

<b>0182P HILTI IN FIRE-STOPPING</b>
-------------------------------------

**Branded worksection**

This branded worksection *Template* has been developed by NATSPEC in conjunction with **HILTI (Aust) Pty Ltd** (the Product Partner) and may be used whilst the Product Partner is licensed to distribute it. The copyright remains with NATSPEC. As with all NATSPEC worksections, it is the responsibility of the user to make sure it is completed appropriately for the project. The user should also review its applicability for local conditions and regulations. Check [www.natspec.com.au](http://www.natspec.com.au) for the latest updated version.

**Worksection abstract**

This worksection *Template* is applicable to HILTI fire-stopping for service penetrations, and construction/control joints in and between building elements that are required to have a fire-resistance level (FRL). It addresses the NCC Deemed-to-Satisfy provisions of BCA (2022) Spec 13.

**How to use this worksection**

Customise this worksection *Template* for each project. See A guide to NATSPEC worksections ([www.natspec.com.au](http://www.natspec.com.au)) for information on *Template* structure, word styles, and completing a worksection.

**Related material located elsewhere in NATSPEC**

If a listed worksection is not part of your subscription package and you wish to purchase it, contact NATSPEC.

Related material may be found in other worksections. See for example:

- *0432 Curtain walls* for fire-stopping between floor slabs and curtain walls, and inside hollow curtain walls at the floor slab.
- *0741 Ductwork* for fire dampers in ductwork at penetrations.

Related branded worksections by HILTI:

- *0181p HILTI anchors*.

**Other fire-stopping products not provided by HILTI**

This branded worksection *Template* includes generic material which may not be provided by the Product Partner including:

- Fire-stop mortars.
- Formulated compound of incombustible fibres.
- Non-combustible mineral fibre stuffing.
- Intumescent fire pillows.
- Fire-stop composite sheets.
- Control joint insert - Elastomeric foam strip.

**Documenting this and related work**

NCC Deemed-to-Satisfy provisions must be specified, if they are to apply in the project. BCA (2022) C4D15 references several alternatives including:

- AS 1668.1 (2015) for protection of openings for ventilation and air-conditioning ducts or equipment.
- AS 4072.1 (2005) (and AS 1530.4 (2014)), for type-testing of service penetration fire protection.
- BCA (2022) Spec 13 for installation of certain metal pipes, sanitary plumbing, wires and cables, and electrical switches and outlets.

BCA (2022) C4D16 references AS 1530.4 (2014) for type-testing of construction joint fire protection. The term *Construction joint* in BCA (2022) C4D16 is equivalent to *control joint* in AS 4072.1 (2005).

The relevant requirements for fire-stopping are those in AS 4072.1 (2005), which references AS 1530.4 (2014), and those in BCA (2022) S13C7. For simplicity this specification is based on AS 4072.1 (2005). AS 4072.1 (2005) contains options that are addressed in this worksection.

Fire-stopping systems include the fire barrier (FRL rated building element) that is penetrated, the service penetrating the opening and the fire-stopping products.

The worksection contains technical content that may need to be customised by a professional engineer for inclusion in a project specification.

You may document this and related work as follows:

- Identify and code individual penetrations to be fire-stopped for scheduling.
- Coordinate with drawings.
- Coordinate with services engineers for service penetrations e.g. locations, sleeving (see **BUILDING PENETRATIONS** in *0171 General requirements*), re-penetration, penetrant details (e.g. materials, contents and sizes) and penetration sizes.

Minimise the number and size of service penetrations. Fire-stopping of wiring, cables and cable trays at penetrations must conform to AS/NZS 3000 (2018) clause 3.9.9.3.

- Coordinate with the structural design for control joint fire-stopping and to make sure that service penetrations are non-loadbearing. Penetrations are generally static and simple friction-fitting of mineral fibre insulation may be sufficient. Control/construction joints are dynamic and therefore adhesion and the ability to move is essential.
- Make sure that fire-stopping is documented consistently, without duplication or gaps - ideally only once, in this worksection. Service penetrations will often contain several services e.g. fire, power, water supply. The documentation of fire-stopping can easily get out of hand, if tackled in more than one worksection.
- See NATSPEC TECHnote DES 020 on fire behaviour of building materials and assemblies.

The *Normal* style text of this worksection may refer to items as being documented elsewhere in the contract documentation. Make sure they are documented.

Search [acumen.architecture.com.au](http://acumen.architecture.com.au), the Australian Institute of Architects' practice advisory subscription service, for notes on the following:

- Guarantees and warranties.

#### Specifying ESD

The following may be specified by retaining default text:

- Prohibition on use of toxic materials including asbestos and lead.
- Fire stopping sealants: Limiting VOC levels.

The following may be specified using included options:

- Recycled material content e.g. for mineral fibre products.

Refer to NATSPEC TECHreport TR 01 on specifying ESD.

## 1 GENERAL

HILTI is a world leader in the design and manufacture of cutting-edge technologies, software and services for the professional construction industry. Every day our technologies support awe-inspiring feats of engineering around the world – from the famous bullet train in Japan, the new built Perth stadium or Sydney iconic Barangaroo just to list a few. We offer a 360 degrees service for construction – acting as a true partner for our customers.

