BUILDING PERFORMANCE

Consultation document
Building Code update 2022
Protection from Fire

Issuing and amending acceptable solutions and verification methods

2 MAY 2022

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

Ministry of Business, Innovation and Employment (MBIE)

Hīkina Whakatutuki – Lifting to make successful

MBIE develops and delivers policy, services, advice and regulation to support economic growth and the prosperity and wellbeing of New Zealanders.

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Preface

The Building Code forms a key part of our building regulatory system in New Zealand. It sets the minimum performance for the design of buildings. The Ministry of Business, Innovation and Employment (MBIE) is responsible for updating the Building Code and its documents so we can keep pace with innovation, current construction methods and the needs of contemporary New Zealand.

At MBIE, we aim for a balance between setting minimum performance requirements where necessary to ensure buildings are safe, healthy and durable, and encouraging higher standards of performance where this will impact positively on outcomes for the country.

The changes we are proposing aim to ensure new buildings better protect the safety of the people who use them.

This consultation document includes the details of proposals for Protection from Fire. The proposed changes are intended to improve the level of fire safety for residential homes and bring fire system requirements in line with the latest industry standards.

Please take the time to let us know your thoughts. MBIE will carefully consider and weigh all submissions before it makes any decisions. You can provide feedback by following the instructions on MBIE's Have Your Say webpage.

Final decisions on the changes will be made and communicated later this year.

Seeking feedback on Protection from fire

In this consultation document, we seek your feedback on the following proposals:

Proposal 1. Protection from fire for residential homes

Proposal 2. Fire safety systems

How to provide feedback

We invite you to submit feedback on the Building Code update by 5:00 pm on Friday, 1 July 2022.

- You can provide your feedback by completing a survey online via MBIE's Have Your Say webpage, or
- You can download a form at www.mbie.govt.nz and send it to us by email or post.
  - Email to: buildingfeedback@mbie.govt.nz, with subject line Building Code consultation 2022
  - Post to:

    Building System Performance
    Ministry of Business, Innovation and Employment
    PO Box 1473
    Wellington 6140

Your feedback will contribute to further development of the Building Code.

Release of information

MBIE may publish copies or excerpts of submission to MBIE's website at www.mbie.govt.nz. MBIE will consider you to have consented to uploading by making a submission, unless you clearly specify otherwise in your submission.

If your submission contains any information that is confidential or you otherwise wish us not to publish, please:

- indicate this at the start of your submission, with any confidential information clearly marked within the text
- provide a separate version excluding the relevant information for publication on our website.

Submissions will also become official information, which means it may be requested under the Official Information Act 1982 (OIA). The OIA specifies that information is to be made available upon request unless there are sufficient grounds for withholding it. If we receive a request, we cannot guarantee that feedback you provide us will not be made public. Any decision to withhold information requested under the OIA is reviewable by the Ombudsman. If you have any objection to the release of any information in the submission, and in particular, which parts you consider should be withheld, please set this out in your submission together with the reasons for withholding the information. MBIE will take such objections into account and will consult with submitters when responding to requests under the Official Information Act 1982.

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The Privacy Act 2020 establishes certain principles with respect to the collection, use and disclosure of information about individuals by various agencies, including MBIE. Any personal information you supply to MBIE in the course of making a submission will only be used for the purpose of assisting in the development of advice in relation to this consultation or for contacting you about your submission. We may also use personal information you supply in the course of making a submission for other reasons permitted under the Privacy Act 2020 (eg. with your consent, for a directly related purpose, or where the law permits or requires it). Please clearly indicate in your submission if you do not wish your name, or any other personal information, to be included in any summary of submissions that MBIE may publish.

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Protection from fire – Long term strategy

This year we are proposing changes to the Building Code compliance pathways for protection from fire.

These proposals support MBIE's long term strategy for continuous improvements to Building Code requirements and compliance pathways with respect to protection from fire, ensuring they are fit for purpose and safeguard people from unacceptable risks arising from fires in buildings.

The long-term strategy seeks to:

- provide a sufficient level of fire safety in buildings
- support housing densification
- adapt to new technologies, including new construction materials and techniques, and innovation in fire protection systems
- ensure compliance pathways are up-to-date with the latest technology, industry practice, comparable to international solutions and consistent for users;
- ensure there are no gaps in performance objectives, and that these are defined at the appropriate regulatory level.

The changes proposed this year to Acceptable Solution C/AS1 (Proposal 1) seek to modernise the fire protection requirements for residential homes to reflect the increased demand for higher density housing. Since this document was first published in 2012, it has been updated a number of times. In 2022, we are proposing a completely new edition, including changes to the scope of buildings covered and adjusting settings accordingly, including those for fire safety systems, fire resistance ratings, means of escape and control of external fire spread.

The changes proposed this year relating to fire safety systems (Proposal 2) seek to bring requirements for these systems up to date with the latest technology and industry practice, following the recent publication of standards relating to fire alarms, smoke alarms, sprinklers and smoke control systems. We are proposing changes across the relevant compliance pathways to ensure the provisions relating to fire safety systems are up-to-date, consistent and clear.

Future work planned includes addressing other inconsistencies that have been identified in existing compliance pathways, particularly between requirements in the Acceptable Solutions C/AS1 and C/AS2 and Verification Method C/VM2, and updating the requirements for firefighting operations, based on feedback from the sector received in 2020.

The changes proposed pave the way for this future work, as well as work across other areas of the Building Code. For example, the proposal to cite the updated standard for fire alarms (NZS 4512) will enable the sector to become more familiar with enhanced provisions for visual alerting devices, so that these offer better safeguards for people who are deaf or hard of hearing. Future building code requirements for the wider use of these devices is anticipated, in line with a wider strategy to improve the accessibility of buildings for all New Zealanders.

1. Protection from fire for residential homes

We are proposing to increase the scope of C/AS1 to include additional types of low-rise multi-unit homes, with accompanying changes to address the associated fire risks. This proposal considered fire safety settings for all building types proposed to be covered by C/AS1 and takes into account previous feedback on the document, the latest standard for smoke alarms, and international practices for residential fire safety.

1.1. Reasons for the change

New Zealand is experiencing sustained demand for more housing leading to higher density development. Providing clear acceptable solutions for complying with the fire requirements in the Building Code will support building consent processes and enable safe construction for all types of housing development.

The Acceptable Solution C/AS1 covers residential buildings where people sleep, and outbuildings. The first Edition of C/AS1 was published in April 2012 and was intended to be a simplified compliance pathway for houses, townhouses and small stacked multi-unit dwellings. As demand and construction of multi-unit dwellings increased, C/AS1 was used for larger and more complex multi-unit dwellings, raising questions about whether the fire risks for these types of buildings were being suitably addressed by the document.

MBIE's initial response in 2020 was to change the scope of the document to limit the size of multi-unit dwellings for which the C/AS1 compliance pathway could be used. Buildings that fell outside of C/AS1 could demonstrate compliance using C/AS2 which provided additional fire safety features but is more difficult to use. This was intended to be a temporary measure so that the C/AS1 document could be further developed to provide simple solutions to address the associated fire risks in low-rise residential construction. This proposal now seeks to revisit that scope to allow for more low-rise multi-unit homes to be included alongside other changes to the document to improve its use.

1.2. Proposed changes

The proposed changes include increasing the scope of multi-unit dwellings covered by C/AS1 and addressing the associated fire risks for these and other buildings covered by the document. The proposed changes for each section of the document are discussed in Section 1.4.

For more details of the proposed wording in Acceptable Solution C/AS1, please refer to the draft document in Appendix A.

1.3. Options

Currently, the scope of C/AS1 includes detached dwellings, townhouses, and "stacked" multi-unit dwellings with two single-storey units stacked on top of each other with a limited height. For this proposal, MBIE considered the following two options to increase the scope of the multi-unit dwellings against the status quo:

Option 1. Two stacked units of two-storeys resulting in four-storey construction – This option would expand the height of buildings covered by the document to four storeys and use provisions from C/AS2 to address the associated fire risks from the taller buildings.

Option 2. Three-storey construction with limitations on height – This option would expand the height of multi-unit dwellings covered by the document to three storeys while modifying existing provisions within C/AS1 to address the associated fire risks.

Option 1 would provide for more buildings to be covered by the C/AS1 compliance pathway, but would also make the C/AS1 document more complex and include provisions that are onerous for low-rise construction.

Option 2 was considered to provide the best balance of including more multi-unit dwellings within the scope, while retaining C/AS1 as a relatively simple compliance pathway. Only Option 2 was considered for further analysis in this consultation document.

1.4. Analysis of the proposed changes

1.4.1. Objectives of the proposal

There are two objectives of this proposal:

- Provide a clear, practical, and simple compliance pathway for protection from fire for low-rise residential buildings; and
- Provide adequate protection measure to address the fire risks associated with this type of construction.

These contribute to achieving Clause C1 - Objectives of Clauses C2-C6 (Protection from Fire) of the Building Code, which states:

Objective

C1 The objectives of clauses C2 to C6 are to:

(a) safeguard people from an unacceptable risk of injury or illness caused by fire,

(b) protect other property from damage caused by fire, and

(c) facilitate firefighting and rescue operations.

Additional Functional Requirements and Performance Criteria of the Building Code are discussed in the analysis where applicable.

1.4.2. Methodology and assumptions

To develop this proposal, MBIE:

- Reviewed feedback from past consultations regarding issues with the C/AS1 document.
- Engaged with external stakeholders to identify general building trends in New Zealand and issues that have arisen when trying to seek building consent for these buildings using the existing C/AS1 document.
- Engaged with external stakeholders to identify the associated fire risks for low-rise residential construction and whether the existing measures in C/AS1 were fit for purpose.
- Reviewed international practice and requirements for residential construction fire safety.
- Drew from principles and requirements within C/AS2 where appropriate to ensure alignment of the requirements across the compliance pathways.
- Engaged with external stakeholders to provide comments on a proposed draft of the changes prior to consultation.

Some of the assumptions that were key to this work included:

- The demand for higher density housing will continue.
- Requiring additional land or separation between buildings will be costly for development although would vary across different sites.
- Current retail prices for construction materials are indicative of costs. However, these costs are likely to vary between suppliers and over time.
- Making changes to the existing acceptable solution is more efficient and effective than developing a new acceptable solution to specifically cover low-rise multi-unit dwellings.

1.4.3. Fire risks in residential construction

For the development of the new C/AS1 document, MBIE identified the following fire risks that are not adequately captured in the existing C/AS1:

- **Unreasonable delay moving to a place of safety** – Components of the means of escape are inadequately specified, which may impede occupants during evacuation causing injury or illness. Occupants may be unaware of a fire developing in other parts of a building. Internal or external escape routes may be blocked by fire.
- **Interior spread through the building to adjacent household units** – The fire severity for household units with higher fuel loads may exceed the fire resistance rating resulting in fire spread through interior boundaries, (i.e. walls and floors), to adjacent household units. Fire spread could also occur through penetrations, junctions between elements and unprotected closures in fire separations.
- **External vertical fire spread to upper floors in the building containing sleeping uses or other property** – Fire spread can occur through unprotected areas, (i.e. glazing, external walls, or roofs), from a lower unit in a different firecell.
- **External spread to other properties across a boundary** – The fire severity for household units may exceed the fire resistance rating resulting in fire spread through external wall openings to neighbouring properties.
- **Structural systems designed adequately to prevent injury to occupants and fighters, and protect other property during and after fire** – Fire resistance ratings for loadbearing elements are not currently specified in C/AS1.

The following sections describe the proposed changes for each section of the document to address these fire risks. For more details of the proposed wording in Acceptable Solution C/AS1, please refer to the draft document in Appendix A.

1.4.4. Part 1. General

Changes are proposed within Part 1 of C/AS1 that would alter the scope of risk group SH (the group of buildings that are covered by C/AS1). Risk group SH is one of seven risk groups that have been developed by MBIE to regulate different fire protection solutions for different types of buildings[1]. The definition of each of these seven risk groups can be changed by making changes to the relevant acceptable solution.

Currently, the scope of risk group SH is defined as:

- Detached dwellings with a single household unit such as stand-alone houses
- Low-rise multi-unit dwellings where each household unit has its own escape route that is independent of all other household units such as attached townhouses and stacked household units where there is no more than one household unit above another, with each household unit having a single storey and an escape height less than four metres.
- Detached dwellings where fewer than six people (not including members of the residing family) pay for accommodation such as boarding houses, homestays, bed and breakfasts
- Outbuildings.

The proposed revised description of risk group SH is:

- Residential buildings where people sleep, and where:
  - each household unit has its own escape route that is independent of all other household units, and
  - building height is less than 11 m, and
  - building is maximum of three-levels, and
  - building escape height is less than 7 m.

  This includes:
  - stand-alone houses;
  - attached side-by-side townhouses;

[1] The risk groups used in C/AS1 and C/AS2 are different from uses and classified uses defined in building regulations. They are also separate from the risk groups A, B and C that are referenced in clause F6 of the Building Code.

- stacked multi-unit dwellings where there is no more than one household unit above another with the lower household unit having not more than two-storeys and upper household unit being a single-storey

› Residential buildings where people sleep, and where fewer than 6 people paying for accommodation including boarding houses, homestays, bed and breakfast, and similar accommodation.
› Home-based business activities, (except as included within risk groups CA and WB) including accountant, conveyancing, and/or similar to a domestic living home-based business that is carried out in a household unit by its permanent residents and that does not involve the employment of persons other than those residents.
› Outbuildings as described in section 7.0 of clause A1 of the Building Code.

1.4.4.1. Stand-alone houses, townhouses and multi-unit dwellings

While previously not required, the proposed definition requires standalone houses and attached townhouses to meet the same four criteria (an independent escape route, maximum height of 11 metres, maximum of three levels and escape height less than 7 metres) as is being proposed for multi-unit dwellings, to be included within the scope of C/AS1. Buildings within this revised definition are considered to be relatively low fire risk and this has informed the development of the remainder of the proposed C/AS1 document.

1.4.4.2. Paid accommodation

The proposed addition of "Similar accommodation" to the definition follows feedback from building consent authorities and previous public consultations that suggests that there has been some uncertainty regarding permanent and transient accommodation arrangements (i.e.. holiday rental accommodation and shared student accommodation where the building or parts of buildings are used for a temporary accommodation, or shared accommodation). MBIE does not consider these activities to impose significantly different risks to the existing examples of accommodation included within risk group SH. To limit risks associated with transient and educational accommodation, MBIE proposes a limit on the number of occupants to less than six people.

1.4.4.3. Home-based business activities

Given the increasing occurrence of home office type situations, MBIE received feedback that clarification on these situations is needed. A new description of "home-based business activities" is proposed to be added to the scope of the document. This includes examples of "accountant, conveyancing, and/or similar to domestic living home-based business that is carried out in a household unit by its permanent residents and that does not involve the employment of persons other than those residents".

1.4.4.4. Outbuildings

During the development of the proposal, the question of whether to exclude some types of outbuildings, such as shared garages and large outbuildings, from the scope of C/AS1 was considered. MBIE determined that there is not enough supporting evidence to suggest that these buildings, which are not intended for human habitation, need to be excluded. To limit risks associated with larger outbuildings, MBIE proposes limitations on permitted travel distances within outbuildings (in Part 3). No changes have been recommended to the scope of outbuildings covered by C/AS1 in the final proposal.

1.4.5. Part 2. Firecells, fire safety systems and fire resistance ratings

A minor change is proposed for the "provision of firecells" text to make it clearer for the user. The key changes to this section occur in the "Fire safety systems" and "Fire resistance ratings" sections, as described below. Feedback is sought on these impacts of these proposed changes to inform the final decisions.

1.4.5.1. Fire safety systems – updating the definition of "Type 1 smoke alarm system" (required in each household unit)

Most of New Zealand's fire-related deaths occur in residential homes and nearly half of which are people who were asleep at the time. Currently C/AS1 requires each household unit to be provided with smoke alarms in accordance with Acceptable Solution F7/AS1. F7/AS1 sets out the type, location and maintenance requirements for the smoke alarms. These are only required to be placed in or near bedrooms and they can be either battery powered or hardwired. The smoke alarms do not need to be interconnected.

Interconnected alarms alert occupants to fire faster, providing more time to escape. Thus, it is proposed that all household units in C/AS1 require compliance with the revised standard, NZS 4514: 2021 "Interconnected smoke alarms for houses". Details of the new standard are discussed in Proposal 2.

The new standard reflects changes in technology including wireless connectivity between alarms. The incorporation of the standard will mean that smoke alarms installed in new or altered homes will need to be interconnected and installed throughout the building. This ensures that alarms will sound throughout the household unit, irrespective of where the smoke was detected.

Providing interconnected smoke alarm coverage throughout an entire house would require more devices than the current requirements. The difference in cost has been estimated in the order of a few hundred dollars (depending on the size and layout of the dwelling). These costs may come down as interconnected devices become more prevalent.

MBIE notes that the proposed requirements for fire safety systems will effectively set a new benchmark for residential homes, that is likely to be required as part of a building consent for any alteration for buildings that fall within risk group SH[2]. However, MBIE considers the cost for interconnected smoke alarm coverage to be low relative to the cost of construction or renovation, and with significant benefits for life safety of home occupants.

1.4.5.2. Fire resistance ratings – increase to fire resistance rating values

Fire resistance ratings (FRR) provide minimum performance thresholds (as confirmed through fire tests) for certain elements of a building. In New Zealand a "life rating" describes the minimum performance level for the elements that allow for movement of people from their location within a building to a safe place. A "property rating" describes the minimum performance level for the elements that prevent spread and damage to other properties.

The current requirements of C/AS1 include life and property ratings of 30 minutes. In C/AS2, the minimum life rating and property rating is 60 minutes (except where sprinklered, which is 30 minutes). The lower life safety ratings of C/AS1 generally reflect the relatively simple layouts and short escape routes to places of safety. The appropriate level of fire resistance was a key issue raised during the review of the C/AS1 requirements.

The approach taken in other countries varies, but generally includes higher fire resistance ratings than New Zealand for low-rise residential homes. In comparing to other countries[3],

- The United Kingdom is most similar to New Zealand's current settings with a FRR of 30 minutes for garages and homes with an escape height of less than five metres and a FRR of 60 minutes for homes with an escape height above five metres.
- The United States has a FRR of 60 minutes (or 30 minutes when sprinklered).
- Canada has a FRR of 45 minutes for structural elements and 90 minutes for intertenancy walls.
- Australia has FRR of 60 minutes for internal walls and 90 minutes for loadbearing walls.

For New Zealand, it is proposed to increase the minimum FRR in C/AS1 to 60 minutes for the life rating and property rating. Where buildings are sprinklered, fire ratings of 30 minutes will remain. This is intended to provide higher fire protection across residential homes and better reflects requirements used in other countries.

In practice, the difference in cost between a 30 minutes and 60 minutes fire resistance rating for plasterboard has been estimated at approximately 40% higher. For a typical external wall (10 x 10 metres), the extra cost is estimated at $400, and for a larger wall (20 x 10 m) approximately $800. Total cost implications for a building would however depend on the design of the building and on how fire resistance ratings apply to different

[2] For compliance of existing buildings, refer to the Building Act sections 112 and 115.
[3] Further comparisons are provided in Wade, C. and Baker, G., "Densified Housing Analysis of Fire Resistance Requirements," External Research report ER69, BRANZ Ltd, 2022.

features of a building as described in the remainder of this proposal. As previously noted, feedback is sought on these impacts of these proposed changes to inform the final decisions.

1.4.5.3. Application of fire resistance ratings to building elements including structural adequacy of loadbearing elements during fire

The fire resistance ratings requirements for building elements are not currently specified in C/AS1. In C/AS2, there are a number of provisions that clarify how the requirements apply to different elements. The absence of the requirements in C/AS1 can cause confusion on what is required for compliance with the Building Code. It is proposed to include several clarifications in Part 2. The proposal includes:

- Stating that fire resistance ratings apply to each side of a building element (except for floors and external walls one metre or more from the boundary).
- Specifying where insulation ratings apply.
- Clarifying requirements for structural adequacy of loadbearing elements during fire and the post-fire stability requirements for buildings covered by C/AS1. This includes some wording to minimise confusion between “structural adequacy” and “stability”.

The proposed changes aim to clarify the requirements for dwellings that are designed in accordance with both B1/AS1 (an acceptable solution for New Zealand Building Code Clause B1 Structure) and C/AS1. Dwellings within the scope of both B1/AS1 and C/AS1 have not traditionally required a structural engineer to be included in the design team unless one or more of the building’s loadbearing components were outside the scope of B1/AS1. Where these loadbearing elements are outside the scope of B1/AS1, a structural engineer would normally use Verification Method B1/VM1 to verify that both the element and the structure that it is being installed within comply with the Building Code. This type of design work is termed specific engineering design within the standards referenced by B1/AS1.

The proposal includes two new paragraphs in C/AS1 that aim to ensure loadbearing elements will have an appropriate FRR and to explicitly allow dwellings designed using both B1/AS1 and C/AS1 to progress without requiring a structural engineer. These paragraphs also aim to ensure that all other loadbearing elements used in dwellings are designed in accordance with B1/VM1. The proposal expects that product suppliers will be obliged to ensure that the test loads that are applied during fire tests are not less than the loadings that are likely to be applied to the elements when they are installed in buildings designed using both B1/AS1 and C/AS1.

It is also proposed to change the definition of “structural adequacy” that is used in both C/AS1 and C/AS2 to clarify that the definition refers to test loads, which will normally be vertical loads. This change is required to avoid an incorrect interpretation of the reference to B1/VM1 in the existing definition. Many have incorrectly interpreted this reference as requiring building elements such as boundary walls to be designed to remain standing in the unlikely event that the structure is no longer able to provide horizontal support after a fire.

1.4.6. Part 3. Means of escape

Means of escape relate to the routes of travel from a building to a place of safety. Currently, C/AS1 requires escape routes to comply with D1/AS1 and provides maximum permitted travel distances for the escape routes within a building where occupants may be exposed to fire or smoke while making their escape. The distances differ depending on the type of fire safety system (i.e.. smoke alarm or sprinklers provided), and also includes a maximum length for “dead end” (one way) pathways.

Changes are proposed to provide more clarity and address gaps in the current provisions. It is proposed to include additional requirements for escape routes in C/AS1 to address the following items:

- General principles – It is proposed to define general components of escape routes, and also clarify that the final exit may be beyond the exit door of a building. This will provide more certainty for designers and consistency in interpretation of escape routes elements. .
- Height and width of escape routes – It is proposed to include minimum height and width requirements that align with C/AS2 requirements. This is intended to provide more clarity than the existing reference to the Acceptable Solution D1/AS1.

- Length of escape routes – It is proposed to specify how travel distances are calculated to remove uncertainty on this within C/AS1. Requirements currently found in C/AS2 are not considered suitable for C/AS1. Providing modifications (various multipliers) to lengths may trigger additional requirements for fire safety systems that otherwise may not be necessary to address the fire risks. In C/AS1 we propose to use actual travel path distances without any modifications.
- External escape routes – C/AS1 does not currently contain requirements for external escape routes. C/AS2 contains requirements for external route protection by providing two directions of escape, fire rating external walls, or providing additional distance between the external wall and the escape route, or sprinklers in the building. Requiring the same separation distance as in C/AS2 (2 metres) would impact the use of land between buildings. Requiring fire rating of external walls adjacent to escape routes would increase cost of construction and impact the ventilation requirements in other parts of the Building Code, as fire rated windows must be permanently closed. For C/AS1, the proposed measures for protection include:
  - Providing a minimum separation distance of 1.0 m between the external safe path and any unprotected areas in adjacent external walls, lower roofs or other firecells, where the building is unsprinklered, or
  - Fire rating of adjacent external walls, lower roofs or other firecells, or
  - Installation of a specified sprinkler system.
- Doors subdividing escape routes – The Building Code functional requirement C4.2 requires that buildings must be provided with means of escape to ensure that there is a low probability of occupants of those buildings being unreasonably delayed or impeded from moving to a place of safety and that those occupants will not suffer injury or illness as a result. C/AS2 has several requirements for the doors and locking devices on escape route, however C/AS1 currently does not include any requirements. It is proposed that locking devices should not prevent movement to a safe place in the event of fire.

1.4.7. Part 4. Control of internal fire and smoke spread

Internal fire and smoke spread is generally controlled using fire separations between building units. Fire separations limit fire or smoke spread between parts of a building. These measures only apply where separate household units share a common building element (ie. a wall, floor and roof, etc) and are separate 'firecells'. It is proposed to include additional requirements in C/AS1 to clarify requirements for fire separations and firecell construction. These additional measures include:

- Fire separations – It is proposed to provide more clarity on firecell construction and where fire resistance ratings would apply between household units, garages, and separate escape routes.
- Fire stopping – Fire stopping refers to the materials or methods of construction used to seal around penetrations or gaps to restrict the spread of fire within or through fire separations. Currently, there are no requirements for fire stopping in C/AS1. Other countries (including Australia, United Kingdom, United States , Canada and Sweden) all specify fire stopping requirements for residential construction. Similarly, fire stopping is also required within C/AS2. Costs of fire-stopping will vary depending on the material used but are estimated to be minimal. The practice is overall considered very effective for limiting fire and smoke spread in a building.
- Fire rated shafts – Building services serving multiple units are likely required to pass through multiple fire separations. This has been identified as potential risk for fire and smoke spread. It is proposed to include additional requirements in C/AS1 so that each household units has independent building services. Alternatively, where services are required to pass through multiple firecells, a protective shaft would be required to reduce risks associated with frequent service penetrations.
- Floors, concealed spaces and closures in fire separations – It is proposed to add general provisions for the fire rating of floors, concealed spaces and closures in fire separations to provide more clarity on the requirements in the document.

1.4.8. Part 5. Control of external fire spread

The control of external fire spread relates primarily to the objective of protecting "other property[4]" from damage caused by fire. MBIE has identified this as a key area of risk associated with higher density construction, where fire is more likely to spread from one unit to other, or from one building to another due to closer proximity of buildings.

1.4.8.1. Horizontal fire spread from external walls

The current requirements in C/AS1 specify a distance of 1.0 m from external walls to a boundary for standalone buildings and 5 m for multi-unit dwellings. The two different distance creates some inconsistencies in the approach to addressing fire risks. For example, a three-storey standalone house could be built as close as 1 m metre to the boundary with unprotected walls and windows of any size, but a two- to three-storey townhouse would require distance of 5 m.

It is proposed to align these requirements to require a minimum of 1.0 m of separation from the external wall to the boundary for buildings in C/AS1. The approach is also generally consistent with international practice. Australia, for instance, requires 900 mm separation for houses. In addition, Australia has additional requirements for return walls within 900 mm to a boundary.

The reduced distance is considered as a trade-off against the increased fire resistance ratings and other additional fire spread protection measures included as part of this proposal. It also aligns with the proposed scope of the document to limit the height of structures covered in C/AS1. All of these elements are required in order to satisfy the Performance criteria and Objectives of the Building Code and must be considered holistically.

1.4.8.2. Horizontal fire spread from roof projections, open sided buildings, and similar construction

The proposed changes to this section of C/AS1 clarify the types of "similar construction" that are also subject to the fire rating requirements set out in Part 2 and therefore have the associated costs of meeting a proposed fire resistance rating requirement of 60 minutes. These costs will vary depending on the type of construction and design.

The types of construction proposed to be included in this section are :

- Eaves connected to a fire rated external wall within 1.0 m of the boundary.
- All decks located within 1.0 m of the boundary.
- Eaves connected to an unrated external wall within 300 mm of the boundary.
- Where there is any single deck projecting from a wall within 300 mm of a boundary, require a fire rated floor, and barriers/projections made of non-combustible or limited combustible materials.
- In specified circumstances where a multi-unit dwellings deck's floor is adjacent to the relevant boundary, or less than 300 millimetres to boundary, fire rated construction is required to separate adjacent properties.
- Clarifying requirements for building overhangs.

The proposed changes also include:

- Specifying that fire resistance rating applies to both sides of the wall within 1.0 m of the boundary.
- An allowance for small unprotected wall areas without fire rating (including a new figure to illustrate the requirements).
- Specifying maximum permitted areas of fire resistant glazing.

The proposed provisions in this section take into account the risk profile of buildings proposed within the scope of C/AS1 and available information on international practice.

1.4.8.3. Vertical fire spread in multi-unit dwellings

There is a risk of vertical fire spread to other household units for stacked units, or attached side-by-side household units. The Building Code Functional Requirements C3.1, C3.2, and C3.3 look to minimise external

[4] Property on other allotments and/or with separate ownership to where the fire originates.

vertical fire spread to upper floors. The associated Performance criteria C3.5 states that buildings must be designed and constructed so that fire does not spread more than 3.5 metres vertically from the fire source over the external cladding of multi-level buildings.

The proposed scope of C/AS1 is increased to include construction of up to three-storey stacked units. MBIE proposes to mitigate the associated risk by adopting an approach similar to the current C/AS1 approach.

The approach includes:

- Maintaining status quo for spandrels or aprons.
- Requiring overhanging construction in multi-unit dwellings to be fire-rated.
- Clarifying requirements for FRR of decks in stacked units through the inclusion of new requirements and figures.
- Clarifying requirements for external cladding systems and the fire testing of cladding materials.

It is also proposed to amend the current provision:

Fire spread from a roof close to and lower than an external wall of an attached sleeping unit or attached building on other property shall be prevented by providing an FRR of 30/30/30 to either:

- The part of the roof within 5.0 m horizontally of the wall, or
- Any part of the wall within 9.0m vertically of the roof.

The proposed new provision is:

Fire spread from a roof close to and lower than an *external wall* of an attached sleeping unit or attached *building* on *other property* shall be prevented.

This shall be achieved by providing either:

- An FRR of 60/60/60 to part of the roof within 2.0 m horizontally of the adjoining external wall, including its supporting structure, against the threat of fire from the underside, or
- An FRR of 60/60/60 to part of the external wall within 2.0 m vertically of the adjoining roof, or
- An automatic fire sprinkler system complying with NZS 4515 or NZS 4541 in firecell below the lower roof.

1.4.9. Part 6. Firefighting

There are no changes proposed to Part 6. Firefighting as part of this proposal. The current measures in C/AS1 provide vehicular access to multi-unit dwellings. The current Building Code Performance criteria are found in code Clause C5 – Access and safety for firefighting operations. These criteria are limited in application as follows:

Limit on application

Performance requirements in clauses C5.3 to C5.8 do not apply to backcountry huts, detached dwellings, within household units in multi-unit dwellings, or to outbuildings, and ancillary buildings.

This limit on application would exclude many of the situations proposed for the scope of C/AS1. The review of these requirements and the limits on application in the Building Code are outside the scope of this consultation.

1.4.10. Part 7. Prevention of fire occurring

This part of the acceptable solution contains provisions for the construction and installation of fixed appliances. There are two proposed changes for this part which are intended to align with text in Acceptable Solution C/AS2 and connect to other parts of the Building Code. These changes are:

- Gas burning appliances – the text is proposed to reference Building Code clause G11 “Gas as an energy source”.
- Downlights – the text on downlights is proposed to be replaced with a new section “Electrical fire safety” and reference Building Code clause G9 “Electricity”.

These clauses of the Building Code contain equivalent sets of measures as the current C/AS1 text and removing the specific requirements in C/AS1 ensures the requirements do not conflict.

1.4.11. Other changes as part of this proposal

1.4.11.1. References

It is proposed to cite the latest versions of the fire safety standards NZS 4512, NZS 4514, and AS 1668 in line with the fire safety system proposals described in Section 1.8.1 and Proposal 2 of this consultation. Further discussion of the new standards and the rationale for referencing them is provided in Proposal 2.

A new citation is also included for BS EN 13501. This has been included to accompany new text (decks and balconies section of Part 5 external spread) and changes to the definition of non-combustible within the list of definitions, in alignment with C/AS2.

The list of references of other legislation has also been updated.

1.4.11.2. Definitions

It is proposed to amend the definitions section to include definitions from other Building Code compliance pathway documents, primarily C/AS2, with the exception of finished ground level. This definitions has been taken from compliance pathways for external moisture (E2). Feedback is sought on whether this definition works in the context of how the terms have been used in the proposed text of C/AS1.

Lastly, it is proposed to delete “handrail”, “smokecell”, “smoke control door” and “wharenui” given their limited use within the document.

