

Fire Safety 02 | Building service penetration installations through fire-rated and smoke proof walls, floors and ceilings

Audience

The audience/s for this Practice Note include/s:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Architects/ Designers | <input checked="" type="checkbox"/> Owner Builders |
| <input checked="" type="checkbox"/> Builders | <input checked="" type="checkbox"/> Plumbers |
| <input checked="" type="checkbox"/> Building Surveyors / Inspectors | <input checked="" type="checkbox"/> Real estate management agents |
| <input checked="" type="checkbox"/> Engineers | <input checked="" type="checkbox"/> Trades and Maintenance (inc. Electricians) |
| <input checked="" type="checkbox"/> Home owners / Residential tenants | <input checked="" type="checkbox"/> Other – Installers, Body Corporate |

Purpose

The purpose of this Practice Note is to provide guidance on the selection and installation of service penetrations through fire-rated and smoke-proof walls, floors and ceilings which must resist the spread of fire within a building.

The content below provides guidance on:

- Service penetrations through fire-rated and smoke-proof walls, floors and ceilings
- Regulatory requirements for building service penetrations
- Service penetration installation checklist
- Common types of service penetration products



The correct installation of service penetrations through fire rated and smoke-proof walls, floors and ceilings is vital for occupant safety. There can be significant consequences of incorrect installation of penetrations, such as injury or loss of life.

Abbreviations & Definitions

The abbreviations and definitions set out below are for guidance only. They are not intended to vary those set out in the Building Act 1993, the Building Regulations 2018 or the National Construction Code.

- **Act** – Building Act 1993
- **AS** – Australian Standards require a particular method of construction and installation
- **DtS**- Deemed to Satisfy
- **ESM – Essential Safety Measures** -to ensure the safety of occupants, are the fire safety features that are installed or constructed in a building or place of public entertainment
- **FRV** – Fire Rescue Victoria



- **NCC** – National Construction Code
- **RBS** – Relevant Building Surveyor
- **Regulations** – Building Regulations 2018
- **FRL** – as defined by Schedule 1 of the NCC 2022. Fire Resistance Level is an expression of the length of time in minutes that a specimen performs on three criteria: *structural adequacy, integrity and insulation*.

Service penetrations of fire rated and smoke-proof walls, floors and ceilings

NCC 2022 Clauses C3D6, C4D13, C4D15, and Specifications 11 and 13 prescribe the materials and methods of installation for building services that penetrate required fire-rated and or smoke proof walls, floors and ceilings. Fire-rated and smoke-proof building elements are built to contain fire and smoke to a particular area of a building, such as one or more rooms or storeys for a specified period of time. This helps prevent other parts of the building from being affected by the fire and protects occupants and property. It also gives occupants more time for emergency evacuation or to reach an area of refuge.

A service penetration is an aperture, opening or gap that can be open or closed, and it is made through a fire-resisting element to allow for the passage of services. These services might include plumbing, electrical, gas or telecommunication pipes, wires, and cable trays.

If installed incorrectly, a service penetration through a fire-rated or smoke-proof wall can create a weak point that can allow fire and smoke to spread. Products and systems have been specially designed and tested to seal gaps and ensure the integrity of the fire rated and smoke-proof wall to reduce the impact of penetrations.

A building permit is required where services are proposed to penetrate through fire-resisting or smoke-proof walls, floors and ceilings. With safety in mind, it is important that all service penetrations are installed correctly, and the RBS is responsible for assessing the proposed work and carrying out mandatory inspections of these building service penetrations.

If changes are made to passive fire systems including service penetrations, records must be kept for 10 years. This is required for maintenance of Essential Safety Measures (ESM), for further guidance please see VBA Building Practice Note ESM-02 Maintenance of Essential Safety Measures.



For more information on the application to buildings in bushfire prone areas, see NCC 2022 Volume One Part G5, Specification 43 and AS 3959 Construction of buildings in bushfire prone areas.

Regulatory requirements for building service penetrations

When building services pass through fire-rated or smoke-proof building elements, they must be sealed to provide resistance to fire and/or prevent smoke from escaping through gaps or openings.