### 1.1 RESPONSIBILITIES

#### General

Requirement: Provide HILTI fire-stopping, as documented.

*Documented* is defined in *0171 General requirements* as meaning contained in the contract documents.

### 1.2 COMPANY CONTACTS

#### HILTI technical contacts

Website: [www.hilti.com.au/content/hilti/A2/AU/en/engineering/design-center/fire-protection1.html](http://www.hilti.com.au/content/hilti/A2/AU/en/engineering/design-center/fire-protection1.html) or [ask.hilti.com.au](http://ask.hilti.com.au)

### 1.3 CROSS REFERENCES

#### General

Requirement: Conform to the following:

- *0171 General requirements*.

*0171 General requirements* contains umbrella requirements for all building and services worksections.

List the worksections cross referenced by this worksection. *0171 General requirements* references the *018 Common requirements* subgroup of worksections. It is not necessary to repeat them here. However, you may also wish to direct the contractor to other worksections where there may be work that is closely associated with this work.

NATSPEC uses generic worksection titles, whether or not there are branded equivalents. If you use a branded worksection, change the cross reference here.

### 1.4 STANDARDS

#### General

Proprietary fire-stopping products must conform to NCC Deemed-to-Satisfy provisions. In particular, type-testing to AS 4072.1 (2005), AS 1530.4 (2014) and BCA (2022) S13C7 will be required. Type-testing to overseas standards may be

acceptable to the authority responsible for building approval, but as this is outside the Deemed-to-Satisfy solutions of the NCC on which this worksection is based, amend accordingly.

Service penetration fire-stopping systems: To AS 4072.1 (2005) and BCA (2022) C4D15.

BCA (2022) C4D15(2)(a) requires type-testing to both AS 4072.1 (2005) and AS 1530.4 (2014). AS 4072.1 (2005) covers design, type-testing and certification of fire-stopping at service penetrations through fire-resisting elements, and control/construction joints between fire-resisting elements. There is also a partial exemption in return for some restrictions.

BCA (2022) C4D15(2)(c) requires installation of fire-stopping to BCA (2022) Spec 13. This covers material, installation and type-testing. If these clauses are to be applied, the design of the penetrations must take into account the restrictions imposed in them, and in BCA (2022) Spec 13 at large.

BCA (2022) S13C7(1) requires conformance to ISO 540 (2008) for high temperature flow criteria.

BCA (2022) H3D5 requires fire protection for separating building elements and for services penetrations.

Control/construction joint fire-stopping systems: To AS 4072.1 (2005) and BCA (2022) C4D16.

BCA (2022) C4D16 requires type-testing to AS 1530.4 (2014), so these alternatives amount to nearly the same thing. But AS 4072.1 (2005) (Appendix A, clause A6) advises that the fire-resistance test (i.e. AS 1530.4 (2014)) on elements containing control joints is a test for joints within elements and not between different elements. Nevertheless, it is the standard fire test that is used, and supplemented by other tests, in AS 4072.1 (2005). Appendix C2 of AS 4072.1 (2005) cites additional standards for the physical performance of control joints.

## 1.5 INTERPRETATION

### Definitions

General: For the purposes of this worksection, the definitions given in AS 4072.1 (2005) apply.

Edit the **Definitions** subclause to suit the project or delete if not required. List alphabetically.

## 1.6 MANUFACTURER'S DOCUMENTS

### Technical manuals

Product information: [www.hilti.com.au/c/CLS\\_FIRESTOP\\_PROTECTION\\_7131](http://www.hilti.com.au/c/CLS_FIRESTOP_PROTECTION_7131).

## 1.7 SUBMISSIONS

### Statement of design compliance

Certification: Submit a statement of design compliance in the form of a treatment schedule for each typical fire-resistant sealing system.

List compliance documents in the **Fire-stopping systems schedule**.

Treatment schedule: To AS 4072.1 (2005) Appendix B clause B3.

Treatment schedules to include the following:

- For service penetrations: Penetrant, separating element, FRL, products, referenced compliance document (Test report / Regulatory information report), referenced table and installation details according to the compliance document.
- For joints: Details of jointing elements, products, joint width, joint depth, referenced compliance document (Test report / Regulatory information report), referenced table and installation details according to the compliance document.

### Statement of installation compliance

Certification of installation: Submit a record of each installation with the information listed in AS 4072.1 (2005) Appendix B. Clearly label each service penetration or control joint and make available information listed in clause B4.

- Schedule: To AS 4072.1 (2005) Figure B1.
- Statement of compliance: To AS 4072.1 (2005) Figure B2.

The statement will be used for the fire-stopping management system.

### Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

### Products and materials

General: Submit the following:

- Evidence that systems conform to documented requirements.
- Copies of relevant manufacturers' instructions.
- Product data sheets (PDS).
- Safety data sheets (SDS) where applicable.

Type tests: Submit type test reports from an Accredited Testing Laboratory, or regulatory information report, demonstrating conformance to BCA (2022) C4D15, as evidence of conformance for each combination of fire-stopping materials, application, type of service, substrate, and penetration orientation, including drawings of tested details.

