness.

Figure 2 provides two examples where possible co-ordination issues may result in difficulties in meeting the limitations of the fire stopping system.

a) left-hand hole full of cables (c.f. 'percentage fill' limits)



b) pipe bend very close to the wall, making the installation of a fire collar difficult or impossible

Figure 2: Examples of possible co-ordination issues

Co-ordination briefings should occur regularly during the project (e.g. weekly at 'toolbox meetings') and should include all relevant personnel.

These briefings should also cover discussions about the project programme for each trade. Any space which was completed but was subsequently affected by re-work by any trade should be discussed to check if this work results in fire stopping re-work.

### 10-1.4.10 Remedial work and builders work

The responsibility and costs for undertaking local repair work to fire stopped locations (e.g. painting and patches to risers) to be clarified through discussions with Property Services prior to undertaking any work. It is typical that Property Services will provide painters for this work and the contractor would do any building works.

# 10-1.5 Documenting Fire Stopping Works

## 10-1.5.1 Introduction

Although AS 4072 Part 1 includes a non-mandatory (informative) section on documenting fire stopping works, the University requires that all fire (and smoke) stopping works are fully documented as detailed within this guide. This information is intended to identify:

- Where the works were undertaken
- Who carried out the installation
- The details of each fire and smoke stopping systems used
- Evidence to show how the works are compliant.

Completing this documentation should begin early in the project when the fire stopping solution is being designed.

Key items of this documenting include the "fire stopping design package" and onsite labelling.

Upon completion of the fire stopping works, all documentation is to be submitted to Property Services. Unless agreed otherwise with Property Services, it is expected that the documentation will include a Producer Statement (construction) (PS3) where the contractor can confirm the installation or construction has been carried out in accordance with the Building Code (and any University requirements).

Where construction monitoring occurs and unless agreed otherwise with Project Services, it is expected the documentation will include a Producer Statement (construction review) (PS4) which confirms that any inspections and information supplied by the contractor during the course of the works have been completed on reasonable grounds in accordance with the relevant design requirements.

## 10-1.5.2 University of Auckland Fire Penetration Identification Key

Identifier numbers are to be in this format: BBB – F- RRRRR – 9999

Where:

- BBB = Building no
- F = Floor no
- RRRRR = Room no
- 9999 = Penetration identifier no

**Example:**

**405-1-101-4541**

## 10-1.5.3 Fire Stopping Design Package

The main contractor (or appointed specialist fire stopping contractor) is to develop a 'fire stopping design package' which provides evidence to show how all fire stopping is compliant. The contractor shall make this information available to the fire engineer during the construction phase for periodic reviews.

The fire stopping design package shall include:

- Photos (with reference numbers) taken to support the fire and smoke stopping works

- All relevant information relating to each fire and smoke stopping systems used – e.g. manufacturer's datasheets, fire test reports, installation instructions, Engineering Judgement documentation.
- A 'fire stopping schedule' for the works. All individual fire stopping systems installed are to be scheduled so the information can be inputted into a fire stopping register attached to the University's asset register system, Maximo.

  To simplify the importing of this schedule information to the Maximo register the fire stopping schedule is to be provided in Excel format with the following columns in this order (Excel column letter):

  A. Unique fire stopping item number. Following the University's Fire Penetration Identification Guidelines (see 10-1.5.2). This number is based on the:
     i. Building number
     ii. Room number
     iii. Service penetration number
  B. Building number
  C. Room number
  D. Service penetration number (typically sequential – the University will advise the next number to use)
  E. Substrate construction (e.g. concrete, plasterboard, speedwall, etc.)
  F. Details of service penetration (e.g. 100mm PVC pipe, bundle of 15 comms cables etc.)
  G. Fire (and/or smoke) stopping system used (including all products). By the reference to 'system', it is noted that more than one product may be required to fire stop
  H. Fire resistance rating (FRR) achieved
  I. Product/system life expectancy
  J. System inspection and maintenance requirements – if specific requirements beyond AS 4072 is necessary. Leave blank if regular visual inspection is all that is required.
  K. Product/system maximum 'cycling' operations permitted – where applicable, leave blank if no such limitation
  L. Photo reference number
  M. Name of installer
  N. Date of installation.