A full description of the proposed changes to definitions is provided in Appendix A of this consultation document.

1.4.11.3. Appendices

It is proposed to amend the appendices to include further details of the fire safety systems and fire testing standards. These proposed changes are intended to align with the text in C/AS2. For more details of the fire safety system appendices, refer to Proposal 2.

1.4.11.4. Document formats and Verification Method C/VM1

As part of this proposed change, we would be publishing the C/AS1 and C/VM1 documents in the new document format used in other parts of the Building Code and first introduced in 2021. The Acceptable Solution C/AS1 is currently part of a combined document with Verification Method C/VM1.

The new document format includes:

- Standalone documents for each acceptable solution and verification method.
- A consistent set of heading and numbering formats across all compliance pathway documents.
- Moving references and definitions into standardised appendices at the end of the document and including the definitions used within the document.
- Ensuring that all documents start with a consistent statement of their role in the building regulatory system and the scope of buildings and designs they can be used for.
- Enhanced features such as coloured graphics, hyperlinks and icons.
- The use of a single column format for text, tables and figures.

The new edition of Verification Method C/VM1 has been provided with an introduction to fit into the new document format. Otherwise, there are no further content changes to C/VM1 as this was outside the scope of this proposal. The proposed drafts for C/AS1 and C/VM1 are provided in Appendix A of this consultation document.

1.5. Transitions

It is proposed to have a 12 month transition period for this proposal.

Effective date: 3 November 2022

Transitional arrangements: 12 months

It is proposed that the existing acceptable solutions and verification methods will remain in force, as if not amended, until 2 November 2023 (the proposed cessation date), a period of 12 months.

TABLE 1.1: Proposed transitional arrangements for Acceptable Solutions C/AS1

Document	Before 3 November 2022	From 3 November 2022 (effective date) to 2 November 2023 (cessation date)
Existing C/AS1	If used, will be treated as complying with the Building Code.	If used, will be treated as complying with the Building Code.
Amended C/AS1	Does not apply to Building Consents issued before this date.	If used, will be treated as complying with the Building Code.

1.6. Questions for the consultation

1-1 Do you support issuing the new Acceptable Solution C/AS1 with the changes proposed to the following parts of the document?
- › Part 1. General
- › Part 2. Firecells, fire safety systems and fire resistance ratings
- › Part 3. Means of escape
- › Part 4. Control of internal fire and smoke spread
- › Part 5. Control of external fire spread
- › Part 7. Prevention of fire occurring
- › References, definitions, and appendices

1-2 Do you think the proposed Acceptable Solution C/AS1 covers all important aspects for protection from fire for risk group SH?
If there are additional aspects of this document that you think should be included, please tell us.

1-3 What impacts would you expect on you or your business from the proposed changes?
These impacts may be economic/financial, environmental, health and wellbeing, or other areas.

1-4 What support would you or your business need to implement the proposed changes if introduced?

1-5 Do you agree with the proposed transition time of 12 months for the proposed changes to take effect?
- ☐ Yes, it is about right
- ☐ No, it should be longer (24 months or more)
- ☐ No, it should be shorter (less than 12 months)
- ☐ Not sure/no preference

2. Fire safety systems

We are proposing to improve the protection of people and buildings from fire by bringing the requirements for fire safety systems (fire alarms, sprinklers, smoke alarms and smoke control in air-handling systems) in line with the latest industry standards. These changes would ensure the provisions in our compliance pathways for fire safety systems are up-to-date, consistent and clear.

2.1. Reasons for the change

Fire safety systems are used to keep people in buildings safe in the event of a fire. The technology of these systems is continually developing. Widely used industry standards that relate to fire safety systems, such as smoke alarms (NZS 4514), fire alarms (NZS 4512), sprinkler systems (NZS 4541) and smoke control (AS 1668.1) have been recently revised to reflect the latest technology and industry practice. These revised standards are not incorporated into the Building Code system until their citations are updated to reflect the revised versions. Updating these citations is part of routine maintenance of the acceptable solutions and verification methods, to ensure users are provided with the most up-to-date information and remove uncertainty in the consent process.

There are several other issues that have been identified in relation to requirements for fire safety systems within the relevant acceptable solutions:

- Current provisions in the relevant acceptable solutions only require smoke alarms in or near bedrooms. The vast majority of deaths as a result of fire occur in the home while people are sleeping. However, smoke has to reach the bedroom before the alarm sounds to awake the occupants. By this time, smoke and fire conditions created by a fire starting in the kitchen or other area may have cut off the escape route from the bedroom.
- For some lower-risk buildings, current compliance pathways allow for the omission of a connection from a fire alarm to a fire monitoring service if there is a landline phone in the building. With the high degree of mobile phone ownership in the general population and good network coverage across the country, this requirement is not reducing fire safety risk and is redundant.
- Current compliance requirements include restrictions on the option of installing a sprinkler system instead of heat detectors where the environment is challenging for smoke detection (as they may cause excessive nuisance alarms). This is not consistent with current practice since sprinklers also activate on heat detection but have the added benefit of containing/extinguishing the fire.
- For some buildings that are required to have a sprinkler system, there is an allowance in the compliance pathway for the sprinkler system not to extend into car parks areas within the buildings. This leads to lower protection from fire in these car park areas, where the fire risk is high due to the increasing fuel loads of modern vehicles.
- There are inconsistencies between descriptions of fire safety system types in Building Code documents, leading to potential confusion and delays in the consenting process.

In this consultation, we are seeking to streamline the fire safety system requirements and make them consistent with industry practices and standards.

2.2. Proposed changes

There are six main topics as part of this proposal:

- Fire safety system standards
  - Cite NZS 4512: 2021 Fire detection and alarm systems in buildings in Acceptable Solutions C/AS1 and C/AS2, and Verification Method C/VM2.

- Cite NZS 4514: 2021 Interconnected smoke alarms for houses in Acceptable Solutions C/AS1 and C/AS2.
- Cite NZS 4541: 2020 Automatic fire sprinkler systems in Acceptable Solutions C/AS1 and C/AS2 and Verification Method C/VM2.
- Cite AS 1668.1:2015 Fire and smoke control in buildings Amendment 1 in Acceptable Solution C/AS2.

› Domestic smoke alarms

- Amend C/AS2 Paragraph 2.2.1, Table 2.2, Table 2.2a and F7/AS1 to require smoke alarms in new homes to comply with NZS 4514. This will mean that smoke alarms installed in new homes will need to be interconnected and installed throughout the building.

› Removing requirements for a landline phone

- Amend C/AS2 Tables 2.2 to remove the requirement for a landline phone to be installed if a connection to a fire monitoring service can be omitted.

› Removing restrictions for sprinklers to replace smoke detectors

- Amend C/AS2 Tables 2.2b and 2.2c so that when a smoke detection (Type 4) fire alarm system can be substituted with a heat detection (Type 3) fire alarm system, the use of a sprinkler (Type 6) system is not more restricted than a heat detection fire alarm system.

› Requiring sprinkler systems to extend into car parks

- Amend C/AS2 Paragraph 2.2.4 and Table 2.3 so that where a sprinkler system is required, that system should also be required to extend throughout any car park areas in the building

› Editorial changes

- Resolve errors and improve consistency in the relevant compliance pathways, including consolidating the requirements for fire safety systems that currently sit across Acceptable Solution C/AS2 and Acceptable Solution F7/AS1. These changes are intended to improve clarity and consistency in the consenting process.

The proposed changes are discussed in Section 2.4.

For more details of the proposed wording in the acceptable solutions and verification methods, please refer to

› For proposed changes to Acceptable Solution C/AS1, Appendix A.

› For proposed changes to Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2, Appendix B.

2.3. Options

For this proposal, MBIE considered the following three options against the status quo:

Option 1: Identify alternative standards for fire safety systems and reference those documents instead

This option was not considered to be reasonable as the only alternative standards are from overseas and may not align well with fire safety system design practices and product market in New Zealand. Furthermore, alternative standards from overseas may be less readily accepted by the sector, especially if they have to be purchased and compared with the existing standards which are already well known and subsidised through MBIE's sponsorship.

Option 2: Update the references in the compliance pathways to the revised standards, with no other modifications

This option was not considered to be reasonable as some sections of the revised standards are not required to demonstrate compliance with the Building Code, so modifications are required to be specified in the compliance pathways. Furthermore, existing material in the compliance pathways does not align with the content of the revised standards, which could lead to confusion and potential delays in the consenting process.

Option 3: Update the references in the compliance pathways to the revised standards, with other modifications as described in this proposal (Recommended)

This option is recommended to enable the latest technology and industry practices to be recognised in demonstrating compliance with the Building Code. The changes in this proposal ensure that only the content of the revised standards that are required to demonstrate compliance are incorporated in the compliance pathways. Furthermore, associated changes to the compliance pathways will ensure the requirements are consistent and applicable to modern construction methods in New Zealand, including a greater prevalence of high-density housing.

After careful consideration, Option 3 provides the only reasonable option for further analysis.

2.4. Analysis of the proposed changes

2.4.1. Objectives of the proposal

The primary objective of this proposal is to update the citation of standards relating to fire safety systems in the relevant compliance pathways, in addition to other associated changes that will improve their clarity and consistency. These changes contribute to achieving Clause C1 - Objectives of Clauses C2-C6 (Protection from fire) of the Building Code, which states:

2.4.2. Objective

C1 The objectives of clauses C2 to C6 are to:

(a) safeguard people from an unacceptable risk of injury or illness caused by fire,

(b) protect other property from damage caused by fire, and

(c) facilitate firefighting and rescue operations.

2.4.3. Methodology and assumptions

MBIE sought advice on the formulation and impact of the changes being proposed with a panel of industry experts currently active in their field. The panel included the Chairs of the most recent fire alarm and domestic smoke alarm standards committees, the Chairs of the sprinkler and hydrant standard committees[5], as well as the technical lead a sprinkler system certifier organisation, two Society of Fire Protection fire engineers, a Building Control Officer, a Fire and Emergency New Zealand fire engineer, a commissioner of fire alarm systems, and the Chief Executive Officer of the Fire Protection Association of New Zealand the peak industry body for fire safety systems.

For each of the standard citations that MBIE are proposing to update, a summary of key changes from the previous versions has been presented. This includes an analysis of the proposed changes and its impact in comparison to the status quo.

2.4.4. Fire safety system standards

2.4.4.1. NZS 4512: 2021 Fire detection and alarm systems in buildings

This standard provides a complete specification for the design, manufacture, installation, documentation, and maintenance of building fire detection and alarm systems. The main changes to the 2021 version compared to the 2010 version that is currently referenced in the compliance pathways are:

- The specifications and guidance for the design and use of Visual Alerting Devices (VADs) have been expanded. This offers more detailed guidance for designers who include VADs in their fire alarm design.
- There are new provisions for wireless detection technology, networked systems, and duct smoke detection. This allows for more cost-effective and efficient installations.
- Requirements for seismic restraints for system components have been updated and now align with the latest standards for seismic loading in New Zealand.
- There are increased maximum zone areas, travel distances and location requirements for manual call points which may offer some reduction in installation cost.

[5] Note: The updated hydrant standard NZS 4510 was not published at the time this proposal was being prepared and analysed.

- The specification for Type 5 fire alarm system's alerting and hush facilities have been improved. This enhances residential smoke detection in apartment buildings.
- The area of a zone for which smoke detectors can be substituted for heat detectors has been reduced from 30% to 25%. This will have a minimal cost impact and is not considered to increase the number of nuisance alarms.

2.4.4.2. NZS 4514: 2021 Interconnected smoke alarms for houses

This standard provides a specification for the selection, installation, commissioning and maintenance of interconnected smoke alarms in houses (single household units). The main changes to the 2021 version compared to the 2009 version that is currently referenced in the compliance pathways are:

- There are new provisions for long-life batteries and wirelessly interconnected smoke alarms. This allows for these options which may be more cost effective, making it more affordable to install interconnected smoke alarms in new and existing houses.
- Testing requirements have been simplified, which means compliance can be more easily demonstrated.
- Solutions for people who are deaf and hard-of-hearing are described, meaning they are better provided for in the event of a fire.
- There is more clarity and guidance on the selection and location of smoke alarms (eg. for ceilings with exposed frame members). This should lead to more effective smoke detection in the event of a fire.
- The standard is written for a non-technical audience, including homeowners, so the content has been made clearer and more understandable meaning that it should be easier to comply with the requirements.

We are proposing to reference NZS 4514: 2020 in Acceptable Solution C/AS2 (and Acceptable Solution C/AS1, see Proposal 1) for domestic smoke alarm requirements, instead of Acceptable Solution F7/AS1.

2.4.4.3. NZS 4541: 2020 Automatic fire sprinkler systems

This standard provides an integrated set of rules for the design, installation, and maintenance of sprinkler systems, so that systems reliably protect against the loss of life and minimise property damage from fire. The main changes to the 2020 version compared to the 2013 version that is currently referenced in the compliance pathways are:

- The requirements for more robust water supplies are amended, to apply to buildings over 45 metres high instead of 25 metres. This means installation costs will be reduced for buildings between 25 and 45 metres tall, and the change is not considered to impact life safety.
- Requirements for seismic restraints of pipework have been updated. These now align with the latest standards for seismic loading in New Zealand, offering more assurance that sprinkler systems will not harm occupants during a seismic event and will remain operational after a seismic event.
- Hangers, fasteners and seismic bracing elements now need to meet minimum performance criteria set by relevant standards.
- The requirements for sprinkler protection of car stackers, high-piled storage and warehouse racking have been updated, based on evidence events and testing overseas: this offers improved protection in these areas.

Currently the content of NZS 4541 incorporated by reference into C/AS2 is modified in Appendix B. We are proposing to retain these modifications as part of these changes. Current modifications to NZS 4541 will remain. These modifications remove fire rated walls and backflow preventers as part of the sprinkler system, remove requirements around fuel loads outside those of the building, and change the biennial survey requirements.

MBIE's standards operating protocol[6] clearly outlines what content should be included in acceptable solutions and verifications methods. When a standard is referenced in an acceptable solution or verification method, it

[6] Refer to the Operating Protocol – Referencing standards in the Building Code system.

becomes part of that compliance pathway. While there may be more content within NZS 4541: 2020 that does not align with the operating protocol, it is proposed to address these in future Building Code updates.

2.4.4.4. AS 1668.1: 2015 Fire and smoke control in buildings Amendment 1

This standard provides minimum requirements for mechanical air-handling and mechanical smoke control systems for use by designers, installers, inspectors and regulators of these systems. It is referenced in C/AS2 to provide requirements for where an HVAC (Heating, ventilation, and air conditioning) system is to shut down upon detection of a fire. The latest version of this standard is an Australian standard, but the version that is currently referenced in the compliance pathways is a joint Australian/New Zealand standard (AS/NZS 1668.1: 1998). The main changes to the latest version are:

- Updated references to the latest versions of AS 1682.1 and AS 1682.2 for the design and installation of smoke and fire dampers. The aim of this is to encourage the manufacture and installation of improved dampers.
- New requirements for smoke dampers be installed in every duct between fire compartments. This is a significant change with cost implications, therefore we propose to modify the citation to exclude these new requirements from Acceptable Solution C/AS2.
- Updates to general requirements including isolation switches, signal transmission, system interfaces, variable speed drives and documentation. These updates bring the requirements up-to-date with new technology.
- For zone pressurisation systems, the upper limit of the pressure differential is lowered from 100 pascals to 80 pascals. This change will not affect lift shaft pressurisation systems that are allowed in C/AS2 as an alternative to other fire safety systems, which we understand are rarely used in any case.
- Several of the other smoke control systems have been amended, but these do not affect C/AS2 requirements.

We propose to modify the citation of AS 1668.1 to exclude the new requirement for smoke dampers in all ducts and penetrations between fire separations. This is a significant change with potentially high-cost implications. A more detailed cost benefit analysis would need to be carried out before these requirements can be included in the acceptable solution, and we will consider this in our future work.

In addition, the latest version of this standard has removed requirements for smoke detection and makes reference to AS 1670.1, the Australian fire alarm standard, for these instead. Since it is not possible to comply with both AS 1670.1 and NZS 4512 (the New Zealand fire alarm standard) we propose to modify the citation of AS 1668.1 so any references to AS 1670.1 are replaced by references to NZS 4512. Complying with NZS 4512 will be more straightforward and cost-effective in New Zealand. Similarly, we are also proposing to modify the reference to AS/CA S009 to AS/NZS 3000: 2018 Electrical Installations, to ensure the wiring rules in New Zealand apply.

2.4.5. Domestic smoke alarms

Installing smoke alarms throughout the house allows for earlier fire detection and warning, giving occupants more time to escape. Interconnected smoke alarms ensure the warning signal sounds throughout the house, which alerts all occupants, regardless of where the smoke occurs. This proposal will significantly increase life safety[7]. Currently smoke alarms in domestic buildings are only required to be placed in or near bedrooms, and they can be either battery powered or hardwired. The smoke alarms do not need to be interconnected. These requirements are currently set out in Acceptable Solution F7/AS1.

The standard for interconnected smoke alarms for houses, NZS 4514, is currently only referenced in F7/AS1 for the maintenance of smoke alarms. The 2010 version of the standard does not allow for battery operated smoke alarms. All smoke alarms have to be interconnected, but the standard does not allow for wireless interconnection. The 2021 version of NZS 4514 allows for long-life batteries and wireless interconnections, as technologies have been improved and systems are more reliable.

[7] Lilley, R., McNoe, B., and Duncanson, M., "Unintentional Domestic Fire Related Fatal Injury In New Zealand: 2007-2014", University of Otago, Dunedin, November 2018, available online at fireandemergency.nz.

These new technologies mean that it has become more cost effective to install interconnected smoke alarms in all areas of the home. For new buildings, the cost impact will be minimal as installing a hard-wired interconnected smoke alarm system during construction can be done while the house is being wired. For renovations which require a building consent, the battery operated, wirelessly interconnected smoke alarms option allows this to be done without rewiring the home.

Fire and Emergency New Zealand have formally endorsed this proposal to update domestic smoke alarm requirements in the Building Code compliance pathways to incorporate the new requirements of NZS 4514: 2021.

This proposal will affect smaller residential buildings in the scope of C/AS2 as well as most buildings within the scope of C/AS1, the acceptable solution for houses, townhouses and smaller multi-unit apartment buildings. For details of the proposed changes to C/AS1 regarding smoke alarm requirements, refer to Proposal 1.

2.4.6. Removing requirements for a landline phone

Currently in C/AS2, certain low-risk buildings with fire alarms may not need to have a direct connection to the fire service if a landline is installed. This implies that in the event of a fire, building occupiers may have to delay evacuation in order to call the fire service from the landline, which could be placed far from an exit. This requirement is considered to be outdated, given the high levels of mobile phone ownership in New Zealand. Mobile networks currently cover areas where over 95% of New Zealand's population work and live, and work is underway to increase this for improved emergency response capability in rural areas[8]. It is proposed to remove this requirement from C/AS2.

2.4.7. Removing restrictions for sprinklers to replace smoke detectors

In some situations, C/AS2 allows for smoke detection systems (Type 4) to be substituted for either heat detection systems (Type 3) or sprinkler systems (Type 6), to reduce the occurrence of nuisance alarms in environments which are challenging for smoke detectors. Currently there are more restrictions on when a sprinkler system, compared with when a heat detection system, can be used for this purpose, including limits on occupant load and fire cell requirements. MBIE are proposing to remove these restrictions so that a sprinkler system may be used for this purpose to the same extent that heat detectors may be used, since sprinkler systems incorporate both heat detection and fire suppression functionality. Determination 2017-023[9] supports that sprinkler systems are superior to heat detection systems, and that they are more effective in terms of life safety. This proposal does not change minimum requirements, but simply allows for the use of sprinkler systems in some situations if desired.

2.4.8. Requiring sprinkler systems to extend into car parks

Currently in C/AS2 there is an exemption for some sprinklered buildings that allows car park areas that are part of the building not be covered by the sprinkler system. Recent research and evidence suggest that the fuel load in car park areas is increasing, as vehicle sizes are increasing, include more flammable plastic material, run on different fuels and are parked closer together[10,11,12]. MBIE are proposing to remove the current exemption. We understand from discussions with sprinkler industry experts that this is not a widely used exemption, with designers more often opting to use a sprinkler system in car park areas but not in the rest of the building. This proposed change will bring the requirements of C/AS2 in line with current practice and is proportional to the fire risk posed by these areas.

[8] Refer to the Mobile Black Spots Fund (MBSF).
[9] MBIE, "Compliance of the substitution of automatic fire sprinkler systems for heat detectors in a basement carpark", Determination 2017/023, available online at www.building.govt.nz.
[10] Collier, P.C.R, "Car Parks – Fires Involving Modern Cars and Stacking Systems", Study Report SR 255, BRANZ Ltd, 2011, available online at www.branz.co.nz.
[11] Boehmer, H., Klassen, M., and Olenick, S., "Modern Vehicle Hazards in Parking Structures and Vehicle Carriers", NFPA Fire Protection Research Foundation, Quincy, MA, 2020, available online at www.nfpa.org.
[12] Hutchinson, V. and Boehmer, H., "Modern Vehicle and Parking Garages: Design Trends Present New Challenges", SFPE Europe Q3, Issue 19, 2020, available online at www.sfpe.org.

2.4.9. Editorial changes

2.4.9.1. Consolidating content relating to fire safety system types into one place

Building Code clause F7 includes requirements for warning systems to alert people to an emergency. Currently, only warning systems for fire are addressed in Acceptable Solution F7/AS1. We are proposing to replace the current requirements in F7/AS1 for domestic smoke alarms with the requirements in NZS 4514: 2021 (see Section 2.4.3.2). The remaining content of F7/AS1 relates to fire alarm and sprinkler system type descriptions. We are proposing to update this content, to ensure it aligns with the relevant updated standards (NZS 4512, NZS 4515 and NZS 4541), and move it to new appendices in C/AS1 and C/AS2 as appropriate. In addition, we propose to include descriptions of other fire safety system types (Type 9, Type 15, Type 18) that are currently not found in F7/AS1.

Fire safety system types are only referred to in C/AS1 and C/AS2. C/VM2 does not make reference to fire safety system types, nor do any other acceptable solutions or verification methods (with the exception of F7/AS1). The proposal to update and move content from F7/AS1 into C/AS1 and C/AS2 allows users to access all the relevant information about fire safety system requirements in one place, including references to standards, and avoids unnecessary duplication across several documents.

We are also proposing to add a new paragraph to maintain the allowance, where appropriate, of an NZS 4515 compliant sprinkler system to replace a NZS 4541 system where a Type 7 system is required.

2.4.9.2. Correcting cross referencing errors in Table 2.3

Currently C/AS2 Table 2.3 is used to determine the minimum required fire safety system for a building with multiple risk groups. Due to errors in the table, cross referencing by starting with either the row or the column for a risk group may give two different answers. We are proposing to amend Table 2.3 to remove these ambiguities, and also to align Table 2.3 with the proposed new descriptions of the system types in C/AS2 Appendix B.

2.4.9.3. Combining Tables 2.2a to 2.2d into one Table 2.2

Currently C/AS2 Tables 2.2a to 2.2d are used to determine which fire safety system to install in a building, with a different table used for each risk group. The tables are spread over three pages with many repetitive footnotes. We are proposing to combine Tables 2.2a to 2.2d into one Table 2.2 and align the footnotes with the other changes outlined in this proposal (see sections 2.4.6 and 2.4.7). This will mean the existing 27 footnotes across four tables will be replaced by 8 footnotes in one table.

2.4.9.4. Moving the design sequence process to an informative figure

Currently C/AS2 Paragraph 2.2.3 describes a design sequence process to determine the fire safety systems for a building with multiple fire cells. Although the information is helpful to users, it is not a requirement and compliance can be demonstrated without following this process. We are proposing to remove the text of Paragraph 2.2.3 and instead describe the process in a new Figure 2.1, which will have 'informative' rather than 'normative' status. This is more appropriate for the information.

Paragraph 2.2.5 is also informative and so, for similar reasons, we are proposing to remove this.

2.4.9.5. Aligning with the proposed changes to Acceptable Solution C/AS1

The following amendments are proposed to ensure revised document align with changes proposed to C/AS1:

- Amend the scope for Risk Group SH in Table 1.1 in C/AS2,
- Amend the definition for structural adequacy in C/AS2 and C/VM2.

For details of the proposed changes to C/AS1, refer to Proposal 1.

2.5. Impacts of these changes

Costs and benefits of the changes were assessed qualitatively. MBIE expects the following from these changes:

- The proposed change to update the citations to four recently updated standards has been analysed in Section 2.4.3. The changes included in the updated standard are generally enabling wider use of the latest technology in fire safety systems within the Building Code compliance pathways, and in many situations the cost of complying with requirements will remain unchanged or reduce, and life safety of building occupants in the event of a fire will be improved. The potentially high-cost implications of new requirements for smoke dampers in the updated version of AS 1668.1 are being avoided by modifying the citation to exclude this requirement. The cost to designers of accessing the updated standards in order to comply is considered minimal and is subsidised by MBIE's sponsorship. The standards NZS 4512 and NZS 4514 are free to access, and the cost of accessing NZS 4541 is significantly reduced by MBIE's sponsorship.
- The proposed change to require interconnected smoke alarms in new residential buildings may result in a higher one-off cost for purchase and installation, but as it will be in the order of a few hundred dollars (depending on the size and layout of the dwelling), this is not considered to be significant in the context of a new house build or renovation. New provisions for systems that use long life batteries and wireless connectivity make their installation more cost effective, especially for renovation work. The benefits to increased occupant safety in the event of a fire outweighs the cost, because the occupants will be alerted of a fire anywhere in the house and have more time to evacuate, compared to the current situation which only alerts occupants when smoke enters the bedroom.
- The proposed change to remove the requirement for landline may result in minor cost savings for some buildings, as a landline may no longer need to be installed. Benefits are removing an outdated requirement from the Building Code that is likely not relevant in any situation today, given mobile phone usage and network coverage.
- The proposed change to remove the restriction for the use of sprinklers versus heat detectors where either may replace smoke detectors has no cost implications, as heat detection systems may still be used in preference to the more expensive sprinkler systems in these specific situations. The benefits are that should sprinklers systems be preferred, they can be used more widely and comply with requirements, offering superior fire safety functionality.
- The proposed change to remove the exemption for sprinkler systems in car park areas that are part of a sprinklered building may have some cost implications for some buildings. The additional cost of extending a sprinkler system into car park areas is expected to be around 10% to 15% of the sprinkler system cost, depending on the building height, size and classification. We understand that the current exemption for car park areas is not widely used. However, in those cases, the benefits of having the sprinkler system extend into car park areas, will be an increase to life safety and reduced fire risks in those areas.
- The proposed editorial changes do not create any material cost increase to a building that complies with the Building Code by means of the acceptable solution. Designers who are used to referring to F7/AS1 for fire alarm descriptions will now find more up-to-date requirements in C/AS2, alongside all the other requirements for fire safety systems. Other proposed changes to improve consistency and fix existing errors will improve the consenting process.

In consideration of these impacts, the benefits of the proposed changes outweigh the costs.

2.6. Transitions

It is proposed to have a 12 month transition period for all topics in this proposal.

Effective date: 3 November 2022

Transitional arrangements: 12 months

It is also proposed that the existing acceptable solutions and verification methods will remain in force, as if not amended, until 2 November 2023 (the proposed cessation date), a period of 12 months.

TABLE 2.1: Proposed transitional arrangements for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

Document	Before 3 November 2022	From 3 November 2022 (effective date) to 2 November 2023 (cessation date)
Existing C/AS2, F7/AS1 and C/VM2	If used, will be treated as complying with the Building Code.	If used, will be treated as complying with the Building Code.
Amended C/AS2, F7/AS1 and C/VM2	Does not apply to Building Consents issued before this date.	If used, will be treated as complying with the Building Code.

2.7. Questions for the consultation

2-1 Do you support the amendments to Acceptable Solution C/AS2 and Verification Method C/VM2 to reference the following standards?
- NZS 4512: 2021 Fire detection and alarm systems in buildings
- NZS 4514: 2021 Interconnected smoke alarms for houses
- NZS 4541: 2020 Automatic fire sprinkler systems
- AS 1668.1: 2015 Fire and smoke control in building Amendment 1

2-2 Are there any additional modifications to the referencing of the fire safety system standards that we should consider?
If there are modifications that you think should be included, please tell us.

2-3 Do you support amending Acceptable Solution F7/AS1 and referring to C/AS1 and C/AS2 for requirements for warning systems?

2-4 Do you support the amendments to Acceptable Solution C/AS2 for the following topics?
- Domestic smoke alarms
- Removing requirements for a landline phone
- Removing restrictions for sprinklers to replace smoke detectors
- Requiring sprinkler systems to extend into car parks

2-5 Do you support the editorial changes to Acceptable Solution C/AS2 and Verification Method C/VM2 for the following items?
- Correcting cross referencing errors in Table 2.3
- Combining Tables 2.2a, 2.2.b, 2.2c and 2.2d into one Table 2.2
- Moving the design sequence process steps into an informative figure
- Aligning with the proposed changes to Acceptable Solution C/AS1

2-6 What impacts would you expect on you or your business from the proposed options?
These impacts may be economic/financial, environmental, health and wellbeing, or other areas.

2-7 Do you agree with the proposed transition time of 12 months for the proposed changes to take effect?
- ☐ Yes, it is about right
- ☐ No, it should be longer (24 months or more)
- ☐ No, it should be shorter (less than 12 months)
- ☐ Not sure/no preference

Appendix A. Proposed changes to Acceptable Solution C/AS1 and Verification Method C/VM1

As part of Proposal 1, here are proposed changes to the Acceptable Solution C/AS1 and Verification Method C/VM1. Changes proposed to Acceptable Solution C/AS2 can be found in Appendix B.

The proposed changes are listed by topic within the consultation. The proposed new editions of Verification Method C/VM1 and Acceptable Solution C/AS1 are also provided in draft form as complete documents.

Part 1. General – Scope of this document

- Amend Sections 1.1.1 to 1.1.3 to update the text, table and figure describing what buildings are included in risk group SH and therefore covered by C/AS1. This includes:
  - Increasing the scope of multi-unit dwellings covered by the document
  - Adding 'similar accommodation' to the description of transient accommodation
  - Adding home-based business activities
- Amend Subsection 1.1.2 and provide new Table 1.1.2.1 to provide examples of buildings and parts of buildings that are out of scope.
- Issue the new Section 1.1.4 Compliance pathway to provide a summary of the compliance pathways for Protection from fire.

Part 2. Firecells, fire safety systems and fire resistance ratings

Provision of firecells

- Amend Paragraph 2.1.1.1 "firecell floor limits" by changing "there are no requirements relating to firecells" to "there are no limitations on the firecell floor area".

Fire safety systems

- Amend Section 2.2 Fire safety systems by:
  - Changing the definition of Type 1 smoke alarm system (required in each household unit) to require compliance with the standard NZS 4514: 2021 "Interconnected smoke alarms for houses".
  - Revising the references for sprinkler systems, smoke alarm and fire alarm systems, and smoke control as described in Proposal 2 in this consultation.
- Amend Section 2.3 Fire resistance ratings to:
  - Increase the life rating and property rating from 30 minutes to 60 minutes (unless a fire sprinkler system is installed, where applicable)
- Issue the new Subsections 2.3.2 to 2.3.4 to:
  - Confirm that fire ratings apply to each side of a building element (except for floors).
  - Define where insulation ratings apply.
  - State the requirements for structural adequacy of loadbearing elements during fire.

Part 3. Means of escape

- Issue the new Section 3.1 setting out general principles for escape routes including that the final exit may be beyond the exit door of the building.
- Amend Section 3.2 Height and width of escape routes to:
  - Add new requirements specifying minimum height and width requirements for escape routes.
  - Allow for minor obstructions from handrails and door assemblies.
- Amend Section 3.3 Length of escape routes to:

  - Revise the table of travel distances by deleting old Type 1 system, and aligning Type 1 system with updated NZS 4514 standard, and
  - Including allowances for maximum travel distances where no alarm is installed (i.e. outbuildings).
  - Issue new Subsections 3.3.2 to 3.3.5 clarifying calculations for open path lengths
- Issue the new Subsections 3.3.6 and 3.3.7 to:
  - State where safe paths terminate.
  - Providing new requirements for external escape routes and three choices for meeting external safe path requirements.
- Issue the new Section 3.4 providing new requirements for doors in escape routes:
  - Specifying opening width and angle for doors.
  - Allowing manual sliding doors where space has an occupant load of less than 20.
  - Locking devices to be visible and not prevent movement to a safe place in the event of fire.