The statement that a product conforms to AS 4072.1 (2005) alone is incomplete. See BCA (2022) C4D15 and BCA (2022) C4D16 for evidence required for FRL of tested systems.

The proposed fire-stopping system must be type-tested for the specific situation intended. For example, a test certification for a PVC-U floor waste would not be acceptable for a different PVC-U pipe penetrating a wall. Similarly, if it is proposed to include bends or fittings within the thickness of the fire-resisting building element the fire-stopping system should have been tested with these in place as their presence may reduce the thickness of fire-stopping material.

Check that the completion certification references current and relevant type tests. Permissible variations from the prototype are defined in AS 4072.1 (2005) Section 4.

Overseas certification may be admissible. For example, Underwriters Laboratories (UL) certification to UL 1479 (2015) or certification to ASTM E814 (2023). These entail exposure to a standard temperature-time fire, and to a subsequent application of a hose stream. Two ratings are given for each fire-stop: an F rating, based upon flame occurrence on the unexposed surface, and a T rating based upon the temperature rise and the flame occurrence.

Products sourced from the US and Canada may be listed in the UL Fire Resistance Directory, the Intertek Certification Listings, or the FM Approvals. Products sourced from the UK may be listed in the LPCB List of Approved Fire and Security Products and Services (RedBookLive).

### Samples

Sample panels: Supply a sample panel of each fire-stopping assembly, on representative substrates. If built into the works, identify by marking it as a control sample.

Perhaps limit sample panels to assemblies documented without reference to brand, and to assemblies exposed to view since quality of finish will be more important e.g. colour, pattern.

Size: 500 mm run for junction seals and 500 x 500 mm area for penetration seals.

### Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Evidence of experience: [complete/delete]

e.g. Experienced (minimum 5 years documented) in the installation of fire-stopping that is similar in material, design, and extent to that specified. Contractor's certification that the installer has the documented experience may also be required in **SUBMISSIONS**, as might evidence of the manufacturers' approval, licensing and supervision of the installer(s).

Delete if supplier/installer details are not required.

### Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

## 1.8 INSPECTION

### Pre-installation meeting

General: Hold a meeting at the project site with the fire-stopping materials manufacturer and installer to review the fire-stopping requirements. Give notice.

A pre-installation conference before starting fire-stopping might be appropriate. If so, consider including this *Optional* style text by changing to *Normal* style text.

### Notice

Inspection: Give notice so that inspection may be made of the following:

- Service penetrations completed and ready for fire-stopping.
- Control/construction joints completed and ready for fire-stopping.
- Finished fire-stopping, before being concealed.

Authority inspections: [complete/delete]

Include authority inspections if appropriate. Consider an inspection to check for adhesion and curing.

## 2 PRODUCTS

### 2.1 GENERAL

#### Products

Compliance: Use only firestop products conforming to AS 1530.4 (2014) and AS 4072.1 (2005) for specific fire-rated construction conditions. Conform to construction assembly type, penetrating item type, annular space requirements and fire-rating involved for each separate instance.

Compatibility: Provide fire-stopping composed of components that are compatible with each other, the substrates forming openings, and any items penetrating the fire-stopping under conditions of service and application.

Refer to manufacturer's testing data and field experience.

Ancillary components: Provide components for each fire-stopping system that are required as additional fill material or support. Use only components specified by the fire-stopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

Penetrations in smoke barriers: Provide fire-stopping with ratings determined to UL 1479 (2015) or ASTM E814 (2023).

- L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

Mould resistance: Provide fire-stopping materials with a mould and mildew resistance rating of 0, to ASTM G21 (2015).

Maintenance: Use products or systems that are designed to be easier for operation and maintenance where applicable

Consider the ability for re-penetration, e.g. Use CFS SL GA for cables. CFS-TTS for top track seal.

Fire-stopping materials include intumescent mastics, sealants, cement mortar, gypsum-based plaster, cement or gypsum-based vermiculite/perlite mixes, glass fibre, crushed rock, blast furnace slag or ceramic-based products (with or without resin binders). See BCA (2022) C2D11 on not using fire-retardant (e.g. intumescent) coatings to conform to substrate requirements for Spread-of-Flame Index, Smoke-Developed Index and flammability.

Materials and assemblies or systems are often dealt with separately in technical literature. The designer must determine product suitability in terms of type of joint or penetration. Some of these complexities are discussed in AS 4072.1 (2005). For joints, consider joint width, joint expansion and contraction, and sealer/substrate compatibility. Fire-stopping at control joints will often be additional to expansion joint assemblies, which serve other functions. Consider exposure restrictions.

Penetration sealing systems often comprise ceramic fibres derived from alumina and silica melts. These are a class of man-made vitreous fibres (MMVF), synthetic mineral fibre and Statutory Work Health and Safety provisions may apply to their use. Refer to Safe Work Australia: Guide to handling refractory ceramic fibres (2020) at [www.safeworkaustralia.gov.au](http://www.safeworkaustralia.gov.au).

#### Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

**SUBSTITUTIONS** in 0171 *General requirements* sets out the submissions required if the contractor proposes alternative products. Refer also to NATSPEC TECHnote GEN 006 for more information on proprietary specification.

#### Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Edit the list to suit the project or delete if not required.