The Deemed to Satisfy (DtS) provisions of the NCC require that service penetrations in fire rated and smoke-proof construction are protected, whereby:

- the correct product or system is being used and manufacturers specifications and installation instructions are followed;
- fire rated or smoke sealing products used in construction, achieve testing requirements to the relevant standards;
- the products supplied are exactly as per the manufacturers' specifications;



- if a product differs to a minor degree from a tested prototype, the product:
 - is capable of meeting the required FRL as confirmed in a report from an Accredited Testing Laboratory; and
 - has been approved by the RBS.

Australian Standards relevant to all penetration types

Designers, builders, and installers need to ensure that the installation has been tested in accordance with the NCC and relevant Australian Standards (AS):

AS 1530 Methods for fire tests on building materials, components and structures	Sets out test procedures and criteria for the determination of fire-resistance of building elements.
AS 4072.1 Components for the protection of openings in fire-resistant separating elements, Part 1: Service penetrations and control joints	Specifies requirements for the testing, interpretation of test results, installation of penetration sealing systems and control joints sealing systems in fire-resistant elements of construction.
AS 1851 Routine service of fire protection systems and equipment	Sets out requirements for inspection, testing, preventive maintenance and survey of fire protection systems and equipment.



For guidance on documenting and assessing building performance solutions for a proposed installation method or product not strictly in accordance with NCC 2022 and or an applicable Australian Standard refer to Practice Note PS-01 and NCC 2022 Part A2G2.

Service penetrations installation checklist

The following tasks must be completed before a penetration is made:

- Check with the Council, Building Surveyor or the Owner that the appropriate building permit is in place first prior to undertaking work. Work without an applicable building permit is not allowed.
- Look at the building plans approved by the Building Surveyor and any accompanying documentation to ensure the proposed penetration does not have an adverse impact on the structural stability, integrity and insulation, fire performance or other services to the building. In the event that it does, the Building Surveyor must be informed.
- Confirm that any service penetration product:
 - is appropriate for the service being installed.
 - is tested to ensure fire resistance level of the product matches the fire resistance level of the wall, floor, or ceiling.
- If intending to use a product that does not have a tested prototype, contact the RBS for advice.
- Carefully follow the manufacturers' specifications and installation instructions for product or system used. This includes checking any fixings for suitability before use.
- Correctly install the product to create a seal. Only use materials and products that are specified and approved in the building permit documentation. Remember that not all materials are appropriate for sealing all types of penetrations.



Common types of service penetration products

Fire dampers

A fire damper is a device installed in a building's Heating, Ventilating, and Air Conditioning (HVAC) system. Fire dampers are typically installed inside the ductwork that penetrates a fire-resisting wall, floor or ceiling and are activated automatically by heat. These can be either mechanical, such as spring-loaded or drop-down designs or intumescent, a damper that swells when heat is applied.

Fire pillows

Fire pillows are used for filling in gaps and wrapping around pipes and conduits in hard-to-reach places. Multiple fire pillows are used in a combination of sizes to fully seal these holes and gaps. Fire pillows are typically made from a fire-resistant fabric bag filled with granulated fire-resistant material or intumescent material.

Pass through devices

A pass-through device is a device with hinges or intumescent material that acts as a barrier to fire, smoke, and gas.

Pass through devices may be used when communications and electrical services pass through walls, floors and ceilings. They can also be used for some types of pipes. They provide passive fire protection through intumescent material and use of sealant, similar to a foam plug. Pass through devices can usually be re-entered for new building services.

Fire collars

A fire collar is a retaining ring that is wrapped around a pipe. It contains intumescent material, which expands automatically under heat. Fire collars are used when sealing penetrations of some types of cables, conduits, and pipes. Different types of fire collars are suitable for floor, wall and ceiling application, depending on the type of material. Fire collars can be cast-in, retro fit, floor waste or drop-in.

Not all plastic pipes and conduits have approved tests enabling the use of fire collars, particularly the thicker walled gas pipes, water pipes and conduits.

Fire collars must be installed with required fixings as specified by the manufacturer. Consideration must be given to fixing size (diameter and length), the amount and location of fixing points per collar.

Fire mastic (polyurethane, acrylic)

Fire mastic is a type of fire-rated sealant. It can be polyurethane or acrylic. It is used for sealing fire rated movement, connection joints and penetrations, including pipes and penetrations to porous and non-porous substrates.