Part 4. Control of internal fire and smoke spread

- Amend Section 4.1 to clarify the requirements for fire separations and firecell construction including:
  - Issue the new Subsections 4.1.2 to 4.1.5 to specify the requirements for fire stopping of fire separations and specify firecell construction including the requirement for a protected shaft for services within multi-unit dwellings that pass between firecells.
  - Issue the new Subsection 4.1.6 clarifying fire resistance ratings for floors.
  - Issue the new Subsection 4.1.7 adding requirements for fire stopping within concealed spaces.
  - Issue the new Subsection 4.1.8 adding a requirement for fire doors.
- Issue the new Section 4.2 updating the requirements for interior surface finishes.

Part 5. Control of external fire spread

- Amend Section 5.1 to update the requirements for horizontal fire spread from external walls by:
  - Removing the requirement for fire resistance rating for external walls in multi-unit dwellings between 1.0 and 5.0 m of the boundary and aligning these buildings with the requirements for standalone buildings.
  - Specifying that fire resistance rating applies to both sides of the wall.
  - Providing a new figure to illustrate walls subject to these requirements.
  - Clarifying that the notional boundary section does not apply to household buildings and associated outbuildings on the same allotment.
  - Making allowance for small areas without fire rating (including a new figure to illustrate)
  - Confirming the maximum permitted areas of fire resistant glazing.
- Amend Section 5.2 to provide new requirements for small unprotected areas and fire resisting glazing
- Amend Section 5.3 to clarify requirements for external spread from roof projections, open sided buildings and similar construction by:
  - Reducing the distance from the boundary from 650 mm to 300 mm for requiring fire-rating (60 mins) of eaves connected to an unrated external wall.
  - Providing and defining the term “open-sided building”
  - Providing new figure to clarify section on carports and similar construction
  - Clarifying requirements for decks and balconies
  - Issuing new requirements for building overhangs
- Amend Section 5.4 to update requirements for vertical fire spread in multi-unit dwellings by reducing current fire resistance rating requirement from within 5 m horizontally of the wall to 2 m, and from within 9 m vertically of the adjoining roof to 2 m (with new illustrative figure).
- Amend Section 5.5 to provide new requirements for vertical fire spread and fire testing of cladding materials.

Part 6. Firefighting operations

- No changes are proposed to this section.

Appendix A. Proposed changes to Acceptable Solution C/AS1 and Verification Method C/VM1

Part 7. Prevention of fire occurring

- Amend Section 7.1 to replace the text with reference to Building Code clause G11
- Amend Section 7.2 to remove the section on downlights and include a new section "Electrical fire safety" to reference Building Code clause G9 Electricity.

Appendix A. References (moved from the start of the document)

- Cite the following standards in Acceptable Solution C/AS1:
  - NZS 4512: 2021 Fire detection and alarm systems in buildings
  - NZS 4514: 2021 Interconnected smoke alarms for houses
  - AS 1668.1: 2015 The use of ventilation and air conditioning in buildings – Fire and smoke control in buildings Amendment 1
  - BS EN 13501-1: 2018 Fire classification of construction products and building elements – Classification using test data from reaction to fire tests

Appendix B. Definitions (moved from start of document)

- Provide new definitions for:
  - "adjacent building", "allotment", "boundary", "cavity barrier", "concealed space", "exitway", "fire hazard", "fire resisting glazing", "hazardous", "intended use", "open space", "other property", "outbuilding", "place of safety", "protected shaft", "road", "safe path", "travel distance". (These proposed definitions align with definitions in Acceptable Solution C/AS2)
  - "finished ground level" (This proposed definition aligns with definitions within compliance pathways for E2)
- Provide amended definitions for:
  - "building", "firecell", "fire resistance rating", "fire stop", "Group Number", "integrity", "non-combustible", "occupant load", "penetration", "primary element", "relevant boundary", "surface finish" and "unprotected areas" (to align with definitions within Acceptable Solution C/AS2)
  - "structural adequacy"
- Removing the definitions of:
  - "handrail", "smokecell", "smoke control door" and "wharenui" (these are not key terms used within Acceptable Solution C/AS1)

C

BUILDING PERFORMANCE

C1-C6 Protection from fire

Acceptable Solution C/AS1

Protection from fire for buildings with sleeping (residential) and outbuildings (risk group SH)

DRAFT FOR PUBLIC CONSULTATION

SECOND EDITION | EFFECTIVE X XXXXXXXX XXXX

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

New Zealand Government

Preface

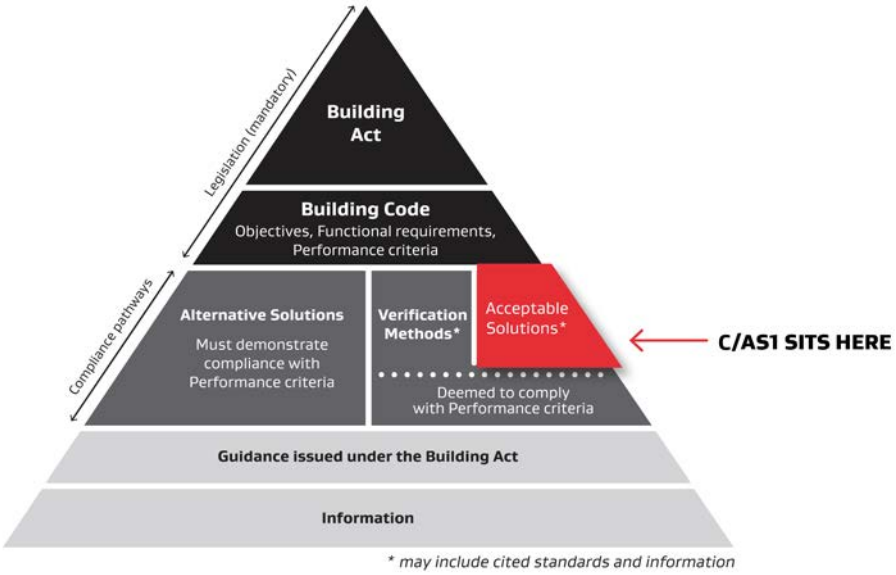
Document status

This document (C/AS1) is an acceptable solution issued under section 22 (1) of the Building Act 2004 and is effective on X XXXXXXXX XXXX. It does not apply to building consent applications submitted before X XXXXXXXX XXXX. The previous Acceptable Solution C/AS1 First Edition, as amended, can be used to show compliance until X XXXXXXXX XXXX and can be used for building consent applications submitted before X XXXXXXXX XXXX.

Building Code regulatory system

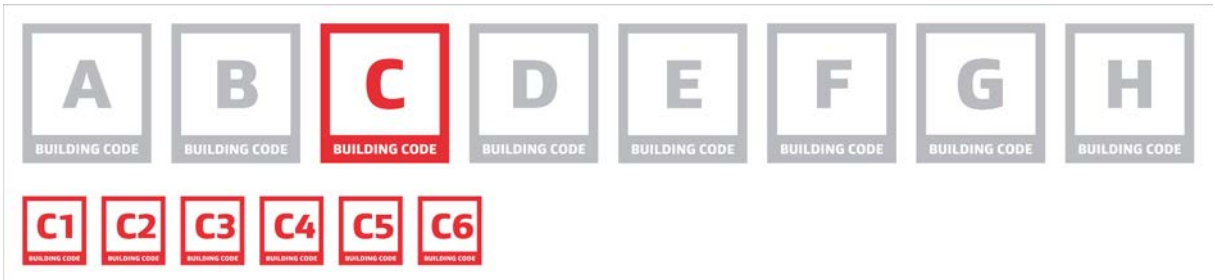
Each acceptable solution outlines the provisions of the Building Code that it relates to. Complying with an acceptable solution or verification method are ways of complying with that part of the Building Code. Other options for establishing compliance are listed in section 19 of the Building Act.

Schematic of the Building Code System



A building design must take into account all parts of the Building Code. The Building Code is located in Schedule 1 of the Building Regulations 1992 and available online at www.legislation.govt.nz.

The part of the Building Code that this acceptable solution relates to is clause C1- C6 Protection from Fire. Further information on the scope of this document is provided in Part 1. General.



Further information about the Building Code, the objectives, functional requirements and performance criteria provisions that it contains, and other acceptable solutions and verification methods are available at www.building.govt.nz.

Main changes in this version and features of this document

Main changes in this version

› This will be updated as part of finalisation of the document. For the purposes of consultation a description of the main changes is provided in Appendix A of the consultation document.

Features of this document

› For the purposes of Building Code compliance, the standards and documents referenced in this verification method and acceptable solution must be the editions, along with their specific amendments listed in Appendix A.

› Words in *italic* are defined at the end of this document in Appendix B.

› Hyperlinks are provided to cross-references within this document and to external websites and appear with a blue underline.

› Appendices to this acceptable solution are part of, and have equal status to, the acceptable solution. Figures are informative only and the wording of the paragraphs takes precedence. Text boxes headed 'COMMENT' occur throughout this document and are for guidance purposes only.

› Classified uses for *buildings*, as described in clause A1 of the Building Code, are printed in bold in this document. These requirements are also denoted with classified use icons for:

H **Housing**	Com **Commercial**	Out **Outbuildings**
CR **Communal residential**	Ind **Industrial**	Anc **Ancillary**
CN **Communal non-residential**		

› *Risk groups*, as described in this document, are also printed in bold in this document. These requirements are also denoted with *risk group* icons for:

SH **Buildings with sleeping (residential) and outbuildings**	CA **Public access and educational facilities**	WS **High level storage or potential for fast fire growth**
SM **Sleeping (non-institutional)**		
SI **Care or detention**	WB **Business, commercial and low level storage**	VP **Vehicle storage and parking**

Contents

Part 1. General

1.1 Introduction

1.1.1 Scope of this document

SH
Out

1.1.1.1 The scope of this acceptable solution is restricted to ***risk group* SH**. This covers *buildings* where people sleep and **outbuildings** (refer to Table 1.1.1.1).

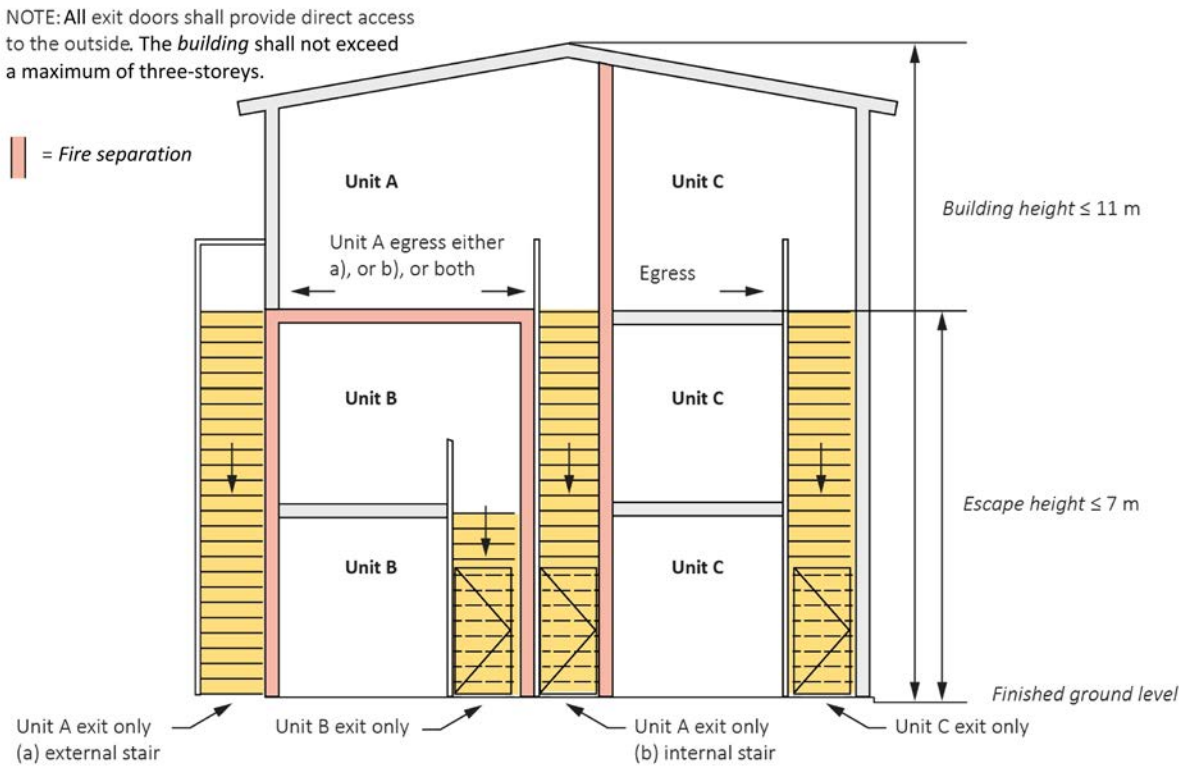
Table 1.1.1.1: Buildings covered by C/AS1

Paragraph 1.1.1.1

Risk group	Applies to
SH **Buildings with sleeping (residential) and outbuildings**	Residential *buildings* where people sleep, and where i) each *household unit* has its own *escape route* that is independent of all other *household units*, and ii) *building height* is less than 11 m, and iii) *building* is maximum of three-levels, and iv) *building escape height* is less than 7 m. This includes: › stand-alone houses; › attached side-by-side townhouses; › stacked *multi-unit dwellings* where there is no more than one *household unit* above another with the lower *household unit* having not more than two-storeys and upper *household unit* being a single-storey (see Figure 1.1.1.1). Residential *buildings* where people sleep, and where fewer than 6 people paying for accommodation including boarding houses, homestays, bed and breakfast, and similar accommodation. Home-based business activities, (except as included within ***risk groups* CA** and **WB** in Table 1.1.2.1) including accountant, conveyancing, and/or similar to a domestic living home-based business that is carried out in a *household unit* by its permanent residents and that does not involve the employment of persons other than those residents. **Outbuildings** as described in section 7.0 of clause A1 of the Building Code.

Figure 1.1.1.1: Multi-unit dwellings in risk group SH

Paragraph 1.1.1.1



1.1.2 Items outside the scope of this document

1.1.2.1 *Buildings* or parts of *buildings* in ***risk groups* other than SH** (refer to Table 1.1.2.1 for other *risk groups*) are outside the scope of this acceptable solution. This includes:

a) Shared lifts (serving more than one *household unit*), or
b) Shared decks/balconies (serving more than one *household unit*), or
c) Shared concealed spaces (serving more than one *household unit*), e.g. subfloor or roof, or
d) *Outbuildings* with a *dead end open path* more than 20 m, and a total *open path* more than 50 m.

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Table 1.1.2.1: Risk groups outside the scope of Acceptable Solution C/AS1. Refer to C/AS2.

Paragraph 1.1.2.1

Risk group	Applies to
SM **Sleeping (non-institutional)**	**Permanent accommodation such as**: Apartment *buildings* and other *buildings* which consist of more than one *household unit* (other than low rise *multi-unit dwellings* in the scope of ***risk group* SH**.) **Transient accommodation such as**: Hotels, motels, serviced apartments, hostels, backpackers, cabins at holiday parks. *Buildings* where six or more people pay for accommodation (such as boarding houses/homestays/ bed and breakfast). *Wharenui* and other community sleeping spaces such as halls (even if used occasionally). Sheltered housing such as refuges, reintegration for prisoners, homeless shelters etc. **Educational accommodation such as**: University halls of residence, school boarding hostels etc.
SI **Care or detention**	**Care activities such as**: Institutions, hospitals including outpatients and day procedures (excluding special care facilities such as operating theatres, intensive care units, prisons, delivery and recovery rooms and hyperbaric chambers or other such places that require stay in place strategies). Aged care facilities. Residential care in institutions, hospices. Medical day treatment: i.e. medical centres and dental practices using sedation or treatment rooms where people are unable to self-evacuate without assistance; e.g. for dialysis or chemotherapy. Care in the community houses and homes. **Detention facilities (excluding prisons) such as**: Police stations, court *buildings* and hospitals with detention facilities.
CA **Public access and educational facilities**	**Crowd activities such as**: Halls, *theatres* and cinemas. Recreation and event centres (including tiered seating for up to 2000 people and with any primary egress for more than 100 people at the level of the playing surface). Educational institutions without sleeping including schools and *early childhood centres*. Churches and other places of worship. Restaurants and cafes, shops and shopping malls. Exhibition, retail areas including car showrooms and trade fair space. Public libraries with less than 2.4 m storage height. Spaces for viewing open air activities (does not include spaces below a grandstand), open grandstands, roofed but unenclosed grandstand, uncovered fixed seating). **Personal service activities such as**: Dentists, doctors (except as included within ***risk group* SI**), banks, beautician and hairdressing salons.

Contents

Table 1.1.2.1: Risk groups outside the scope of Acceptable Solution C/AS1. Refer to C/AS2. (Continued)

Paragraph 1.1.2.1

Risk group	Applies to
WB **Business, commercial and low level storage**	**Professional activities such as**: Offices (including professional services such as law and accountancy practices). Laboratories, workshops (including mechanics workshops). May contain storage with a capable height of storage of less than 3.0 m. **Industrial activities such as**: Factories, processing and manufacturing plants (excluding *foamed plastics*) with a capable height of storage of less than 3.0 m. **Storage activities such as**: *Buildings* or parts of *buildings* capable of storage no more than 5.0 m in height. Warehouses and storage *buildings* (other than those listed above), capable of storage more than 5.0 m in height, but with a height to the apex no greater than 8.0 m and total floor area of no more than 4200 m^2. Temperature controlled storage with a capable height of storage of less than 3.0 m, other than some limited areas in processing areas, or up to a maximum area of 500 m^2 with a maximum capable of storage height of 5.0 m. **Intermittently occupied buildings (other than *outbuildings*) such as**: Light aircraft hangers, *buildings* containing fixed plant and or fixed machinery and spray painting operations, whether or not in a spray booth.
WS **High level storage or potential for fast fire growth**	**Storage activities such as**: Warehouses with a capable height of storage of over 5.0 m or over 8.0 m to the apex and total floor area greater than 4200 m^2. Temperature controlled storage outside of the scope of ***risk group* WB**. **Service activities such as**: Trading and bulk retail wholesalers with a storage height greater than 3.0 m. Supermarkets with shelving over 3.0 m in height. Exhibition, retail areas and trade fair space with a storage height greater than 3.0 m.
VP **Vehicle storage and parking**	**Vehicle parking – within a building or a separate building including**: Car parking *buildings*. Vehicle parking or stacking within *buildings*. Goods vehicle parking. Service vehicle and unloading areas. Car storage warehouses.

1.1.2.2 If this acceptable solution cannot be followed in full, use C/AS2, C/VM2, or an alternative solution to demonstrate compliance.

1.1.3 The control of hazardous substances is not covered by this Acceptable Solution

1.1.3.1 This acceptable solution does not provide for any use, storage or processing of hazardous substances. Compliance with Verification Method F3/VM1 and the Hazardous Substances and New Organisms Act 1996, and the Health and Safety at Work (Hazardous Substances) Regulations 2017 is required where applicable in addition to the requirements of this acceptable solution.

1.1.4 Compliance pathway

1.1.4.1 This acceptable solution is one option that provides a means of establishing compliance with the performance criteria in Building Code clauses C1-C6 Protection from fire.

Contents

1.1.4.2 Demonstrating compliance with C1-C6 Protection from fire through the use of acceptable solutions and verification methods is summarised in Table 1.1.4.2. Compliance may also be demonstrated using an alternative solution.

Table 1.1.4.2: Demonstrating compliance with C1-C6 Protection from fire through the acceptable solutions and verification methods

Paragraph 1.1.4.2

Clause	Applies to	Relevant acceptable solutions and verification methods
C1 Objectives of clauses C2 to C6 (protection from fire) C2 Prevention of fire occurring C3 *Fire* affecting areas beyond the fire source C4 Movement to place of safety C5 Access and safety for firefighting operations C6 Structural stability	All *buildings* with specific limits on application for individual Functional requirements and Performance criteria	C/AS1 for ***risk group* SH** C/AS2 for ***risk groups* other than SH** excluding *buildings* with complex features C/VM1 for solid fuel burning appliances for compliance with clauses C2.2 and C2.3 C/VM2 for all *buildings* except those that: a) Do not have simultaneous evacuation schemes that evacuate immediately to the outside, or b) Require a managed evacuation, or c) Contain *fire hazards* that are not defined in the Verification Method.

1.1.5 Alterations and changes of use to buildings

1.1.5.1 This acceptable solution may be used to determine the compliance of *building work* (in relation to an existing *building*).

1.2 Using this acceptable solution

1.2.1 Determining the classified use

1.2.1.1 Classified uses for *buildings* are described in clause A1 of the Building Code.

Part 2. Firecells, fire safety systems and fire resistance ratings

2.1 Provisions of firecells

2.1.1 Firecell floor area limits

2.1.1.1 There are no limitations on the *firecell* floor area.

2.2 Fire safety systems

2.2.1 Minimum fire safety system

2.2.1.1 *Fire safety systems* specified in this acceptable solution shall be as defined in Appendix C.

2.2.1.2 Each household unit shall be provided with a minimum of Type 1 domestic smoke alarm system in compliance with NZS 4514.

Out 2.2.1.3 *Fire safety systems* are not required for **outbuildings** where the lengths of *dead end* and *total open paths* do not exceed distances given in Subsection 3.3.1.

2.3 Fire resistance ratings

2.3.1 FRR values

2.3.1.1 Unless explicitly stated otherwise in this acceptable solution, *fire resistance ratings (FRRs)* shall be as follows:

a) *Life rating* = 60 minutes, and

b) *Property rating* = 60 minutes.

2.3.1.2 If a *building* is provided with an automatic *fire* sprinkler system installed in accordance with NZS 4515 or NZS 4541, the *FRR* shall be as follows:

a) *Life rating* = 30 minutes, and

b) *Property rating* = 30 minutes.

2.3.2 General requirements for fire resistance ratings

2.3.2.1 *FRRs* shall apply to each side of a *building element* that is exposed to *fire*, except floors are only required to have an *FRR* for exposure from the underside.

2.3.2.2 The *FRR* of *building elements* integral with a *fire separation* shall be no less than that of the *fire separation*.

2.3.2.3 *External walls* within 1.0 m of the *relevant boundary* shall be *fire rated* for *fire* exposure from both sides equally.

2.3.3 Applying the insulation component in fire resistance ratings

2.3.3.1 *Insulation* ratings shall apply to:

a) All *fire separations*, except as noted in Paragraph 2.3.3.2, and

b) Parts of *external walls* which are adjacent to an external *safe path* where it is a single *means of escape* from *fire*. To determine when a *fire rating* is required, refer to Subsection 3.3.7.

2.3.3.2 *Insulation* ratings are not required to apply to:

a) Elements where sprinklers are installed throughout the building, in accordance with either NZS 4541 or NZS 4515, or

b) Fire resisting glazing in accordance with Paragraph 5.2.1.3.

2.3.4 Structural adequacy of loadbearing elements during fire

2.3.4.1 Loadbearing *building elements* supporting other *building elements* that are required to have a *FRR* shall have a *FRR* that is the maximum *FRR* of the supported elements.

2.3.4.2 Loadbearing *building elements* that are required to have a *FRR* shall be either:

a) Designed in accordance with B1/AS1 for use in a *building* that is within the scope of B1/AS1, or

b) Verified in accordance with B1/VM1.

COMMENT: Within this acceptable solution, *buildings constructed* in accordance with B1/AS1 are deemed to comply with Building Code clause C6. B1/VM1 can be used where *buildings* are outside the scope of B1/AS1.

Part 3. Means of escape

3.1 General principles

3.1.1 Components of escape routes

3.1.1.1 *Escape routes* shall comply with clause D1 of the Building Code. Ramps, stairs, ladders, landings, handrails, doors, vision panels and openings shall comply with Acceptable Solution D1/AS1.

3.1.1.2 The components of an *escape route* may be comprised of:

a) *Open paths*, and

b) *Exitways*, (these may comprise of smoke lobbies and *safe paths*), and

c) *Final exits.*

3.1.1.3 Provided the allowable lengths of *open paths* are not exceeded, an *escape route* may be comprised of only an *open path* and *final exit*.

3.1.1.4 The *final exit* is where the *escape route* enters a *safe place*. This might be beyond the exit door from the *building.*

3.1.2 Number of escape routes

3.1.2.1 A single *escape route* is permitted provided the *dead end open path* distance specified in Paragraph 3.3.1.1 is not exceeded.

3.2 Height and width of escape routes

3.2.1 Height

3.2.1.1 Height requirements within *escape routes* shall be as follows:

a) The clear height shall be no less than that required by Acceptable Solution D1/AS1, and

b) Any door opening within, or giving access to, any *escape route* shall have a clear height of no less than 1955 mm for the required width of the opening.

3.2.2 Width

3.2.2.1 The minimum width of individual *escape routes* shall be no less than:

a) 700 mm for horizontal travel, and

b) 850 mm for vertical travel.

c) 1000 mm for *exitways*.

3.2.3 Obstructions

3.2.3.1 The following minor obstructions are acceptable within the width of an *escape route*:

a) Handrails complying with Acceptable Solution D1/AS1 and projecting no more than 100 mm into the width of an *open path*, and

b) Door assemblies that project no more than 100 mm into the width of an *open path*.

3.3 Length of escape routes

3.3.1 Travel distances

3.3.1.1 An *escape route* may be any length, but the lengths of *dead ends* and total *open paths* shall not exceed the distances given in Table 3.3.1.1. If these allowable distances are exceeded, the proposed building is outside the scope of this acceptable solution.

Table 3.3.1.1: Travel distances on escape routes

Paragraph 3.3.1.1

Portion of the escape route	Maximum travel distance for different buildings and systems		
	Outbuildings or No system	Household units NZS 4514, and Type 1 system	Household units NZS 4515, or NZS 4517, or NZS 4541 sprinkler system, and Type 1 system
Dead end open path DEOP	20 m	35 m	40 m
Total *open path* TOP	50 m	75 m	100 m

3.3.2 Open path lengths

3.3.2.1 When determining *open path* lengths, including any *dead end*, the following shall apply:

a) Start point: the length shall be measured from no more than 1.0 m from the most remote point in a space.

b) Furniture and fittings: allowance shall be made for the *travel distance* around obstructions, such as furniture and fittings located in *open path*. If location of obstructions is unknown, then the allowable *travel distance* shall be measured orthogonally (see Figure 3.3.2.1).

c) Termination: an open path ends at the start of a *safe path* or *final exit*.

3.3.3 Stairs and ladders

3.3.3.1 Stairs and ladders occurring in an *open path* shall have their *open path* taken as:

a) For straight and curved stairs: the plan length measured on the stair centreline, plus the plan length of each landing,

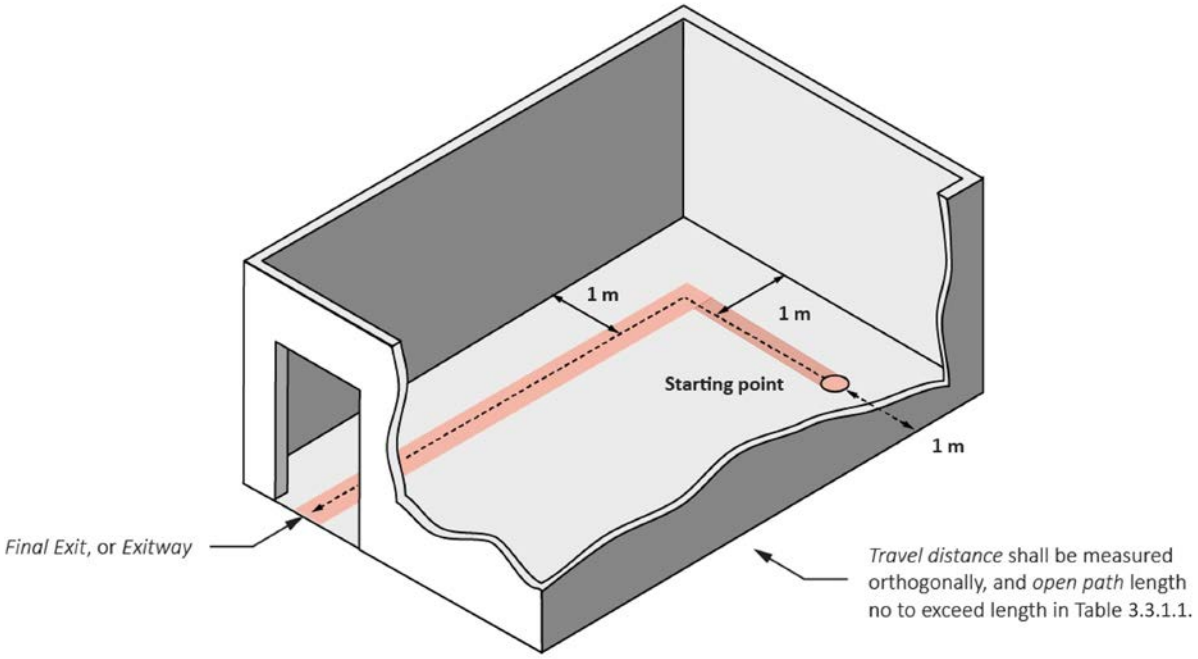
b) For ladders: use the vertical height.

3.3.4 Intermediate floors

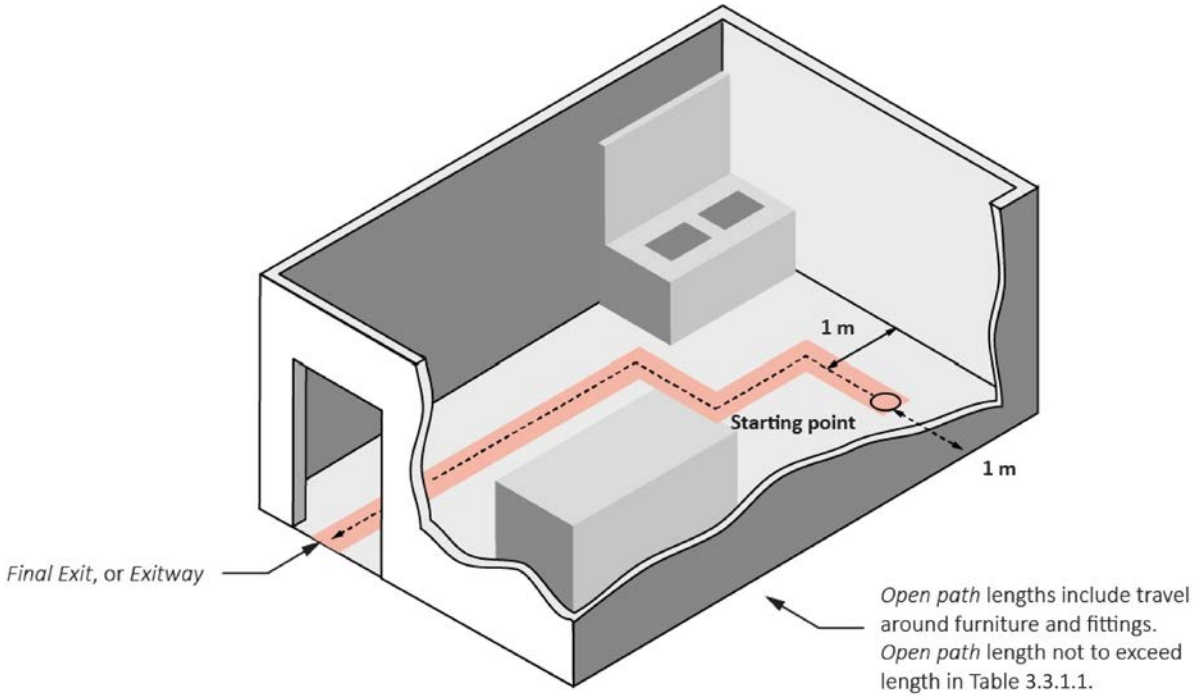
3.3.4.1 The *open path* length within *household units* or *outbuildings* shall be taken as a distance that is necessary for a person to travel from any point within a built environment to the nearest exit, taking into account the layout of walls, partitions and fittings.