#### Storage and handling

General: Deliver, unload and store products and accessories in unbroken manufacturer's packaging in a dry, well-ventilated and secure storage area, unaffected by weather.

Shelf life: Use materials that have not exceeded their shelf life.

#### Control joints

General: To AS 4072.1 (2005) clauses 2.3 and 4.7 and Appendix C.

**Toxicity**

Toxic materials: Free of asbestos and lead, and free of, nor requiring the use of, toxic solvents.

Specify low-VOC solvents if required.

Toxicity in fire: Non-toxic.

SDS often detail fire behaviour including toxic by-products generated.

Toxicity before curing: Select products with very limited, or no health hazards, where applicable.

Refer to manufacturers safety data sheets. e.g. Acrylic based sealant is recommended over PU based sealant for control joint applications.

**Product certification**

Certification scheme: [complete/delete]

Product certification: From an organisation accredited by the Joint Accreditation Scheme of Australia and New Zealand (JAS-ANZ).

Service penetration fire-stopping systems: Fire-resistance tested to AS 1530.4 (2014).

BCA (2022) C4D15 allows an exemption for the insulation criteria if the penetrating service is:

- A metal pipe system.
- Protected so that combustible material is not and cannot be located within 100 mm of it.
- Not in a required exit.

If this is not the case, or if this specification is to BCA (2022) C4D15(2)(a), then insulation failure needs to be evaluated.

Fire-stop mortars: Resistance to explosive spalling to AS 1774.36 (2019).

Control joint fire-stopping systems: Fire-resistance tested to AS 1530.4 (2014).

Consider documenting completion tests, for example, a series of 5 fog tests at random locations. Fog units (machines) should have a formulation output range of 6.8 L/h. Formulation particle size 0.5 to 25 microns. Fogging agent should be non-toxic, non-staining and should provide a heavy fog at 30 ppm with a permissible airborne level concentration of 50 ppm. Fog at a rate of 4 s/2.8 m<sup>3</sup>. Maintain the fog density until inspection is complete. Failure occurs if any penetration, joint or void, under this worksection, emits visible fog.

**2.2 HILTI FIRESTOPPING FOR ELECTRICAL TRADES**

A range of sealants, foams and pre-formed solutions for non-loadbearing openings in fire rated building elements.

Refer to HILTI product data sheets for application details and tested FRL's.

HILTI CP 636 Firestop Mortar to help prevent fire and smoke from spreading through large openings with cable, pipe and mixed penetrations, and CFS CT-B Firestop Board for sealing medium to large openings are both also available from HILTI as a performance solution and are currently being tested to Australian standards. Contact HILTI for more information on these products.

**CP 606 Flexible Firestop Sealant**

Description: A flexible and paintable acrylic based fire-stopping sealant.

Sealant to protect single or small bundles of cables through stud walls and masonry walls.

FRL: Up to -/240/240.

**CP 611A Firestop Intumescent Sealant**

Description: Intumescent water based, silicone-free sealant for fire-stopping of electrical penetrations. Expansion ratio of 1:10.

Sealant to protect combustible penetrations including cables, cable bundles, conduits, plastic pipes, PEX pipe and pair coil.

FRL: Up to -/120/120.

**CFS-F FX Flexible Firestop Foam**

Description: Intumescent, self-expanding, fire-stopping foam to help create a fire and smoke barrier around cable and mixed penetrations.

Suitable for irregular opening sizes for cables, cable bundles, conduits and cable trays. Capable of achieving an FRL of up to -/120/120.

**CFS-BL Firestop Block**

Description: Intumescent preformed polyurethane firestop blocks for sealing penetrations with cables. Dust and fibre free, with an expansion ratio of 1:3.

Workable blocks for sealing large rectangular openings up to 1 x 1 m.

FRL: Up to -/120/120.

### CFS-PL Firestop Plug

Description: Reusable intumescent fire-stopping solution for permanent or temporary cable openings in walls and floors. Dust and fibre free, with an expansion ratio of 1:3.

Self-sealing, workable plug for circular openings up to 202 mm.

FRL: Up to -/120/120.

### CFS-P BA Firestop Putty Bandage

Description: Intumescent, self-adhering putty bandage used to improve the fire-rating of cable penetrations. Used in combination with CFS-PL and CFS-BL.

Self-adhesive bandage for use around cables and pipes. Shorter wrapping length to maximise cable performance and capable of achieving FRL of up to -/120/120.

### CFS-SL GA Firestop Pathway

Description: Intumescent preformed device for high-traffic cabling with optimal airflow control and twist to close mechanism. High smoke and gas resistance with low air leakage of 0.6 m<sup>3</sup>/h for 28 cables at 10 Pa.

Fire-rated insert for preformed circular openings. Twist to open for cable management.

FRL: Up to -/120/120.

## 2.3 HILTI FIRESTOPPING FOR PLUMBING AND SPRINKLER TRADES

A range of pre-formed, cast-in and sealants for filling around penetrants in non-loadbearing openings in fire rated building elements. Refer to HILTI product data sheets for application details and tested FRL's.

### CP 606 Flexible Firestop Sealant

Description: A flexible and paintable acrylic based fire-stopping sealant.

Sealant to protect copper, steel, galvanized steel, stainless steel and brass pipe through walls and floors.