Fire wraps

Fire wraps are a strip of flexible intumescent fibre wrapped around a pipe to insulate it. Fire wraps are used for pipes (including plastic, insulated plastic or metal) passing through walls and floors in concrete or plasterboard, post pour floor installations, or sometimes used in conjunction with fire bands in plasterboard. The wraps are wrapped around electrical conduits and plumbing PVC pipes passing through walls and floors.



Fire mortar

Fire mortar is a type of fire-resistant cement compound which is supplied as a pre-mixed powder to which water is added. It is used in concrete and masonry walls and floors involving penetrations of electrical cabling, steel, and copper pipes.

Fire rated boards

A fire rated board is a fire resistant, composite sheet material which acts as a barrier to fire and smoke. Fire rated boards are used for lining walls, floors, ceilings, and beams, including internal or external works, heat applications, steel and ductwork protection.

Fire spray

Fire spray is applied to steel and other types of metal found in construction where a fire barrier is required. It acts as a thermal insulator to keep metal below the temperature at which it would otherwise fail during a fire. Fire spray is not suitable for surfaces exposed to moisture or high humidity.

Glass fibre insulation

Glass fibre insulation (or fibreglass insulation) consists of non-combustible, extremely fine glass fibres. It may be sold in batts (as glass wool), rolls or slabs, or applied as a spray.

It is one of the most common insulation materials and can be applied around service penetrations in walls and ceiling installations.



When choosing or using a penetration sealing product or material, check that:

- it has been tested at a NATA accredited testing laboratory and is certified to meet the requirements of AS 1530; and
- it meets any requirements for its use as specified by a registered fire engineer or building surveyor.

Related Documentation

- Building Act 1993
- Building Regulations 2018
- National Construction Code
- AS 1530.4:2014 - Methods for fire tests on building materials, components, and structures - Part 4: Fire resistance tests for elements of construction
- AS 1668.1:2015 - The use of ventilation and air conditioning in buildings - Part 1: Fire and smoke control in buildings
- AS 1668.2:2012 - The use of ventilation and air conditioning in buildings - Part 2: Mechanical ventilation in buildings
- AS 1682.1:2015 - Fire, smoke and air dampers - Part 1: Specification
- AS 1682.2:2015 - Fire, smoke and air dampers - Part 2: Installation
- AS 1851:2012 - Routine service of fire protection systems and equipment
- AS 3959:2018 - Construction of buildings in bushfire prone areas
- AS 4254.1:2012 - Ductwork for air-handling systems in buildings - Part 1: Flexible duct
- AS 4254.2:2012 - Ductwork for air-handling systems in buildings - Part 2: Rigid duct
- Building Practice Note ESM-02 Maintenance of Essential Safety Measures
- Building Practice Note PS-01 Performance Solutions, Documentation and Assessment



List of Amendments

- Update of NCC references to align with the new 2022 referencing system
- Update format and content review

Document history

Sector	Building
Category	Fire Safety
Topic	Service penetrations of fire rated and smoke proof walls
Document number	02
Version	3.0
Superseded	<ul style="list-style-type: none">• Version 2, published November 2022, supersedes Practice Note FS-01 Service penetration installation in fire rated and smoke proof walls• Version 1, first published September 2022.
Published	30 March 2023

Contact Us

If you have a technical enquiry, please email technicalenquiry@vba.vic.gov.au or call 1300 815 127.

Victorian Building Authority

Goods Shed North
733 Bourke Street
Docklands VIC 3008

www.vba.vic.gov.au

Copyright

© March 2023 Victorian Building Authority (VBA).

This Practice Note has been prepared and published by the VBA for general educational and information purposes only. This publication must not be copied, reproduced, published, adapted, or communicated by any person without the VBA's prior written consent or as permitted by the Copyright Act 1968 (Cth). The VBA makes no warranties or representations whatsoever about the accuracy, reliability, suitability, completeness or authenticity of any information or material contained in this resource. Any use or reliance on such information is at a person's own risk. The VBA accepts no liability whatsoever for any direct, indirect, or consequential loss or damage any person may suffer arising out of or in connection with the access or use of this resource (including any third-party material included in this resource).