Figure 3.3.2.1: Length of open paths

Paragraph 3.3.2.1



(a) Fixture and fitting positions are unknown



(b) Fixture and fitting positions are known

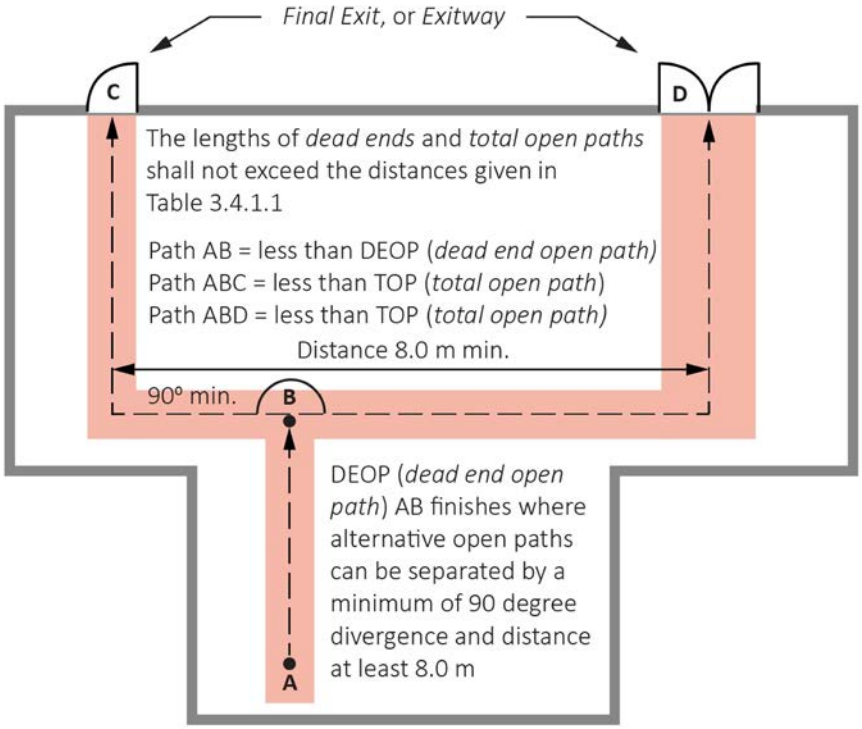
3.3.5 Dead end open path

3.3.5.1 A *dead end* terminates where the *escape route* reaches a point in the *open path* which offers alternative directions of travel, or at a *final exit*, or an *exitway*.

3.3.5.2 If two or more *open paths* are required, they shall be separated from each other, and remain separated until reaching an *exitway* or *final exit*. Separation shall be achieved by diverging (from the point where two escape routes are required), at an angle of no less than 90° until separated by a distance of at least 8.0 m, (see Figure 3.3.5.2).

Figure 3.3.5.2: Alternative open path separation

Paragraph 3.3.5.2



3.3.6 Safe paths

3.3.6.1 *A safe path* shall terminate at a *final exit*.

3.3.6.2 *Escape routes* from *buildings* shall enter directly into an external *safe path* or a *final exit*.

3.3.7 External escape routes

3.3.7.1 Where an *escape route* enters an *open space* with more than one direction of escape, an external *safe path* is not required.

3.3.7.2 If there is only one direction of escape, and the *building* is not sprinklered, and an *escape route* enters an *open space*, (i.e. an external private stairway, or shared ground level path), it shall meet the requirements of a *safe path* between that point and the *final exit*.

3.3.7.3 External *safe path* requirements shall be achieved by:

a) Providing a minimum separation distance of 1.0 m between the external *safe path* and any *unprotected areas*

   i) in adjacent *external walls* (see Figure 3.3.7.3), or

   ii) lower roofs of other *firecells*; or

b) *Fire* rating of adjacent *external walls* and roofs of other *firecells* within 1.0 m of the external *safe path* shall

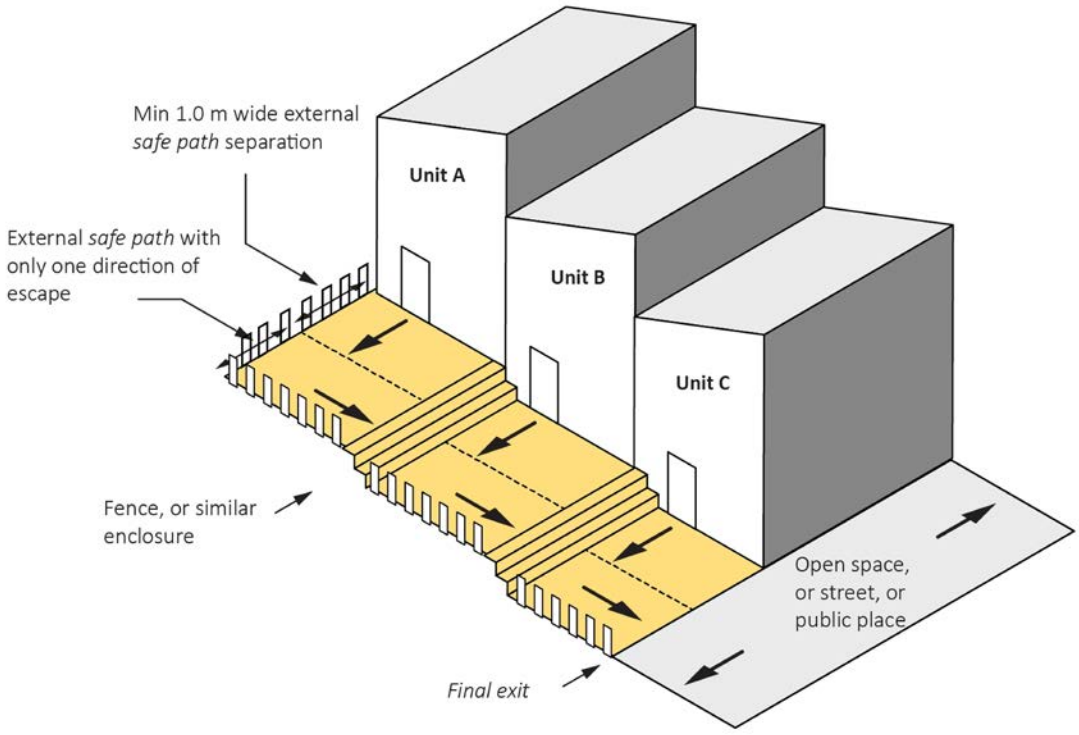
   i) comply with the *FRR* requirements of Section 2.3, and

   ii) have no unprotected openings; or

c) *Buildings* located less than 1.0 m of the external *safe path* shall be provided with an automatic *fire* sprinkler system installed to NZS 4515 or NZS 4541.

Figure 3.3.7.3: External escape routes from unsprinklered buildings

Paragraph 3.3.7.3



3.4 Doors subdividing escape routes

3.4.1 Degree and width of opening

3.4.1.1 Doors on *escape routes* shall satisfy the following requirements:

a) Provide an unobstructed opening width of no less than 760 mm, and when multi-leaf, have no single leaf less than 500 mm wide; and

b) Open no less than 90°; and

c) When opened, not cause the door swing to obstruct the minimum required width of an *escape route*; and

d) Manual sliding doors may be used where the space has an occupant load of less than 20.

3.4.2 Door locking devices

3.4.2.1 Locking devices shall be located where such a device would be normally expected. Locking mechanisms shall not impede or prevent occupants from moving to a safe place in the event of a *fire*.

Part 4. Control of internal fire and smoke spread

4.1 Firecells

4.1.1 Fire separations

4.1.1.1 Within multi-unit dwellings each *household unit*, including an independent escape route and associated garage, shall be a single *firecell* separated from other *household units* by *fire separations* having an *FRR* in accordance with Section 2.3.

Out 4.1.1.2 **Outbuildings** attached to *household units* or garages shared by more than one *household unit* shall be *fire separated* from each adjacent *household unit* with a *fire rated construction* having an *FRR* in accordance with Section 2.3.

4.1.1.3 An attached separate *household unit* to the primary dwelling, such as a granny flat, shall be *fire separated* from the primary dwelling with *fire rated construction* having an *FRR* in accordance with Section 2.3.

i COMMENT: For detached *household units*, refer to the *fire separation* requirements in Part 5.

4.1.2 Fire stopping

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

4.1.2.2 *Fire stops* shall have an *FRR* of no less than that required for the *fire separation* within which they are installed, and shall be tested in accordance with Appendix E. E.3.1.

4.1.2.3 *Fire stops* and methods of installation shall be identical to those of the prototype used in tests to establish their *FRR*.

4.1.2.4 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*.

4.1.2.5 To avoid the passage of smoke through *fire separations*, or between *fire separation* and unrated part of the *external wall*, gaps shall be sealed with compliant *fire resistant* materials tested to AS 1530.4.

4.1.3 Firecell construction

4.1.3.1 *Fire separations* shall have no openings other than for closures such as *fire doors*, and penetrations complying with Subsection 4.1.1.3.

4.1.3.2 *Firecell* effectiveness shall be maintained to ensure continuity of *fire separations* at separation junctions, and around joints where closures and penetrations occur.

4.1.4 Junctions of fire separations

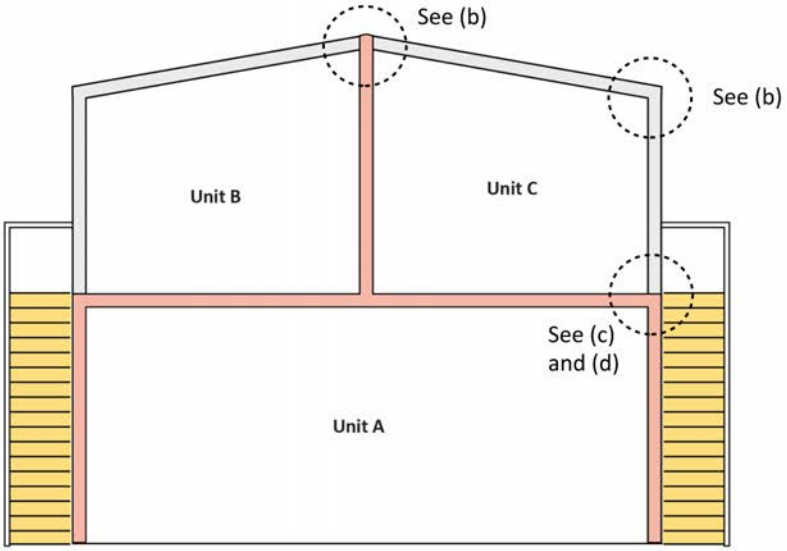
4.1.4.1 Where *fire separations* meet other *fire separations* or *external walls*, they shall either be bonded together or have the junction *fire stopped* over its full length (see Figure 4.1.4.1).

4.1.4.2 Vertical *fire separations* and *external walls* shall:

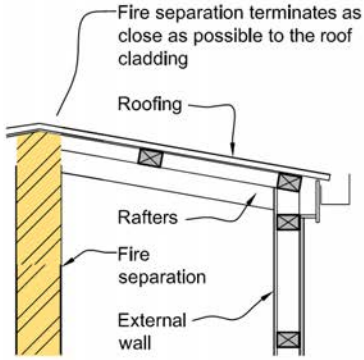
a) terminate as close as possible to the external roof cladding and primary elements providing roof support, with any gaps fully fire stopped (see Figure 4.1.4.1), or
b) Extend not less than 450 mm above the roof to form a parapet.

Figure 4.1.4.1 Firecell construction

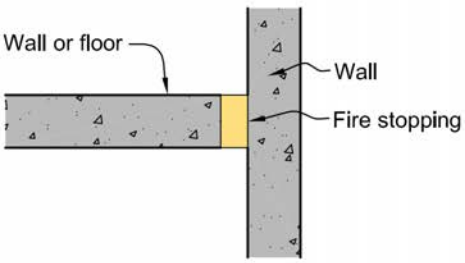
Paragraph 4.1.4.1



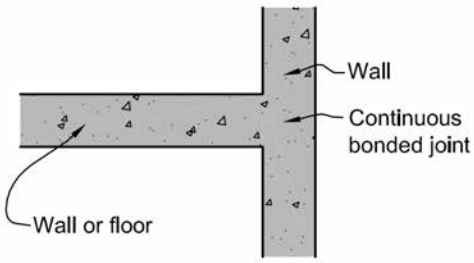
(a) Section view of a *multi-unit dwelling*



(b) Section view
Junction *fire separation* between a wall and roofing



(c) Plan or section view
Junction *fire separation* between a wall and floor



(d) Plan or section view
Junction *fire separation* between a wall and floor

4.1.5 Fire rated shafts

4.1.5.1 Each *household unit* shall be provided with independent services.

4.1.5.2 In *multi-unit dwellings*, where services may pass from one *firecell* to another, services shall be contained within a *protected shaft*.

4.1.5.3 Every *protected shaft* shall be a separate *firecell* within the *firecell* or *firecells* in which it is located. The shafts walls shall have an *FRR* as required by Section 2.3. The *FRR* of the shaft wall shall apply to both sides equally.

4.1.6 Floors

4.1.6.1 Floors between *firecells* shall be *fire separations*. The *FRR* of a floor shall be in accordance with Section 2.3.

Out 4.1.6.2 *Intermediate floors* located within the same *firecell* as a *household unit* or **outbuilding** do not a *FRR*.

4.1.6.3 In *buildings* with unoccupied subfloor spaces between the ground and lowest floor, vertical fire separations shall be extended down to the *finished ground level* to subdivide subfloor spaces spanning multiple *firecells*.

4.1.7 Concealed spaces

4.1.7.1 The spread of *fire* in *concealed spaces* shall be avoided by ensuring that voids do not pass from one *firecell* to another, and by blocking off smaller voids using *fire stops* (refer to Section 4.1.1.3).

4.1.7.2 Any *concealed space* which may be path for *fire* spread within internal walls or floors which are *fire separations,* or within external walls, shall be *fire stopped* at all common junctions (see Figure 4.1.4.1).

4.1.8 Fire doors

4.1.8.1 *Fire doors* shall comply with:

a) Appendix E. E.4.1, and

b) For smoke control performance, Appendix E. E.4.2.

4.2 Interior surface finishes

4.2.1 Surface finish requirements for walls and ceilings

4.2.1.1 Except where *foamed plastic building materials* or *combustible* insulating materials are used, there are no *surface finish* requirements in ***risk group* SH**.

4.2.2 Foamed plastic and combustible insulating materials

4.2.2.1 If *foamed plastics building materials* or *combustible* insulating materials form part of a wall or ceiling system, the completed system shall achieve a *Group Number* as equal or less than 3, and the foamed plastics shall comply with the flame propagation criteria as specified in AS 1366 Parts 1–4 for the material being used. The above requirements do not apply to the following *building elements*:

a) Small areas of non-conforming product within a *firecell* with a total aggregate surface area of not more than 5.0 m^2; and

b) Electrical switches, outlets, cover plates and similar small discontinuous areas; and

c) Pipes and cables used to distribute power or services; and

d) Handrails and general decorative trim of any material such as architraves, skirtings and window components, including reveals, provided these do not exceed 5% of the surface area of the wall or ceiling they are part of; and

e) *Damp-proof courses*, seals, caulking, flashings, thermal breaks and ground moisture barriers; and

f) Individual *doorsets*; and

g) Continuous areas of permanently installed openable wall partitions, having a surface area of not more than 25% of the divided room floor area or 5.0 m^2, whichever is the greater.

COMMENT: The completed system may or may not include a surface lining product enclosing any insulation material from any adjacent *occupied space*. If a surface lining is not included, then the foamed plastics or *combustible* insulating materials when tested alone shall achieve a *Group Number* of 3, otherwise a surface lining is also required such that the completed system achieves a *Group Number* of 3. This paragraph applies to foamed plastics *building* materials whether exposed to view from the *occupied space* or enclosed.

Part 5. Control of external fire spread

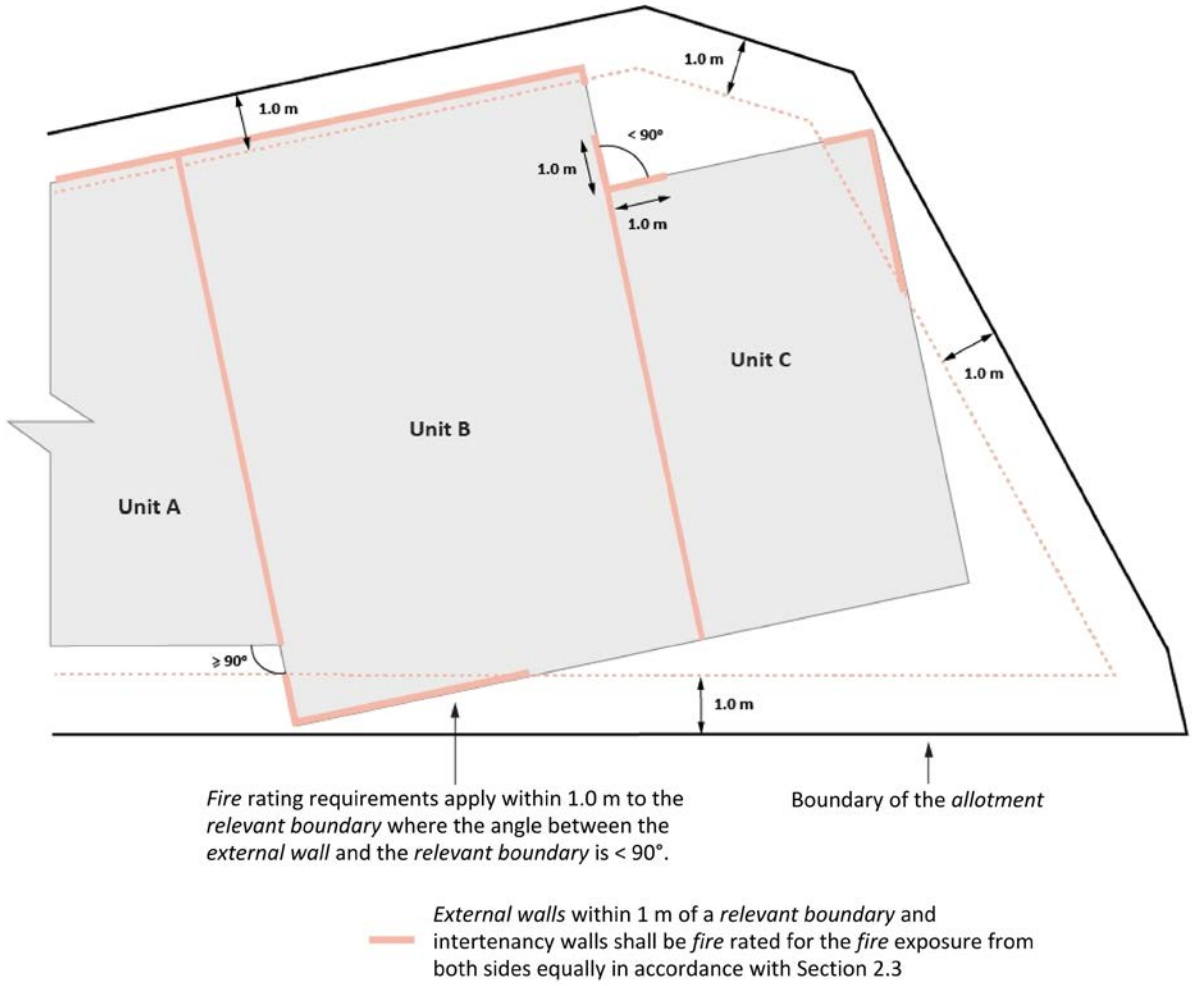
5.1 Horizontal fire spread from external walls

5.1.1 Fire rating of external walls

5.1.1.1 The parts of the *external walls* which are less than 1.0 m and less than 90° from the *relevant boundary* (see Figure 5.1.1.1) shall be *fire* rated to protect from both directions and achieve a *FRR* no less than the values in Section 2.3.

Figure 5.1.1.1: Fire rating of external walls

Paragraph 5.1.1.1



5.1.1.2 Where the intersection angle of the *building* and the *relevant boundary* is 90° or greater, an *unprotected area* of 100% is permitted for the *external wall*.

5.1.1.3 If a wall or part of a wall is less than 1.0 m from the *relevant boundary*, a combination of small *unprotected areas* and fire *resisting glazing* is permitted as detailed in Section 5.2

5.1.2 Notional boundary – firecells on the same property

5.1.2.1 For *firecells* containing *household units* under common ownership in the same *building*, or in separate *buildings* on the same property, a *notional boundary* shall be used instead of the *relevant boundary*. The words *relevant boundary* shall be interpreted as *notional boundary*. This does not apply between a *household unit* and its associated *outbuilding* within the same *allotment*.

5.1.2.2 Where both *firecells* on the same property contain *household units*, analysis shall be done separately for each *firecell* with respect to the same *notional boundary*.

5.2 Small unprotected areas and fire resisting glazing

5.2.1 Maximum permitted areas

5.2.1.1 If the *external wall* is required to have an *FRR*, the *external wall* is allowed to have small *unprotected areas* no greater than 0.1 m^2, (referred to as Type A areas), and areas of *fire resisting glazing*, (referred to as Type B areas), permitted by Table 5.2.1.1 according to the distance from the *relevant boundary*.

5.2.1.2 Small *unprotected areas* and *fire resisting glazing* shall be located in compliance with Figure 5.2.1.2.

5.2.1.3 *Fire resisting glazing* shall be rated for the *integrity* only, and the *FRR* of both the glazing and the *external wall* shall be in accordance with Section 2.3.

5.2.1.4 Where *firecells* are protected with an automatic *fire* sprinkler system (installed as per NZS 4515 or NZS 4541), there is no limit on permitted area of the *fire resisting glazing*.

Table 5.2.1.1: Maximum permitted areas of fire resisting glazing in unsprinklered firecells

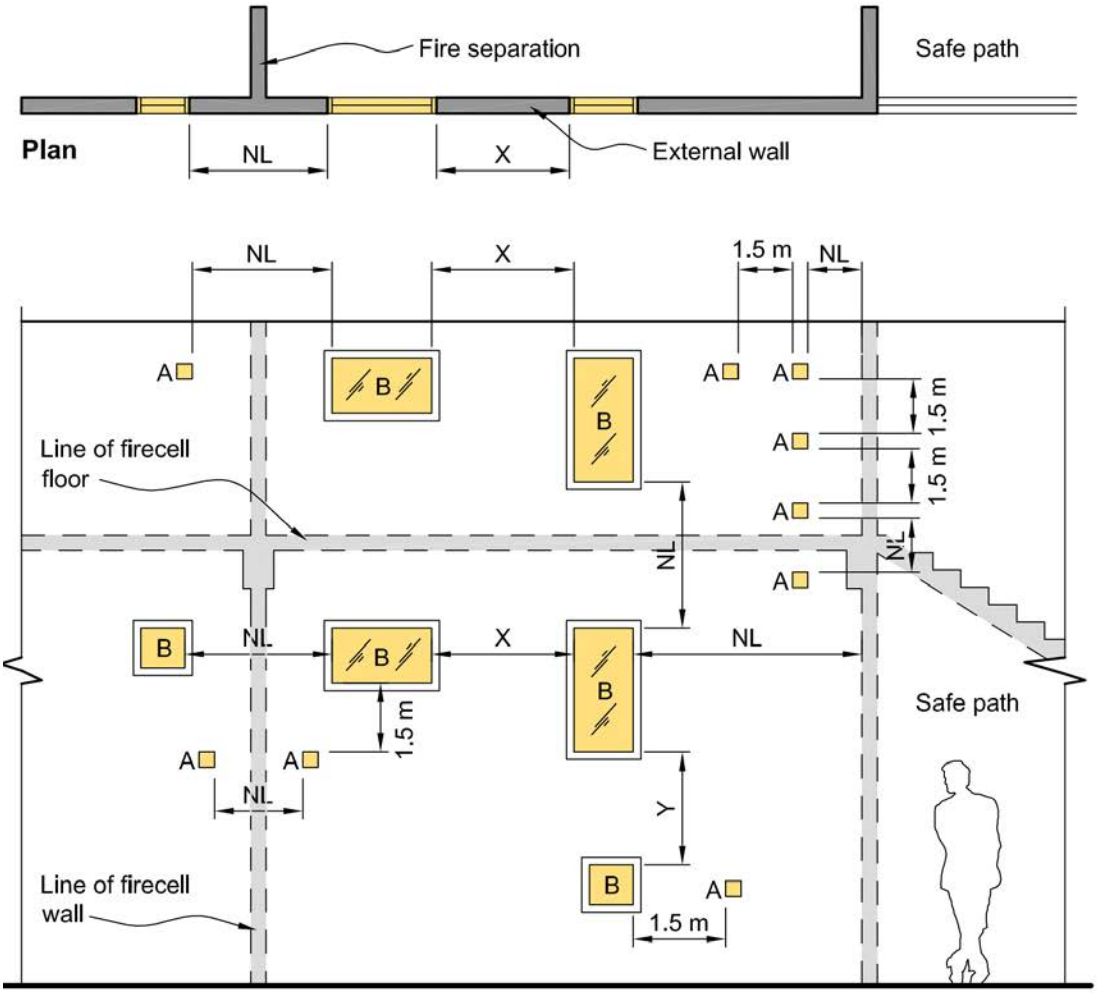
Paragraph 5.2.1.1

Distance to the relevant boundary (m)	Maximum glazing area (m^2) (1)
0.0	1.0
0.4	1.0
0.5	1.5
0.6	2.0
0.7	3.0
0.8	3.5
0.9	5.0
1.0	6.0
> 1.0	Unlimited

Note:
(1) *Firecells* provided with an automatic fire sprinkler system installed as per NZS 4515 or NZS 4541 have no limit on the area of *fire resisting glazing*.

Figure 5.2.1.2: Permitted small unprotected areas and fire resisting glazing

Paragraphs 5.2.1.2



Elevation

Dimensions shown are minimum distances between Type A unprotected areas and of Type B fire resisting glazing

Legend

A□ Type A *unprotected areas* of 0.1 m² maximum

B **Type B areas of *fire resisting glazing* complying with Table 5.2.1.1.**

NL No limitation on spacing

X Spacing to be no less than the greater of the widths of the two Type B areas being considered

Y Spacing to be no less than the greater of the heights of the two Type B areas being considered

5.3 External fire spread from roof projections, open sided buildings, and similar construction

5.3.1 Eaves

5.3.1.1 Where the *external wall* is required to have an *FRR*, eaves projections shall be *constructed* with the same *FRR* as the *external wall*. Alternatively, the *fire* rated *external wall* shall be extended to the underside of the roof, and the roof projections need not be *fire* rated.

5.3.1.2 Where the *external wall* is not required to have a *FRR*, and roof projection extends to within 300 mm of the *relevant boundary*, either

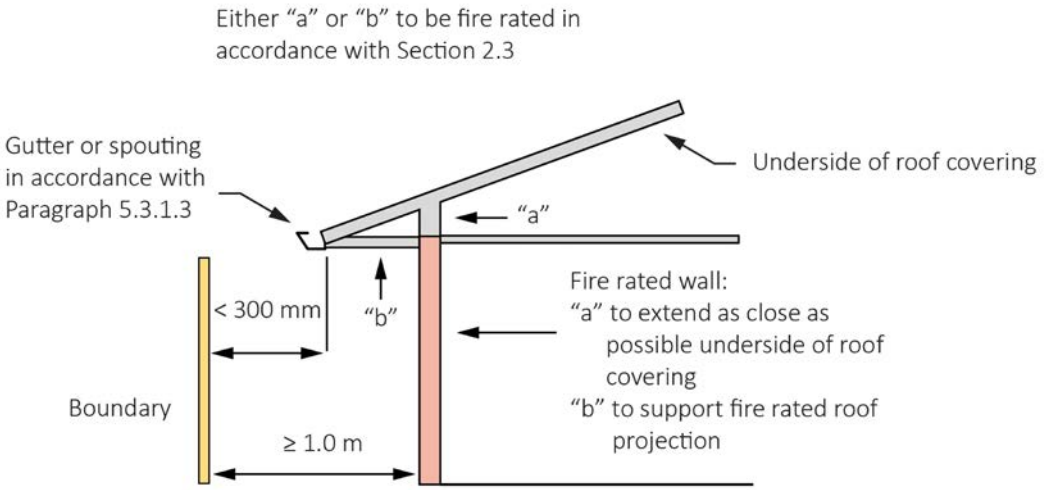
a) the *fire* rated wall shall extend to the underside of the roof, and the eaves need not be *fire* rated, or

b) the eaves construction and the *external wall* from which it projects shall have *FRRs* in accordance with Section 2.3, (see Figure 5.3.1.2).

5.3.1.3 Guttering or spouting, which form part of eaves construction, does not have to be *fire* rated.

Figure 5.3.1.2: Eaves

Paragraph 5.3.1.2



5.3.2 Carports and similar construction

5.3.2.1 An open-sided *building*, (e.g. a carport, or similar construction), may be either a detached *building*, or connected to another *building*, (see Figure 5.3.2.1). For the open-sided *building* to be deemed 'detached', the horizontal distance between the other *building* and the roof of the open-sided *building* shall be no less than:

a) 1.0 m for roof area exceeding 40 m^2, or

b) 0.3 m for roof area no greater than 40 m^2.

5.3.2.2 An open-sided *building* is permitted to have walls and roof with 100% unprotected area provided that all the following conditions are met:

a) At least two sides are completely open to the environment, and

b) An open-sided *building* and *adjacent building* are under the same ownership, and

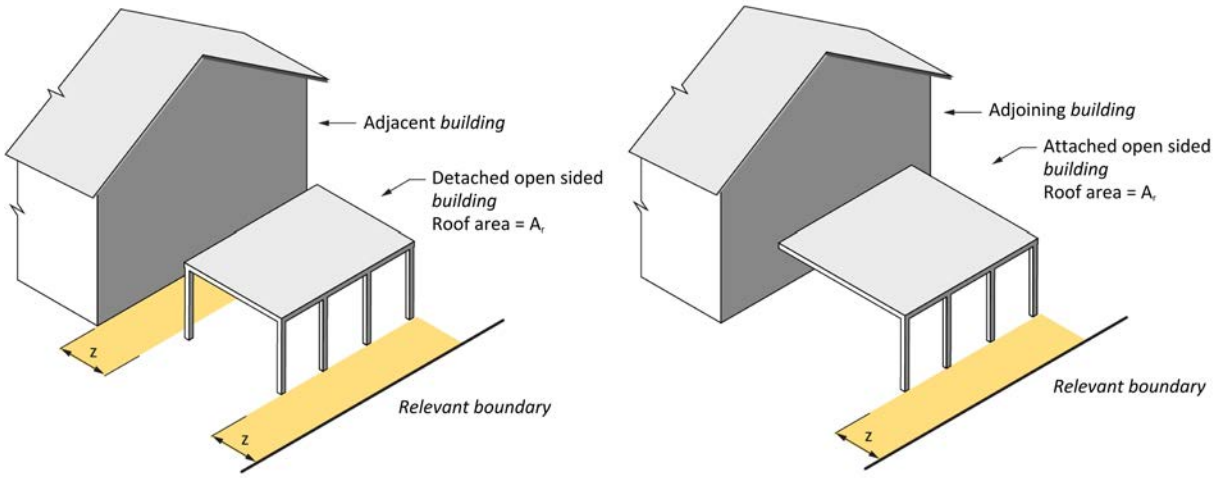
c) For a roof plan area of no more than 40 m^2, no part of the roof is closer than 0.3 m to a *relevant boundary*, and

d) For a roof plan area exceeding 40 m^2, no part of the roof is closer than 1.0 m to a *relevant boundary*.

5.3.2.3 Where the requirements of Paragraph 5.3.2.2 are not met, the applicable *external wall/s* of an open-sided *building* shall comply with Section 5.1.

Figure 5.3.2.1: Carports and similar construction

Paragraph 5.3.2.1



Separation distances for non-fire rated construction

When A_r is ≤ 40 m^2, 'Z' shall be ≥ 0.3 m.

When A_r is > 40 m^2, 'Z' shall be ≥ 1.0 m.

Notes:

(1) This figure applies only to single storey open sided *buildings*.