FRL: Up to -/240/240.

### CP 611A Firestop Intumescent Sealant

Description: Intumescent water based, silicone-free sealant for fire-stopping of electrical penetrations. Expansion ratio of 1:10.

Sealant to protect combustible penetrations including cables, cable bundles, conduits, plastic pipes, PEX pipe and pair coil.

FRL: Up to -/120/120.

### CFS-C EL Firestop Endless Collar

Description: Fire-stopping collar for pipe penetrations in CLT walls and floors. Comes in a roll, to be shaped on site for non-standard pipe configurations, comprising intumescent band that can be cut to length and fixed around pipes via hooks.

Retrofit collar to help create a fire and smoke barriers to protect combustible pipe including uPVC, HDPE & PVC Floor waste.

FRL: Up to -/90/90 for CLT walls and floors.

### CFS-C P Premium Firestop Collar

Description: Fire-stopping preformed collar, comprising intumescent inlay fitted into a galvanized steel housing with adjustable hooks. Expansion ratio of 1:17.

Retrofit collar to help create a fire and smoke barriers to protect combustible pipe including UPVC, CPVC, HDPE.

FRL: Up to -/240/240.

### CP 680-P Cast-in Firestop Sleeve

Description: One-step intumescent fire-stopping cast-in sleeve for plastic pipe penetrations through floors. Minimum height of 200 mm with screw on extensions.

Cast-in sleeve for protecting plastic pipework up to 160 mm diameter through floors.

FRL: Up to -/240/240.

## 2.4 HILTI FIRESTOPPING FOR HVAC TRADES

A range of fire-rated sealants and bandages for wrapping penetrants in fire-rated openings. May be used as part of a fire-rated assembly. Refer to HILTI product data sheets for application details and tested FRL's.

**CP 611A Firestop Intumescent Sealant**

Description: Intumescent water based, silicone-free sealant for fire-stopping of electrical penetrations. Expansion ratio of 1:10.

Sealant to protect combustible penetrations including cables, cable bundles, conduits, plastic pipes, PEX pipe and pair coil.

FRL: Up to -/120/120.

**CFS-B Firestop Bandage**

Description: Fire-stopping bandage for a fire and smoke barrier around non-combustible pipes with combustible insulation.

Preformed bandage to protect insulated copper or metal pipe with Armflex or mineral wool insulation through walls or floors.

FRL: Up to -/120/120.

**2.5 HILTI FIRESTOPPING FOR PLASTERING AND PARTITION TRADES**

A range of fire-rated, sealants and pre-formed solutions for fire-rated construction. Refer to HILTI product data sheets for application details and tested FRL's.

**CP 606 Flexible Firestop Sealant**

Description: A flexible and paintable acrylic based fire-stopping sealant.

Sealant to protect control joint in varies of configurations in plasterboard walls, masonry walls and concrete floors.

FRL: Up to -/240/240.

**CFS-TTS E Firestop Top Track Seal**

Description: Preformed polyurethane material for top-of-wall joints in plasterboard walls. Up to 50% movement capability and acoustic performance of  $R_w$  62 dB.

Innovative solution for optimal quality control and maintenance. Available in different widths for standard tracks.

FRL: Up to -/120/120 in stud walls.

**2.6 HILTI FIRESTOPPING FOR FACADE TRADES****CFS-SP SIL Silicone-based sealant**

Description: High-durability joint sealant spray for high-moisture, quick-cure environments for slab edge joint applications.

Joint spray with mineral wool backing to protect slab edge joints in various configurations up to a maximum 200 mm joint width.

FRL: up to -/120/120.

**2.7 OTHER FIRE-STOPPING PRODUCTS****Fire-stop mortars**

Type: Re-enterable cement-based compound, mixed with water. Non-shrinking, moisture resistant. Insoluble in water, after setting.

For large penetrations. Setting time typically 60 minutes, curing time 24 hours depending upon the temperature and humidity during curing.

**Formulated compound of incombustible fibres**

Material: Formulated compound mixed with mineral fibres, non-shrinking, moisture resistant. Insoluble in water after setting.

Not suitable for joints.

**Non-combustible mineral fibre stuffing**

Not suitable for joints. Alkaline water contamination of the backer or filler materials may cause corrosion of metallic penetrating items.

Material: Mineral fibre stuffing insulation, dry and free of other contaminants.

Standard: To AS/NZS 4859.1 (2018) Section 7.

The standard refers to mineral fibre insulation as an insulation material only and does not address its fire resistance properties. Use and install in accordance with a type test to achieve a required FRL.

**Intumescent fire pillows**

Material: Self-contained self-locking intumescent fire pillows for medium to large openings, where no additional support is required.

May be used for re-penetrations.

**Fire-stop composite sheets**

Material: Composite system comprised of a number of components, including a fire-resistive elastomeric sheet, bonded on either side with layers of sheet steel and/or steel-wire mesh covered with aluminium foil.

Suitable for large penetrations in walls and floors. Usually for re-penetrations. Mechanically fixed, sealed with intumescent.

**2.8 ACCESSORIES****PE backing rod**

Material: Open and closed cell PE backing rod. Install to the fire stopping manufacturer's instructions.