The fire stopping package is a living document and it should be regularly updated throughout the project as new details are confirmed. Draft versions of the package are likely to be required to be submitted to the project team (e.g. Property Services and the fire engineer) for periodic review.

The completed fire stopping package shall be submitted to Property Services and the project fire engineer prior to practical completion (e.g. at least 2 weeks) to allow time for final review.

The final package is likely to be provided to the applicable BCA / TA (e.g. Auckland Council). The installer is to liaise with Property Services to confirm these arrangements.

### 10-1.5.4 Labels Documenting Fire Stopping Works

Each fire and smoke stopping installation is to be clearly labelled with each label uniquely numbered. All fields on this label are to be completed by the product / system installer.

The label shall be placed on the floor or wall surface immediately beside, and on at least one side of, the fire or smoke stop. Should a label be placed in a highly aesthetic location, the installer is to seek confirmation of this location (in advance of applying the label) from Property Services (and possibly the project architect).

All labels are expected to remain in place for the life of the fire or smoke stop. Certain construction surfaces and environmental conditions (e.g. hot plant rooms) can decrease the adhesion of the label (which may result in label curling). To mitigate against this, the installer is to apply a coating of fire sealant (e.g. Hilti CP 606 or similar) to the construction surface where the label is to be placed. This sealant is to be spread so to provide contact to least all four corners of the label prior to applying the label. Care is to be taken so the sealant does not spread beyond the label resulting in an untidy finish.

### 10-1.5.5 Data Management

Upon completion of the fire stopping works, all documentation is to be submitted to the Property Services Asset Management Team. The current format of this submission is detailed below and has been developed so that the associated data can be easily inputted into the University's asset management system (Maximo).

**The complete package is to be submitted to Property Services on a USB Flash drive.**

Table 8: Fire stopping documentation format

| Item | Requirements |
|---|---|
| Files required | Asset Registration Sheet containing<br>• One asset for the building.<br>• One asset per floor of the building. |
| File format | Fully digital (no paper version required)<br>• Spreadsheet (e.g. fire stopping schedule): MS Excel (xlsx)<br>• Asset Registration Form - obtain copy from asset management team before starting. |
| File naming | File name:<br>• **Asset Registration form**: Asset Registration – Fire Penetrations - Building No. - YYYYMMDD. Example: Asset Registration – Fire Penetration - B201E - 20220113.xlsx<br>• All relevant information relating to each fire and smoke stopping systems used (e.g. manufacturer's datasheets, fire test reports, installation instructions, Engineering Judgement documentation)<br>  • B502 – 20180115 – <FireStoppingEvidence>.pdf |
| Excel Schedule | All individual fire stopping systems installed are to be scheduled so the information can be inputted into a fire stopping register attached to the University's asset register system, Maximo. See above for details of content and formatting. File name to be as above:<br>Example: B502 – LEVEL01 - 20180115 - FireStoppingSchedule.xls |