(2) In all cases at least two sides of the perimeter wall shall be completely open to the environment.

5.3.3 Decks and balconies

5.3.3.1 Decks shall have no less than 50% of the perimeter areas open to the environment, and may have roof projections complying with Paragraphs 5.3.1.1 and 5.3.1.2 (see Figure 5.3.3.1).

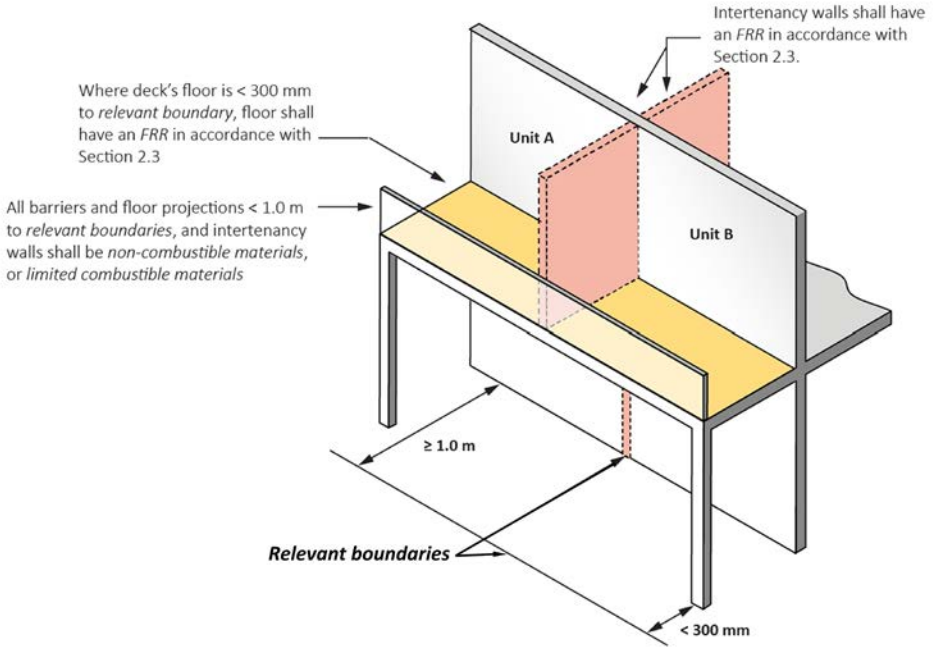
5.3.3.2 Where a deck projects beyond the face of an *external wall* which is required to be *fire* rated, the deck shall achieve a *FRR* in accordance with Section 2.3, and exposed exterior faces of the floor projection and barriers shall be *non-combustible*, or *limited combustible materials*.

5.3.3.3 Where decks are located at single floor level and the deck floor is less than 300 mm to *the relevant boundaries*, the deck floor shall achieve an *FRR* in accordance with Section 2.3 and exposed exterior faces of the floor projection and barriers shall be *non-combustible*, or *limited combustible materials* (see Figure 5.3.3.1 (a), (b) and (d)).

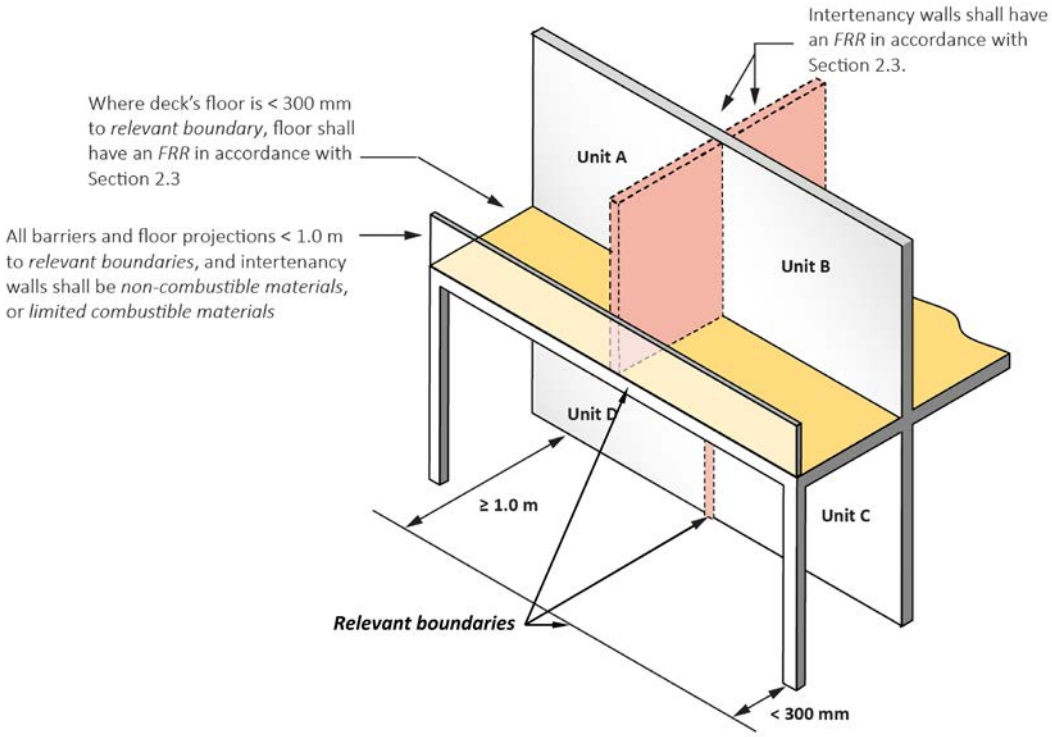
5.3.3.4 In addition to requirements of Paragraph 5.3.3.3, in *multi-unit dwellings*, where a deck's floor is adjacent to the *relevant boundary*, the intertenancy wall shall achieve an *FRR* in accordance with Section 2.3, and exposed exterior faces of the intertenancy wall shall comply with Section 5.5 (see Figure 5.3.3.1).

5.3.3.5 In side-by-side *multi-unit dwellings* the requirement of Paragraph 5.3.3.3 do not apply where adjacent decks are located more than 300 mm to the *boundary* of the *allotment* and a *fire* rated inter-tenancy/party *external wall* is separating adjacent *household units* the full height of the building (see Figure 5.3.3.1 (c)).

Figure 5.3.3.1: Decks at a single level where decks are less than 300 mm to the boundary of allotment
Paragraphs 5.3.3.1, 5.3.3.3, and 5.3.3.5



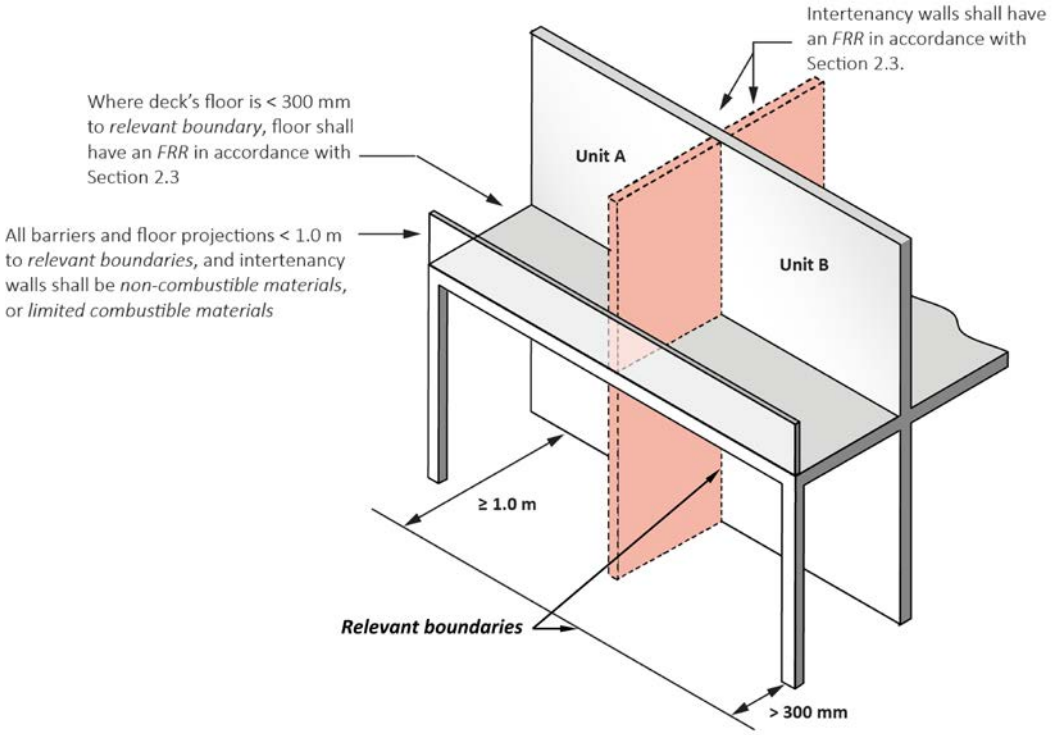
(a) Detached dwellings and side-by-side *multi-unit dwellings*



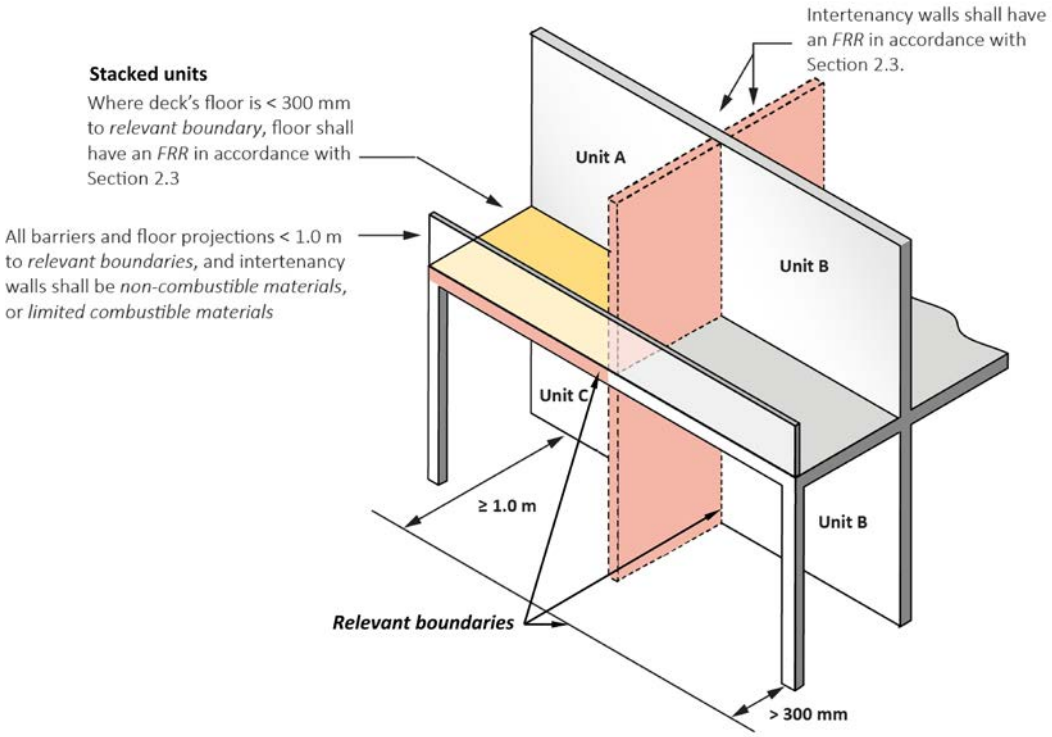
(b) Stacked *multi-unit dwellings*

Figure 5.3.3.1: Decks at a single level where decks are less than 300 mm to the boundary of allotment (Continued)

Paragraphs 5.3.3.1, 5.3.3.3, and 5.3.3.5



(c) Side-by-side *multi-unit dwellings* with adjacent decks between units



(d) *Multi-unit dwellings* with adjacent decks between units

5.3.3.6 Where decks are located at a single floor level and deck floor is more than 300 mm to the *relevant boundaries*, the deck floor shall achieve the same *FRR* as the internal floor, and barriers shall be *non-combustible* or *limited combustible materials*, see Figure 5.3.3.6 (a) and (b).

5.3.3.7 Where decks are located on more than one level or deck at single floor level has a multi-use, (see Figure 5.3.3.7), the control of external *fire* spread shall be applied to *building* projections in accordance with Section 5.1.

5.3.3.8 In addition to requirement of Paragraph 5.3.3.7, in *multi-unit dwellings*, where decks are adjacent to the *relevant boundary*, (see Figure 5.3.3.7), decks and intertenancy walls shall have an *FRR* in accordance with Section 2.3, and exposed exterior faces of the projections and barriers shall comply with Section 5.4.

5.3.4 Building overhangs

5.3.4.1 The *building* overhangs shall comply with the requirements for the horizontal *fire* spread from *external walls* in accordance with Paragraph 5.1.

5.3.4.2 In *multi-unit dwellings*, protection from vertical *fire* spread is required for *building* overhangs where the overhang is less than 1.0 m from a *relevant boundary*.

5.3.4.3 Protection can be achieved by:

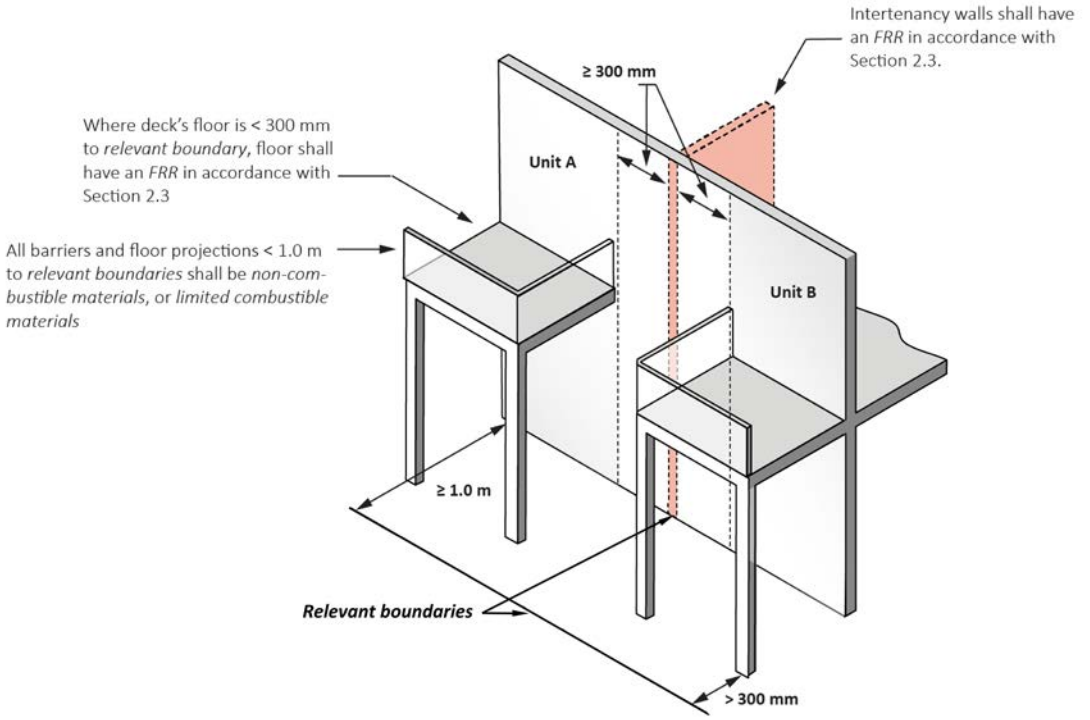
a) For *multi-unit dwellings,*

   i) *fire* rating floor projections in accordance with Section 2.3 (see Figure 5.3.4.3 (a)), and

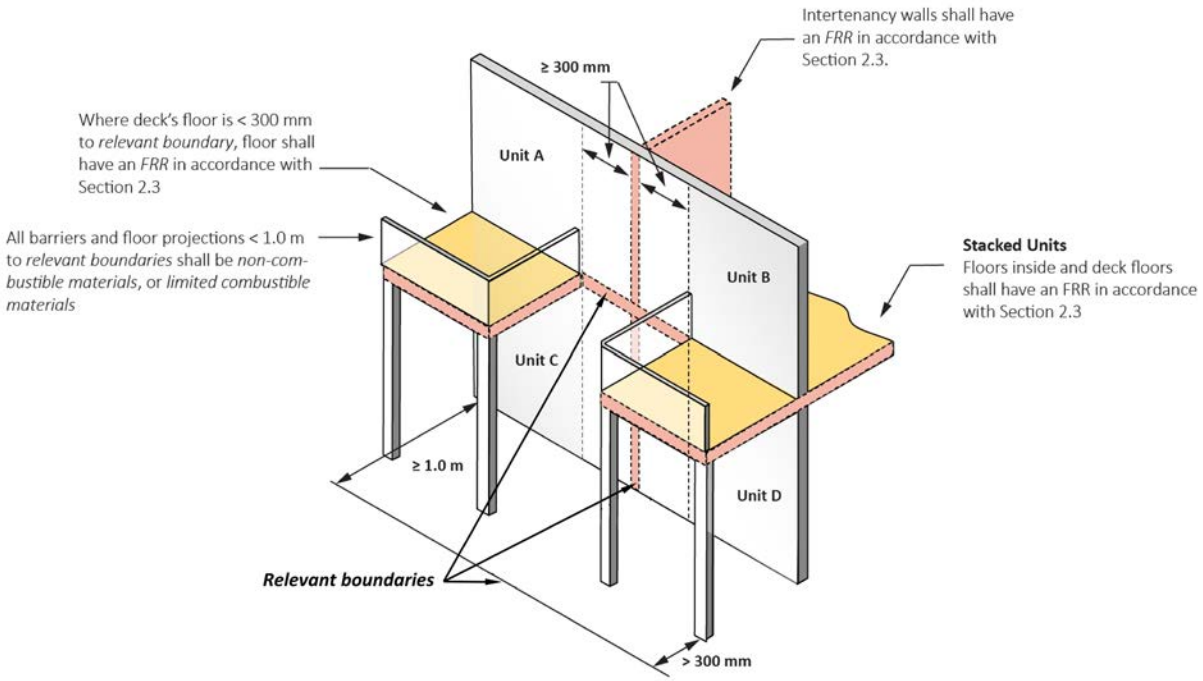
   ii) providing *non-combustible* or limited *combustible materials* for all exposed exterior faces of the floor projection; or

b) For side-by-side *multi-unit dwellings*, providing a full height intertenancy wall that has a *FRR* in accordance with Section 2.3 (see Figure 5.3.4.3 (b)).

Figure 5.3.3.6: Decks at a single level where decks are more than 300 mm to relevant boundaries
Paragraph 5.3.3.6



(a) Side-by-side *multi-unit dwellings* where decks are more than 300 mm to the *relevant boundaries*



(b) Stacked *multi-unit dwellings* where decks are more than 300 mm to *relevant boundaries*

Figure 5.3.3.7: Decks at multiple floor levels

Paragraph 5.3.3.7

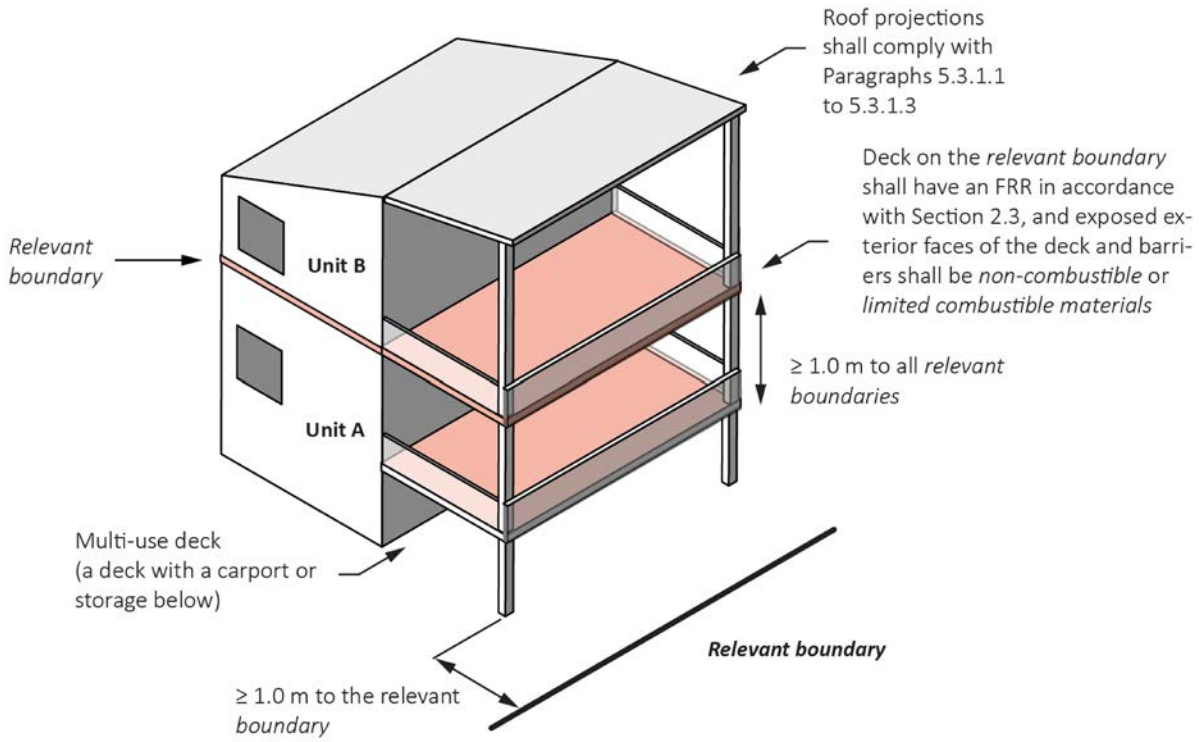
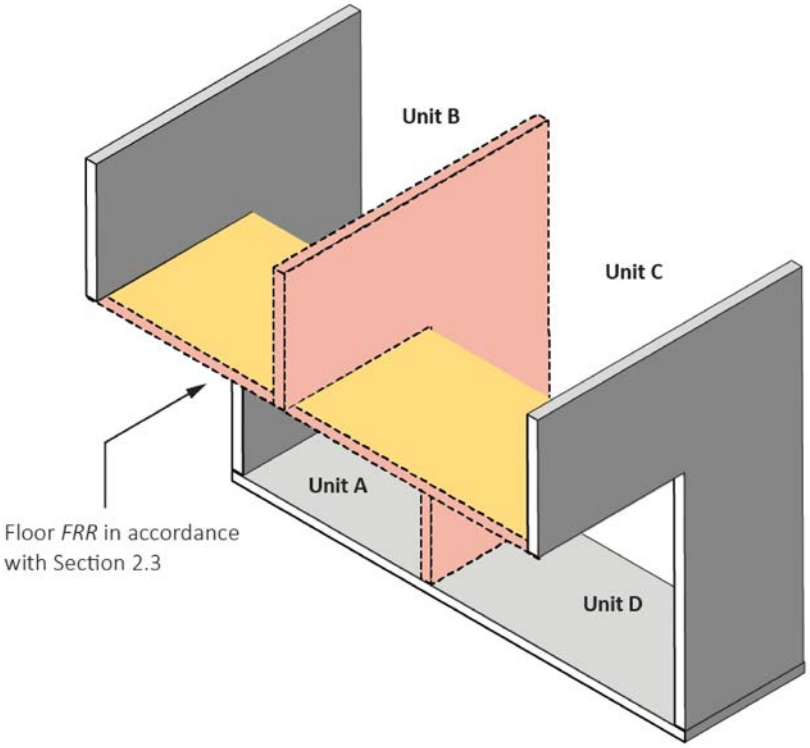
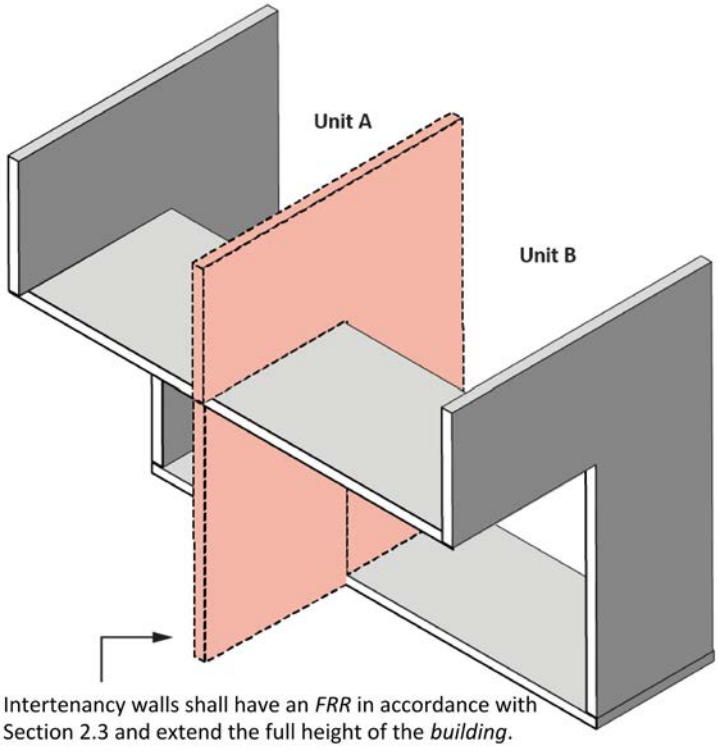


Figure 5.3.4.3: Building overhang protection

Paragraph 5.3.4.3



(a) *Fire* rated floors for for stacked or side-by-side *multi-unit dwellings*



(b) Full height intertenancy walls for side-by-side *multi-unit dwellings*

5.4 Vertical fire spread in multi-unit dwellings

5.4.1 Protection from a lower roof in multi-unit dwellings

5.4.1.1 *Fire* spread from a roof close to and lower than an *external wall* of an attached sleeping unit or attached *building* on *other property* shall be prevented (see Figure 5.4.1.1).

5.4.1.2 This shall be achieved by providing either:

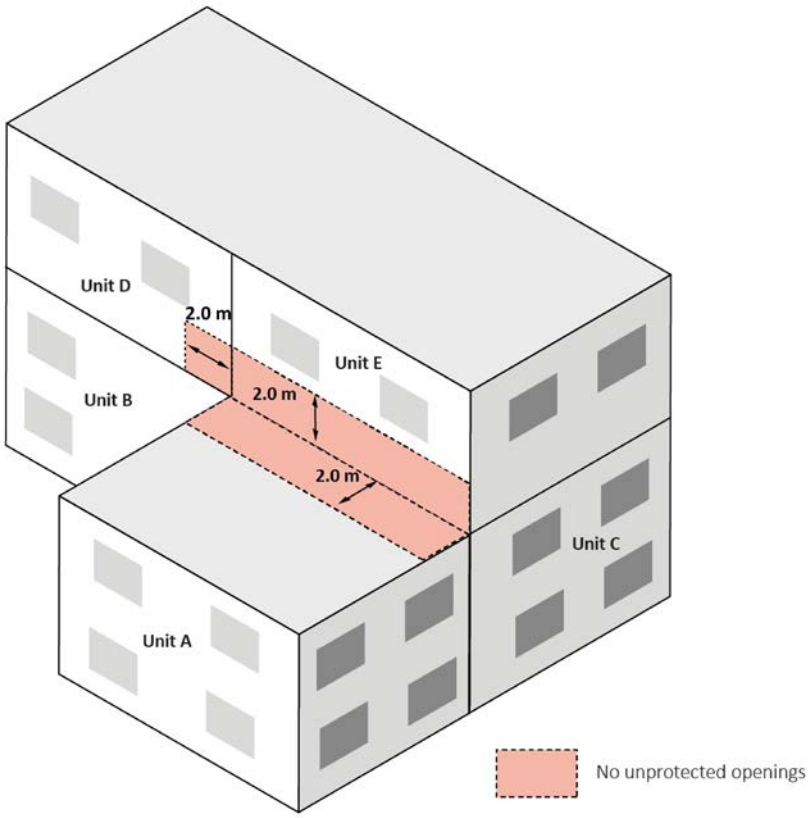
a) An *FRR* of 60/60/60 to part of the roof within 2.0 m horizontally of the adjoining *external wall*, including its supporting structure, against the threat of *fire* from the underside, or

b) An *FRR* of 60/60/60 to part of the *external wall* within 2.0 m vertically of the adjoining roof, or

c) An automatic fire sprinkler system complying with NZS 4515 or NZS 4541 in *firecell* below the lower roof.

Figure 5.4.1.1: Protection from a lower roof in multi-unit dwellings

Paragraph 5.4.1.1



5.5 External cladding systems

5.5.1 External wall cladding materials

5.5.1.1 Where e*xternal walls* are located less than 1.0 m from a *relevant boundary*, cladding materials shall be:

a) *Non-combustible* or *limited combustible* materials; or

b) Tested in accordance with the relevant *standard tests* in Appendix E E5.1 and achieve a Type A classification.

5.5.1.2 The requirements of Paragraphs 5.5.1.1 do not apply where the intersection angle between the *external wall* and the *relevant boundary* is ≥ 90° (see Figure 5.5.1.2).

5.5.2 Cavity barriers

5.5.2.1 The spread of *fire* through cavities in an *external wall* cladding systems of *multi-unit dwellings* shall be avoided by providing *cavity barriers* at each floor level, and at *notional boundary* walls.

5.5.2.2 *Cavity barriers* shall:

a) Not reduce the *FRR* required for the element within which they are installed, and

b) Where practical, be tightly fitted and mechanically fixed to rigid construction, but if this is not possible gaps shall be *fire stopped*, and

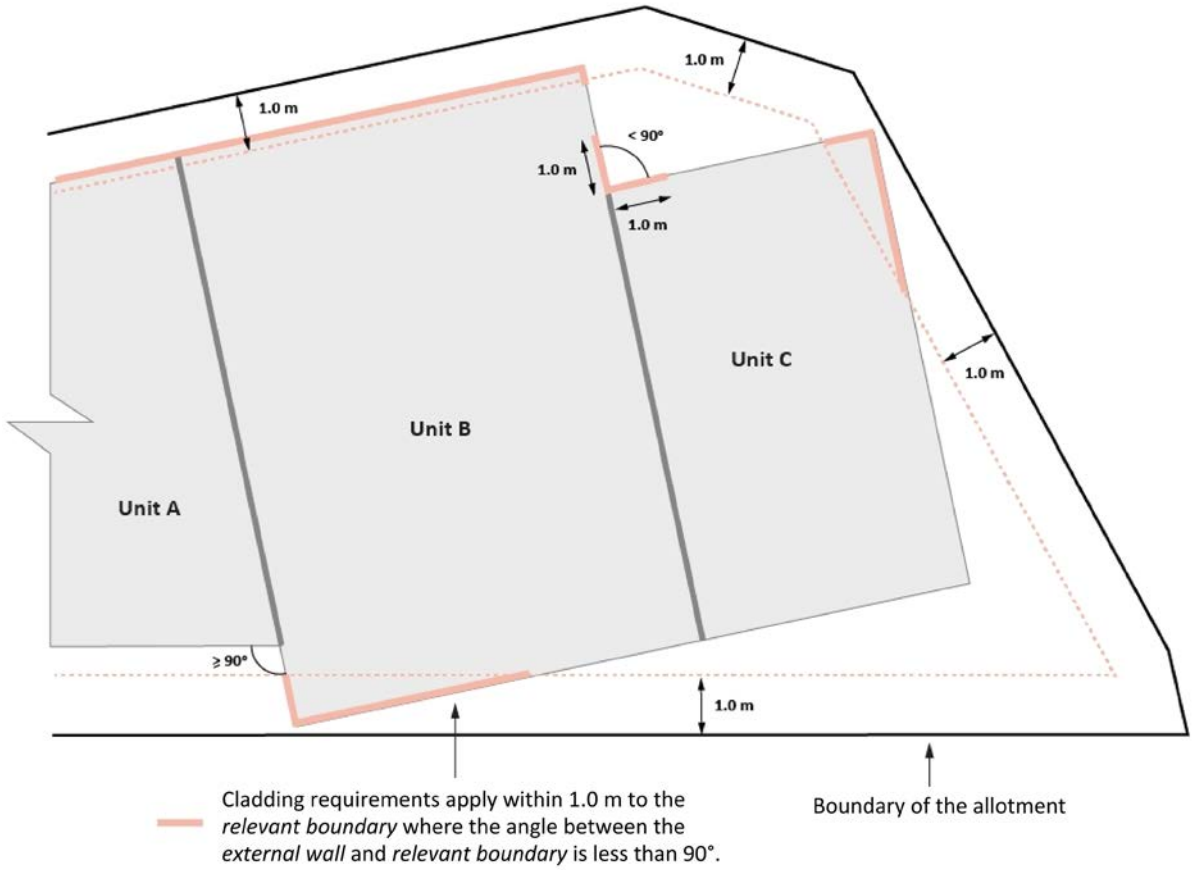
c) Be fixed in a way that avoids impairment of their *fire separation* function as a result of:

i) building movement due to subsidence, shrinkage or thermal change, or

ii) collapse or failure of their components or fixings, or of abutting materials and any *penetrations* during a *fire*.