**Control joints insert – elastomeric foam strip**

Control joint insert: Elastomeric foam strip laminated with a graphite based intumescent compound on both sides, which is a water resistant seal that expands when exposed to heat.

Suitable for long linear control joints in horizontal and vertical locations.

**Accessories**

Stickers and labels: [complete/delete]

Consider using labels as part of the fire-stopping management system. Informative only in AS 4072.1 (2005) Appendix B.

Use HILTI Firestop system adhesive labels and HILTI identification stickers complete with QR code.

The label should contain information on the firestop system installed, including the person/company responsible for the installation, and dates to facilitate inspection and maintenance.

Primer: [complete/delete]

As recommended by manufacturer for substrates.

Permanent dam material: Non-combustible.

For intumescent, fire-stop mortars and fire-stop silicones. Delete if dam material is not to be permanent.

Permanent dam material type: [complete/delete]

e.g. Mineral fibreboard, ceramic fibre matting, mineral fibre matting, sheet metal, alumina silicate fibre board. Backers may include urethane foam rod, or glass fibre rope.

Metal lath: [complete/delete]

For cable tray penetrations; used to enclose both sides of the vertical penetration, to keep fire-stop pillows in place, and to prevent unauthorised or accidental removal of fire-stopping.

Installation accessories: Provide clips, collars, fasteners, stainless steel cable ties, temporary stops and dams, backing rods and other devices required to position, support and contain fire-stopping and accessories.

Mineral fibre installation often needs clips or retainers to hold it in place.

**3 EXECUTION****3.1 PREPARATION****Substrates**

General: Give notice, if substrates or penetrants or both are not suitable for fire-stopping.

Cleaning: Clean substrates of dirt, dust, grease, oil, loose material, and other matter that may affect the bond of fire-stopping products.

Primer: Dry substrates for primers and sealants.

Restraint: Install backing and/or damming materials to arrest liquid material leakage. Remove temporary dams after material has cured.

**3.2 INSTALLATION****General**

Extent: Fire-stop and smoke-stop interruptions to fire-resistance rated assemblies, materials and components, including penetrations through fire-resisting elements, breaks within fire-resisting elements such as expansion joints, and junctions between fire-resisting elements.

Fire-resisting elements must be identified, either on the drawings, or in a schedule. Add curtain wall fire-stopping if not covered in 0432 *Curtain walls*; this is typically at the junction between a fire-resisting element (e.g. a floor slab) and a non fire-resisting building element (e.g. a curtain wall), which does not fit into the description provided above.

Sequence: Fire-stop after services have been installed through penetrations and properly spaced and supported, after sleeving where appropriate, and after removal of temporary lines, but before restricting access to the penetrations, including before dry lining.

Refer to HILTI Instruction for Use and Operating Instruction for the following:

- Depth and thickness of sealants and their application.
- Correct spacing of cables and other services through penetrations.
- Application of different and combined firestop products to achieve the required FRL.

Fire-resistance level (FRL): Install products to the manufacturer's recommendations. Installation to achieve the documented FRL in accordance with the manufacturer's tested system.

Ventilation: Supply ventilation for non-aqueous solvent-cured materials.

Density: Apply fire-stopping material to a uniform density.

Fire-stopping exposed to view: Finish surfaces to a uniform and level condition.

Cable separation: Maintain cable separation to HILTI's requirements.

Refer to AS 4072.1 (2005) clause 4.9.3 for further details on clearances.

Protection: Protect adjacent surfaces from damage arising through installation of fire-stopping. Protect completed fire-stopping from damage arising from other work.

Loose or damaged fire-stopping material: Remove and replace.

Penetrations by pipes and ducts: Allow for thermal movement of the pipes and ducts.

Preventing displacement: Reinforce or support fire-stopping materials with non-combustible materials when:

- The unsupported span of the fire-stopping materials exceed HILTI limits.
- The fire-stopping materials are non-rigid (unless shown to be satisfactory by test).

Environmental management: Refer to HILTI Safety Data Sheets for product details.

Intumescent, fire-stop mortar and fire-stop silicone require special handling - refer to safety data sheets for WHS and environmental issues.

Ambient conditions: Generally store and install products in temperatures above 5°C. Refer to HILTI product data sheets for additional information.

Consider a blanket requirement to maintain building temperature at over 5°C before, during, and for 3 days after installation. Some specifications suggest that the permanent HVAC should be in operation. Application temperature for multi-component foams and water-based products is critical. Consult manufacturer's data. Generally do not apply materials when temperature of substrate material and ambient air is below 5°C. Cold-temperature products are available.

Penetrations: Provide structural support around the opening.

Applies to vertical and horizontal openings. AS 4072.1 (2005) assumes all service penetrations are non-loadbearing, unless documented otherwise.

### 3.3 HILTI FIRESTOP PRODUCTS

#### General

Installation: Apply HILTI fire-stopping products to HILTI's instructions to achieve the correct fire resistance level and to completely close and seal joints.

Refer to HILTI Instruction for Use or Operating Instruction for depth and thickness of sealants and their application. Installation to the correct thickness and density are essential to achieve the correct FRL. Numerous applications have been type tested by Warrington Fire to establish FRL's for HILTI products.