### 10-1.5.6 Documenting Fire and Smoke Dampers

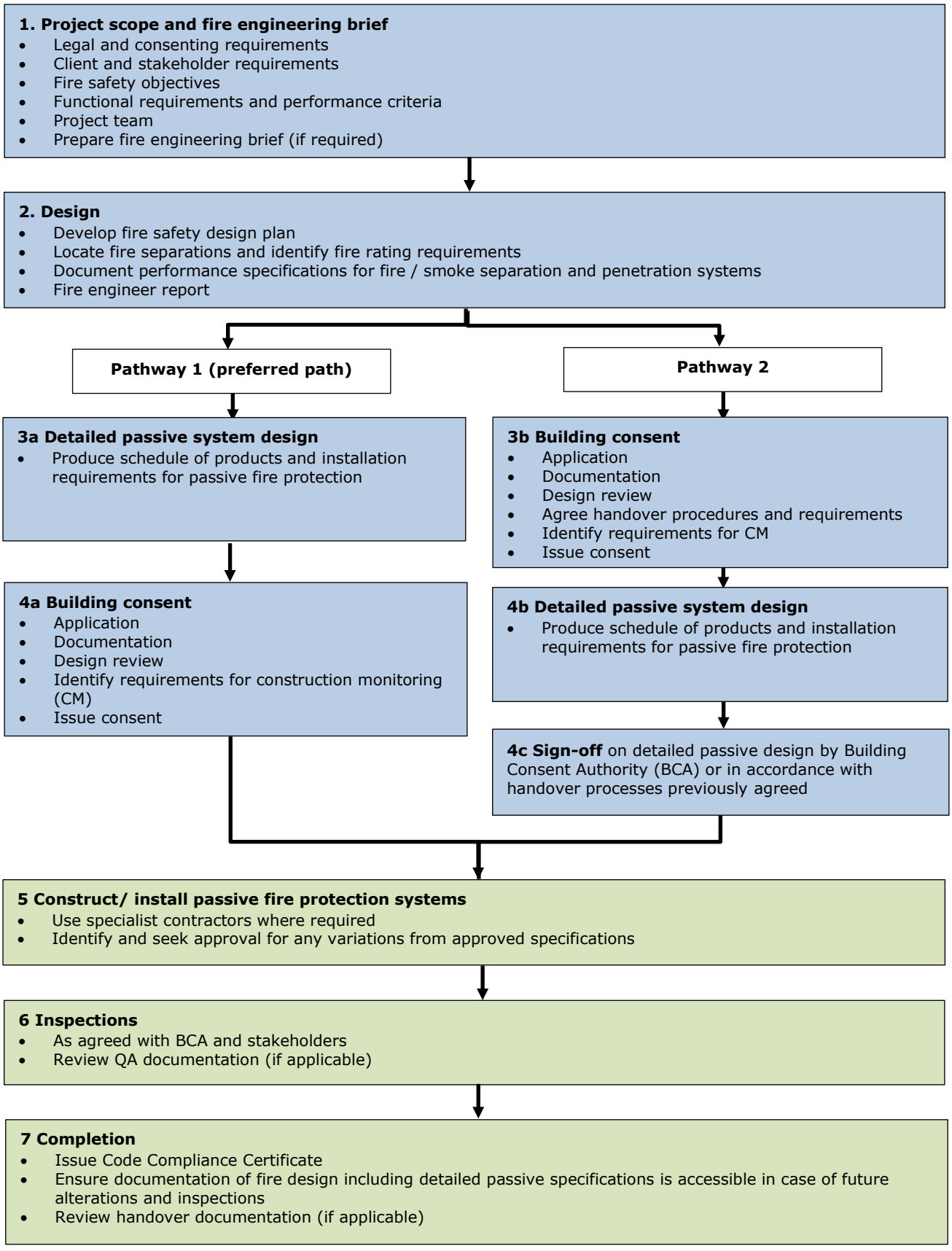
The University differentiates between fire and smoke stopping installations fire and smoke dampers.

Labelling of fire dampers is defined by a University standard which differs from the labelling for fire stopping. Contractors shall liaise with Property Services regarding any dampers.

**Note:** Any fire sealant required around a fire damper is associated with the fire damper installation and not considered a fire stopping detail.