Figure 5.5.1.2: Requirements for external wall cladding systems

Paragraph 5.5.1.2



Part 6. Firefighting

6.1 Fire service vehicular access

6.1.1 Multi-unit dwellings

6.1.1.1 If *buildings* that contain *multi-unit dwellings* with more than 2 units are located remotely from the street boundaries of a property, pavements situated on the property and necessary to be used for vehicular access to a hard-standing within:

a) 75 m of any point in any unit contained in the *building* except if there is a sprinkler system complying with NZS 4515, and

b) 20 m of any inlets to *fire* sprinkler or *building fire* hydrant systems, shall

i) Be able to withstand a laden weight of up to 25 tonnes with an axle load of 8 tonnes or have a load-bearing capacity of no less than the public roadway serving the property, whichever is the lower, and

ii) Be trafficable in all weathers, and

iii) Have a minimum width of 4.0 m, and

iv) Provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings.

COMMENT: Access to *buildings* for *fire* appliances will be generally via public streets, but provision is needed on multi-*building* sites to enable appliances to reach the required hard-standing.

Part 7. Prevention of fire occurring

7.1 Heating appliances

7.1.1 Solid fuel appliances

7.1.1.1 AS/NZS 2918, as modified by Paragraph 7.2.1.3, can be used for the installation of:

a) Domestic solid fuel burning appliances, installed in either domestic or commercial situations, and

b) *Flue systems*.

7.1.1.2 A normative Appendix is an integral part of this standard.

7.1.1.3 Modifications to AS/NZS 2918:

Delete paragraph 3.8 and substitute the following:

"3.8 Seismic restraint

The appliance and the floor protector shall be mechanically fixed to the floor itself.

The test seismic force shall be taken as the application of a horizontal force equal to 0.40 times the appliance weight acting in any direction at the mid-height of the combustion chamber. The appliance shall not move, tilt or be dislodged from its installed position during the application of the test force.

The weight of the flue system and a wetback, if fitted, shall not be included in the test."

Delete Section 7 and substitute the following:

"7.1 Ventilation

Ventilation shall be in accordance with Acceptable Solution G4/AS1.

7.2 Water heating equipment

Water heating appliances installed in conjunction with the heating appliance shall be vented and shall comply with Acceptable Solution G12/AS1."

7.1.2 Gas burning appliances

7.1.2.1 Gas-burning appliances shall be installed in accordance with clause G11 of the Building Code.

7.1.3 Oil-fired appliances

7.1.3.1 AS 1691, with the modifications given in Paragraph 7.2.3.2, can be used for the installation of domestic oil-fired appliances.

7.1.3.2 Modifications to AS 1691

Delete Paragraph 2.2.3 and substitute the following:

"2.2.3 Electrical equipment

Electrical equipment shall comply with Acceptable Solution G9/AS1 or Verification Method G9/VM1."

Delete "CSIRO durability Class 2 or better" from paragraph 3.1.2 (b) and substitute "H5 treatment".

Delete the Note to paragraph 3.1.2 (d).

Delete Paragraph 3.1.4 and substitute the following:

"3.1.4 Stability

The appliance shall be mechanically fixed to the building.

The test seismic force on the fuel tank shall be taken as the application of a horizontal force in kilograms numerically equal to 0.40 times the tank volume in litres acting at the centre of the tank.

The test seismic force on the appliance shall be taken as the application of a horizontal force equal to 0.40 times the appliance operating weight acting at the centre of the appliance.

The appliance and the fuel tank shall resist their respective seismic forces with no significant movement."

Delete the words "without specific approval" from paragraph 3.2.8 (b).

Delete Paragraph 5.1.1.

Add the following note to 5.2.2:
"Note: Refer to Acceptable Solution G4/AS1 for ventilation requirements."

7.1.3.3 AS/NZS 2918 Sections 2 and 4 can be used for the installation of *flues* for domestic oil-fired appliances.

7.2 Electrical fire safety

7.2.1 Electrical installations

7.2.1.1 Electrical installations in buildings shall comply with clause G9 of the Building Code.

7.3 Open fires

7.3.1 Chimneys

7.3.1.1 *Chimneys* shall be *constructed* in accordance with Table 7.3.1.1 and Figure 7.3.1.1. They shall have:

a) *Fireplaces* lined with *fire* bricks having a thickness of no less than 50 mm

b) *Fireplace* joints of *non-combustible* material and shall be sealed against air leakage

c) *Chimney* brickwork of no less than a single skin of brick 90 mm thick plus a 65 mm thick layer of grout, and

d) An expansion gap provided in *chimneys* containing *flue liners*. These *flue liners* shall be wrapped in a *combustible* material of thickness no less than 0.25 mm (for example heavy-quality *building* paper) to prevent the grout filling from bonding with the *flue liner*.

Table 7.3.1.1: Minimum acceptable dimensions of chimneys

Paragraph 7.3.1.1

Chimney construction	Chimney jamb and chimney back thickness (mm)		Chimney breasts and side gathering and chimney wall thickness above the level of the gather, excluding linings (mm)
	Excluding filling and flue liner	Including filling and flue liner	
Concrete	170	255	170
Brickwork	155	230	155
Pre-cast pumice concrete	85	170	85

7.3.1.2 Cross-sectional areas of *flues* shall be no less than 0.03 m^2 for an open *fireplace* (see Figure 7.3.1.2).

7.3.1.3 *Flue* linings shall be one of the following types:

a) Clay *flue liners* with rebated or socketed joints, or

b) Imperforate clay pipes with socketed joints, or

c) High alumina cement and kiln-burnt aggregate pipes, with rebated or socketed joints, or steel collars around joints.

7.3.1.4 The *flue liners* shall be fitted with the sockets or rebates uppermost to prevent condensate running out, and to prevent any caulking material from being adversely affected. Joints between the flue liners, and any space between flue liners and the masonry, shall be filled with weak mortar or insulating concrete (see Figure 7.3.1.2 (a)).

7.3.1.5 *Flue liners* are not required for:

a) Brick *chimneys* if *constructed* of two 90 mm skins of brickwork with a 65 mm grout-filled gap between (see Figure 7.3.1.2 (b)), or

b) Ordinary concrete *chimneys*, or

c) Pre-cast pumice concrete *chimneys*.

7.3.1.6 Clearance above roofs shall be in accordance with Figure 4.9 of AS/NZS 2918.

7.3.1.7 Every *fireplace* shall have a separate flue.

7.3.1.8 *Flue* joints shall be of *non-combustible* material and sealed against air leakage.

7.3.1.9 *Hearths* for *fireplaces* shall:

a) Be *constructed* of fully grouted stones, bricks or concrete of no less than 50 mm total thickness, and

b) Extend no less than 230 mm on each side of the *fireplace* opening, and no less than 380 mm forward of the *fireplace* opening, and

c) Have no *combustible* material closer than the clearances given in Paragraph 7.3.1.9 b)from the upper and lower surfaces of the hearth.

7.3.1.10 Clearances between a *chimney* and any *combustible* material (see Figure 7.3.1.10) shall be no less than:

a) 200 mm at any opening in the *flue*, or at the *fireplace* opening, and

b) 200 mm above or below the upper surface of the *hearth*, and 75 mm from the lower surface of the *hearth*.

7.3.1.11 *Hearth* edges are to be separated from *combustible* material with *insulating material* having a minimum service operating temperature of 150°C.

7.3.1.12 A ventilated space of no less than 50 mm shall be provided between the outer face of a *fireplace*, *chimney* or *flue* and any *combustible* material.

7.3.1.13 AS/NZS 2918 Sections 2 and 4 can also be used for the installation of flues from open *fires*.

Figure 7.3.1.1: Chimney terms and dimensions

Paragraph 7.3.1.1

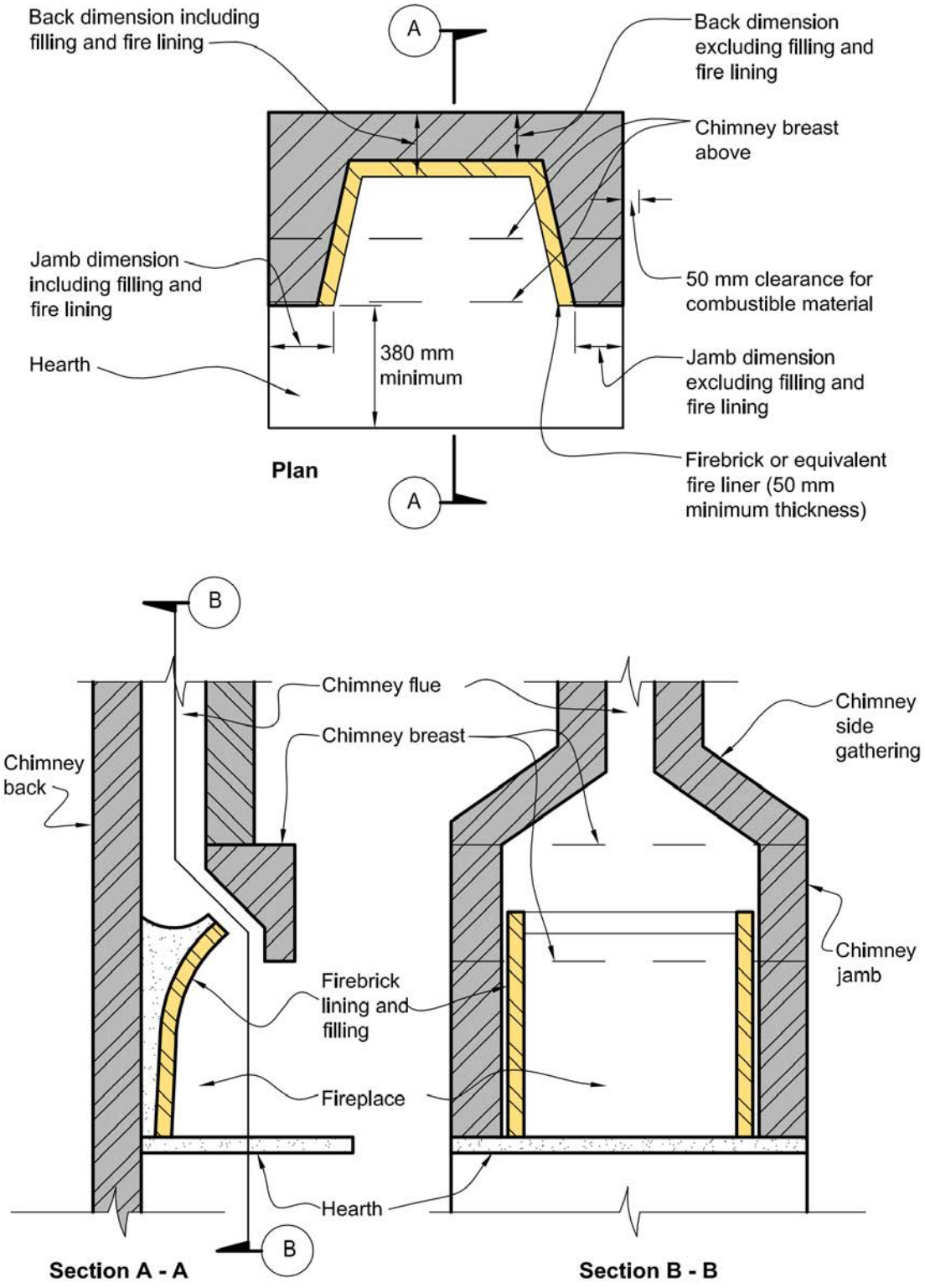


Figure 7.3.1.2: Brick chimney flues – sections

Paragraphs 7.4.1.2 and 7.3.1.5

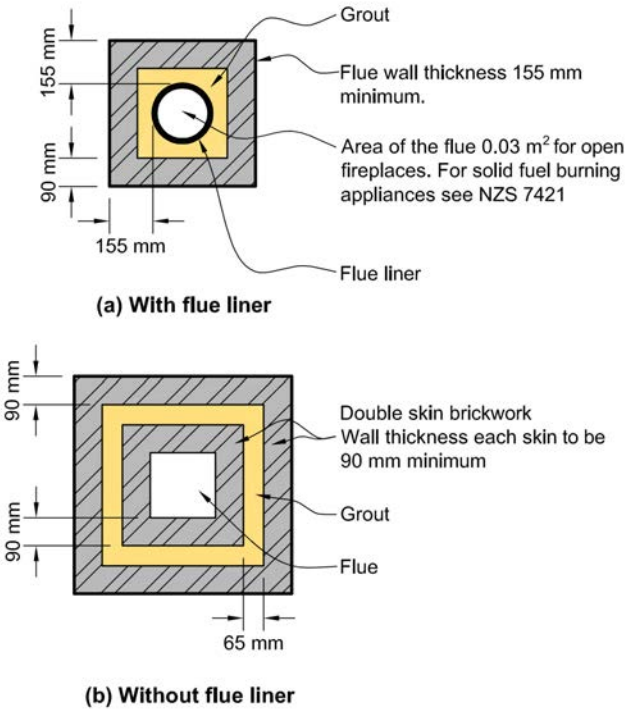
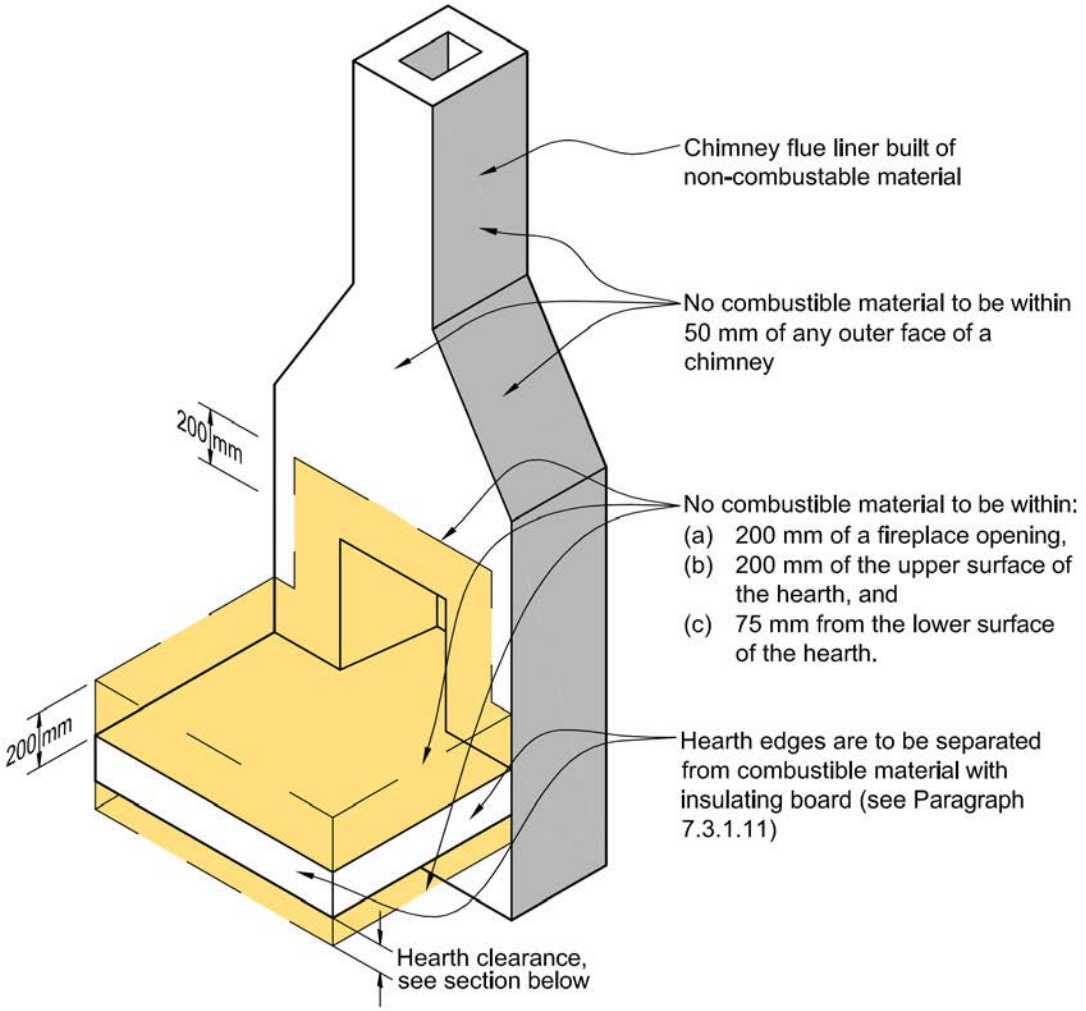
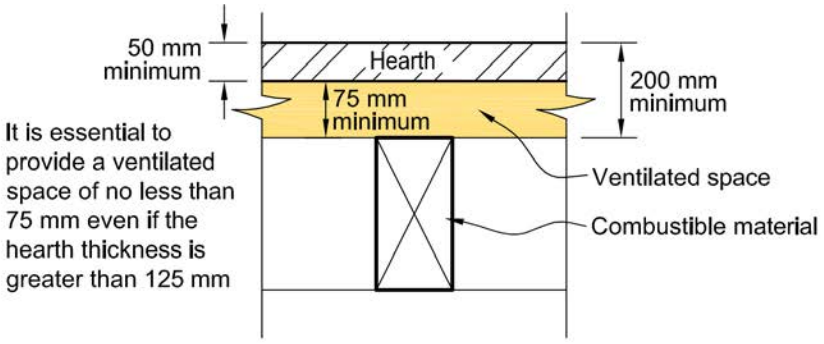


Figure 7.3.1.10: Clearances between a chimney and hearth, and combustible materials
Paragraph 7.3.1.10





Section showing minimum dimensions

Appendix A. References

For the purposes of Building Code compliance, the standards referenced in this acceptable solution must be the editions, along with their specific amendments, listed below.

Standards New Zealand		**Where quoted**
NZS/BS 476:-	Fire tests on building materials and structures	
Part 21: 1987	Method for determination of the fire resistance of loadbearing elements of construction	E.3.1.2
Part 22: 1987	Method for determination of the fire resistance of non-loadbearing elements of construction	E.3.1.2
AS/NZS 2918: 2001	Domestic solid fuel burning appliances	7.1.1.1, 7.1.1.3, 7.1.3.3, 7.3.1.6, 7.3.1.13
AS/NZS 3000: 2018	Electrical installations – Known as the Australian/ New Zealand Wiring Rules	D.1.3.2
AS/NZS 3837: 1998	Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter	E.5.1.1, E.2.1.2
NZS 4232:-	Performance criteria for fire resisting enclosures	
Part 2:1988	Fire resisting glazing systems	Definitions
NZS 4510: 2008	Fire hydrant systems for buildings *Amend: 1*	C.2.10.1
NZS 4512: 2021	Fire detection and alarm systems in buildings	C.1.1.2, C.2.2.1, C.2.3.1, C.2.4.1, C.2.4.3, C.2.5.3, C.2.5.4, C.2.8.1, D.1.1.1, D.1.3.2, D.1.3.3
NZS 4514: 2021	Interconnected smoke alarms for houses	2.2.1.2, Table 3.3.1.1, C.1.1.4, C.2.1.1
NZS 4515: 2009	Fire sprinkler systems for life safety in sleeping occupancies (up to 2000 m^2)	2.3.1.2, 2.3.3.2, 3.3.7.3, 5.2.1.4, 5.4.1.2,, 6.1.1.1, C.1.1.3, D.1.2.3, Definitions, Table 3.3.1.1, Table 5.2.1.1
NZS 4517: 2010	Fire sprinkler systems for houses	Table 3.3.1.1, C.1.1.3
NZS 4520: 2010	Fire-resistant doorsets	E.4.1.1
NZS 4541: 2020	Automatic fire sprinkler systems	2.3.1.2, 2.3.3.2, 3.3.7.3, 5.2.1.4, 5.4.1.2, C.1.1.3, D.1.2.3, Definitions, Table 3.2.1.1, Table 5.2.2.1

These standards can be accessed from www.standards.govt.nz.

Standards Australia		
AS 1366:-	Rigid cellular plastics sheets for thermal insulation	
Part 1: 1992	Rigid cellular polyurethane (RC/PUR) *Amend: 1*	4.2.2.1
Part 2: 1992	Rigid cellular polyisocyanurate (RC/PIR)	4.2.2.1

References

			Where quoted
	Part 3: 1992	Rigid cellular polystyrene – moulded (PC/PS-M) *Amend: 1*	4.2.2.1
	Part 4: 1989	Rigid cellular polystyrene – extruded (RC/PS-E)	4.2.2.1
AS 1530:-		Methods for fire tests on building materials, components and structures	
	Part 1: 1994	Combustibility test for materials	E2.3.1, Definitions
	Part 4: 2005	Fire-resistance tests of elements of building construction	4.1.2.5, E.3.1.1
AS 1668:-		The use of ventilation and/or air conditioning in buildings	
	Part 1: 2015	Fire and smoke control in multi-compartment buildings *Amend: 1*	C.2.8.1, D.1.3.1, D1.3.2
AS 1691: 1985		Domestic oil-fired appliances – installation	7.1.3.1, 7.1.3.2
AS 4072:-		Components for the protection of openings in fire-resistant separating elements	
	Part 1: 2005	Service penetrations and control joints *Amend: 1*	E.3.1.2

These standards can be accessed from www.standards.org.au.

British Standards

BS EN 13501-		Fire classification of construction products and building elements
	Part 1: 2018	Classification using test data from reaction to fire tests	E.2.3.1, Definitions

This standard can be accessed from www.standards.govt.nz.

International Standards Organisation

ISO 5660:-		Reaction-to-fire tests – Heat release, smoke production and mass loss rate
	Part 1: 2002	Heat release rate (cone calorimeter method)	E.5.1.1, E.5.1.2

This standard can be accessed from www.iso.org

New Zealand Legislation

Conservation Act 1987	Definitions
National Park Act 1970	Definitions
Reserves Act 1977	Definitions
Hazardous Substances and New Organisms Act 1996	1.1.3.1, Definitions
Health and Safety at Work (Hazardous Substances) Regulations 2017	1.1.3.1, Definitions
Local Government Act 1974	Definitions

These documents can be accessed from www.legislation.govt.nz

Appendix B. Definitions

These definitions are specific to this acceptable solution. Other defined terms found in italics within the definitions are provided in clause A2 of the Building Code.

Adjacent building	A nearby *building*, including an adjoining *building*, whether or not erected on *other property.*
Allotment	Has the meaning given to it by section 10 of the Building Act 2004.
Backcountry hut	A building that— a) is located on land that is administered by the Department of Conservation for conservation, recreational, scientific, or other related purposes, including any land administered under any of the following: i) the Conservation Act 1987; ii) the National Parks Act 1980; iii) the Reserves Act 1977; and b) is intended to provide overnight shelter to any person who may visit and who carries his or her own food, bedding, clothing, and outdoor equipment; and c) contains only basic facilities, which may include (but are not limited to) any or all of the following: i) sleeping platforms or bunks; ii) mattresses; iii) food preparation surfaces; iv) appliances for heating; v) appliances for cooking; vi) toilets; and d) has been certified by the Director-General as being in a location that wheelchair users are unlikely to be able to visit; and e) is intended to be able to sleep— i) no more than 20 people in its backcountry hut sleeping area; and ii) no more than 40 people in total; and f) does not contain any connection, except by radiocommunications, to a network utility operator.
Boundary	Any *boundary* that is shown on a survey plan that is approved by the Surveyor-General and deposited with the Registrar-General of Land, whether or not a new title has been issued.
Building	Has the meaning given to it by sections 8 and 9 of the Building Act 2004. For the purposes of this acceptable solution and notwithstanding the definition of *building*, a number of separated *buildings* cannot be taken as a single *firecell*.
Building element	Any structural and non-structural component or assembly incorporated into or associated with a *building*. Included are *fixtures*, services, *drains*, permanent mechanical installations for access, glazing, partitions, ceilings and temporary supports.
Building height	The vertical distance between the floor level of the lowest *occupied space* above the ground and the top of the highest occupied floor, but not including spaces located within or on the roof that enclose stairways, lift shafts, or machinery rooms.

Definitions

Cavity barrier	A *construction* provided to close openings within a *concealed space* against the passage of *fire*, or to restrict the spread of *fire* within such spaces.
Chimney	A *non-combustible* structure which encloses one or more *flues*, *fireplaces* or other heating appliances.
Chimney back	The *non-combustible* wall forming the back of a *fireplace.*
Chimney breast	The front *fireplace* wall *construction* above the *fireplace* opening.
Chimney jambs	The side walls of a *fireplace.*
Combustible	See *non-combustible*.
Concealed space	Any part of the space within a *building*, excluding *protected shafts*, that cannot be seen from an *occupied space*.
Construct	In relation to a *building*, includes to design, build, erect, prefabricate, and relocate the *building*; and construction has a corresponding meaning.
Dead end	That part of an *open path* where escape is possible in only one direction.
Doorset	A complete assembly comprising a door leaf or leaves including any glazed or solid panels adjacent to or over the leaves within the door frame including hardware or other inbuilt features; and a door frame, if any, with its fixings to the wall and, for a sliding or tilting door, all guides and their respective fixings to the lintel, wall or sill.
Escape height	The height between the floor level in the *firecell* being considered and the floor level of the required *final exit* which is the greatest vertical distance above or below that *firecell*. Where the *firecell* contains *intermediate floors*, or upper floors within *household units* the escape height shall be measured from the floor having the greatest vertical separation from the *final exit*.
Escape route	A continuous unobstructed route from any *occupied space* in a *building* to a *final exit* to enable occupants to reach a *safe place*, and shall comprise one or more of the following: *open paths,* and *safe paths*. Note that doors in an escape route are not considered to be obstructions provided they comply with this Acceptable Solution and D1/AS1.
Exitway	All parts of an *escape route* protected by *fire* or *smoke separations*, or by distance when exposed to open air, and terminating at a *final exit*.
External wall	Any exterior face of a *building* (including a roof) within 30° of vertical, consisting of *primary* and/or *secondary elements* intended to provide protection against the outdoor environment, but which may also contain *unprotected areas*.
Final exit	The point at which an *escape route* terminates by giving direct access to a *safe place*.
Finished ground level (FGL)	The level of the ground against any part of a *building* after all backfilling and/or landscaping and/or surface paving has been completed.
Fire	The state of combustion during which flammable materials burn producing heat, toxic gases, or smoke or flame or any combination of these.
Firecell	Any space including a group of contiguous spaces on the same or different levels within a *building*, which is enclosed by any combination of *fire separations*, *external walls*, roofs, and floors. Floors, in this context, include ground floors and

	those in which the underside is exposed to the external environment (eg when cantilevered). Note that internal floors between *firecells* are *fire separations*.
Fire door	A doorset, single or multi-leaf, having a specific *fire resistance rating*, and in certain situations a smoke control capability, and forming part of a *fire separation*. The door, in the event of *fire*, if not already closed, will close automatically and be self-latching.
Fire hazard	The danger of potential harm and degree of exposure arising from – a) the start and spread of *fire*; and b) the smoke and gases that are generated by the start and spread of *fire*.
Fireplace	A space formed by the *chimney back*, the *chimney jambs*, and the *chimney breast* in which fuel is burned for the purpose of heating the room into which it opens.
Fire resisting glazing	Fixed or openable glazing, completed with frame and fixings, mullions, transoms and glazing beads, with a specified *FRR* and complying with NZS 4232.2.
Fire resistance rating (FRR)	The term used to describe the minimum *fire* resistance required of *primary* and *secondary elements* as determined in the *standard test* for *fire* resistance, or in accordance with a specific calculation method verified by experimental data from standard *fire* resistance tests. It comprises three numbers giving the time in minutes for which each of the criteria *structural adequacy*, *integrity* and *insulation* are satisfied, and is presented always in that order. There are two types of *FRR: life rating* and *property rating*.
Fire retardant	A substance or a treatment, incorporated in or applied to a material, which suppresses or delays the combustion of that material under specified conditions.
Fire safety systems	The combination of all active and passive protection methods used in a *building* to— a) warn people of an emergency; and b) provide for safe evacuation; and c) provide for access by, and the safety of, firefighters; and d) restrict the spread of *fire*; and e) limit the impact of *fire* on *structural stability*.
Fire separation	Any *building element* which separates *firecells* or *firecells* and *safe paths*, and provides a specific *fire resistance rating*.
Fire stop	A material or method of *construction* used to restrict the spread of *fire* within or through *fire separations*, and having a *FRR* no less than that of the *fire separation*. *Fire stops* are mainly used to seal around *penetrations*, but can also be used to seal narrow gaps between *building elements*.
Flammability index (FI)	That index number for flammability, which is determined according to the *standard test* method for flammability of thin flexible materials.
Flue	The passage through which the products of combustion are conveyed to the outside.
Flue liner	Pipes or linings of *fire* clay, metal or *fire* brick that surrounds *flues*.