### 3.4 OTHER FIRE-STOPPING PRODUCTS

#### Control joint insert – elastomeric foam strip

Installation: To the manufacturer's recommendations to completely close and seal the joint.

#### Fire-stop mortars

Ambient conditions: Do not install below 5°C.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

**Formulated compound of incombustible fibres**

Installation: To the manufacturer's recommendations to completely close and seal the opening.

**Non-combustible mineral fibre stuffing**

Installation: Install in accordance with a type tested installation to achieve the required FRL. Completely close and seal the opening.

Installation of inert stuffing is not temperature dependant.

**Fire-stop composite sheets**

Installation: To the manufacturer's recommendations to completely close and seal the opening.

**3.5 COMPLETION****Certification**

Certification of installation: On satisfactory completion of the installation and before the date for practical completion, certify that each fire resistant sealing system (service penetration or control joint) is identical with a tested system and has been correctly installed to the manufacturer's recommendations.

**Cleaning**

Requirement: Clean the finished surfaces and remove spilled and excess fire-stopping materials without damaging other work.

**Labelling**

Requirement: To the recommendations of AS 4072.1 (2005) Appendix B.

Location: Attach labels to cables, conduits, pipes and ducts on both sides of and close to, the control joint or penetration. On large items, provide multiple labels.

This makes mandatory the informative AS 4072.1 (2005) Appendix B. This labelling is to include the number of the standard, FRL, name and contact details of the installer, installation date, a unique installation reference number and name and contact details of the manufacturer.

HILTI can supply labels for installation at fire stop locations. Check requirements of any proposed Product Certification scheme nominated in PRODUCTS, **GENERAL**, **Product certification** for additional requirements.

**Operation and maintenance manuals**

General: For fire-stopping systems that are intended to be modified in service, submit a user manual.

Compliance with this clause targets the Operations and Maintenance requirement within the Minimum Expectation level of the Verification and Handover credit in Green Star Buildings (2021).

**Warranties**

HILTI fire-stopping products and systems: Submit the published product warranties on completion.

**4 SELECTIONS**

**Schedules** are a tool to specify properties required for products or systems. If the principal permits documentation of the product or system by proprietary name, some of the properties may be unnecessary and can be deleted. Document the product or system's location or application here and/or on the drawings with a matching project code. Refer to NATSPEC TECHnote GEN 024 for guidance on using and editing schedules.

**4.1 FIRE-STOPPING PRODUCTS****Fire-stopping products schedule**

For control joint seals, AS 4072.1 (2005) Appendix C refers to the physical performance required to retain integrity for attributes relating to performance functions other than fire. These attributes can be evaluated by a number of methods listed in Section C2 of Appendix C.

	FS1	FS2	FS3
Proprietary item			
Manufacturer's item number			
Material or component			
Sound reduction index			
Elongation/shrinkage (%)			
Potential expansion: Minimum (%)			

	FS1	FS2	FS3
Adhesion and bond to substrate (kPa)			
Compressive strength (kPa)			
Density (kg/m <sup>3</sup> )			
Vapour permeability (ng/Pa/s/m <sup>2</sup> )			
Air permeability (L/s/m <sup>2</sup> )			
Durability in service (years)			
Recycled content (%)			
VOC content (gram/L)			
Colour			
Paintable			

The **Fire-stopping materials schedule** should be completed by a qualified fire engineer. It is included for situations requiring a generic performance specification. If proprietary items are substituted delete the performance values.

The codes in the header row of the schedule designate each application or location of the item scheduled. Edit the codes to match those in other contract documents.

Proprietary item: The brand name and designation of the product. Nominate HILTI products here.

Manufacturer's item number: Manufacturers reference number.

Material or component: e.g. Fire-stop putty, fire-stop collar. Include product reference code e.g.: CFS-B.

Sound reduction index: Schedule here if part of an acoustic rated installation.

If specifying by product, edit or delete the rows below:

- Elongation/shrinkage: Can vary from 5 to 1800%, depending on the material.
- Potential expansion: Minimum: Intumescent only. Should be at least 200 to 300%. Most intumescent products offer 800 to 1000%.
- Adhesion and bond to substrate (kPa): The resistance of a material to failure under compression.
- Compressive strength (kPa): The resistance to breaking under compression.
- Density (kg/m<sup>3</sup>): Very variable. For mineral fibre stuffing - at least 8 kg/m<sup>3</sup>.
- Vapour permeability (ng/Pa/s/m<sup>2</sup>): If penetrated wall is in the plane of the vapour retarder.
- Air permeability (L/s/m<sup>2</sup>): If penetrated wall is in the plane of the air barrier.
- Durability in service (years): Service life is usually 5 to 10 years.
- Recycled content (%): Mineral fibre products may contain recycled content. A minimum % could be specified for these products.
- VOC content (gram/L): e.g. Maximum 250 gram/L.
- Colour: e.g. Black, dark grey. If being used in areas exposed to view, this may not be the only consideration. Final cured colour can also indicate the correct mix formulation and expected performance.
- Paintable: Product suitable for painting after installation.

Also consider where dust-free applications are required.