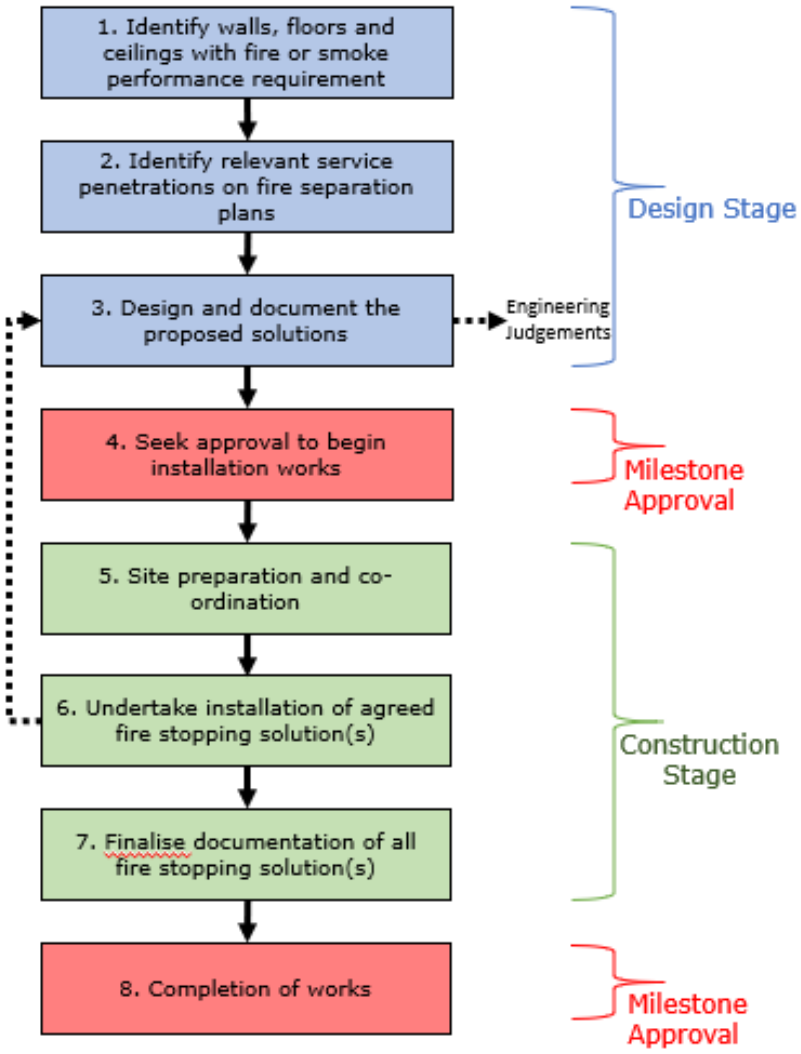
The fire stopping installer is to contact Property Services if any existing dampers observed during their fire stopping work do not have labels. The installer is to provide basic details (e.g. room location) to Property Services so this issue can be addressed (outside the fire stopping works).

# Appendix A Methodology Flowchart for New Building Projects



# Appendix B Methodology Flowchart for Existing Building Projects

Read this flowchart in conjunction with the process table following it. An example showing the use of the flowchart is included in B.2.




## B.1 Process Table that accompanies Methodology Flowchart for Existing Building Projects

| No | Task | Description |
|---|---|---|
| **Design Stage** | | |
| 1. | Identify walls, floors and ceilings with fire or smoke performance requirement | 1. Source from Property Services / project fire engineer.<br>2. Identify all fire or smoke performance requirements on "fire separation" plans and sections showing all relevant walls, floors and ceilings (the substrate).<br>3. Property Services / fire engineer approves.<br>4. If required, update before starting work if they are not correct.<br>5. Specify all fire ratings for stability, integrity and insulation (e.g. (60)/60/60)<br>6. For each relevant substrate, confirm the minimum NZBC and University of Auckland requirements. |