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Flue system	A series of interconnecting *flue* pipe casings which form a safe passage (*flue*) for conveying products of combustion from within an appliance to the outside of a *building* or structure.
Foamed plastics	*Combustible* foamed plastic polymeric materials of low density (typically less than 100 kg/m^3) and classified as cellular polymers which are manufactured by creating a multitude of fine void (typically 90 to 98%) distributed more or less uniformly throughout the product. Examples of *foamed plastics* are latex foams, polyethylene foams, polyvinyl chloride foams, expanded or extruded polystyrene foams, phenolic foams, ureaformaldehyde foams, polyurethane foams and polychloropene foams.
Group Number	The classification number for a material used as a finish, surface, lining, or attachment to a wall or ceiling within an *occupied space* and determined according to the *standard test* methods for measuring the properties of lining materials. The method for determining a Group Number is described in C/VM2 Appendix A.
Hazardous	Creating an unreasonable risk to people of bodily injury or deterioration of health.
Hazardous substance	has the meaning ascribed to it by section 2 of the Hazardous Substances and New Organisms Act 1996.
Hearth	The insulating floor under the *fire* and in front and at the sides of the *fireplace.*
Household unit	a) means a *building* or group of *buildings*, or part of a *building* or group of *buildings*, that is— i) used, or intended to be used, only or mainly for residential purposes; and ii) occupied, or intended to be occupied, exclusively as the home or residence of not more than 1 household; but b) does not include a hostel, boarding house, or other specialised accommodation.
HVAC	An abbreviation for heating, ventilating and air-conditioning.
Insulating material	A material that has a thermal conductivity of less than 0.07 W/mK.
Insulation	In the context of *fire* protection, the time in minutes for which a prototype specimen of a *fire separation*, when subjected to the *standard test* for *fire* resistance, has limited the transmission of heat through the specimen.
Integrity	In the context of *fire* protection, the time in minutes for which a prototype specimen of a *fire separation*, when subjected to the *standard test* for *fire* resistance, has prevented the passage of flame or hot gases. The precise meaning of *integrity* depends on the type of *building elements* being treated and how it is defined in the *standard test* being used.
Intended use	In relation to a *building* – a) includes any or all of the following: i) any reasonably foreseeable occasional use that is not incompatible with the intended use; ii) normal maintenance; ii) activities undertaken in response to *fire* or any other reasonably foreseeable emergency; but

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	b) does not include any other maintenance and repairs or rebuilding.
Intermediate floor	Any upper floor within a *firecell* which because of its configuration provides an opening allowing smoke or *fire* to spread from a lower to an upper level within the *firecell*.
Life Rating	The *fire resistance rating* to be applied to elements of *construction* that allows movement of people from their location in a *building* to a *safe place*.
Limited combustible	A material that does not comply with the requirements for a *non-combustible* material and is classified as A2 in accordance with BS EN 13501-1.
Means of escape from fire	In relation to a *building* that has a floor area— a) means continuous unobstructed routes of travel from any part of the floor area of that *building* to a *place of safety*; and b) includes all active and passive protection features required to warn people of *fire* and to assist in protecting people from the effects of *fire* in the course of their escape from the *fire*.
Multi-unit dwelling	Applies to a *building* or use which contains more than one separate household or family.
Non-combustible	Material either — a) composed entirely of glass, concrete, steel, brick/block, ceramic tile, or aluminium; or b) classified as non-combustible when tested to AS 1530.1; or c) classified as A1 in accordance with BS EN 13501-1.
Notional boundary	The *boundary* which for *fire* safety purposes, is assumed to exist between two *buildings* on the same property under a single land title. The *notional boundary* is not permitted to be located any closer than 1.0 metre to any unprotected areas within the external wall of the *buildings* that is receiving the radiation where orientated at less than 90°.
Occupant load	The greatest number of people likely to occupy a particular space within a *building*. It is determined by: a) dividing the total floor area by the m2 per person (occupant density) for the activity being undertaken, or b) for sleeping areas, counting the number of sleeping (or care) spaces, or c) for fixed seating areas, counting the number of seats.
Occupied space	Any space within a *building* in which a person will be present from time to time during the *intended use* of the *building*.
Open path	That part of an *escape route* (including *dead ends*) within a *firecell* where occupants may be exposed to *fire* or smoke while making their escape.
Open space	Land on which there are, and will be, no *buildings* and which has no roof over any part of it other than overhanging eaves.
Other property	Any land or *buildings* or part of any land or *buildings*, that are: a) not held under the same *allotment*; or b) not held under the same *ownership*; and c) includes a road

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Owner	In relation to land and any *buildings* on the land— a) means the person who— i) is entitled to the rack rent from the land; or would be so entitled if the land were let to a tenant at a rack rent; and b) includes— i) the *owner* of the fee simple of the land; and ii) for the purposes of Building Act sections 32, 44, 92, 96, 97, and 176(c), any person who has agreed in writing, whether conditionally or unconditionally, to purchase the land or any leasehold estate or interest in the land, or to take a lease of the land, and who is bound by the agreement because the agreement is still in force.
Penetration	A *building element* passing through an opening in a *fire separation*. A *penetration* may include, but is not limited to: pipes, cables, ducts, hoses, drains, cable trays, ropes, data outlets, power outlets, hatches, glazing, structural bracing etc.
Place of safety	Either— a) a safe place; or b) a place that is inside a building and meet the following requirements: i) the place is constructed with fire separations that have fire resistance sufficient to withstand burnout at the point of the fire source; and ii) the place is in a building that is protected by an automatic fire sprinkler system that complies with NZS 4541 or NZS 4515 as appropriate to the building's use; and iii) the place is designed to accommodate the intended number of persons; and iv) the place is provided with sufficient means of escape to enable the intended number of persons to escape to a safe place that is outside a building.
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.
Property rating	The *fire resistance rating* to be applied to elements of *construction* that allows for protection of *other property*.
Protected shaft	A space, other than a *safe path*, enclosed by *fire separations* or *external walls* used to house *building* services, lifts, or conveyors which pass from one *firecell* to another.
Relevant boundary	The boundary of an *allotment* that is *other property* in relation to the *building* in question and from which is measured the separation between the *building* and that *other property*; and for the *external wall* of any *building*, the *relevant boundary* is the nearest of— a) a *boundary* of a freehold *allotment*, except that if the other property is a *road*, railway line, or public *open space*, the *relevant boundary* is the *boundary* on the far side of that *other property*; or b) a *boundary* of a cross-lease or a company lease or a licence, except that if the *other property* is *open space* to which the lessee or licencee of the *building* in question has an exclusive right of access and occupation or to which 2 or more

	occupiers of the *building* in question have rights of access and occupation, the *relevant boundary* is the *boundary* on the far side of that *other property*; or c) a *boundary* shown on a unit plan (but excluding a *boundary* between a principal unit and its accessory unit), except that if the *other property* is *open space* and is common property, the *relevant boundary* is the *boundary* on the far side of that *other property*. Refer also to *notional boundary* for *buildings* on the same property under a single land title.
Risk group	The classification of a *building* or *firecells* within a *building* according to the use to which it is intended to be put.
Road	Has the meaning ascribed to it by section 315 of the Local Government Act 1974 and includes a public place and also includes a motorway.
Safe path	That part of an *exitway* which is protected from the effects of *fire* by *fire separations*, *external walls*, or by distance when exposed to open air.
Safe place	A place, outside of and in the vicinity of a single *building* unit, from which people may safely disperse after escaping the effects of a fire. It may be a place such as a street, *open space*, public space or an *adjacent building* unit.
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.
Stability	In the context of *fire* protection is the support provided to a *building element* having a *FRR*, intended to avoid premature failure due to structural collapse as a result of applied load, dead and live loads or as a result of any additional loads caused by *fire*.
Standard test	A test method which is recognised as being appropriate for the *fire* protection properties being assessed. Refer Appendix C for a list of *standard test* methods.
Structural adequacy	In the context of the *standard test* for *fire* resistance, is the time in minutes for which a prototype specimen has continued to carry its test load. The standard test specifies deflection limits and how vertical test loads are determined. B1/VM1 shall be substituted where standard tests require recognised structural standards to be used.
Surface finish	The combination of a surface coating and substrate material on surfaces of *building elements* exposed to view. It can be an applied decorative coating or the uncoated *building element* itself. For interior surfaces the requirements are evaluated in terms of a *Group Number*.
Travel distance	The length of the *escape route* as a whole or the individual lengths of its parts, namely: a) *open paths*, and b) *safe paths*.
Unprotected area	In relation to an *external wall* of a *building*, means: a) Any part of the *external wall* which is not *fire* rated or has less than the required *FRR*, and b) Any part of the *external wall* which has *combustible* material more than 1.0 mm thick attached or applied to its external face, whether for cladding or any other purpose.

	Unprotected areas include non-*fire* rated windows, doors, or other openings, and non-*fire* rated *external wall construction*.

Appendix C. Fire safety systems

C.1 Fire alarm and sprinkler systems

C.1.1 Installation

C.1.1.1 Part 2 specifies which type of *fire safety system* shall be installed in each *risk group*.

C.1.1.2 *Fire* alarm systems shall be designed and installed in accordance with NZS 4512 where appropriate and the specific requirements of this acceptable solution.

C.1.1.3 Sprinkler systems shall be designed and installed in accordance with NZS 4541, or NZS 4515, or NZS 4517 where appropriate and the specific requirements of this acceptable solution.

C.1.1.4 Smoke alarms shall be manufactured and installed in accordance with NZS 4514 where appropriate and the specific requirements of this acceptable solution.

C.2 Fire safety system descriptions

C.2.1 Type 1 – Domestic smoke alarm system

C.2.1.1 A Type 1 is a smoke alarm or multiple interconnected smoke alarm devices containing a smoke detector and an alarm sounding feature. The system shall comply with NZS 4514. Connection to a remote receiving centre is not required.

C.2.2 Type 2 – Manual fire alarm system

C.2.2.1 A Type 2 is a *fire* alarm system compliant with NZS 4512 with manual call points throughout the building. Supplementary heat, smoke, or other detectors may be included in the system.

C.2.3 Type 3 – Automatic fire alarm system activated by heat detectors and manual call points

C.2.3.1 A Type 3 is an automatic *fire* alarm system compliant with NZS 4512 with full *building* coverage of heat detectors and manual call points.

C.2.3.2 If the *building* area to be protected is not fully covered with heat detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary detectors.

C.2.4 Type 4 – Automatic fire alarm system activated by smoke detectors and manual call points

C.2.4.1 A Type 4 is an automatic *fire* alarm system compliant with NZS 4512 with full *building* coverage of smoke detectors and manual call points.

C.2.4.2 If the *building* area to be protected is not fully covered with smoke detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary smoke detectors.

C.2.4.3 In limited circumstances as described in NZS 4512, where the ambient conditions of a space are not suitable for smoke detectors, heat detectors are allowed to be substituted.

C.2.5 Type 5 – Automatic fire alarm system with modified smoke detection and manual call points

C.2.5.1 A Type 5 is a variation of the Type 4 and Type 7 alarm systems requiring part of the smoke detection component to comprise only a local alarm. The local alarm system, activated by the presence of smoke, shall have audible alerting devices to warn only the occupants within the household unit or suite, and the *building* management (such as in motels, hotels or multi-unit accommodation in retirement villages), where such management exists.

C.2.5.2 The local alarm component of a Type 5 system:

a) Shall be restricted to single *firecells* containing sleeping accommodation, being *household units* or individual suites in ***risk group* SH** and **SM**. The local alarm system shall not be extended to other areas such as *exitways* or common spaces. These shall retain a Type 4 smoke detection system, and
b) Shall have the facility to be silenced (muted) by a 'hush' facility located at a level readily able to be reached in accordance with clause D1 of the Building Code.
c) Shall be permitted only where an automatic *fire* alarm system activated by heat detectors (part of the main alarm system) is also installed in sleeping *firecells* which do not already have an automatic *fire* sprinkler system.

C.2.5.3 Where a Type 5 is required, in *exitways* and common spaces the required Type 4 or Type 7 system shall not be modified. The system installation for Type 3 and Type 4 components shall comply with NZS 4512. The system installation for Type 7 shall comply with NZS 4541.

C.2.5.4 The Type 5 system installation for the local smoke alarm component shall also comply with NZS 4512.

C.2.6 Type 6 – Automatic fire sprinkler system with manual call points

C.2.6.1 A Type 6 system is a combined automatic *fire* sprinkler system and Type 2 alarm. Activation of the sprinklers shall automatically activate the audible alerting devices of the *fire* alarm system. Sprinkler installation shall comply with NZS 4541, as appropriate and as modified by Appendix D.

C.2.7 Type 7 – Automatic fire sprinkler system with smoke detectors and manual call points

C.2.7.1 A Type 7 system is a combined Type 6 and Type 4 or Type 5 alarm system. Sprinkler installation shall comply with the requirements of a Type 6 system.

C.2.8 Type 9 – Smoke control in air-handling systems

C.2.8.1 Where smoke control is required in relation to heating, ventilating or air conditioning systems, it shall comply with the requirements of either:

a) AS 1668.1 for HVAC system shutdown and interface with any Type 4 or 7 system, or
b) NZS 4512 to provide ancillary function output for HVAC system shutdown if a Type 4 or 7 alarm system is used as a means of smoke detection.

C.2.9 Type 15 – Fire and Emergency New Zealand Lift Control

C.2.9.1 The control of lifts under *fire* conditions shall comply with NZS 4332.

C.2.10 Type 18 – Fire hydrant systems for buildings

C.2.10.1 *Fire* hydrant systems shall comply with NZS 4510.

Appendix D. Modifications to fire safety system standards

D.1 Fire safety systems

D.1.1 Fire detection and alarm systems in buildings

D.1.1.1 Wherever *fire* alarms are required by this acceptable solution, they shall comply with NZS 4512.

D.1.2 Automatic fire sprinkler systems

D.1.2.1 Wherever sprinklers are required by this acceptable solution, they shall comply with the relevant New Zealand Standard as modified by Paragraphs D1.2.2 and D1.2.3.

D.1.2.2 **NZS 4541** is modified as follows:

Clause 1.3 Definitions

Sprinkler system A system including:
(a) to (i) No change.
(j) Delete.
(k) No change.

Clause 2.5 Delete entire clause

Clause 2.6 Delete entire clause

Clause 12.3 Routine inspections

Clause 12.3

Delete first two paragraphs and replace with:

"It is important that a sprinkler system at all times complies with this Standard as amended by Paragraph B2.1 of Appendix B to C/AS2 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person."

D.1.2.3 **NZS 4515** is modified as follows:

Clause 1.5 Definitions
Sprinkler system A system including:
(a) to (g) No change.
(h) Delete.

Clause 1.11 Delete entire clause.

Clause 2.1.2 Delete.

Clause 2.1.3 Delete.

D.1.3 Smoke control in air-handling systems

D.1.3.1 Where AS 1668.1 is used as a means to comply with C2.8.1. a), AS 1668.1 is modified as follows:

Clause 7.2.1(b) Delete clause

Clause 7.2.3 Delete clause

D.1.3.2 AS 1670.1 as referenced in AS 1668.1 is modified as follows:
Clause 7.1 Delete first sentence.
Delete last sentence and replace with:

"Detection and control shall also be in accordance with NZS 4512 except where varied by this clause."

Clause 7.4.1 Replace "this Standard" with "NZS 4512"
Clause 7.5.1 (c) Delete and replace with:

"Detectors shall be spaced in accordance with the requirements of NZS 4512"

Clause 7.5.1 (d) Delete and replace with:

"Optical beam smoke detectors shall be spaced in accordance with the requirements of NZS 4512"

Clause 7.5.1 Note Delete

Clause 7.5.2.1 Replace "this Standard" with "NZS 4512".

Clause 7.2.5.1(i) Delete the first sentence and replace with:

"Rooms that have a dimension of 10 m or more in any direction on the horizontal plane shall have detection provided in the room in accordance with NZS 4512".

Figure 7.5.2.2(B) Replace "15 m" with "10 m"

Clause 7.15.1 Location Delete and replace with

"The FFCP shall be incorporated into or located adjacent to the main indicating unit and constructed in accordance with the requirements in NZS 4512. Note An example is shown in Figure 7.15.1"

Clause 7.17.2 (iii) Replace "AS/CA S009" with "AS/NZS 3000"

Clause 7.18 Transmission paths Delete first paragraph and replace with:

"Transmission paths to equipment serving more than one smoke control zone shall have a redundant transmission path. Transmission paths to the following equipment forming part of the smoke control system shall meet the requirements of Clause 2.6, Clause 3.13, Clause 3.25, Clause 3.26 and NZS 4512."

Clause 7.19.1 Replace "Clause 1.7.2" with "NZS 4512".

D.1.3.3 In addition to meeting the requirements in AS 1670.1 as modified to comply with the requirements for smoke detectors which are part of the smoke control in air-handling systems, further requirements in NZS 4512 will need to be met where a *fire* alarm system is required to be installed.

Appendix E. Fire test methods

E.1 Test methods

E.1.1 General

E.1.1.1 This appendix contains test methods for confirming that specific *building elements* satisfy relevant provisions of the acceptable solutions for Protection from Fire. It includes both established *standard tests* and other test methods for *building elements* in situations where *standard tests* are unavailable.

E.1.1.2 If these specific *building elements* have been tested to a version of a standard in force at the date of testing and a later version of that Standard has been incorporated by reference in this acceptable solution, retesting is not required.

E.2 Properties of materials

E.2.1 Flammability of floor coverings

E.2.1.1 This section is left empty.

E.2.2 Flammability of suspended flexible fabrics and membrane structures

E.2.2.1 This section is left empty.

E.2.3 Combustibility test

E.2.3.1 Materials shall be classified as:

a) *non-combustible* or *combustible* when tested to AS 1530 Methods for fire tests on building materials and structures - Part 1: Combustibility test for materials; or

b) *non-combustible* when classified as A1 in accordance with BS EN 13501-1 Fire classification of construction products and building elements - Part 1: 2018 Classification using test data from reaction to fire tests; or

c) *limited combustible* when classified as A2 in accordance with BS EN 13501-1 Fire classification of construction products and building elements - Part 1: 2018 Classification using test data from reaction to fire tests.

E.3 Fire resistance

E.3.1 Fire resistance ratings

E.3.1.1 *Primary* and *secondary elements*, closures and *fire stops* shall be assigned a *fire resistance rating (FRR)* when tested to:

a) AS 1530 Methods for fire tests on building materials and structures – Part 4: Fire resistance tests of elements of building construction, or

b) NZS/BS 476 Fire tests on building materials and structures – Parts 21 and 22.

E.3.1.2 *Fire stops* shall be tested:

a) 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, and

b) In accordance with AS 4072: Components for the protection of openings in fire-resistant separating elements – Part 1: Service penetrations and control joints.

E.4 Fire doors and smoke control doors

E.4.1 Fire doors

E.4.1.1 *Fire doors* shall be evaluated in circumstances representative of their use in service, and shall comply with NZS 4520 Fire-resistant doorsets.

E.4.2 Smoke control doors

E.4.2.1 A door shall be deemed to be a smoke control door if, in addition to the requirements in this acceptable solution for smoke control doors:

a) The door is a *fire* door that is fitted with appropriate smoke seals; or

b) It is *constructed* with solid core leaves. Solid timber core leaves, when used, shall have a leaf thickness of no less than 35 mm; and

c) It is provided with smoke seals as required by this acceptable solution. Smoke seals shall be in continuous contact with the mating element, and located so as to minimise interruption by hardware; and

d) The frames are constructed of timber, and the jambs are no less than 30 mm thick; and

e) Any vision panel cut-outs are no less than 150 mm from the leaf edges; and

f) The maximum average clearances (excluding pre-easing) are

   i) Leaf to frame 3 mm, and

   ii) Leaf to leaf 5 mm, and

   iii) Leaf to top of any floor covering 10 mm; and

g) Any additional facings are adhesive fixed; and

h) It is provided with signage identifying it as a smoke control door in accordance with Acceptable Solution F8/AS1.

E.4.3 Frictional forces

E.4.3.1 The forces required to open any *fire* door on an *escape route* shall not exceed 67 N to release the latch, 133 N to set the door in motion, and 67 N to open the door to the minimum required width. These forces shall be applied at the latch stile. This requirement does not apply to power-operated doors.

E.4.4 Self-closing provision

E.4.4.1 All *fire* door leaves shall be self-closing, and provision shall be made for the self-closing device to be adjustable during commissioning to satisfy the requirements of Paragraph E.4.3.1 after installation.

E.4.4.2 Where it is desirable in normal circumstances for a fire door to operate freely, it is acceptable to use a self-closer mechanism which activates in the event of fire but does not operate at other times.

E.5 Fire properties of external wall cladding systems

E.5.1 Cladding materials

E.5.1.1 Cladding materials shall be classified using the values in Table E.5.1.1 when tested in accordance with:

a) ISO 5660 Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method), or

b) AS/NZS 3837 Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter.

E.5.1.2 In addition to meeting the general requirements of ISO 5660 Part 1 and AS/NZS 3837, testing shall be in accordance with the following specific requirements:

a) An applied external heat flux of 50 kW/m^2, and

b) A test duration of 15 minutes, and
c) The total heat release measured from start of the test, and
d) Sample orientation horizontal, and
e) Ignition initiated by the external spark igniter.

E.5.1.3 Timber claddings which have a *fire retardant* treatment incorporated in or applied to them shall be subjected to the regime of accelerated weathering described in ASTM D 2898 Method B with the water flow rate from Method A before testing in accordance with the requirements of Paragraph E.2.1.1.

E.5.1.4 Claddings incorporating a metal facing with a melting point of less than 750°C covering a *combustible* core or insulant shall be tested as described in Paragraph E.5.1.2 without the metal facing present. Aluminium has a melting point of less than 750°C.

Table E.5.1.1: Classification of materials in external wall cladding systems

Cladding material type	Peak heat release rate (kW/m^2)	Total heat released (MJ/m^2)
Type A	≤ 100	≤ 25
Type B	≤ 150	≤ 50

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Preface

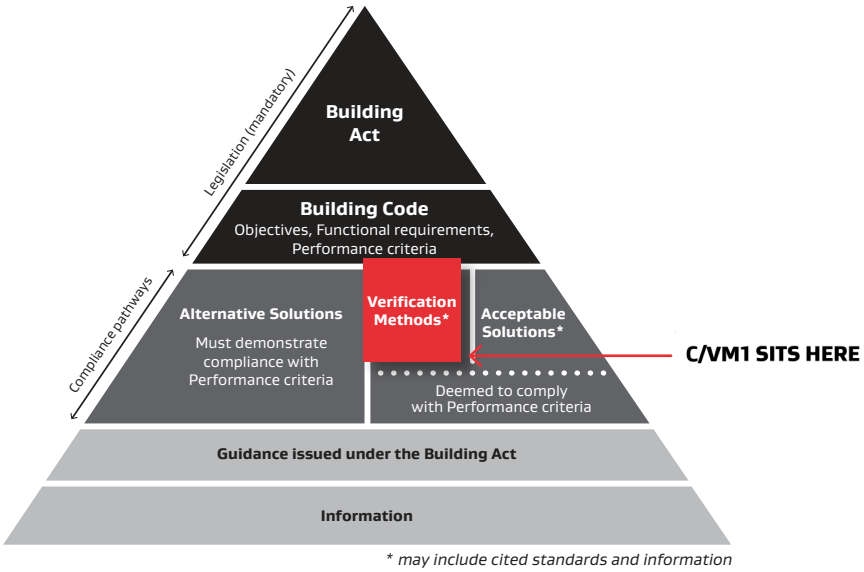
Document status

This document (C/VM1) is a verification method issued under section 22 (1) of the Building Act 2004 and is effective on X XXXXXXXX XXXX. It does not apply to building consent applications submitted before X XXXXXXXX XXXX. The previous Verification Method C/VM1 First Edition, as amended, can be used to show compliance until X XXXXXXXX XXXX and can be used for building consent applications submitted before X XXXXXXXX XXXX.

Building Code regulatory system

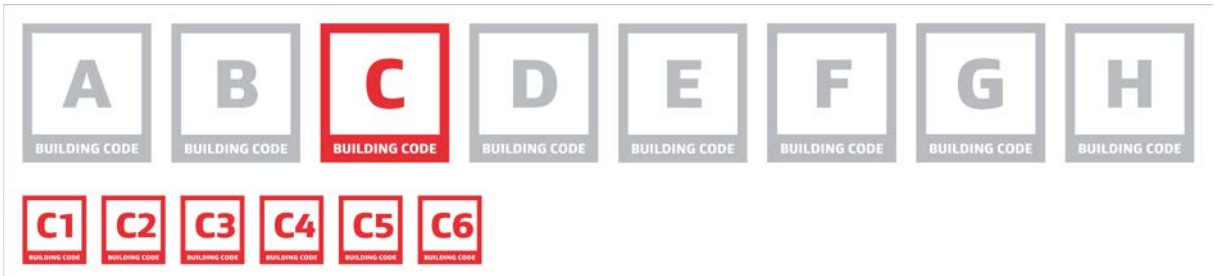
Each verification method outlines the provisions of the Building Code that it relates to. Complying with an acceptable solution or verification method are ways of complying with that part of the Building Code. Other options for establishing compliance are listed in section 19 of the Building Act.

Schematic of the Building Code System



A building design must take into account all parts of the Building Code. The Building Code is located in Schedule 1 of the Building Regulations 1992 and available online at www.legislation.govt.nz.

The part of the Building Code that this verification method relates to is clause C Protection from Fire and specifically C2 Prevention of Fire Occurring. Further information on the scope of this document is provided Part 1. General.



Further information about the Building Code, the objectives, functional requirements and performance criteria provisions that it contains, and other acceptable solutions and verification methods are available at www.building.govt.nz.

Main changes in this version and features of this document

Main changes in this version

This is the fifth edition of C/VM1. The main changes from the previous version are:

› The document has been published in a standalone format and the layout has been revised to improve clarity.

› Additional information on the document and its scope provided in Part 1. General.

People using this document should check for amendments on a regular basis. The Ministry of Business, Innovation and Employment may amend any part of any verification method or acceptable solution at any time. Up-to-date versions of verification methods and acceptable solutions are available from www.building.govt.nz

Features of this document

› For the purposes of Building Code compliance, the standard referenced in this verification method must be the edition listed in Appendix A.

› There are no words in *italic* defined at the end of this document in Appendix B.

› Hyperlinks are provided to cross-references within this document and to external websites and appear with a blue underline.

› Appendices to this verification method are part of, and have equal status to, the acceptable solution.

Contents

Part 1. General

1.1 Introduction

1.1.1 Scope of this document

1.1.1.1 This verification method is a means of demonstrating that a solid fuel burning appliance complies with clauses C2.2 and C2.3 of the Building Code for the prevention of fire.

1.1.2 Compliance pathway

1.1.1.2 This verification method is one option that provides a means of establishing compliance with the performance criteria in Building Code clauses C2.2 and C2.3. Compliance may also be demonstrated using an alternative solution.

Part 2. Solid fuel appliances

2.1 Limiting heat transfer

2.1.1 Test requirements

2.1.1.1 Compliance with Building Code Performances C2.2 and C2.3 may be verified for solid fuel burning appliances by meeting the appropriate test requirements of AS/NZS 2918.

Appendix A. References

For the purposes of Building Code compliance, the standard referenced in this verification method must be the edition listed below.

Standards New Zealand		**Where quoted**
AS/NZS 2918: 2001	Domestic solid fuel burning appliances	2.1.1.1

Appendix B. Definitions

There are no definitions specific to this verification method.

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New Zealand Government

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

As part of Proposal 2, here are proposed changes to the acceptable solutions and verification methods for Acceptable Solution C/AS2, Verification Method C/VM2 and Acceptable Solution F7/AS1. Changes proposed to Acceptable Solution C/AS1 and Verification Method C/VM1 can be found in Appendix A.

The proposed changes are listed by topic within the consultation. Additional tables show the proposed text in the documents to be changed. The new or amended text is shown in blue. The new proposed text for F7/AS1 is presented in full.

Fire safety system standards

- Amendments to Verification Method C/VM2
  - Cite NZS 4512: 2021 Fire detection and alarm systems in buildings
  - Cite NZS 4541: 2020 Automatic fire sprinkler systems
- Amendments to Acceptable Solution C/AS2
  - Cite the new AS 1668.1: 2015 The use of ventilation and air conditioning in buildings – Fire and smoke control in buildings Amendment 1
  - Cite AS/NZS 3000: 2018 Electrical installations – Known as the Australian/New Zealand Wiring Rules
  - Cite NZS 4512: 2021 Fire detection and alarm systems in buildings
  - Cite NZS 4514: 2021 Interconnected smoke alarms for houses
  - Cite NZS 4541: 2020 Automatic fire sprinkler systems
  - Amend Paragraphs 3.10.4 and 3.10.5 to replace the citation of AS/NZS 1688.1 with AS 1668.1.
  - Modify the citations of NZS 4541 and AS 1668.1 in C/AS2 Appendix B.

Domestic smoke alarms

- Amend C/AS2 Paragraph 2.2.1, Table 2.2, Table 2.2a, Appendix A Paragraph A2.1.1 and cite NZS 4514 as a Type 1 system.
- Remove Paragraph 3.0 Domestic smoke alarms from F7/AS1.

Removing requirements for a landline phone

- Amendments to Acceptable Solution C/AS2
  - Provide a new definition for a remote receiving centre
  - Amend Paragraph 2.2.1 and provide a new Paragraph 2.2.2 for when a remote receiving centre is not required.
  - Remove note 1 from Table 2.2a, note 3 from Table 2.2b, and note 3 from Table 2.2c which refer to the requirements for a landline phone. Refer to the proposed table notes in the new proposed Table 2.2.

Removing restrictions for sprinklers to replace smoke detectors

- Amend Acceptable Solution C/AS2 Table 2.2b table note 5 and Table 2.2c note 5. The amendment table note is proposed as Table 2.2 note 4.

Requiring sprinkler systems to extend into car parks

- Amend Acceptable Solution C/AS2 to remove the existing Paragraph 2.2.4 and Table 2.3 note 3.

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

Editorial changes

- Consolidating content relating to fire safety system types into one place – Issue a new edition of F7/AS1 and move content to C/AS1 Appendix C and C/AS2 Appendix A.
- Correcting cross referencing errors in Table 2.3 – Amend Acceptable Solution C/AS2 Table 2.3
- Combining Tables 2.2a to 2.2d into one Table 2.2 – Amend Acceptable Solution C/AS2 to remove Tables 2.2a to 2.2d and combine these into the proposed Table 2.2.
- Moving the design sequence process to an informative figure – Amend Acceptable Solution C/AS2 to remove existing Paragraph 2.2.3 and insert in a new Figure 2.1. The existing Figure 2.1 is proposed to be renumbered as Figure 2.2.
- Aligning with the proposed changes to Acceptable Solution C/AS1
  - Amend Table 1.1 and the description of risk group SH in C/AS2
  - Provide a new definition for structural adequacy in C/AS2 and C/VM2

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

B.1 C/VM2 References and Definitions

Current text (red text to be removed)	Proposed text (blue text to be added)
Verification Method C/VM2 – References	
Standards New Zealand NZS 4512: 2010 Fire detection and alarm systems in buildings	**Standards New Zealand** NZS 4512: 2021 Fire detection and alarm systems in buildings
NZS 4541: 2013 Automatic fire sprinkler systems	NZS 4541: 2020 Automatic fire sprinkler systems
Acceptable Solution C/VM2 – Definitions	
Structural adequacy In the context of the *standard test* for *fire* resistance, is the time in minutes for which a prototype specimen has continued to carry its applied load within defined deflection limits.	Structural adequacy In the context of the *standard test* for *fire* resistance, is the time in minutes for which a prototype specimen has continued to carry its test load. The *standard test* specifies deflection limits and how vertical test loads are determined. B1/VM1 shall be substituted where *standard tests* require recognised structural standards to be used.

B.2 C/AS2 References and Definitions

Current text (red text to be removed)	Proposed text (blue text to be added)
Acceptable Solution C/AS2 – References	
Standards New Zealand AS/NZS 1668:- The use of ventilation and air conditioning in buildings Part 1: 1998 Fire and smoke control in multi-compartment buildings Amend 1	**Standards Australia** AS 1668:- The use of ventilation and air conditioning in buildings Part 1: 2015 Fire and smoke control in buildings *Amend: 1*
Standards New Zealand	**Standards New Zealand** AS/NZS 3000: 2018 Electrical installations – Known as the Australian/New Zealand Wiring Rules
NZS 4512: 2010 Fire detection and alarm systems in buildings	NZS 4512: 2021 Fire detection and alarm systems in buildings NZS 4514: 2021 Interconnected smoke alarms for houses
NZS 4541: 2013 Automatic fire sprinkler systems	NZS 4541: 2020 Automatic fire sprinkler Systems
Acceptable Solution C/AS2 – Definitions	
	Remote receiving centre A *fire* alarm monitoring centre service provider which transmits *fire* alarm signals to summon Fire and Emergency New Zealand in case of *fire* and complies with NZS 4512.
Structural adequacy In the context of the *standard test* for *fire* resistance, is the time in minutes for which a prototype specimen has continued to carry its applied load within defined deflection limits. The *fire* design load should be as specified in B1/VM1.	Structural adequacy In the context of the *standard test* for *fire* resistance, is the time in minutes for which a prototype specimen has continued to carry its test load. The *standard test* specifies deflection limits and how vertical test loads are determined. B1/VM1 shall be substituted where *standard tests* require recognised structural standards to be used.

B.3 C/AS2 Part 1. General

Current text (red text to be removed)	Proposed text (blue text to be added)
Acceptable Solution C/AS2 – Part 1. General	
Table 1.1 Risk groups Buildings with sleeping (residential) and outbuildings (Out of scope for this Acceptable Solution) Detached dwellings with a single household unit such as: stand-alone houses Low-rise multi-unit dwellings where each household unit has its own escape route that is independent of all other household units such as: Attached townhouses. Stacked household units where there is no more than one household unit above another with each household unit having a single storey and an escape height less than 4.0 m. Detached dwellings where fewer than six people (not including members of the residing family) pay for accommodation such as: boarding houses, homestays, bed and breakfast. Outbuildings.	**Table 1.1 Risk groups** Buildings with sleeping (residential) and outbuildings (Out of scope for this Acceptable Solution) Residential *buildings* where people sleep, and where i) each *household unit* has its own *escape route* that is independent of all other *household units*, and ii) *building height* is less than 11 m, and iii) *building* is maximum of three levels, and iv) *building escape height* is less than 7 m. This includes: • stand-alone houses; • attached side-by-side townhouses; • stacked *multi-unit dwellings* where there is no more than one *household unit* above another with the lower *household unit* having not more than two-storeys and upper *household unit* being a single-storey. Residential *buildings* where people sleep, and where fewer than 6 people paying for accommodation including boarding houses, homestays, bed and breakfast, and similar accommodation. Home-based business activities, (except as included within ***risk groups CA and WB***) including accountant, conveyancing, and/or similar to domestic living home-based business that is carried out in a *household unit* by its permanent residents and that does not involve the employment of persons other than those residents. **Outbuildings** as described in NZBC, Clause A1, Paragraph 7.0.