## 4.2 FIRE-STOPPING SYSTEMS

### Fire-stopping systems schedule

	Electrical	Plumbing	HVAC	Other
Type picture from sample panel				
Type description				
Substrate				
Penetrants				
Fire-stopping product or component				
Compliance document reference				
Page number (compliance doc, for the type)				
Table number (compliance doc, for the type)				
FRL (--/--/--)				

	Electrical	Plumbing	HVAC	Other
Resistance to the incipient spread of fire				
Notes				
Comments (for Building Certifier review)				

The codes in the header row of the schedule designate each trade for the type application.

Typical type description applications for fire-stopping systems include the following:

- Communications cables through apartment door header.
- Electrical cables through apartment door header.
- NBN conduit/electrical conduit through apartment door header.
- Water/gas PEX pipe through apartment door header.
- Edge of floor slabs at curtain wall and precast concrete panels.
- Top track seal for fire-resisting masonry and plasterboard partitions.
- Control joints of fire-resisting masonry and plasterboard partitions.
- Butt joints of fire-resisting masonry and plasterboard partitions.
- T joints of fire-resisting masonry and plasterboard partitions.
- Electrical cables through floors in service risers.
- Communications cables through floors in service risers.
- Metal pipes through service shafts.
- Non-insulated copper pipe through floors in service risers.
- Control joints in fire-resisting masonry and plasterboard partitions.

The location may need to be more specific, unless shown on the drawings e.g. which walls are fire-resisting? To avoid ambiguity, individual penetrations, coded on the drawings, may need to be identified instead, e.g. penetrations P1, P4 and P22 may have fire-stopping code FS3, together with their locations.

Substrate: e.g. Masonry, concrete.

Penetrants: e.g. Copper water pipe, PVC-U electrical conduit. The nature of the penetrating service(s) is an important consideration. The NCC restricts some installations, e.g. BCA (2022) C4D15(2)(c)(ii) is restricted to sanitary plumbing, metal or PVC-U, penetrating floors, and located in a fire isolated sanitary compartment. Identify BCA (2022) C4D15 types here if required.

Fire-stopping products or component: Use the designation codes from the **Fire-stopping products schedule**, e.g. FS1, FS2. These codes could also be used on the drawings, though this might be redundant, depending on how the location has been described.

Compliance document reference: Test report or regulatory information report number.

Page number (compliance doc, for the type): Page number from the report that details the application type.

Table number (compliance doc, for the type): Table number from the report that details the application type.

FRL: e.g. 180/180/180. See BCA (2022) C4D15. The same fire-stopping system may be able to provide various levels of fire-resistance.

Resistance to the incipient spread of fire: See BCA (2022) C4D15. The same fire-stopping system may be able to provide various levels of fire-resistance.

Notes: Any notes from the manufacturer, supplier, contractor or builder.

Comments: Column left blank for Building certifier's review and comments.

Other matters that should be considered include exposure to view, protection against mechanical damage, and access to penetrations e.g. for penetrations subject to servicing or modification, or for penetrations for future expansion.

#### REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1530		Methods for fire tests on building materials, components and structures
AS 1530.4	2014	Fire-resistance tests for elements of construction
AS 1774		Monolithic refractory products
AS 1774.36	2019	Determination of resistance to explosive spalling (ISO 16334:2013, MOD)
AS 4072		Components for the protection of openings in fire-resistant separating elements
AS 4072.1	2005	Service penetrations and control joints
AS/NZS 4859		Thermal insulation materials for buildings
AS/NZS 4859.1	2018	General criteria and technical provisions
BCA C4D15	2022	Fire resistance - Protection of openings - Openings for service installations
BCA C4D16	2022	Fire resistance - Protection of openings - Construction joints

ASTM E814	2023	Standard test method for fire tests of penetration firestop systems
ASTM G21	2015	Standard practice for determining resistance of synthetic polymeric materials to fungi
UL 1479	2015	Standard for fire tests of penetration firestops
<b>The following documents are mentioned only in the <i>Guidance</i> text:</b>		
AS 1668		The use of ventilation and air conditioning in buildings
AS 1668.1	2015	Fire and smoke control in buildings
AS/NZS 3000	2018	Electrical installations (known as the Australian/New Zealand Wiring Rules)
BCA C2D11	2022	Fire resistance - Fire resistance and stability - Fire hazard properties
BCA H3D5	2022	Class 1 and 10 buildings - Fire safety - Fire separation of garage-top-dwellings
BCA Spec 13	2022	Fire resistance - Penetration of walls, floors and ceilings by services
BCA S13C7	2022	Fire resistance - Penetration of walls, floors and ceilings by services - Fire-stopping
GBCA Buildings	2021	Green Star Buildings
NATSPEC DES 020		Fire behaviour of building materials and assemblies
NATSPEC GEN 006		Product specifying and substitution
NATSPEC GEN 024		Using NATSPEC selections schedules
NATSPEC TR 01		Specifying ESD
SWA RCF	2020	Guide to handling refractory ceramic fibres
LPCB List		List of Approved Fire and Security Products and Services (RedBookLive)
FM Approvals		FM Global
Intertek		Intertek Certification Listings
UL		UL Product IQ - Fire rated search resources
ISO 540	2008	Hard coal and coke - Determination of ash fusibility