| No | Task | Description |
|---|---|---|
| 2. | Identify relevant service penetrations on fire separation plans | 1. Confirm with Property Services / fire engineer if 'relevant service penetrations' relate only to the 'new fire stopping works' or also to remedial work on any existing service penetrations.<br>2. Marked-up plan(s) form basis of all fire stopping design and construction documentation and must include wall/floor/ceiling construction details such as:<br>• Solid-core or hollow-core construction (e.g. concrete or plasterboard)<br>• Thickness of construction<br>• Thickness of linings (for hollow-core construction)<br>• Density of construction (for solid-core construction). |
| 3. | Design and document the proposed solutions | 1. All proposed fire stopping solutions must meet NZBC and University of Auckland requirements.<br>2. Document in a "fire stopping design package" (schedule and marked up plans/sections) to be reviewed by Property Services / fire engineer. Include:<br>• Details identified in earlier steps.<br>• Achieved fire/smoke rating of the solution.<br>• Details on max / min 'annular gap' between service(s) and the substrate.<br>• Any remedial work required to substrate (e.g. patching of plasterboard).<br>• Any supporting elements to be provided (e.g. brackets).<br>• Size of service penetration vs max / min size of substrate opening.<br>• How compliance with the 'percentage fill' limits will be achieved.<br>• Complete installation instructions.<br>• Details of fasteners and how they will be installed (e.g. into solid framework).<br>• Any relevant correspondence that supports the proposed solution.<br>If not possible to use a tested and approved fire stopping solution, a design based on an 'engineering judgement' may be acceptable.<br>Notes:<br>• A product datasheet alone may be insufficient evidence of compliance.<br>• The information in the "fire stopping design package" should provide a guide to the installer to identify the differences between acceptable and unacceptable installation. |
| **Milestone Approval** | | |
| 4. | Seek approval to begin installation | Property Services / fire engineer approves solution in writing by spot-checking the "fire stopping design package" information. |
| **Construction Stage** | | |
| 5. | Site preparation and co-ordination | 1. Discuss proposed works with Property Services to finalise installation programme, installer competency requirements, inspections of installations etc.<br>2. Co-ordinate proposed works with all other relevant trades on-site. Regular communication needed between all-trades to avoid rework.<br>3. Update "fire stopping design package" as required. |
| 6. | Installation of agreed fire stopping solution(s) | 1. Ensure fire stopping installer aware of details in 'fire stopping design package' and the University's requirements.<br>2. Update "fire stopping design package" as solution installed.<br>3. Regularly check if actual on-site arrangements require a fire stopping redesign.<br>4. Regularly communicate / co-ordinate all fire stopping works with all other relevant trades.<br>5. Identify additional remedial fire stopping required to existing penetrations which were not identified during Step 2. Develop fire stopping solutions (and price) for these issues. Provide details to Project Services / fire engineer) for approval to proceed.<br>6. Arrange timings for site inspections of relevant installations. |

| No | Task | Description |
|---|---|---|
| 7. | Finalise documentation of all fire stopping solution(s) | • Add PS3s and any correspondence that supports installation to final 'fire stopping design package' before Property Services / fire engineer reviews.<br>The package documents actual work done and may differ to planned work identified in step 3. |
| **Milestone Approval** | | |
| 8. | Completion of works | 1. Update the University's Passive Fire register with details of the completed works (to be done in accordance to the Contract - discuss with Property Services).<br>2. Property Services confirms 'completion of works' |

## B.2 Methodology Flowchart Example for an Existing Building Project

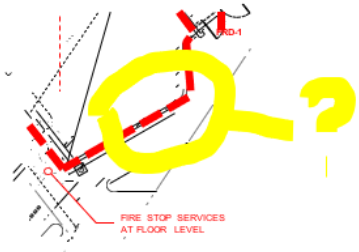
This example is for the Design / Build Fire Stopping Contractor

Applied 'Design Stage' Example: Filling a 10mm gap in a 250mm thick concrete wall.

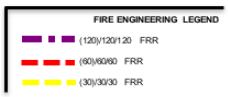
**1. Identify the walls, floor and ceilings** throughout the building which have a fire or smoke performance requirement.