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

B.4 C/AS2 Part 2. Firecells, fire safety systems and fire resistance ratings

Current text (red text to be removed)	Proposed text (blue text to be added)
Acceptable Solution C/AS2 – Part 2. Firecells, fire safety systems and fire resistance ratings	
2.2.1 *Fire safety system* types, as defined in Table 2.2, shall be provided throughout firecells and be as specified in: • Table 2.2a for ***risk groups* SM** and **SI**, and • Table 2.2b for ***risk group* CA**, and • Table 2.2c for ***risk groups* WB** and **WS**, and • Table 2.2d for ***risk group* VP**. A direct connection to Fire and Emergency New Zealand is not required if automatic heat or smoke detection systems are provided in addition to the systems required by this Acceptable Solution	**2.2.1** *Fire safety system* types as defined in Appendix A, shall a) be installed as per the applicable standard(s) as specified in Appendix A and Appendix B, and b) be provided throughout *firecells,* and c) be as specified for the various *risk groups* in Table 2.2. **Connection to remote receiving centre** **2.2.2** Where a *fire* alarm or sprinkler system is required there shall be a connection to a *remote receiving centre,* unless: a) for ***risk group* SM** permanent accommodation and an *escape height* less than 10 m, or b) for ***risk group* CA** i) with no more than 250 occupants and an escape height of less than 4 m, and ii) the use is not a cinema or theatre, or c) for ***risk group* WB**, with no more than 100 occupants and an escape height of less than 4 m, or d) for ***risk group* VP** where no vehicle stackers are installed, or e) for automatic heat or smoke detection systems which are provided as supplementary to the systems required by this Acceptable Solution. **Sprinkler requirements** **2.2.3** For ***risk group* SM** educational accommodation and ***risk group* SI**, the sprinkler component of a Type 7 may be substituted with an automatic sprinkler system that complies with NZS 4515 for life protection if the *building* is within the scope of NZS 4515.
Additional requirements for early childhood centres **2.2.2** In addition to Paragraph 2.2.1, the *fire safety systems* required for *firecells* in *early childhood centres* shall be as follows: a) In single storey *early childhood centres*, dedicated sleeping areas shall be protected with supplementary smoke detectors. The alarm system and any smoke detection system shall comply with NZS 4512. b) Where the *escape height* of the *early childhood centre* is greater than 2.0 m: i) a Type 7 system shall be installed throughout the *building*, and ii) at least two separate *places of safety* shall be provided, and iii) each *place of safety* shall be separated with *fire separations* designed to the *property rating* and have direct access to a *safe path* or *final exit*.	**Additional requirements for early childhood centres** **2.2.4** In addition to Paragraph 2.2.1, the *fire safety systems* required for *firecells* in *early childhood centres* shall be as follows: a) In single storey *early childhood centres*, dedicated sleeping areas shall be protected with supplementary smoke detectors. The alarm system and any smoke detection system shall comply with NZS 4512. b) Where the *escape height* of the *early childhood centre* is greater than 2.0 m: i) a Type 7 system shall be installed throughout the *building*, and ii) at least two separate *places of safety* shall be provided, and

Current text (red text to be removed)	Proposed text (blue text to be added)
	iii) each *place of safety* shall be separated with *fire separations* designed to the *property rating* and have direct access to a *safe path* or *final exit*.
Buildings containing more than one firecell	**Buildings containing more than one firecell**
2.2.3 Where there is more than one firecell the following design sequence shall be used to determine the fire safety systems for other firecells in the building (see Figure 2.1). **Step 1** Determine the risk groups associated with each firecell within the building (refer Table 1.1 and Paragraphs 1.2.1 and 1.2.2). **Step 2** Determine the escape height in metres of each firecell. **Step 3** Determine the occupant load for each firecell in accordance with Paragraph 1.4. **Step 4** Taking into consideration the notes within Tables 2.2a, 2.2b, 2.2c and 2.2d and Paragraph 2.2.2 determine the fire safety systems required to protect each risk group. **Step 5** For each risk group, insert the fire safety system ascertained in Step 4 into Table 2.3 column 1 and determine the fire safety system for the other risk groups in the building from Table 2.3 column 2. **2.2.4** For ***risk group* VP** *firecells* that require a *fire* sprinkler system (refer to Table 2.2d), the *fire* sprinkler system does not need to be extended throughout the remainder of the *building* where the ***risk group*** *VP firecells* are fire separated from the adjacent *firecells*. The *fire* separation between adjacent *firecells* is required to be provided with the greater of the *property rating* of the adjacent *firecells* (refer to Table 2.4). **Step 6** Based on the *fire safety systems* ascertained in Step 5, determine the most onerous requirements from Tables 2.2a, 2.2b, 2.2c, 2.2d and 2.3	**2.2.5** Where there is more than one *firecell* the most onerous requirements shall apply. Refer to Table 2.3 and see Figure 2.1 and Figure 2.2. [Refer to the proposed tables and figures on the following pages]
More than one risk group on a floor	**More than one risk group on a floor**
2.2.5 If there is more than one *risk group* on one floor level, the *fire* safety requirements will depend on whether the *risk groups* occupy the same *firecell*, or whether the floor is divided by *fire separations* into different *firecells*.	
2.2.6 Where *fire separations* are not needed between different *risk groups* on the same floor level, the *fire* safety systems adopted for the *firecell* shall be those of the primary *risk group* (as defined in Paragraph 1.2.2)	**2.2.6** Where *fire separations* are not needed between different *risk groups* on the same floor level, the *fire safety systems* adopted for the *firecell* shall be those of the primary *risk group* (as defined in Paragraph 1.2.2)

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

	Minimum fire safety systems by type required for each risk group						
Risk group	**Occupant type**		**Escape height (metres)**				
			0	**< 4**	**≥ 4 to < 10**	**≥ 10 to < 25**	**≥ 25**
SM	**Permanent**		1, 2[1a],18[2]	1, 2[1a],18[2]	1, 2[1a],18[2]	5, 15, 18[2]	7, 9, 15, 18
	Transient		5[1a], 18[2]	5, 18[2]	5, 18[2]	5, 15, 18[2]	7, 9, 15, 18
	Education		7, 9, 18[2]	7, 9, 18[2]	7, 9, 18[2]	7, 9, 15, 18[2]	7, 9, 15, 18
SI	**Care or Detention**		7[3], 9, 18[2]	7[3], 9, 18[2]	7[3], 9, 18[2]	7[3], 9, 15, 18[2]	7[3], 9, 15, 18
CA	**< 100**		2[1b], 18[2]	2, 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
	100 to 250		2, 18[2]	2, 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
	251 to ≤ 1000		4[4], 18[2]	4[4], 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
	> 1000		7, 9, 18[2]	7, 9, 18[2]	7, 9, 18[2]	7, 9, 15, 18[2]	7, 9, 15, 18
Risk group	**Occupant load**	**Capable of storage height**	**Escape height (metres)**				
			0	**< 4**	**≥ 4 to < 10**	**≥ 10 to < 25**	**≥ 25**
WB	**< 100**	≤ 3.0 m	2[1c], 18[2]	2[1c], 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
		> 3.0 m	3, 18[2]	3, 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
	100 to 1000	≤ 3.0 m	4[4], 18[2]	4[4], 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
		> 3.0 m	4[4], 18[2]	4[4], 18[2]	4[4], 9, 18[2]	4[4], 9, 15, 18[2]	7, 9, 15, 18
	> 1000	any[6]	7, 9, 18[2]	7, 9, 18[2]	7, 9, 18[2]	7, 9, 15, 18[2]	7, 9, 15, 18
WS	**≤ 1000**	any	6, 18[2]	6, 18[2]	6, 18[2]	6, 15, 18[2]	6, 15, 18
	> 1000	any	7, 18[2]	7, 18[2]	7, 18[2]	7, 15, 18[2]	7, 15, 18

Risk group	**Escape height (metres)**		**Vehicle stacker**
	< 10	**≥ 10**	
VP	2[1d,7,8], 18[2]	3[7], 15, 18[2]	6, 18[2]

Notes:

***Fire safety systems* are as specified in Paragraph 2.2.1 and Appendix A and B**

1) This system is not required where:
   a) For ***risk group* SM**, if the escape *routes* serve no more than 10 beds, or where the exit doors from sleeping area *firecells* open directly into a *safe place* or external *safe path*. For ***risk group* SM** transient accommodation, where a Type 5 system is not required, each suite shall be provided with Type 1 smoke alarms.
   b) For ***risk group* CA**, in single level buildings where the *escape routes* serve no more than 50 people.
   c) For ***risk groups* WB**, in single level buildings with a storage height capacity of less than 3.0 m and the *escape route* serves no more than 50 people.
   d) For ***risk group* VP**, if there are fewer than 50 occupants and fewer than 10 vehicles.
2) Not required where the height from Fire and Emergency New Zealand vehicular access to any floor is less than 15 m and Fire and Emergency New Zealand hose run distance to any point on any floor is less than 75 m, as measured from Fire and Emergency New Zealand vehicular access
3) For ***risk group* SI**, if there are more than 100 people receiving hospital care of in detention, the water supply for the sprinkler must be a dual supply and must comply with NZS 4541, with one of the supplies being independent of the public reticulated main.
4) For ***risk groups* CA** and **WB,** where the environment is challenging for smoke detection, a Type 4 may be substituted with a Type 6 or a Type 3 with supplementary smoke detection to avoid unwanted alarm activations
5) Refer to Paragraph 2.2.4 for additional requirements that apply to *early childhood centres.*
6) Refer to Table 1.1 for further limitations on capable of storage height for ***risk group* WB**
7) In ***risk group* VP** where a *firecell* is unsprinklered and there is parking for more than 10 vehicles, each of those *firecells* within that *building* must have natural cross ventilation. See Paragraph 4.1.3.
8) If ***risk group* VP** is within a building that is protected with an automatic *fire alarm system*, the risk group VP *firecell* must have at the minimum a Type 3 system

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

Table 2.3	Required types of fire safety systems for other firecells within the building Read this table in conjunction with Paragraph 2.2.5				
Column 1		**Column 2**			
Fire safety system required by Table 2.2 for the risk group		**Minimum type required for all firecells throughout the building**			
		SM	**CA**	**WB**	**VP**
SM	1, 2	1, 2	5[1]	5[1]	3[2]
	5	5	5[1]	5[1]	3[2]
	7	7	7[1]	7[1]	6[2]
SI	7	7	7	7	6[2]
CA	2	5[1]	2	2	2
	3	5[1]	3	3	3
	4	5[1]	4[1]	4[1]	3[2]
	6	7	6	6	6
	7	7	7[1]	7[1]	6[2]
WB	2	5[1]	2	2	2
	3	5[1]	3	3	3
	4	5[1]	4[1]	4[1]	3[2]
	6	7	6	6	6
	7	7	7[1]	7[1]	6[2]
WS	6	7	6	6	6
	7	7	7[1]	7[1]	6[2]
VP	2	5[2]	2	2	2
	3	5[2]	3	3	3
	6	7[2]	6	6	6

Notes:

1. In ***risk groups*** **CA**, **WB** or **WS**, in areas where the environment is challenging for smoke detection, smoke detectors may be substituted with heat detectors or, for Type 7, sprinkler heads. Smoke detection must be maintained in *firecells* with ***risk groups*** **SM and SI.**
2. ***Risk group*** **VP** *firecells* may have a different type than other *firecells* in the *building* as smoke detection does not need to extend into ***risk group*** **VP** *firecells*.

Appendix B. Proposed changes for fire safety systems for Acceptable Solutions C/AS2 and F7/AS1 and Verification Method C/VM2

Figure 2.1 **Design sequence for determining fire safety systems where there is more than one firecell in a building**
Paragraph 2.2.5

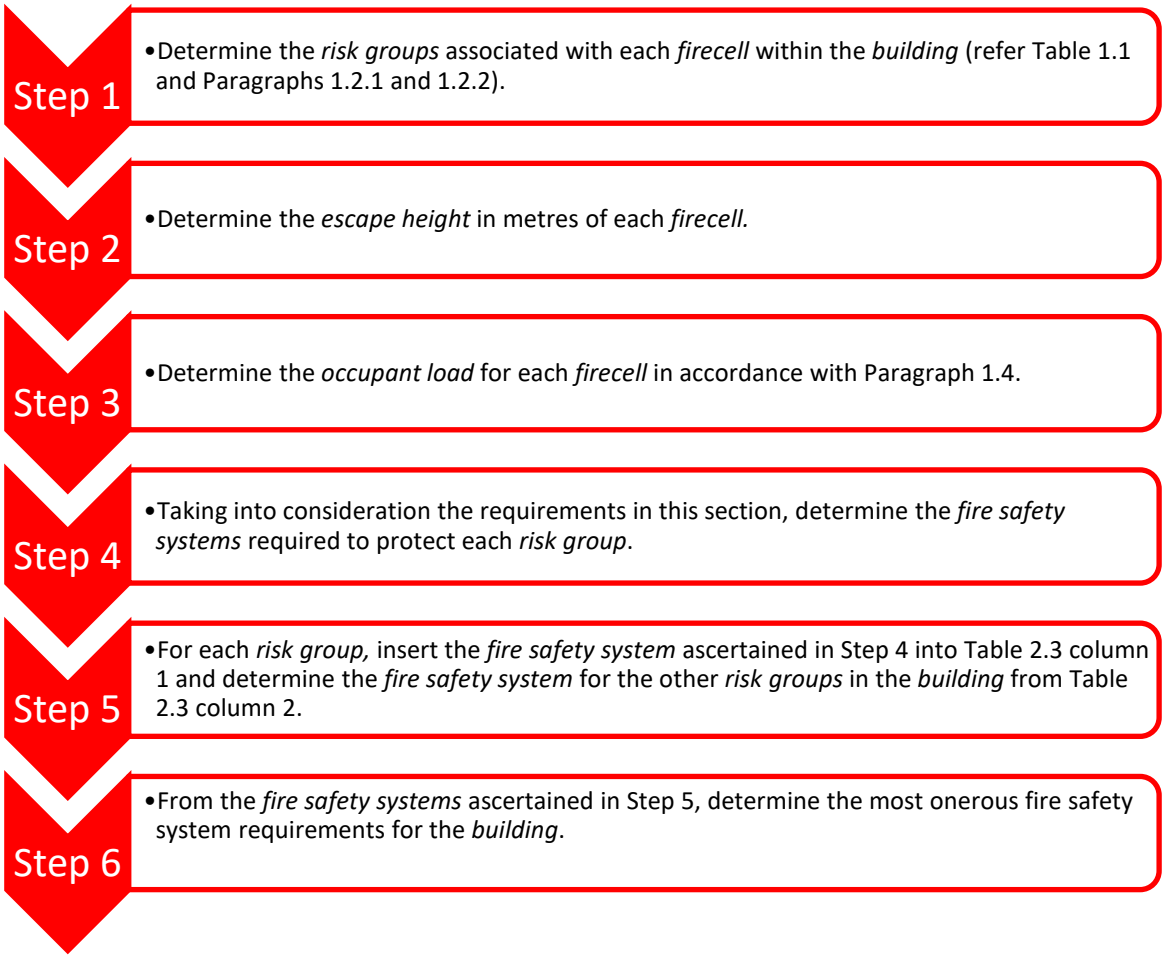
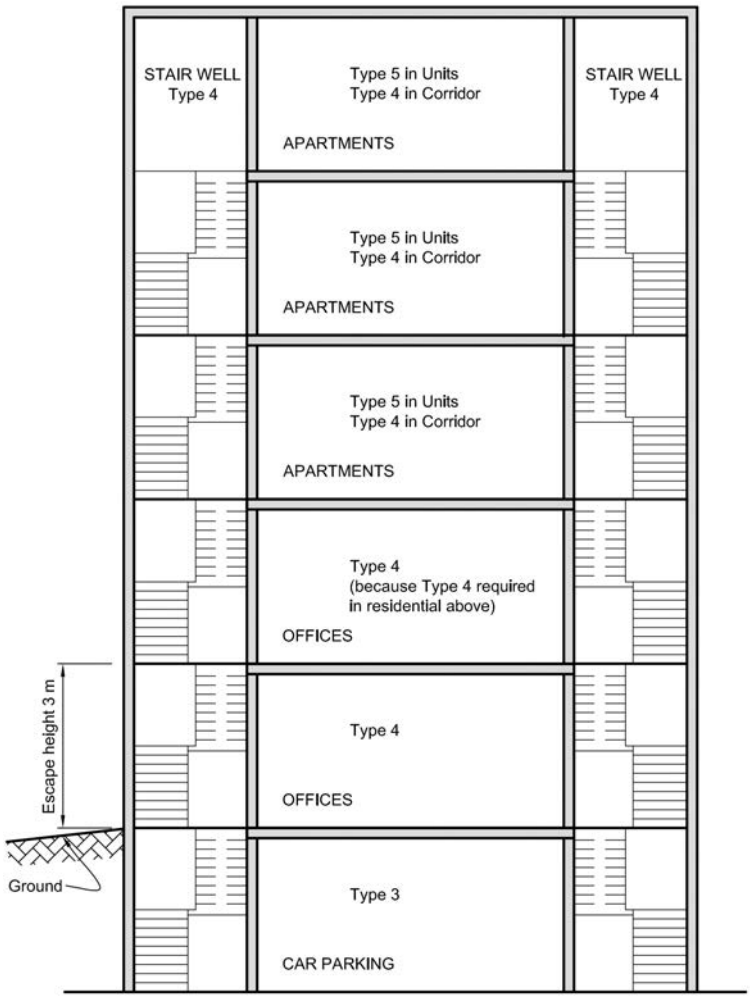


Figure 2.2 **Fire safety systems throughout a building**
Paragraph 2.2.5



B.5 C/AS2 – Part 3. Means of escape

Acceptable Solution C/AS2 – Part 3. Means of escape	
3.10.4 Lift landings shall not open into or be located between *open paths* (see Figures 3.17 and 3.18) and shall either be provided with a *smoke lobby* separated from all other areas or have lift landing doors with smoke control capability. This requirement does not apply if the *building* is protected with a Type 7 system or the lift shaft has a pressurisation system designed to AS/NZS 1668.1. The lift doors shall be as specified in Paragraphs 4.16.3 and 4.16.11.	**3.10.4** Lift landings shall not open into or be located between *open paths* (see Figures 3.17 and 3.18) and shall either be provided with a *smoke lobby* separated from all other areas or have lift landing doors with smoke control capability. This requirement does not apply if the *building* is protected with a Type 7 system or the lift shaft has a pressurisation system designed to AS 1668.1. The lift doors shall be as specified in Paragraphs 4.16.3 and 4.16.11.
3.10.5 In situations not described in Paragraphs 3.10.3 or 3.10.4, lift landings in unsprinklered *buildings* shall either open into a *smoke lobby* or the lift shaft shall be provided with a pressurisation system designed to AS/NZS 1668.1. Any *smoke lobby* shall not be part of the horizontal safe path (i.e. the horizontal *safe path* shall not pass through the *smoke lobby*). See Figure 3.18. The lift doors shall be as specified in Paragraphs 4.16.3 and 4.16.11.	**3.10.5** In situations not described in Paragraphs 3.10.3 or 3.10.4, lift landings in unsprinklered *buildings* shall either open into a *smoke lobby* or the lift shaft shall be provided with a pressurisation system designed to AS 1668.1. Any *smoke lobby* shall not be part of the horizontal safe path (i.e. the horizontal *safe path* shall not pass through the *smoke lobby*). See Figure 3.18. The lift doors shall be as specified in Paragraphs 4.16.3 and 4.16.11.

B.6 C/AS2 – Appendix A

Current text (red text to be removed)	Proposed text (blue text to be added)
A1.1 Fire alarm and sprinkler systems A1.1.1 Fire alarm systems used in *fire safety systems* shall satisfy the requirements of Acceptable Solution F7/AS1. *Fire* sprinkler systems used in *fire safety systems* shall, except where specified, also satisfy the requirements of Appendix B	**A1.1 Fire safety systems** **A1.1.1** Part 2 specifies which type of *fire safety system* shall be installed in each *risk group*. **A1.1.2** *Fire* alarm systems shall be designed and installed in accordance with NZS 4512 where appropriate and the specific requirements of this acceptable solution.
A1.2 Requirements common to alarm systems A1.2.1 All fire alarm systems (except for domestic smoke alarm systems), unless otherwise specified and regardless of their means of activation, shall be provided with a means of communication with Fire and Emergency New Zealand in accordance with Acceptable Solution F7/AS1.	**A1.1.3** Sprinkler systems shall be designed and installed in accordance with NZS 4541 or NZS 4515 where appropriate and the specific requirements of this acceptable solution. **A1.1.4** Smoke alarms shall be manufactured and installed in accordance with NZS 4514 where appropriate and the specific requirements of this acceptable solution.
A2.1 Fire safety system descriptions **A2.1.1** The following text provides a brief description of fire safety systems not otherwise described in Acceptable Solution F7/AS1. See F7/AS1 for descriptions of fire alarm systems Types 1, 2, 3, 4, 5, 6 and 7, and Table 2.2 of this Acceptable Solution. **Type 9 – Smoke control in air-handling systems** Where smoke control is required in relation to heating, ventilating or air conditioning systems, it shall comply with the requirements of either: a) AS/NZS 1668.1 for HVAC system shutdown and interface with any Type 4 or 7 system, or **b)** NZS 4512 to provide ancillary function output for HVAC system shutdown if a Type 4 or 7 alarm system is used as a means of smoke detection. **Type 15 – Fire and Emergency New Zealand Lift Control** The control of lifts under fire conditions shall comply with NZS 4332. **Type 18 – Fire hydrant systems for buildings** Fire hydrant systems shall comply with NZS 4510	**A2.1 Fire safety system descriptions** **Type 1 – Domestic smoke alarm system** **A2.1.1** A Type 1 is a smoke alarm or multiple interconnected smoke alarm devices, each containing a smoke detector and an alarm sounding feature. The system shall comply with NZS 4514. Smoke alarms shall be installed in every *household unit* or *suite* of ***risk group* SH**, and ***risk group* SM** where a Type 5 is not required by this Acceptable Solution. Connection to a *remote receiving centre* is not required. **Type 2 – Manual fire alarm system** **A2.1.2** A Type 2 is a *fire* alarm system compliant with NZS 4512 with manual call points throughout the *building*. Supplementary heat, smoke, or other detectors may be included in the system. **Type 3 – Automatic fire alarm system activated by heat detectors and manual call points** **A2.1.3** A Type 3 is an automatic fire alarm system compliant with NZS 4512 with full *building* coverage of heat detectors and manual call points. If the *building* area to be protected is not fully covered with heat detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary detectors.

Type 4 – Automatic fire alarm system activated by smoke detectors and manual call points

A2.1.4 A Type 4 is an automatic *fire* alarm system compliant with NZS 4512 with full *building* coverage of smoke detectors and manual call points.

If the *building* area to be protected is not fully covered with smoke detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary smoke detectors.

In limited circumstances as described in NZS 4512, where the ambient conditions of a space are not suitable for smoke detectors, heat detectors are allowed to be substituted.

Type 5 – Automatic fire alarm system with modified smoke detection and manual call points

A2.1.5 A Type 5 is a variation of the Type 4 and Type 7 alarm systems requiring part of the smoke detection component to comprise only a local alarm. The local alarm system, activated by the presence of smoke, shall have audible alerting devices to warn only the occupants within the *household unit* or *suite*, and the *building* management (such as in motels, hotels or multi-unit accommodation in retirement villages), where such management exists.

The local alarm component of a Type 5 system:

a) Shall be restricted to single *firecells* containing sleeping accommodation, being *household units* or individual *suites* in ***risk group*** **SM** and **SI**. The local alarm system shall not be extended to other areas such as *exitways,* common spaces, or other *firecells* in the same *building*. These shall retain a Type 4 smoke detection system, and

b) Shall have the facility to be silenced (muted) by a 'hush' facility located at a level readily able to be reached in accordance with NZBC Clause D1.

c) Shall be permitted only where an automatic *fire* alarm system activated by heat detectors (part of the main alarm system) is also installed in the *household unit* or *suite* which does not already have an automatic *fire* sprinkler system.

A2.1.6 Where a Type 5 is required, the Type 4 or Type 7 system required in *exitways,* common spaces, and other *firecells* in the same *building* shall not be modified. The system installation for Type 3, Type 4 and Type 7 components shall comply with NZS 4512. The sprinkler element of the system installation for Type 7 shall also comply with NZS 4541.

Current text (red text to be removed)	Proposed text (blue text to be added)
	A2.1.7 The Type 5 system installation for the local smoke alarm component shall also comply with NZS 4512. **Type 6 – Automatic fire sprinkler system with manual call points** **A2.1.8** A Type 6 system is a combined automatic *fire* sprinkler system and Type 2 alarm. Activation of the sprinklers shall automatically activate the audible alerting devices of the *fire* alarm system. Sprinkler installation shall comply with NZS 4541, as appropriate and as modified by Appendix B. **Type 7 – Automatic fire sprinkler system with smoke detectors and manual call points** **A2.1.9** A Type 7 system is a combined Type 6 and Type 4 or Type 5 alarm system. Sprinkler installation shall comply with the requirements of a Type 6 system. **Type 9 – Smoke control in air-handling systems** **A2.1.10** Where smoke control is required in relation to heating, ventilating or air conditioning systems, it shall comply with the requirements of either: a) AS 1668.1 for *HVAC* system shutdown and interface with any Type 4 or 7 system, or b) NZS 4512 to provide ancillary function output for *HVAC* system shutdown if a Type 4 or 7 alarm system is used as a means of smoke detection. **Type 15 – Fire and Emergency New Zealand Lift Control** **A2.1.11** The control of lifts under *fire* conditions shall comply with NZS 4332. **Type 18 – Fire hydrant systems for buildings** **A2.1.12** *Fire* hydrant systems shall comply with NZS 4510.

B.7 C/AS2 – Appendix B

Current text (red text to be removed)	Proposed text (blue text to be added)
Acceptable Solution C/AS2 – Appendix B	
B1.1 Introduction	**B1.1 Fire detection and alarm systems in buildings** **B1.1.1** Wherever *fire* alarms are required by this acceptable solution, they shall comply with NZS 4512 without further modification to the Standard. **B2.1 Automatic fire sprinkler systems**
B1.1.1 Wherever sprinklers are required by this Acceptable Solution, they shall comply with the relevant New Zealand Standard, amended as shown in Paragraphs B2.1 and B3.1	**B2.1.1** Wherever sprinklers are required by this acceptable solution, they shall comply with the relevant New Zealand Standard, modified as shown in Paragraphs B2.1.2 and B2.1.3.
B2.1 Automatic fire sprinkler systems	
B2.1.1 NZS 4541 is amended as follows:	**B2.1.2 NZS 4541** is modified as follows:
Clause 103 Definitions	**Clause 1.3 Definitions**
Sprinkler system A system including: (a) to (i) No change. (j) Delete. (k) Delete. (l) No change.	**Sprinkler system** A system including: (a) to (i) No change. (j) Delete. (k) No change.
Clause 205 Delete entire clause.	**Clause 2.5** Delete entire clause
Clause 209 Delete entire clause.	**Clause 2.6** Delete entire clause
Clause 1203 Routine Surveys	**Clause 12.3 Routine inspections**
Clause 1203.1	**Clause 12.3.1**
Delete first two paragraphs and replace with:	Delete first two paragraphs and replace with:
"It is important that a sprinkler system at all times complies with this Standard as amended by Paragraph B2.1 of Appendix B to C/AS2 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person."	"It is important that a sprinkler system at all times complies with this Standard as modified by Paragraph B2.1 of Appendix B to C/AS2 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person." **B3.1 Smoke control in air-handling systems** **B3.1.1** Where AS 1668.1 is used as a means to comply with A2.1.10 a), AS 1668.1 is modified as follows: **Clause 7.2.1(b)** Delete clause **Clause 7.2.3** Delete clause **B3.1.2** Where AS 1668.1 is used as a means to comply with A2.1.10 a), AS 1670.1 as referenced in AS 1668.1 is modified as follows: **Clause 7.1** Delete first sentence. Delete last sentence and replace with: "Detection and control shall also be in accordance with NZS 4512 except where varied by this clause." **Clause 7.4.1** Replace "this Standard" with "NZS 4512"

Current text (red text to be removed)	Proposed text (blue text to be added)
	Clause 7.5.1 (c) Delete and replace with: "Detectors shall be spaced in accordance with the requirements of NZS 4512" **Clause 7.5.1 (d)** Delete and replace with: "Optical beam smoke detectors shall be spaced in accordance with the requirements of NZS 4512" **Clause 7.5.1 Note** Delete **Clause 7.5.2.1** Replace "this Standard" with "NZS 4512". **Clause 7.2.5.1(i)** Delete the first sentence and replace with: "Rooms that have a dimension of 10 m or more in any direction on the horizontal plane shall have detection provided in the room in accordance with NZS 4512". **Figure 7.5.2.2(B)** Replace "15 m" with "10 m" **Clause 7.15.1 Location** Delete and replace with "The FFCP shall be incorporated into or located adjacent to the main indicating unit and constructed in accordance with the requirements in NZS 4512. NoteAn example is shown in Figure 7.15.1" **Clause 7.17.2 (iii)** Replace "AS/CA S009" with "AS/NZS 3000" **Clause 7.18 Transmission paths** Delete first paragraph and replace with: "Transmission paths to equipment serving more than one smoke control zone shall have a redundant transmission path. Transmission paths to the following equipment forming part of the smoke control system shall meet the requirements of Clause 2.6, Clause 3.13, Clause 3.25, Clause 3.26 and NZS 4512. **Clause 7.19.1** Replace "Clause 1.7.2" with "NZS 4512". **B3.1.3** In addition to meeting the requirements in AS 1670.1 as modified to comply with the requirements for smoke detectors which are part of the smoke control in air-handling systems, further requirements in NZS 4512 will need to be met where a fire alarm system is required to be installed.

B.8 Proposed text for F7 Warning Systems
Acceptable Solution F7/AS1 Fifth Edition

Part 1. General

1.1 Introduction

1.1.1 Scope of this document

1.1.1.1 This document can be used for warning systems in all *buildings*.

1.1.1.2 Warning systems are not required for **outbuildings**, *backcountry huts,* or **ancillary buildings**.

1.1.2 Compliance pathway

1.1.2.1 This acceptable solution is one option that provides a means of establishing compliance with the performance criteria in Building Code clauses F7.3.1, F7.3.2, and F7.3.3. Compliance may also be demonstrated using an alternative solution.

Part 2. Means of warning from fire

2.1 Warning systems for fire

2.1.1 Demonstrating compliance

2.1.1.1 For means of warning from *fire*, compliance can be demonstrated by meeting requirements for appropriate warning systems in the relevant Acceptable Solutions C/AS1 and C/AS2 for Building Code clauses C1-C6.

Appendix A. References

There are no standards or other documents referenced in this acceptable solution.

Appendix B. Definitions

These definitions are specific to this acceptable solution.

Building	Has the meaning given to it by sections 8 and 9 of the Building Act 2004.
Backcountry hut	A *building* that— a) is located on land that is administered by the Department of Conservation for conservation, recreational, scientific, or other related purposes, including any land administered under any of the following: i) the Conservation Act 1987; ii) the National Parks Act 1980; iii) the Reserves Act 1977; and b) is intended to provide overnight shelter to any person who may visit and who carries his or her own food, bedding, clothing, and outdoor equipment; and c) contains only basic facilities, which may include (but are not limited to) any or all of the following: i) sleeping platforms or bunks; ii) mattresses; iii) food preparation surfaces; iv) appliances for heating; v) appliances for cooking; vi) toilets; and d) has been certified by the Director-General as being in a location that wheelchair users are unlikely to be able to visit; and

	e) is intended to be able to sleep— i) no more than 20 people in its backcountry hut sleeping area; and ii) no more than 40 people in total; and f) does not contain any connection, except by radiocommunications, to a network utility operator.
Fire	The state of combustion during which flammable materials burn producing heat, toxic gases, or smoke or flame or any combination of these.