**2. Identify the relevant service penetrations** in walls, floors and ceiling in the fire separation plans.

1. Fire Separation




2. Wall in question




3. Required Fire Performance to wall

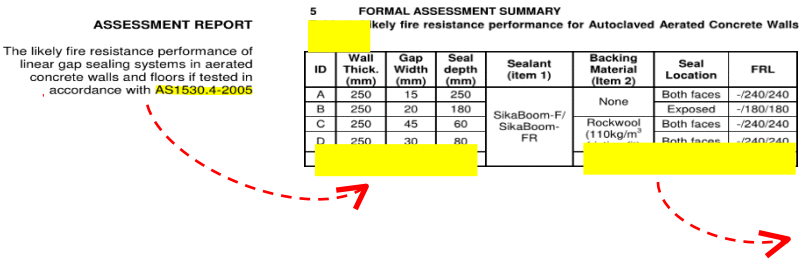
4. Site review of wall construction

NOTE: no service penetration in this design example, nor is the wall load bearing.

**3. Design and document the proposed fire stopping solution(s)** for the relevant walls, floors and ceilings.

Based on a contractor's intent to use 'SikaBoom' which results in a review of the suitability of the product.

1. Fire Test Report



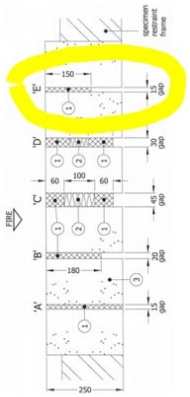
ASSESSMENT REPORT

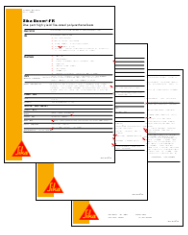
The likely fire resistance performance of linear gap sealing systems in aerated concrete walls and floors if tested in accordance with AS1530.4-2005

5 FORMAL ASSESSMENT SUMMARY

ikely fire resistance performance for Autoclaved Aerated Concrete Walls

| ID | Wall Thick. (mm) | Gap Width (mm) | Seal depth (mm) | Sealant (Item 1) | Backing Material (Item 2) | Seal Location | FRL |
|---|---|---|---|---|---|---|---|
| A | 250 | 15 | 250 | SikaBoom-F/ SikaBoom-FR | None | Both faces | -/240/240 |
| B | 250 | 20 | 180 | | | Exposed | -/180/180 |
| C | 250 | 45 | 60 | | Rockwool (110kg/m³ | Both faces | -/240/240 |
| D | 250 | 30 | 80 | | | Both faces | -/240/240 |





2. Technical Data Sheet

Tests Approvals / Standards
Application Details
Application Conditions / Limitations
Application Instructions
Storage and Shelf Life etc.

**Conclusion:**

- NZBC applicable test/appraisal available (evidence of a compliant fire stopping solution)
- Contractor to complete 'fire stopping design package' and include all relevant details.

**4. Seek approval to begin installation works.**

Contractor submits the completed 'fire stopping package' to University of Auckland Property Services for review before getting approval to start installation work.

# Appendix C Feedback Form

We love hearing from you. Please take a few moments to let us know how we can improve the *Property Services Design Standards and Guidelines*.

| | | | | |
|---|---|---|---|---|
| 1. | **Name:** | | | |
| 2. | Contact Details:<br>(in case we need clarification) | | | |
| **Complete this section if you have found a typo / formatting error.**<br>(If possible, attach a photo of the error) | | | | |
| 3. | Section No: | | Page No/s: | |
| | Description of error: | | | |
| **Complete this section if you have a suggestion about content.** | | | | |
| 4. | Section No: | | Page No/s:<br>(if applicable) | |
| | Suggestion/s: | | | |
| **Complete this section if you have any other suggestions for improvement.** | | | | |
| 5. | Suggestion/s: | | | |
| 6. | Email your feedback to PSTechServices@auckland.ac.nz | | | |
| **Thanks for your feedback!** | | | | |

# Appendix D Index